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AN ANALYSIS ON INFLOW OF FDI IN REAL ESTATE INDUSTRIES OF INDIA WITH SPECIAL REFERENCE TO MUMBAI MARKET

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ABSTRACT:

India is becoming a more popular place for investment in real estate industries; with Bangalore Mumbai is the investment destination for foreigners seeking to make long-term investments. Mumbai is the financial capital of India and has remained the center for international investments for years. With continuous growing and progressing of economy and more opportunities investors from the world flowing into Mumbai's real estate industries. Mumbai played a big role in the 70% increase in foreign investment in India's real estate market in 2019–20, according to a report by real estate consulting firm Knight Frank India. Mumbai's real estate market is attractive to international investors for a number of reasons, such as the city's fast urbanization trend, expanding middle class, and supportive government policies. Therefor this study highlights on the analysis of inflow and impact of FDI on India's real estate industry with reference to Mumbai market.

KEY WORDS: Real estate Industry, Globalization, Foreign Direct Investment Indian Economy.

INTRODUCTION:

Foreign direct investment has been flooding Mumbai's real estate market with capital and expertise that have fueled growth. Foreign developers and investors have recognized Mumbai's potential as a global real estate destination and have actively participated in real estate industries. Overseas Direct Investment (FDI) from overseas stakeholders may now be directed toward smaller projects with built-up areas of 20,000 square meters rather than 50,000 square meters, under the relaxed regulations. This may have an effect on the suburban real estate market in Mumbai's Thane, Badlapur, Ambernath, Bhiwandi, and Navi areas, where local builders have small-scale projects.

Mumbai used to be regarded as the priciest and slowest-growing city in India. However, as Mumbai is the wealthiest city, overseas investors are now focused on its real estate. The Indian government has lifted all prohibitions on foreign direct investments (FDI) in the building and real estate industries, which has significantly boosted the cash-starved industry. Both the city's affordable housing market and the housing sector as a whole will benefit greatly from the foreign funding.

The decision has been well received by Mumbai's real estate sector, which views it as a big step in the right direction toward drawing in international capital. Experts predict that

foreign companies, who had previously been reluctant to make investments in the Indian market, will now have more opportunities thanks to this new strategy. This will then spur more competition, which will drive down real estate prices—something that is much needed.

Mumbai developers are anticipating a more seamless financing process with the relaxation of FDI regulations. Foreign investors can now purchase stock, preference shares, and debt instruments to invest in Indian real estate. Developers should be able to tap a larger pool of investors as a result of the regulatory change, providing a more varied source of funding. As a result, there will be more construction projects, which will boost the amount of prospects for employment creation. Therefore the government of India has made changes for liberalizing foreign direct investment in real estate sector in the last sixteen years so that it will bring revenue and foreign skills and expertise for the real estate firms.

MEANING OF REAL ESTATE:

Property that is made up of both land and improvements, such as fixtures, buildings, roads, buildings, and utility systems, is referred to as real estate. Ownership of the land, improvements, and natural resources such as minerals, plants, animals, and water is conferred by property rights.

REVIEW OF LITERATURE:

Nasar.K.K & Dr.Manoj P.K, 2013 argue that India has a great deal of room for foreign investment because of things like population growth and urbanization in their paper, "Role of Foreign Direct Investment in the Development of Real Estate and Allied Sector in India: A study with a focus n Kerala state." To draw in money from abroad, the government must relax rules and enhance policies by lowering interest rates, providing tax breaks, subsidies, and other benefits. They further claim that while FDI inflows have contributed to India's economic expansion, their rate of inflow has been declining.

Indian Brand Equity Foundation titled "Real Estate" (August 2015), foreign direct investment (FDI) in the building and development sector saw an increase between April 2000 and May 2015, totaling US$24.07 billion, or 9% of all FDI inflow. There is a severe housing scarcity in urban regions in 2014, which presents enormous growth prospects. In order to alleviate the housing crisis in metro areas like Delhi NCR, where there is a significant demand for large investments, the government has decided to create 100 smart cities, which has led to the relaxation of foreign direct investment (FDI) regulations pertaining to real estate.

It is evident from the FICCI survey report "Impact of FDI Reforms on Indian Real Estate Sector" that FDI has decreased over time. To speed up the sector's growth, attempts are being made to liberalize policy regimes and draw in more international investment. According to a poll, the residential sector is the one that benefits from foreign investment the most, following the commercial and retail sectors. The report goes on to say that while REIT has increased FDI inflow, more actions are needed to draw in international capital.

CII discusses in a paper released in February 2019, the real estate industry and highlights new developments in the field, including the adoption of new technology and developing trends in affordable housing.

NEED OF STUDY:

There are very rear study is found on the impact of foreign investment on real estate sector of India Mumbai, a thriving city that has drawn interest from investors worldwide, Non-

Resident Indians (NRIs) have been looking more and more towards Mumbai for investment prospects in recent years. Now, let's examine the aspects of Mumbai that, when supported by facts and convincing evidence, make it a desirable location for NRI investment.

OBJECTIVE OF THE STUDY:

1. To Study Overview of Real Estate Industries in Indian Economy.
2. To analyze the inflow of FDI in Indian real estate industry in Mumbai.
3. To study impact of FDI on real Estate Sector firms in Mumbai market.

PERIOD OF THE STUDY:

The period of this study for is from 2005- 2020 is important due to following reasons: Types Real estate comes in a variety of forms, each having a certain function and utility. The 2005 was the year of reforms, when India opened its doors for FDI. Following its introduction in India in 2014, the amount of foreign investment inflow surged significantly. But after that, the foreign investment began to drop.

RESEARCH METHODOLOGY:

This research study use secondary information as the nature of this work is exploratory and analytical. The research's data and numbers will be collected from various sources like RBI reports, DIPP reports, official agency reports, research publications from different organizations like KPMG, EARNST & YOUNG, CUSHMAN, and WAKEFIEND, research papers, etc. This study has considered about the inflow FDI in of fifteen years, from 2005 to 2020.

FDI POLICIES AND GUIDELINES IN INDIA:

The Department of Industrial Policy and Promotion (DIPP) in 2009 released a notification for opening the Indian real estate sector to Foreign Direct Investment (FDI). As per the notification,

1. Regulatory Framework for FDI in Indian Real Estate:

The regulatory framework consisted as:

- **The Reserve Bank of India (RBI):** RBI plays a important role in overseeing and regulating foreign investments in the real estate sector.
- **Foreign Direct Investment Policies:** These policies provide the overarching guidelines and framework for FDI in India, including the real estate sector.
- **Foreign Exchange Management Regulations:** The Foreign Exchange Management (Transfer/Issue of Security by a Person Resident outside India) Regulations, 2000, play a crucial role in facilitating and monitoring FDI-related transactions.

2. Guidelines for FDI in the Real Estate Sector in India:

Foreign Direct Investments in the real estate sector are subject to specific guidelines, which are outlined as follows: For investors wishing to apply for foreign direct investment (FDI) in real estate, the Indian government has established specific criteria that include requirements related to project completion timelines, investment possibilities, and project location. Certain guidelines apply to foreign direct investments in the real estate sector. These guidelines are as follows: The Indian government has set precise criteria, including deadlines for project completion, investment opportunities, and project location, for investors who seek to apply for foreign direct investment (FDI) in real estate.

1) Minimum space: 10 hectares (25 acres) if serviced housing sites are established; 50,000 square meters of built-up area if building and development projects are undertaken.
2) Investing for fully owned subsidiaries, a minimum capitalization of US$ 10 million is needed. For US$ 5 million, an Audemars Piguet Swiss replica must be brought in for a joint venture with Indian partners.
3) Timetable and instructions within five years of the date the relevant legislative approvals are received, the project must be finished in part. Investors cannot purchase plots without sewage, street lights, roads, water supplies, or other utilities.

OVERVIEW OF REAL ESTATE MARKET IN MUMBAI:

One of the most well-known real estate markets in India is Mumbai, which also has the highest real estate prices in the nation. Given that the majority of Mumbai's land is currently occupied by slums, private residences, or multi-story buildings, the city will likely see two fresh opportunities for real estate development in coming future.

- Demolition and restoration of tiny dwellings into skyscrapers.
- Converting impoverished areas into residential and commercial buildings.

The two redevelopment proposals might lead to multiple new launches of larger residential and commercial complexes in Mumbai, making a banner year for the city's real estate industry.

In addition, two thirds of Mumbai's entire real estate industry is made up of the resale market for properties. This sizable market is dominated by wealthy home buyers.
An Overview of the Indian Real Estate Sector is very fragmented, with many different companies involved. Increased market competitiveness is having an effect on land and selling prices, which is contributing to the oversupply in the market. In addition, a few pan-Indian branded players and numerous local players control the majority of the market. DLF, Prestige Group, Lodha Group, Oberoi Realty, etc. are the nation's leading developers.

FOREIGN DIRECT INVESTMENT IN REAL ESTATE:

FDI is Importance in the Real Estate Industry Because of its enormous multiplier effect on the economy; the real estate sector is one of the most important ones in the Indian economy. Economic expansion is directly impacted by any changes made to the real estate industry. In addition to the industry's widely acknowledged requirement for foreign investments due to sheer demand, the Foreign Direct Investment (FDI) route has drawn interest from overseas investors due to the industry's basic ban on the infusion of capital through other means. It should be mentioned that the use of Foreign Currency Convertible Bonds (FCCBs) and External Commercial Borrowings (ECBs) to raise money for real estate investments has been outright prohibited. FDI in the real estate sector so becomes more significant.

According to DIPP, total FDI inflow in construction development sector during 2000 to 2015 has been around US$ 24.16 billion which is about 9% of total FDI inflows (in terms of US$). In financial year 2022, the construction development sector in India saw a foreign direct investment equity inflow of approximately 125 million U.S. dollars. This was a significant decrease compared to the equity inflows in the previous year, valued at over 420 million dollars.

Source: Colliers

Global funds have become more involved in the Indian real estate market during the past ten years. 2016 marked a turning point for reforms in the Indian real estate industry. The introduction of the Real Estate Regulatory Authority (RERA) and the Goods and Services Tax (GST), and the revision of the Real Estate Investment Trust (REIT) regulations in 2016 all served to boost investor confidence and encourage foreign investment. As can be seen below, foreign capital flows into real estate during the 2017–2021 periods increased thrice to USD24.0bn over the previous five years.

INFLOW OF FDI IN REAL ESTATE SECTOR:

1. Inflow of FDI in India's real estate:

India's diplomatic and trade relations, positioned India as an investment destination, and increased FDI inflows into the country. Out of the countries he traveled to in the 2014–15 fiscal year, India took in USD 19.78 billion in foreign direct investment. Moreover, according to Anuj Puri, Chairman and Country Head at JLL India, FDI in India climbed by 27% in 2014–15 to USD 30.93 billion. However, a 2015 FICCI poll titled "Impact of FDI reforms in the Indian real estate sector" demonstrates just how confused the industry is to this day. FDI in the construction development sector has decreased recently, despite the sector's overall expansion in FDI. That's illustrated in the table below.

FDI in Real Estate Sector (CONSTRUCTION DEVELOPMENT: TOWNSHIPS, HOUSING, BUILT-UP INFRASTRUCTURE)	
Year	**Amount in US$ billion**
2010-11 (April-March)	1.66
2011-12 (April-March)	3.14
2012-13 (April-March)	1.33
2013-14 (April-March)	1.23
2014-15 (April-March)	0.77
2015-16 (April-September)	0.08
Cumulative inflows (April 2000-September 2015)	**24.16**

(Image credits: FICCI, india times)

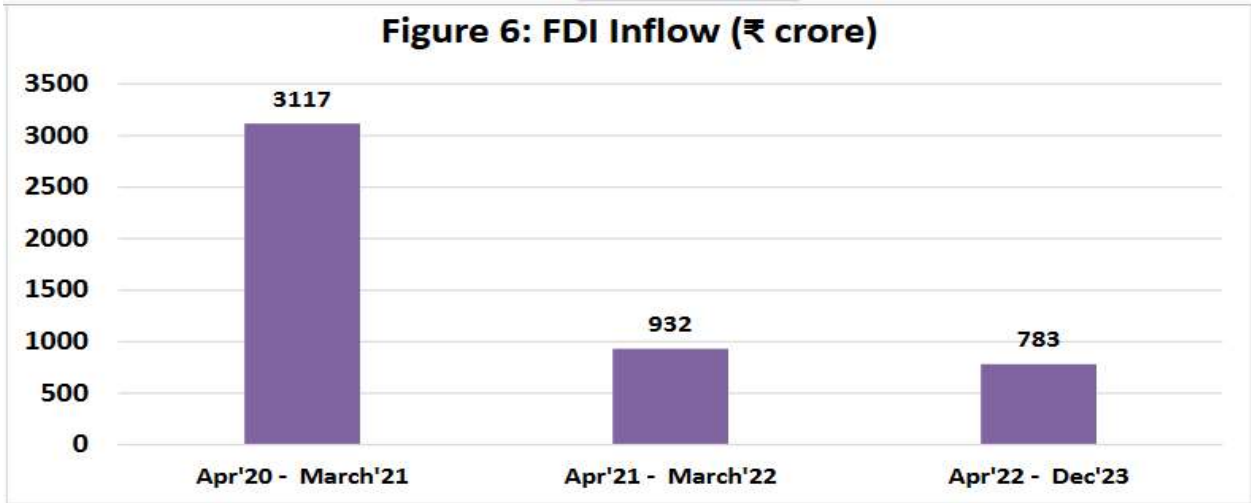
The sector believes that the full effect of the most recent FDI liberalization measures on foreign investments in Indian real estate would become apparent over time.

1. The industry is content with the existing FDI reforms in the field of construction development. The majority is content with the policy development and the recent actions taken by the Central Government. Exclusive News Speakers from the Top: Events, Awards, Webinars, Brand Solutions.
2. In the upcoming months, they believe that FDI reform measures will undoubtedly increase the flow of FDI into the real estate sector.

3. The liberalization of FDI in the real estate industry will have a major positive impact on residential, commercial, and retail properties.
4. All FDI in finished projects under automated route

The sector believes that the government has taken a big step by allowing 100% FDI under the automatic route in finished projects for the operation and management of townships, malls/shopping complexes, and business centers.

2. Current FDI Inflow:



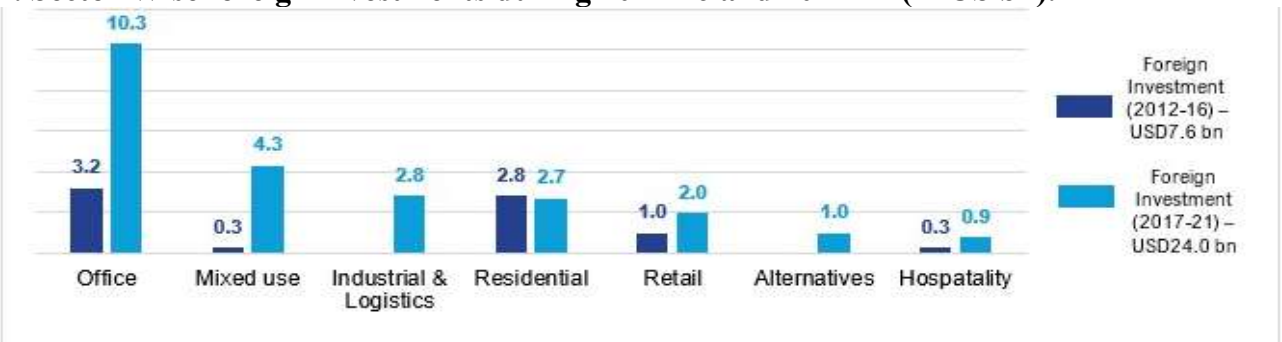
Source: Department for Promotion of Industry and Internal Trade statistic

3. FDI equity inflows from April 2000 to December 2020.

S. No	Sector	Amount of FDI Inflows		%age of Total Inflows
		(In Rs crore)	(In US$ million)	
1	CONSTRUCTION DEVELOPMENT: Townships, housing, built-up infrastructure and construction-development projects	121,888.63	25,371.47	5.55

International investment and investor confidence were increased by regulatory reforms in 2016. The graph below illustrates how foreign capital flow into real estate tripled between 2017 and 2021, totaling USD 24 billion

4. Sector Wise foreign investments during 2012-16 and 2017-21 (in US bn).

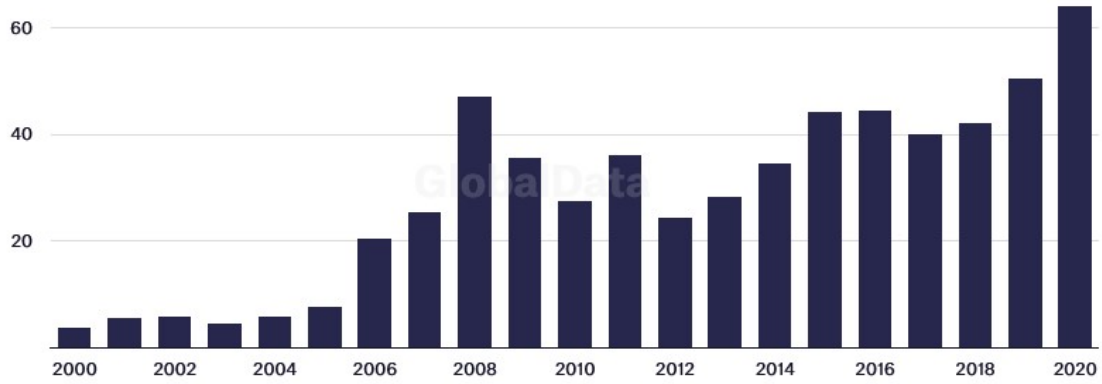


Source: Colliers

Inflow of FDI in India's real estate With reference to Mumbai

Mumbai is the financial hub of India, has experienced varied results since the Covid-19 outbreak began, partly because of its enormous size. With a population of around 13 million, the city on India's west coast holds the title of most populated metropolis in the nation. Naturally, then, Covid-19 had a severe effect on it. However, because to its size, Mumbai has a sizable economy that has shown the ability to recover quickly in a number of areas. Mumbai, the capital of Maharashtra, the third-largest province in India geographically, is well-known for its industrial prowess and is sometimes regarded as the country's center for vehicle manufacture.

Maharashtra has consistently been the top state in the country for foreign direct investment (FDI) for more than. Only Gujarat received more foreign direct investment (FDI) in the 2020–21 fiscal year than Maharashtra, despite the latter still drawing in 28% of all FDI inflows.



Source: UNCTAD

Opportunities and challenges in real estate investments in India:

- By 2031, India's GDP is projected to increase at an average annual rate of 6%, making it the third largest economy in the world.
- The World Bank reports that India's rating in the ease of doing business index increased by 14 places to 63 in 2019.
- The SEZ Act was amended to allow for the establishment of new businesses and hubs.
- The infrastructure for logistics, data centers, and reasonably priced housing is in place.
- Limited Grade A completed office stock that is investible in important cities;
- Poor construction quality and project delays that deter investor sentiment;
- Absence of ownership title and land records;
- Inconsistent labor regulations; and high stamp duty and GST charges in relation to overall transaction costs.

Conclusion and Suggestions:

Growing foreign direct investment (FDI) in Indian real estate is promoting greater openness. Developers have updated their accounting and management systems to comply with due diligence requirements in an effort to secure finance. It was anticipated that Indian real estate would draw a significant amount of FDI for that Indian government should focus more on attracting more FDI in real estate sectors because still there is more

opportunities of foreign investors in real estate sector. Infrastructure facilities should be improved so foreign investment can flow in township of underdeveloped cities rather than only developed ones. Government should bring more clarity over entry and exit norms for foreign investors. States should place more emphasis on approval process; single window clearance time bound clearance, faster resolution of consumer problems, etc.

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An Analysis on Recent Trends in Indian Tourism Industry Opportunities and Challenges

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ABSTRACT:

This study aims to investigate recent trends and the potential and prospects facing the tourism industry of India in the future. To obtain understanding, historical performance data and policy papers pertaining to India's tourist sector have been examined. A work that examines government annual reports, media, websites, and published and unpublished records using secondary data. It was discovered that the rise of foreign exchange revenues and visitor arrivals had significantly improved. The Indian tourist scenario saw a noteworthy and substantial growth rate. India With its varied landscapes, lively customs, and rich cultural legacy, India has long been a well-liked travel destination for people from all over the world. The nation's tourism sector is essential to its economic growth, job creation, and ability to present its own national identity to the world. This study will examine and highlights the current situation of the Indian tourist industry, highlighting its advantages and disadvantages as well as the steps the government has done to improve it. We will also look into possible avenues for industry expansion in order to guarantee sustained growth in the years to come.

Key Words:Trends in Tourism, Tourism Industry, Business.Recent Trends in Indian Tourism.

INTRODUCTION

In recent years, the tourism industry in India has seen an exciting shift that has revealed a vibrant tapestry of possibilities and unique experiences for travelers. India, which is situated between the stunning Himalayas in the north and the stunning beaches in the south, has long been known for its extraordinary diversity and cultural richness. Travel to and experiences of this interesting country are being transformed by a wave of new trends that are currently sweeping the subcontinent, going beyond the usual tourist attractions. The revival of forgotten history, ecological practices, and state-of-the-art technology are propelling the sector to new heights.

India's tourism industry has undergone tremendous change in the last few years, with domestic travel and weekend getaways becoming more and more popular. Previously, Indian travelers seeking novel experiences would usually rank foreign locations highest on their list of priorities. But the dynamics have changed, with domestic travel now taking center stage. India has seen a sharp increase in domestic travel and weekend vacations; 300 million domestic traveler journeys and 100 million weekend getaways are expected by 2023. This trend is being influenced by a multitude of factors, including rising disposable income, more accessible air and ground transportation, more awareness of India's

numerous tourism offerings, and growing usage of social media and online travel booking platforms.

One of the main forces behind India's economy is tourism, which is categorized as a service industry. The following are a few advantages of the tourism sector: It helps to bring down the unemployment rate. The foreign exchange system's development. Encouragement of more economic endeavors within the nation.

An important study on the Indian tourist sector conducted earlier this year found that, in 2014, tourism made up 7.3% of India's total Gross Domestic Product (G.D.P). It is projected by Crooks, Turner, and Snyder (2011) to increase to 8.2% in 2015. This is directly correlated with India's economic growth rate. In India, there are four main categories of tourism:

While it is true that India's tourism industry is a rising star, this is mainly due to the enormous diversity and wealth of the nation's countless untapped tourist destinations; it is also true that nearly every industry in the nation has enormous potential spurred by decades of underperformance. Therefore, despite the exuberance in the local hospitality and tourism sector, the low number of tourists is not surprising. The excitement stems from the fact that the infrastructure in the hotel and tourism industries is choked by the relatively low supply levels.

The tourism industry has enormous potential. India has the potential to become a popular travel destination for many foreign visitors if the major problems preventing the tourism sector in that country from growing to the extent that it deserves are properly identified and proactive actions are taken to overcome them, including all relevant parties.

SCOPE OF THE STUDY:

With the introduction of procedures and laws that support business ventures in this area, the travel and tourism industry has grown in popularity in India in recent years. The prospects, demands, and overall scope of this industry have increased as a result. This field is becoming more and more popular because of the benefits and incentives that come with it. Young people in particular are drawn to it since they are continuously searching for something new, innovative, challenging, and positive so this is very important to find out the recent changes and opportunities available for tourism industry with increase in demand of people for the tourism.

REVIEW OF LITERATURE:

Numerous articles that highlight current trends have been produced, which sheds light on this subject in a very insightful way. I've included a few of their contents here.

Manhas Parikshat Singh (2012) noted that since tourism is a multifaceted service industry, governments, the commercial sector, and nonprofit groups have an obligation to make it more sustainable by reducing its negative effects on the environment, society, and culture and increasing the economic benefits to locals.

According to Archana Bhatia (2013), many people now use tourism as a leisure activity. International travel is becoming more and more popular as a way for people to escape the daily grind. Their primary draws are the captivating leisure, sports, and adventure activities the location offers, or the breathtaking natural beauty of the area. However, every location has some intrinsic strengths and disadvantages that can increase or decrease their ability to

draw in tourists from outside. Similarly, a variety of possibilities or hazards may also arise from the outside world.

According to Anushree Banerjee (2014), the primary obstacles preventing the business from attaining high economic value are a lack of trained workers, a dearth of tourism training facilities, a paucity of highly skilled trainers, and unfavorable working conditions for staff members. Concerns are also raised by policies that can enable workers to work in a supportive environment. This report aims to evaluate the work of the tourist industry's HRD team, specifically focusing on Jet Airways India Ltd.

Shalini N. Tripathi and Masood H. Siddiqui (2010), mentioned that tourism and hospitality have become key global economic activities as expectations with regard to our use of leisure time have evolved, attributing greater meaning to our free time. While the growth in tourism has been impressive, India's share in total global tourism arrivals and earnings is quite insignificant. It is an accepted fact that India has tremendous potential for development of tourism. They may then be more capable and motivated to perform more productively as a result.

OBJECTIVES OF THE STUDY:

Following are the main objectives of this study:

1. To study the review of tourism industry in India.
2. To study the growth and performance of tourism industry in India.
3. To study the trend of foreign tourist arrival in India.
4. To find out growth, opportunities and challenges of Indian tourism sector.

RESEARCH METHODOLOGY:

The present research paper is mostly based on secondary data sources.The design used for this study was that of a descriptive research design which sought to examine, evaluate and assess the current trends in the tourism industry and also the role of tourism in economic development of India Data was collected for this research using secondary sources. To accomplish the objective proposed in this work the author compiled tourism statistics from 2019 to 2023 with a goal of finding no of domestic and foreign tourist visits to India for this period. The following databases were searched:

1. Ministry of Tourism, Government of India and
2. Indian statistics.

The Indian tourism industry's current state:

India has seen a sharp rise in the number of visitors in recent years. The Ministry of Tourism reports that during the previous three years, the nation received about 20–25 million foreign visitors, bringing in a sizable sum of money. An other important factor is domestic tourism, as millions of Indians travel within their own nation every year. For this picture, no alt text is available.

Source:https://www.linkedin.com/pulse/comprehensive-analysis-indian-tourism-industry.

In terms of foreign visitor arrivals (FTAs), India's tourism industry saw growth of 4.1% to 8.2 million in 2015, while foreign exchange earnings (FEEs) increased by 4.1% to USD 21.1 billion. In contrast, FTAs increased by 10.7% to 8.9 million in 2016, and FEE (in US dollars) increased by 9.8% to US$ 23.1 billion. It was estimated that 143 cores of domestic tourists visited States and Union Territories in 2015. Two significant initiatives, PRASAD (Pilgrimage Rejuvenation and Spiritual Augmentation Drive) and Swadesh Darshan (Integrated Development of Theme-Based Tourist Circuits), have been put into place to create tourist infrastructure.

Foreign Tourists in India

Review on Foreign Tourists Arrival in India.

In order to expand India's part of the global tourism market, the Ministry of Tourism offers India as a comprehensive travel destination and advertises the country's tourist locations and products.

Through a coordinated campaign with the travel industry, state governments, and Indian missions, as well as an integrated marketing and promotional strategy, the aforementioned goals are achieved. In order to promote India's wide range of tourism products, the government regularly interacts with industry experts and other pertinent stakeholders, soliciting their opinions and recommendations. The Indian government's Ministry of Tourism has proclaimed "Incredible India!" to increase the number of visitors. Come to India in 2023."

The Ministry of Tourism in India participated in a number of international travel fairs in 2023 in an effort to increase the number of foreign visitors to the country. These included IMEX Frankfurt (17–19 October 2023), OTDYKH Leisure, Moscow, Russia (12–14 September 2023), TOP Resa, Paris, France (3–5 October 2023), PATA Travel Mart 2023 (4-6 October 2023).

Foreign Tourists Arrival (FTAs)

Year	FTAs in India (in million)
2019	10.93
2020	2.74
2021	1.52
2022	6.44
2023 (Jan –Sep)	6.43

Foreign Exchange Earning (FEEs)

Year	Foreign Exchange Earnings (FEEs)(in crore)
2019	216467
2020	50136
2021	65070
2022	139935
2023 (Jan –Sep)	1,66,660

Source: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=19850

Opportunitiesand Challenges:

Despite its immense eventuality, the Indian tourism assiduity faces several challenges. structure gaps, including shy transportation systems, limited accommodation options in remote areas, and sanitation installations, need to be addressed. Safety and security enterprises, especially for womanish trippers bear nonstop attention. also, the negative impact of mass tourism on the terrain and original communities necessitates sustainable practices and responsible tourism enterprise. still, these challenges also present openings for growth and invention.

The development of niche tourism parts similar as adventure tourism, heartiness tourism, andeco-tourism has gained instigation. The rise of digital platforms and social media has enabled small- scale drivers and home- stays to reach a wider followership, fostering entrepreneurship and community involvement in tourism.

India's artistic diversity

is one of the country's main draws for callers. trippers seeking authenticity and uproariousness in their peregrination will find that the country offers a unique experience with its multitude of languages, cookeries, carnivals, art, and armature.

Literal Heritage:

India is home to a stunning number of literal spots, similar as the Red Fort, Qutub Minar, Tajmahal numerous travelers and history suckers from each over the world are drawn to these monuments.

India's natural beauty:

is astounding, ranging from the stirring strands of Goa and Kerala to the gorgeous geographies of the Himalayas. beast suckers andeco-tourists are also drawn to public premises and beast sanctuaries.

India's Tourism Industry's Challenges:

Infrastructure, accessibility, amenities, human resources, security and safety, information and communication, lack of publicity, bank and ATM facilities are just a few of the issues facing India's tourist sector.

Inadequate infrastructure:

The infrastructure required for travel and tourism includes both urban and physical elements, such as access roads, energy, water supplies, and telecommunications, as well as physical infrastructure such parts of transportation modes' entry. Airline surface transportation, lodging, infrastructure, and facilitation systems are all included in the travel and tourism industry. One of the main causes of the decline in foreign tourism in the nation has been the inadequate infrastructure.

Connectivity and accessibility:

In order to fully utilize India's tourist potential, numerous initiatives are being made to create new locations and investigate specialized markets. Nevertheless, these destinations' and the connected cities' infrastructure, including transportation, lodging, and air and road connectivity, is insufficient. This continues to be a significant barrier to tourism growth. Facilities: Basic amenities like clean, well-maintained restrooms and waiting areas, first aid supplies, and drinking water should all be provided at tourist destinations and when traveling.

Human Resources

One of the biggest problems facing the travel and tourist sector is the lack of competent labor; in order to limit business growth, trained labor is needed.

Data and Interaction

The Indian government has designated 22 languages from the 8th schedule as official languages, despite Standard Hindi and English being the official languages of the republic of India. Due to the wide variation in regional languages, foreign visitors may have difficulties when attempting to communicate with locals.

Safety and Security

India is severely deficient in this competitive quality. The main causes are the periodic terrorist strikes as well as internal community disturbances. Women are quite unsafe in this country.

Conclusion and Suggestions of the Study:

India's tourism sector offers a multitude of chances for expansion and improvement. With its stunning scenery, varied experiences, and rich cultural legacy, India has the potential to rise to the top of the world travel rankings. Unlocking this potential, however, will require resolving the issues the industry is facing, emphasizing sustainable practices, and putting

important government policies into place. Through collaboration and the utilization of India's distinct advantages, the tourist sector can attain enduring expansion.

This study makes it clear that, in order to keep India a top travel destination in the world, the government must focus on updating its tourism policies and strategies.

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Assessing the Impact of Minimum Support Price (MSP)- Boon or Bane for Agriculture?

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Abstract

The policy of the Minimum Support Price , is introduced by Indian Government in 1966-67 for agriculture commodities, to provide safety net for farmers and ensures to farmers for fair price to their crops.

This research investigates into the intricacies of the Minimum Support Price (MSP) in agriculture, aiming to provide a comprehensive analysis of its impact. The paper investigates within the district how gross return differ from one another in the Velhe, Bhor and Baramati Taluka of district Pune, Maharashtra.

The contradiction surrounding MSP, exploring whether it serves as a help or a bane for the agricultural sector. Through an extensive examination of challenges, advantages, and disadvantages, this research sheds light on the multifaceted nature of MSP. By analyzing case studies, policy implications, and farmer perspectives, it endeavors to present a nuanced understanding of the controversial role played by MSP in shaping the agricultural landscape. The findings aim to inform policymakers, stakeholders, and the public, fostering a constructive dialogue on the future of MSP and its implications for sustainable agricultural development.

Keyword: Minimum Support Price (MSP), Agriculture Commodities, Policymakers, Sustainable agriculture, Challenges.

Introduction

The Indian government announced minimum support price based on the recommendation of the CACP. The CACP recommends the MSP for 23 agricultural crops, for minimum support and benefits to farmers for those crops which are important like wheat, cotton, paddy, oilseeds, and pulses for all farmers across India. The government of India established Minimum Support Price to Agriculture commodities for providing support to farmers during bumper production years.

Agriculture contributes more than 17 percent to the GDP and feed over 60 percent population of India. The Indian economy is boosting up to 38 percent because of agriculture sector. The Indian government form a policy in 1966-67 for safeguard the interests of both producers and consumers. MSP serves as a system of market involvement by the Indian government, providing insurance to agriculture producers

against sharp falls in price of farm. Provide support the farmers in sales and procure food grains for public distribution was the main objective of MSP.

The paper examines that the Minimum Support Price in agriculture, aiming to bring a comprehensive analysis of its impact. Being in different topographical setting in district how gross return differ from one another, in the Velhe, Bhor and Baramati talukas of Pune district, Maharashtra and examine advantages, and disadvantage of MSP in shaping the agricultural landscape.

Relevance of the Study:

The effect of Minimum Support Price study is highly relevant in today's agricultural landscape due to its significant implications for farmers, the economy, and food security. By examining the effects of MSP implementation, policymakers, researchers, and stakeholders can gain valuable insights into its effectiveness, challenges, and potential improvements.

Understanding how MSP influences farmer income, livelihoods, and well-being is crucial for crafting policies that genuinely support agricultural communities. By assessing whether MSP serves as a reliable safety net or exacerbates farmer distress, the study can inform interventions aimed at improving farmer welfare.

MSP plays a pivotal role in stabilizing agricultural markets by providing price support for key crops. Analyzing its impact on market dynamics, inflation, and government expenditure can help policymakers formulate strategies to ensure both agricultural sustainability and economic stability.

Assessing the strengths and weaknesses of MSP policies can guide policymakers in refining existing frameworks or developing alternative mechanisms to support farmers and promote agricultural growth. By identifying areas of improvement, the study can contribute to evidence-based policy formulation and implementation.

Examining influence of Minimum Support Price on agriculture is pertinent for addressing key challenges and optimizing the benefits of price support mechanisms. By analyzing its implications across different dimensions, the study can offer valuable insights for shaping policies that foster sustainable agricultural development and enhance the well-being of farming communities.

Literature Review

Ali, S.Z., Sindu, R.S., & Vatta, K. (2012). In their research “Effectiveness of Minimum Support Price Policy for Paddy in India: A Case Study of Punjab”. The study examines the efficacy of Minimum Support Price policy for paddy cultivation in India, focusing on Andhra Pradesh and Punjab. It investigates the impact of the MSP mechanism on paddy cultivation, particularly in regions with favorable environmental conditions and fertile agricultural land.

Shroff, S., & Kajale, J. (2007). State Intervention through Price Policy and Risk Mitigation-A Study of Maharashtra. The study observes that in Maharashtra, the production cost of major crops, as calculated by the state Agricultural Price Committee

cell, often exceeds the MSP. It concludes that when prices drop below MSP, farmers may struggle to cover production costs, highlighting Maharashtra as a high-cost state. The study also discusses limitations of alternative risk mitigation measures such as futures trading and the National Agricultural Insurance Scheme.

Kumar, M., Sharma, M., & Kumar, K. (2021). Minimum Support Price for agricultural commodities in India: A Review. This article suggest an outline of the growth rate of MSP crops in India, and the benefits and awareness of MSP among farmers.

Aggarwal, S., Chatterjee, I., & Jha, N. (2023). Minimum Support Price in Indian Agriculture: Supporting Whom and at What Price? The research purposes to examine the correlation between Minimum Support Price and election cycles, suggesting that governments tend to increase MSP rates in areas lacking political alignment with the ruling party.

Korekallu Srinivasa, A., Praveen, K. V., Padmaja, S. S., Nithyashree, M. L., & Jha, G. K. (2023). Does a farmer's knowledge of minimum support price affect the farm-gate price? This study explores the influence of farmer awareness about MSP on farm-gate prices in India.

Research Objective

- To study Minimum Support Price by the government of India.
- Examine the advantage and disadvantage of MSP with geographical settings.

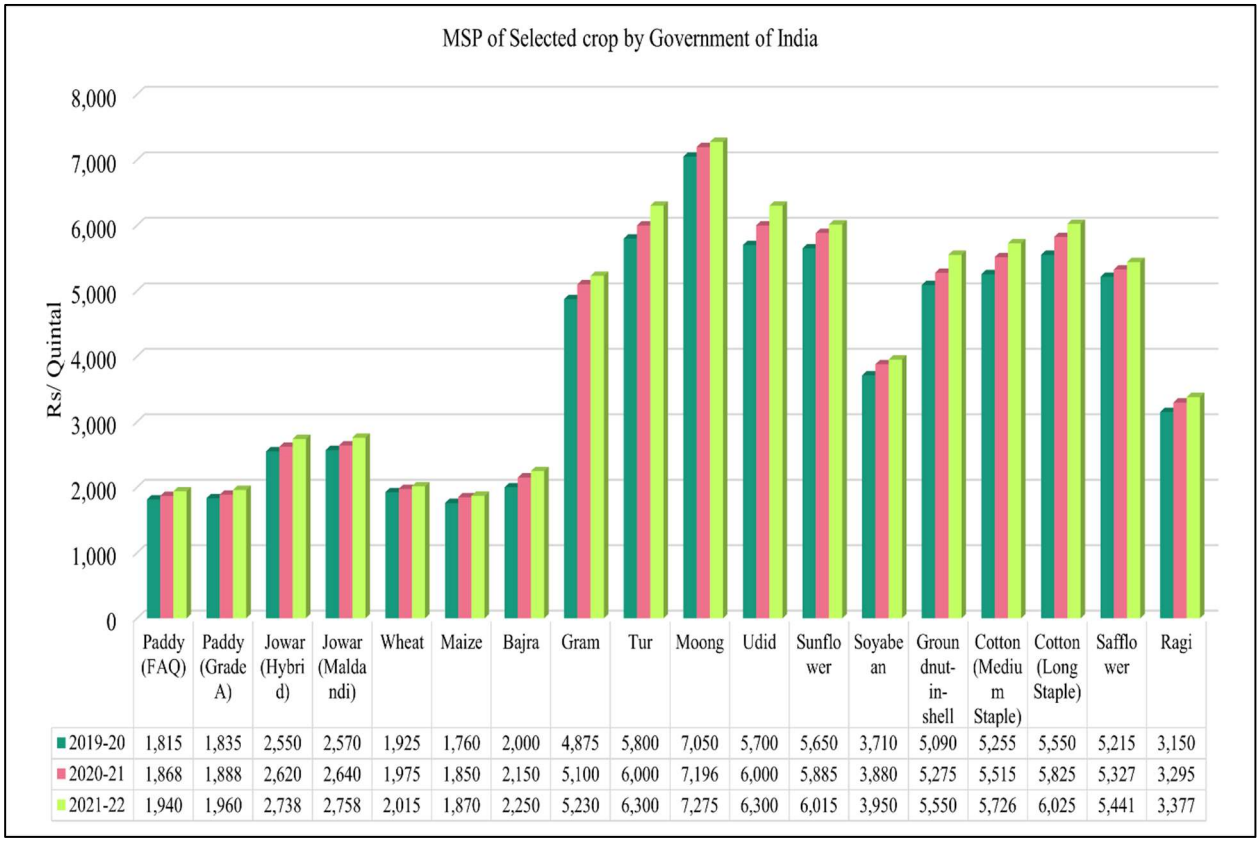
Methodology

Data Collection

The research carried by both primary and secondary sources. In primary source data related to farmers income, transportation facilities available to them etc. collected through Interview, survey and in secondary sources data books, internet web sites, journals, newspapers, clippings, government websites, research articles were used.

Observations

In Maharashtra, the Minimum Support Price (MSP) scheme, implemented by the Government of India, operates through several entities like the Maharashtra State Co-operative Marketing Federation, Maharashtra State Co-operative Tribal Development Corporation, National Agricultural Co-operative Marketing Federation, and Maharashtra State Co-operative Cotton Growers Federation. This initiative guarantees farmers a predetermined price for specific crops before their planting seasons, shielding them from market fluctuations and ensuring the viability of their agricultural endeavors.



	Paddy (FAQ)	Paddy (Grade A)	Jowar (Hybrid)	Jowar (Maldandi)	Wheat	Maize	Bajra	Gram	Tur	Moong	Udid	Sunflower	Soyabean	Groundnut-in-shell	Cotton (Medium Staple)	Cotton (Long Staple)	Safflower	Ragi
2019-20	1,815	1,835	2,550	2,570	1,925	1,760	2,000	4,875	5,800	7,050	5,700	5,650	3,710	5,090	5,255	5,550	5,215	3,150
2020-21	1,868	1,888	2,620	2,640	1,975	1,850	2,150	5,100	6,000	7,196	6,000	5,885	3,880	5,275	5,515	5,825	5,327	3,295
2021-22	1,940	1,960	2,738	2,758	2,015	1,870	2,250	5,230	6,300	7,275	6,300	6,015	3,950	5,550	5,726	6,025	5,441	3,377

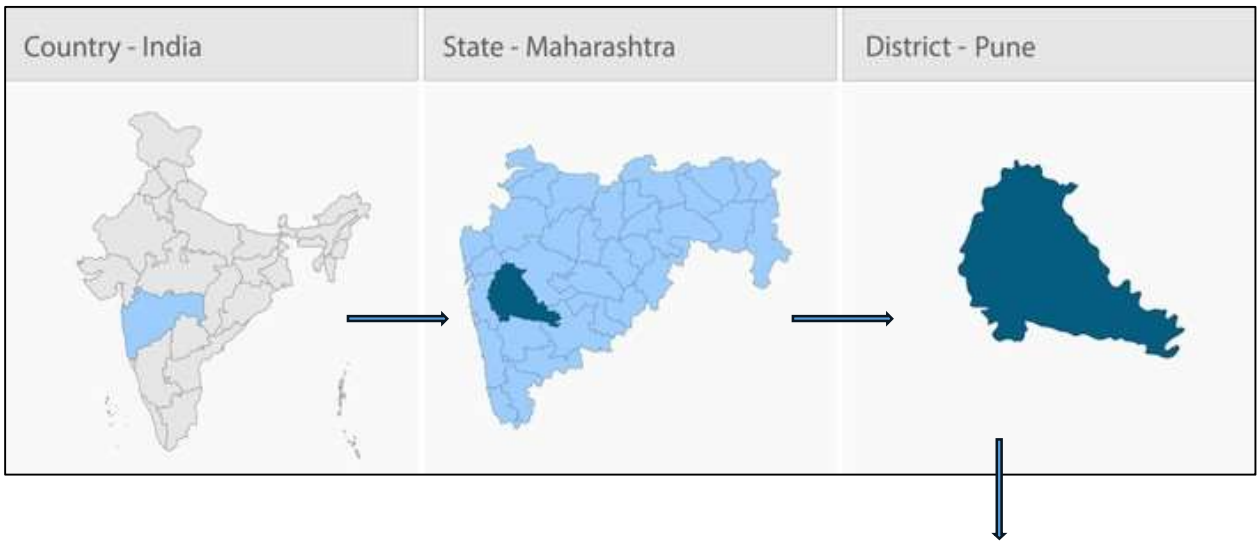
*FAQ: Fair Average Quality

Data Source: Directorate of Marketing, GoM, Graph prepared by researcher

Figure 1: MSP declared by the Government of India from year 2019- 20 to 21-22 for selected crops

Study Area

Sample study area is located in Maharashtra State, taluka Velhe, Bhor and Baramati of Pune district. Google map used to show the topography and infrastructure available in the taluka for transportation.



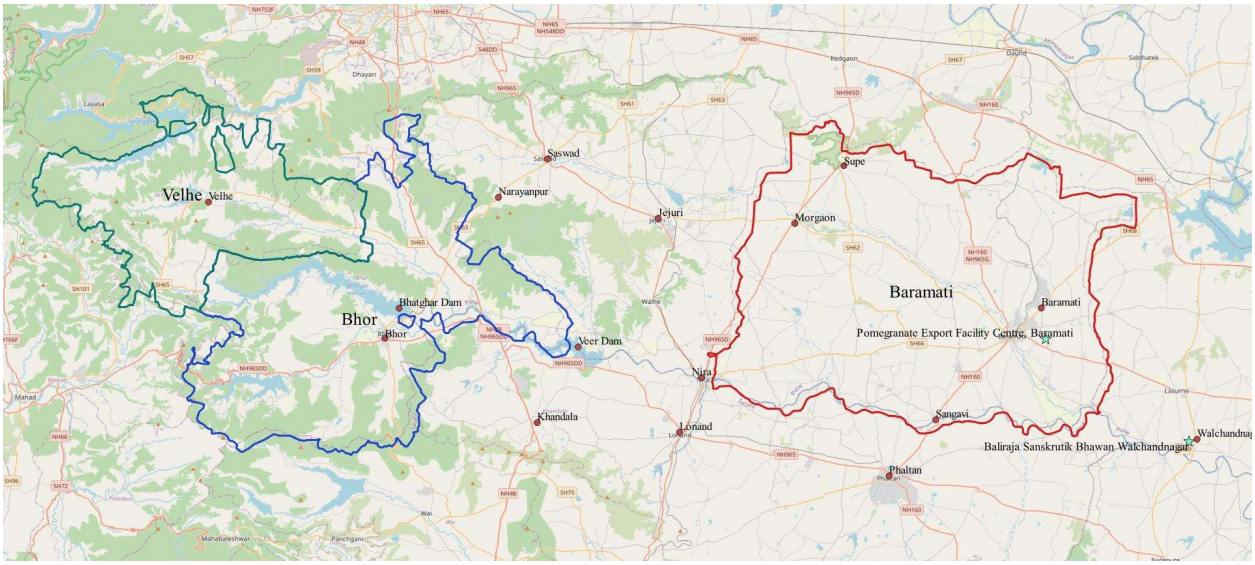


Figure 2: Location and topography of sample study area

Source: Google map

Analysis

The Minimum Support Price (MSP) scheme, supervised by the Commission for Agricultural Costs & Prices (CACP) under the Ministry of Agriculture and Farmers Welfare, sets prices for 22 specific crops and establishes a fair price for sugarcane. These price recommendations are informed by factors like cultivation expenses, supply-demand dynamics, market trends, consumer welfare, and environmental impact.

The CACP evaluates three types of production costs: A2, A2+FL, and C2. A2 encompasses direct expenses such as seeds, fertilizers, pesticides, and labor. A2+FL includes A2 costs and the value of unpaid family labor. C2 provides a comprehensive assessment, accounting for rentals and foregone interest on land and capital assets, in addition to A2+FL.

Eventually, the Cabinet Committee on Economic Affairs (CCEA) of the Union government makes the final decisions regarding MSP levels and related recommendations.

Study of Crops

Comparison of Crops MSP fixed by Government with Cost of Production.

Case 1: Maize

- MSP fixed by government is RS 2090 quintal
- Total cost of production including all factors of A2+FL, C2 is RS 79590 /Hector
- Yield: Quintal/Hector= 43.46 quintal
- Cost of Production/Quintal= 1344RS
- As per farmers demand of MSP which is Cost of Production (COP) per quintal into 1.5 times
- COP*1.5=MSP
- Multiplying COP/Quintal *1.5= 1344*1.5=2016 which is as per demand.

But, when we multiply Yield/hector*MSP set by the government so we get 43.46*2090=90,831RS

As per farmers demand that is 1.5 times the COP, when multiplying COP/Hector*1.5 times we get 79590*1.5=119385

Case 2: Ground Nut

- MSP set by government in Year 2023-24 is RS 6377/- Quintal
- Cost of Cultivation of Ground nut including all expenses like Seeds, Fertilizers, Pesticides, Labour and more.
- Cost of Cultivation/Hector of Land = RS 82256/-
- Yield: Quintal/Hector is 13.49 Quintal
- So Multiplying MSP*Yield per hector we get 6377*13.49 = 91,765 /- Rs as per the demand by the farmers that is 1.5 times the cost of cultivation so multiplying cost of cultivation by 1.5 times, we get 82256*1.5 = Rs. 123,384 /-

We can conclude that in Ground nut farming cost of cultivation is gained by farmers but the actual demand i.e. 1.5 times the cost of cultivation here MSP is short to fulfil the demand. There is difference of around 32 thousand between MSP set and 1.5-time cost of cultivation.

Case 3: Wheat

- MSP Set by the government for per Rs. 2275/quintal
- Cost of Cultivation for per hector of land 57392RS
- Yield of Wheat = 35 quintals/hector
- So, multiplying MSP with Yield / hector we get 2275*35 = Rs 79625/-
- As Per demand i.e. 1.5 time the cost of cultivation 57392*1.5 = 86088/ - Rs.

We can conclude that farmers get the returns of cost of cultivation also very close to their demand but not the accepted value.

The study area reveals significant variations in topography and infrastructure available to farmers across regions. Regional climates, shaped by factors such as topography, landforms, rainfall, and temperature, play a crucial role in crop production costs. Setting a uniform Minimum Support Price for the entire country becomes challenging as these factors influence production expenses differently in different areas. Additionally, findings from primary surveys indicate that government of India proposed prices may not always translate into profitable returns for farmers. In the case of Velhe and Bhor are located in hilly region as well as transportation facilities are very less compared to Baramati which is more developed as located on flat terrain. Velhe and Bhor more than 50 % area is under rough terrain. Connectivity to National highway and major roads So, the farmers from Baramati might have benefit of MSP as it is easy to get accessibility to all resources.

Conclusion

Since farmers demand MSP rate as 1.5 times the cost of cultivation, but the MSP set by Government that only give return of actual cost of cultivation. In case of cultivation cost, government of India declares MSP on nationwide which is very generalized. As geography is taken one of the considerations for MSP it is very unfair for farmers to get same return in different topographical settings. From the study region it is studied that conditions within region there is uneven terrain, transportation Facilities, irrigation

facilities, etc. which affects the gross return of the farmers which directly impact on their overall income. Also, through primary survey it is identified that APMC does not play any role in MSP rates. Farmers approach middle man i.e. third person instead of direct approach to MSP centers.

Recommendations

MSP, determined by the central government, is currently calculated based on various factors related to crop production, providing a uniform price nationwide. However, it is suggested that MSP be tailored regionally, considering the disparities in resources, expenses, and agricultural conditions across different areas. Applying a uniform price may not adequately reflect the varying costs and circumstances involved in crop production throughout the country.

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Actor Partner Interdependence in Conflict Resolution among Married Couples

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ABSTRACT

This quantitative correlational study investigates the intricate relationship between conflict resolution skills and relationship satisfaction. Conflict management means finding ways to make disagreements between couples better so that their relationship becomes stronger. Managing conflict is the main challenge that partners/ married couples face in their relationships.

To explore this relationship through correlational analysis, a snowball sample of participants from the age range of 29-50 completed self – report measures assessing conflict resolution skills and relationship satisfaction. Conflict resolution skills is assessed through Kansas Marital Conflict Scale and Relationship Satisfaction is assessed through Relationship Assessment Scale. 50 couples who have completed 1+ years of their marriage were the participants of this study. Along with correlational analysis, independent t-test was also performed to find out the difference among males and females in conflict resolution skills as well as relationship satisfaction.

The results of this study found that there is positive correlational between conflict resolution skills and relationship satisfaction. And there is no difference among males and females in conflict resolution skills and relationship satisfaction.

Variables : Conflict Resolution, Relationship Satisfaction, Gender

1. INTRODUCTION

1.1 Overview

Nowadays, marriage has become the most disappointing and fragile relationship to a great number of people (Olson & Olson,2000). Conflict is an inevitable process in marriage. The needs and interest of couple lie in marital conflicts. Conflict is the process that begins when one partner identifies that the other one has frustrated some concerns of his/ hers (Thomas,1976). Disagreements happen when people clash about what they want or how they want to get it. If the partner X wants Z and partner Y wants P. If either of them cannot have what they want at all or no one can have what they want, this will lead to conflict (Hocker & Wilmot, 2001). That is why couple avoids the conflict and pretend not to realize it, which may cause even more problems in their marriage and also in their life. Conflicts and disagreement between husband and wife are normal especially in today's complex world.

Conflict management is described as the chance to enhance situations of disagreement between couples and reinforce the bonds within their relationships. Managing conflict is the main challenge that partners / married couples face in their relationships. The experience of the conflict is shaped by the partners (Fincham, Bradbury & Grych, 1990). We begin with the

assumption that disagreement and incompatibility between a couple are unavoidable in any close relationship (Bernard, 1964; Kelley, 1979; Waller, 1938).

We furthermore assume that conflicts cannot be resolved unless they are expressed openly many of married couples show dislike, unfriendly, opposed behaviour towards their partner. Though there are conflict avoidance may work over the short period of time but it generates negative feeling among them. (Blood, 1960; Raush et al., 1974). And due to negative feelings, it leads to a negative interaction between them. For example, avoidance, ignoring, speaking in rude way, etc.

The way couple handle the conflicts is described in terms of 'resolution' (Marchand, 2004). The effective way of building and maintaining strong bond in married couple relationship is communication. Communication allows a couple to share their feeling and thoughts. According to Bornett and Riners 1996, Communication is an important tool for knowing or emotionally connecting with each other.

1.2 Aims and Objectives

Aims

- To analyse the resolution of the conflict through Actor-Partner Interdependence

Objectives

The main objective of this study is:

- To study the impact of conflict resolution on relationship satisfaction
- To understand the difference between males and females in conflict resolution skills and relationship satisfaction

2. REVIEW OF LITERATURE

Marital Satisfaction is related to emotional support, shared interest whereas conflict resolution refers to may be one of the most prominent contributors to global satisfaction (Argle & Furham 1983; Fowers & Olson 1993). It is said that if conflict is managed constructively the growth and enrichment in relationship increases. If it is not managed properly then unsatisfactory relationship occurs. Managing conflict is one of the most important determinants of well-being of relationship (Bacchiocchi 1997, Crohan 1992) and marital satisfaction (Albert and Driscoll 1992). Conflicts not only arise when ability to use conflict destructively, but also in the manner in which they argue, communicate with their partners, react upon it (Burman, Margolin & John 1993 ; Gottman & Knorkoff 1989; Kilman & Thomas 1977; Schaap, Buunk, Kerkstra, 1988, Straus 1979). In this research conducted, there were 5 different conflict management styles were identified a) Competing Behaviour b) Collaborating behaviour c) Compromising d) Avoiding e) Accommodating. The participants came from suburban Black community located outside Stellenbosch in western cape, 57 married couples took part in this study.

Conflict is an inevitable aspect of marital relationships, arising when one partner's actions disrupt those of the other. This study aims to examine conflict management tactics and assess their effectiveness through quantitative analysis. A sample of 300 respondents from Malaysia was surveyed, and data was analysed using SPSS for descriptive statistics. The research utilized the Thomas Kilman MODE instrument to identify conflict management strategies among married couples in Malaysia. The instrument comprised five subscales: Competition, Collaboration, Compromise, Avoidance, and Accommodation. 150 married couples

participated, with ages ranging from 25 to 59, categorized into 25-39 and 40-49 age groups. Findings suggest that the duration of marriage and partners' ages significantly influence conflict management strategies among Malaysian couples.

Conflict is a common occurrence in relationships, characterized by the dynamic interaction between individuals experiencing negative emotions due to perceived disagreements and obstacles to their goals. Effectively managing conflict can foster understanding and positive changes within relationships. This study employed the snowball sampling method, a non-probability sampling technique, to identify cases within a specific network. Three independent variables—Avoidance, Validation, and Volatile—were considered. Couples practicing conflict avoidance tend to move past arguments quickly, while those employing validation handle conflicts in a constructive manner. Volatile conflict style involves vocalizing differences and engaging in passionate discussions. The survey comprised 29 questions, and Gottman's three subscales were scored (n=382). According to Conflict Theory Perspective, couples who learn to negotiate conflict in their relationships are more likely to lead fulfilling lives together.

Currently, one of the prevalent issues in relationships is communication problems. Effective communication is crucial for the success of any relationship. While there is research on conflicts in various domains, there's a dearth of studies on conflict theories and resolution specifically among married couples. This study involved 191 married couples who were selected through a snowball sampling method. Each couple was asked to respond to two sets of questions, one for the wife and one for the husband, which took approximately 25 to 30 minutes to complete. A total of 1000 questions were prepared and distributed to 500 married couples, with 207 couples responding. Conflict resolution styles were assessed using the MCS (Gottman, 1944a).

Two persons who lived together are likely to have disagreements, sources of friction and conflict as well. Beginning with Waller's (1938) analysis of the conflict process, the topic of marital conflict has received considerable attention by the marriage researchers and counsellors. In recent years, there have been diverse analyses of how couples experience and cope with conflict (Barry,1970; Bernard,1964; Blood,1960; Braiker and Kelley,1979; LaRossa,1977; Peterson, unpublished; Raush et al.,1974; Sprey,1971). This research studies showed that how a couple experience conflict and how resolution is connected to the partners feeling of marital satisfaction. Many married couples express very unfriendly behaviour or feelings and avoid confronting them. Even if these conflicts run for shorter period of time but it creates a negative feeling. In this research the respondents were 244 young married couples residing in San Fransisco.

3. METHODOLOGY

3.1 Research Questions

1. Is there a positive correlation between conflict resolution in married couples and their level of relationship satisfaction?

2. Is there a difference between males and females in conflict resolution skills?

3. Is there a difference among males and females about their relationship satisfaction?

3.2 Hypotheses

Alternative Hypothesis

1. There is a statistically significant positive correlation between conflict resolution in married couples and their level of relationship satisfaction.
2. There is a significant difference among males & females in conflict resolution skills.
3. There is a significant difference among males & females about their relationship satisfaction.

Null Hypothesis

1. There is no statistically significant correlation between conflict resolution in married couples and their level of relationship satisfaction.
2. There is no significant difference among males & females in conflict resolution skills.
3. There is no significant difference among males & females about their relationship satisfaction.

3.3 Variables

- Conflict Resolution
- Relationship Satisfaction
- Gender

3.4 Participants

This study was conducted between the married couples who have completed one and plus years of their marriage. The study consisted of 100 participants i.e. 50 couples have actively participated in this study. The age group of the participants was from 29 to 50 years.

Inclusion Criteria

- The participants who were married and have completed one and plus years of their marriage were taken into consideration.
- The age group should be from 29 to 50 years only.

Exclusion Criteria

- The participants who are unmarried and have not completed their one or one plus years of their marriage.
- The participants should be below the age of 29 and more than 50.

3.5 Research Design

This study is a correlational type of study. The survey method was used for data collection through google forms. The research will study the resolution of conflict through Actor-Partner Interdependence.

3.6 Sampling Method

Snowball Sampling Method was used to collect the data. Snowball sampling, a non-probability sampling technique, involves the recruitment of new units by existing ones to constitute a sample. This approach proves beneficial in researching individuals with particular characteristics that may be challenging to identify through other means.

3.7 Research Instrumentation

The research used two measurement tools, namely; The Relationship Assessment Scales and Kansas Marital Conflict Scale.

The Relationship Assessment Scale

The Relationship Assessment Scale (RAS): (RAS; Hendrick, 1988) is a seven item Likert scale which is used to measure global relationship satisfaction.

Kansas Marital Conflict Scale

Kansas Marital Conflict Scale (KMCS) is a 27- item scale used to measure couple conflict.

3.8 Procedure

The data was collected through online mode by circulating google forms using snowball sampling method. Only those participants who met the inclusion criteria were taken into consideration. Firstly, their consent was taken & then they were asked to fill the questionnaire circulated through google form and at last they were debriefed about the study.

4. RESULTS AND DISCUSSION

4.1 Results

This study aims to analyze the resolution of conflict through Actor-Partner Interdependence Model. It was hypothesized that there will be no statistically significant positive correlation between conflict resolution in married couples and their levels of relationship satisfaction. It was also hypothesized that there will be no statistically significant difference among males and females in conflict resolution skills and their relationship satisfaction. The research data was analyzed through Spearman's rank order correlation to find out the relationship between conflict resolution skills and relationship satisfaction. And Independent Sample t test was performed to find out the difference among males and females in conflict resolution skills and relationship satisfaction. The sample was of total 50 married couples i.e. 100 participants ranging from age 29-50 years.

Table 4.1.1 : Correlation between Conflict Resolution Skills and Relationship Satisfaction

Correlations

			Relationship Assessment Scale	Kansas Marital Conflict Scale
Spearman's rho	Relationship Assessment Scale	Correlation Coefficient	1.000	.514**
		Sig. (2-tailed)	.	.000
		N	100	100
	Kansas Marital Conflict Scale	Correlation Coefficient	.514**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

found that the variables Relationship Assessment Scale (Relationship Satisfaction) and Kansas Marital Conflict Scale (Conflict Resolution Skills) are statistically significant with rho = .514. Thus, the first hypothesis stating that, there is a statistically significant positive correlation between conflict resolution skills and relationship satisfaction was retained and the null hypothesis was rejected.

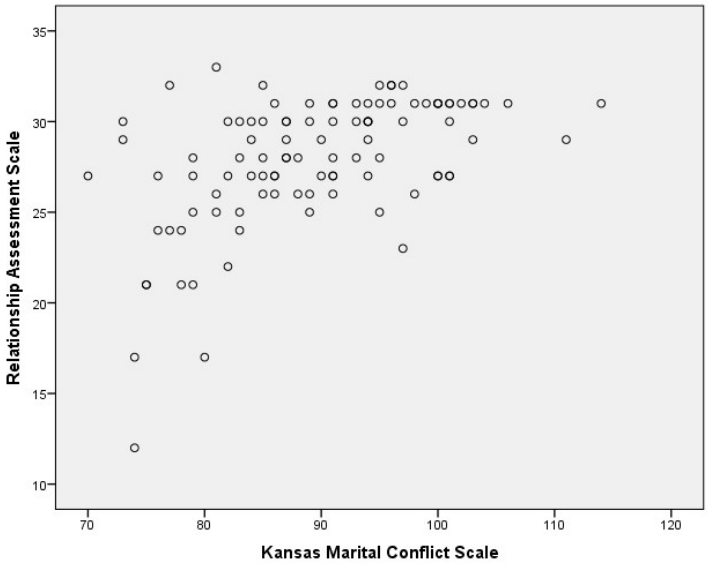

Figure 4.1.a Correlation between the variables Conflict Resolution and Relationship Satisfaction

Figure 4.1.a shows the correlation between each variable according to Spearman's rho. The tests found that the variables Relationship Assessment Scale (Relationship Satisfaction) and Kansas Marital Conflict Scale (Conflict Resolution Skills) are statistically significant with rho = .514. Above figure illustrates the same in graphical format. Thus, the first hypothesis stating that, there is a statistically significant positive correlation between conflict resolution skills and relationship satisfaction was retained and the null hypothesis was rejected.

Table 4.1.2 : Difference among males and females in Conflict Resolution and Relationship Satisfaction

Independent Sample t test			
	p value		Inference
Conflict Resolution	.780	>0.05	NS
Relationship Satisfaction	.234	>0.05	NS

Table 4.1.2 illustrates the difference among males and females in each variable according to Independent Samples t test. The tests found that there is no difference among males and females in Conflict Resolution skills (p=.780) Thus the second hypothesis stating that there is statistically significant difference among males and females in conflict resolution is rejected and the null hypothesis is retained.

In the same way, the tests found that there is no difference among males and females in Relationship Satisfaction (p=.234) Thus the third hypothesis stating that there is statistically significant difference among males and females in relationship satisfaction is rejected and the null hypothesis is retained.

4.2 Discussion

The Correlational analysis and Independent sample t test analysis revealed several noteworthy findings. Firstly, through Spearman's rank order correlation we observed a statistically significant positive correlation between Conflict Resolution Skills (measured by Kansas Marital Conflict Scale) and Relationship Satisfaction (measured by Relationship Assessment Scale). This findings aligns with the previous research suggesting that as the conflict resolution skills improves the levels of relationship satisfaction among married couples also increases.

Secondly, through Independent Samples t test we observed that there is no difference among males and females in Conflict Resolution Skills as well as Relationship Satisfaction.

Throughout the study, its been observed that most of the individuals are highly satisfied in their relationship and each has good conflict resolution skills which helps them in their relationship satisfaction.

5. SUMMARY AND CONCLUSION

5.1 Summary

The aim of the study was to analyze the resolution of conflict through Actor-Partner Interdependence. The sample included 50 married couple i.e. 100 individuals ages 29-50 years. A correlational research design was employed using survey method. The relationship was analyzed using Spearman's rho correlation method. And the difference between males and females was analyzed through Independent samples t test. The analysis revealed that the variables Conflict resolution skills and Relationship Satisfaction are positively correlated and are statistically significant. And there is no difference among males and females in variable conflict resolution and relationship satisfaction and are not statistically significant.

5.2 Limitations

There are few limitations of the study that can be looked into in future research. Firstly, the data was collected by circulating the Google form and it was measured through self-report reports. So, there are chances of getting bias data which can affect the results. Also, the sample size was only 100 participants i.e. 50 couples. Longitudinal research is needed to explore the temporal sequence of these relationships.

5.3 Suggestions for future research study

For the future research, instead of using google form for data collection. Paper pencil test and Interview can be used to get accurate responses. Qualitative study can be used instead of Quantitative Study.

APPENDIX

Relationship Assessment Scale:

	Low				High
1. How well does your partner meet your needs?	1	2	3	4	5
2. In general, how satisfied are you with your relationship?	1	2	3	4	5
3. How good is your relationship compared to most?	1	2	3	4	5
4. How often do you wish you hadn't gotten into this relationship?	1	2	3	4	5
5. To what extent has your relationship met your original expectations?	1	2	3	4	5
6. How much do you love your partner?	1	2	3	4	5
7. How many problems are there in your relationship?	1	2	3	4	5

Scoring:

Items 4 and 7 are reverse- scored.

Scoring is kept continuous. The higher the score, the more satisfied the respondent is with his/her relationship.

Kansas Marital Conflict Scale

First Stage

When you and your husband are beginning to discuss disagreement over an important issue, bow often ;

1. Do you both begin to understand each other's feelings reasonably quickly?
2. Do you both get your points across to each other without too much trouble?
3. Do you both begin to appreciate each other's points of view on the matter fairly?
4. Does your husband seem to be supportive of your feelings about your disagreement?
5. Does your husband tell you that you shouldn't feel the way you do about the issue?
6. Is your husband willing to really hear what you want to communicate?
7. Does your husband insist on contradicting many of your ideas on the issue before he even understands what your ideas are?
8. Does your husband make you feel that your views, even if different from his, are really important to him?
9. Does your husband seem more interested in justifying his own point of view rather than in understanding yours?

10. Does your husband let you feel upset or angry without putting you down for it?

11. Does your husband blame you for any of your feelings of frustration or irritation as if they were mostly your own fault, none of his?

Response categories were almost never (1), once in a while (2), sometimes (3), frequently (4), and almost always (5). Items 5, 7, 9, and 11 were recoded. High scores represent low conflict.

Second Stage

After you and your husband have been discussing a disagreement over an important issue for a while, how often:

1. Are you able to clearly identify the specific things about which you disagree?

2. Are you able to identify clearly the specific things about which you do agree?

3. Are you both able to express how the other feels about the issue?

4. Are you both able to express the other's viewpoint nearly as well as you could you own viewpoint?

5. Does your husband's facial expression and tone of voice convey a sense of:

Discouragement, anger, disgust, condescension, resentment, hostility, frustration, bitterness, self-pity (for himself), cynicism, , respect towards you

Third Stage

About the time you and your husband feel you are close to a solution to your disagreement over an important issue, how often:

1. Are you able to completely resolve it with some sort of compromise that is OK with both of you?

2. Do you end up with very little resolved after all?

3. Do you quickly bring the matter to a conclusion that is satisfactory for both of you?

4. Do you realize the matter will have to be reargued in the near future because at least one of you is still basically unhappy with the apparent solution?

5. Do you find that just as soon as you think you have gotten things resolved, your husband comes up with a new idea for resolving the issue?

6. Does your husband keep on trying to propose things that are not mutually acceptable ways of resolving the issue at hand?

7. Does it seem that no matter what you suggest, your husband keeps on finding new, supposedly better solutions?

8. Are you both willing to give and take in order to settle the disagreement?

9. Are you and your husband able to give up some of what you wanted in order to bring the issue to a close?

10. Are you and your husband able to keep coming closer and closer together on a mutually acceptable solution until you achieve it?

11. Are you and your husband able to reach a mutually acceptable contract for resolving the disagreement?

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Influence of Social Media on Body Image Issues

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ABSTRACT

Social media has been a prominent influence in today's generation for a few years now. With the rise of photoshopping applications it cannot be determined whether what you are seeing is the reality, this factor should be taken into consideration for what to believe and not on social media. Rise of social media mixed with the outdated norms which the society follows about body image issues keeps the young adults of the todays time in a very vulnerable position. It is important for young adults to understand the impact of social media and have the ability to overlook all the improper messages the society is sending in regards with body image. If the awareness is spread among these young minds, then negative impact of body image issues like eating disorders and depression can be lowered. The purpose of this research is to conduct a survey to understand relationship between social media and body image issues. The age group taken into consideration in this research are 18 to 26. It is a quantitative research study with a sample of (n=121) male and female participants. Two scales have been used to retrieve the data: Multidimensional Media Influence Scale (MMDS; Cusumano & Thompson, 2001) and Body Shape Questionnaire 16-B (BSQ 16-B; Evans & Dolan,1993). According to the data, the age group of 18-20 are the most active social media users. There can be seen a positive relationship between social media and body image issues.

Key words: Social Media and Body Image Issue

1. INTRODUCTION:

1.1 Overview:

Social media has a big impact on body image issues in the modern society. With photos of notable social media personalities influencing young folks both favourably and adversely. Do photographs of models make you wish to have the same type of figure or make you feel uneasy about your own? The goal of this study was to discover if there is any influence of social media on body image concerns; we are quite familiar with this topic because we, as young people, face similar situations on a regular basis. With people opting for plastic or cosmetic surgeries to enhance or change their facial features or body shape to achieve the ideal beauty standards, which can have an adverse effect. For instance, BBL Brazilian butt lift is one of the fasted growing plastic surgery procedures ever, but has the highest mortality rate (American Society of Plastic Surgeons, 2018).

1.2 Statistics:

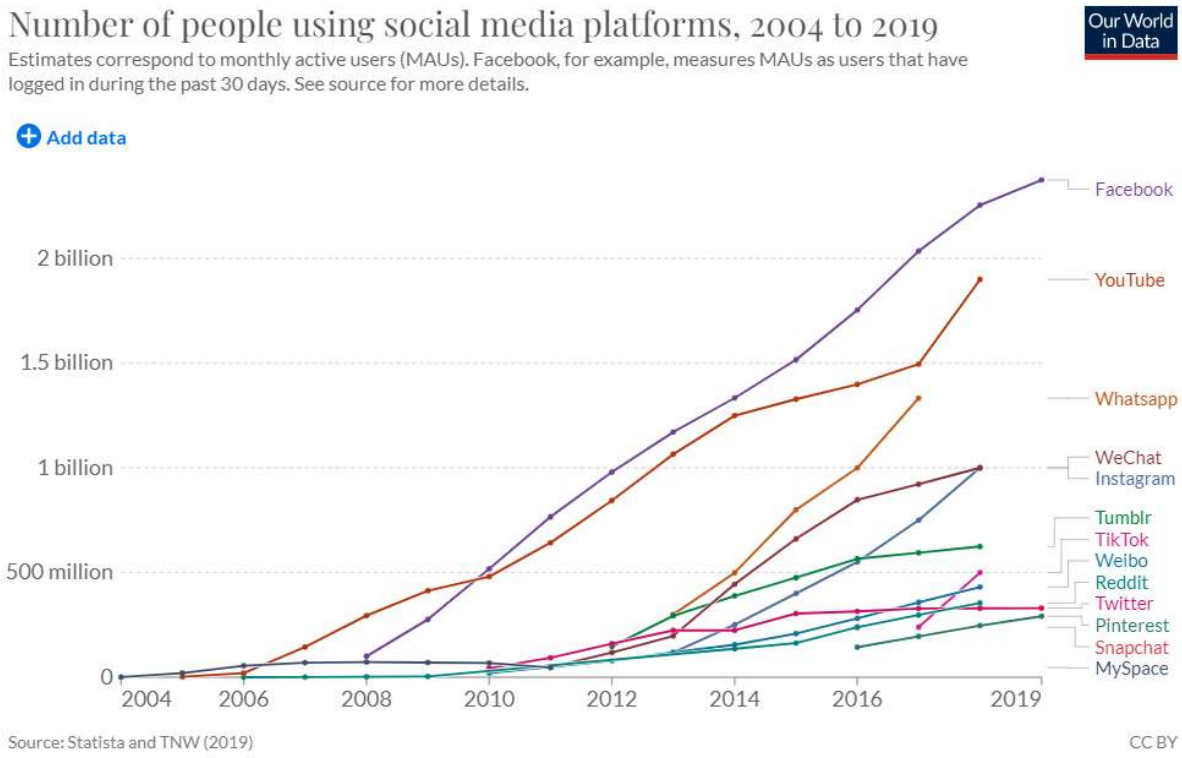
Social Media: -

An article was published by Daniel Morris around February 2022 which stated that, last year in 2021 on an average 18 to 34-year-old were running 8.4 profiles on social media. In India that average was 11.5.

58.4% of the world's population uses social media and the average daily usage is ***2 hours and 27 minutes***

The emergence of social media dates back to the early 2000s, and in 2004, MySpace became the first SNS platform to have one million active monthly users. One may argue that it was the start of social media.

The statistical data shown below demonstrates swift reversals in the other direction. Platforms that were prominent in the past have vanished. In 2008, Facebook's closest competitors were MySpace, Friendster, and Hi5, but by 2012, they held almost negligible shares. In 2006, MySpace briefly overtook Google as the most visited website in the United States, making its situation noteworthy.



The majority of social media sites that have endured the past ten years have seen substantial changes in the features that they provide to their customers. For instance, users were not initially able to contribute photographs or videos to Twitter; however, this changed in 2011, and as a result, over 50% of the material that is seen on the platform today consists of these types of media.

Body Image Statistics: -

According to a March 2019 YouGov online poll by the Mental Health Foundation, United Kingdom, 1,118 GB youths (aged 13-19) and 4,505 UK adults (18+) participated. The findings demonstrated that:

- In the last year, 20% of people experienced shame, 34% felt depressed or hopeless, and 19% were disgusted by their body image.
- Of teens, 31% felt embarrassed about their body image, and 37% felt unhappy.

- A little more than one-third of people reported that their body image had ever caused them to feel nervous (34%) or melancholy (35%).
- Among adults, one in eight (13%) reported having suicidal thoughts or feelings as a result of body image issues.
- Of adults, slightly more than one-half (21%) reported that worrying about their body image was a result of seeing pictures in advertisements.
- Forty percent of teens and slightly more than one in five adults reported that worrying about their body image was a result of social media pictures.

1.3 Theories/Model:

Biopsychosocial Theories build upon sociocultural theories that have been extensively used to examine the role of media in body image concerns.

1.4 Purpose and Significance:

This study aims to investigate how social media affects one's perception of their physique. Since social media has become so widespread and the internet is so widely accessible, practically everyone has an account on at least one social media site. People are becoming more and more prone to being exposed to unrealistic beauty standards as they spend more time online and reading through social media on different topics including food, travel, fitness, beauty, and lifestyle. Everybody is always under pressure to be the ideal size. All people, male or female, give in to these bizarre standards of beauty. The military physique is for men, whereas women have big busts, narrow waists, and broad hips. which, especially if it has resulted in disordered eating, can also cause mental health problems. Our general quality of life may be impacted by having a bad body image.

1.5.1 Aim:

To understand the impact of social media on body image issues.

1.5.2Objectives:

1. To spread body image issues awareness
2. To understand if number of hours spend on SNS can affect the degree of body image issues
3. To recognize surreal beauty standards

2. REVIEW OF LITERATURE:

Body image dissatisfaction have been constantly linked to comparison of looks. So far, many studies have shown comparison link negative body image perception and looks comparison are due to thin- ideal portrayal by mainstream media hubs. Social comparison theory suggests that people are more likely to individuals contrast themselves with those who are similar to them.

In this experiment, women through a computer program were let to change the shape of their body which was photographed earlier in response to the questions asked about self-perception about their body. The findings demonstrated that, independent of BMI, women had larger body disparities compared to the thin-ideal. (Arciszewski et al., 2012)

According to the experiment done by Cohen & Blaszczynski, its goal was to create a connection between body image and appearance comparisons. Compared to normal media photos, individuals exposed to social media photographs expressed greater unhappiness. Type of exposure was not found to moderate the relationship between comparison of looks and body image dissatisfaction. When analyzed according to the exposure type, social media images showed greater comparison of looks and image dissatisfaction than media images. (Cohen & Blaszczynski, 2015)

This research aims to conduct an experiment on correlation between social media mainly Instagram and body image dissatisfaction and fatphobia on Catlan UG students. The sample was of 200 participants both male and female and was done using 3 step experimental research study. (Aziz & Jwana, 2017)

This study was done to see a link between time spent on internet, body image satisfaction and eating disorder of students in grade 7 and 12 in Thai educational system. They took a sample of 620 students from 6 secondary schools in Bangkok using simple random sampling method. They concluded that eating disorders and the use of social media for body image content are inversely correlated with contentment with one's body image. (Kaewpradub et.al., 2017)

The aim of the study was to study the existing research dealing with impact of social media on body image issues, mostly among teenagers. Their results show importance of social media sites mainly, thin-ideal model for girls and muscular-ideal for boys for shaping the body perception of teenagers.

Body image dissatisfaction have been constantly linked to comparison of looks. So far, many studies have shown comparison between body image dissatisfaction and looks comparison are due to thin- ideal portrayal by mainstream media hubs. They concluded that the use of social media for eating disorders and body image content was connected with lower levels of satisfaction with one's body image.

In this experiment, women through a computer program were let to change the shape of their body which was photographed earlier in response to the questions asked about self-perception about their body. Results showed that women had greater body discrepancies in comparison to thin-ideal regardless of BMI. (Arciszewski et.al.,2012)

According to the experiment done by Cohen & Blaszczynski, its goal was to create a connection between body image and appearance comparisons. Compared to normal media photos, those who were exposed to social media photographs expressed more unhappiness. Type of exposure was not found to moderate the relationship between comparison of looks and body image dissatisfaction. When analyzed according to the exposure type, social media images showed greater comparison of looks and image dissatisfaction than media images. (Cohen & Blaszczynski,2015)

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Body image dissatisfaction and social anxiety are particularly common in emerging adults. They have a lot of negative influence like social adjustment and well-being. Social anxiety's core component has shown to be fear of negative evaluation but it's hardly considered in studies of body image and its effect on social anxiety. This study intents to fill the void by exploring the role of fear of negative evaluation in the relationship between body image dissatisfaction and social anxiety. (Pawijit et al., 2017)
The aim of the study was to study the existing research dealing with impact of social media on body image issues, mostly among teenagers. Their results show importance of social media sites mainly, thin-ideal model for girls and muscular-ideal for boys for shaping the body perception of teenagers. (Franchina & Coco, 2018)

3. METHODOLOGY:

3.1 Research Question:

Is there a significant relationship between social media and body image issues among young adults?

3.2 Hypothesis:

Hypothesis 1: Increase in social media use increases body dissatisfaction.
Hypothesis 2: Increase in social media use decreases body appreciation.

3.3 Variables and instruments used:

3.3.1 Variables

Variable 1: social media
Variable 2: body image issues

3.3.2 Instruments

1) Multidimensional Media Influence Scale (Cusumano & Thompson, 2001)
2) BSQ 16-B (Evans & Dolan, 1993)

3.4 Participant

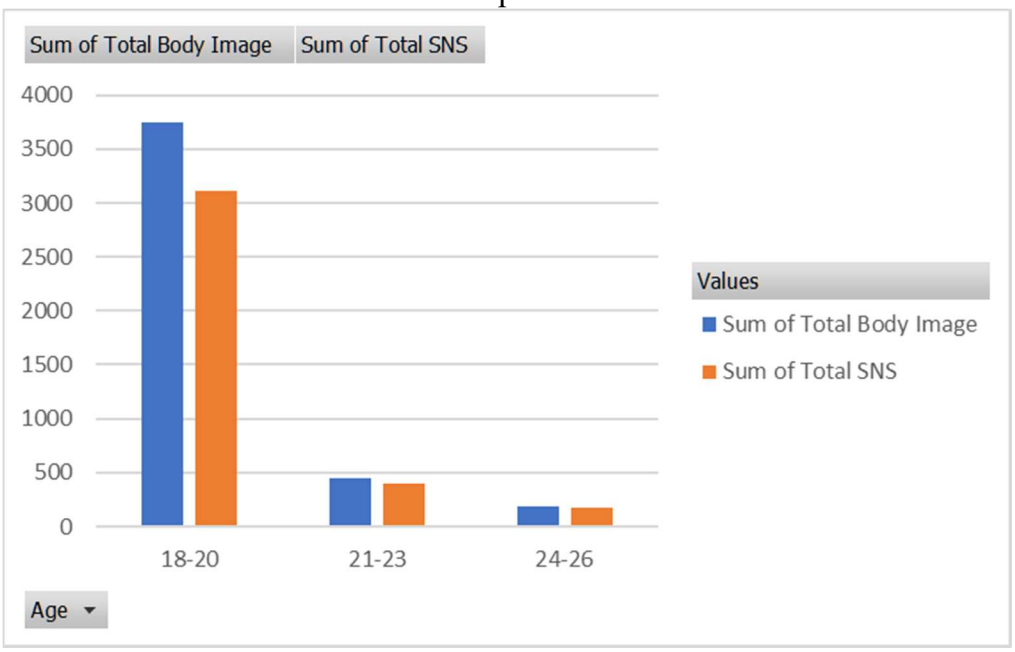
a) Sample Size
   121
b) Inclusive Criteria
   1) 18 to 26-years-old people.
   2) All gender
   3) Within India
c) Exclusive Criteria
   1) Less than 18-years-old people
   2) More than 26-years-old people
   3) Outside India
d) Design
   The type of design used within this research is quantitative using survey-based research through questionnaire. The Predictor variables (independent variable) are social media and age. The Criterion variable (dependent variable) is body image.
e) Sampling Method
   1) Non- probability sampling method: Convenience sample and snowball sample

4.RESULTS & DISCUSSION

Table. 1

Row Labels	Sum of Total Body Image	Sum of Total SNS
18-20	3746	3112
21-23	447	393
24-26	181	178
Grand Total	**4374**	**3683**

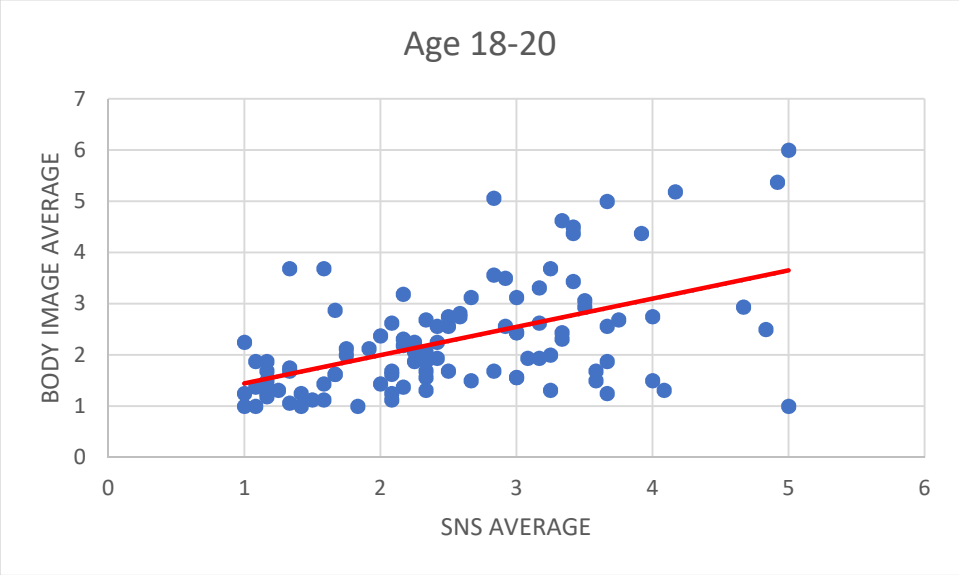
Graph 1.



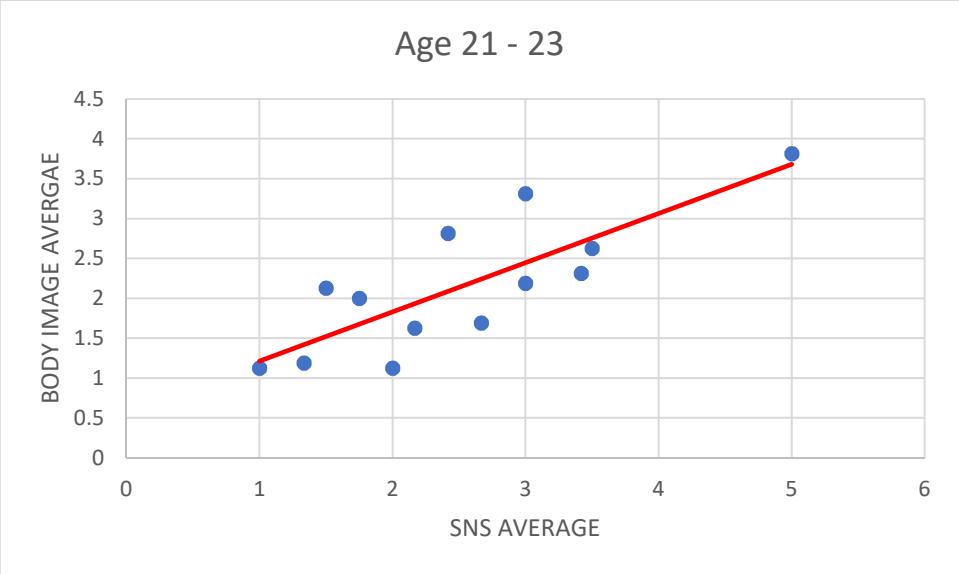
- The above bar graph shows the relation between social media/ SNS (orange) and body image (blue) at different age ranges.
- There were in total 121 participants in this research out of which 102 fell under the 18-20 age range, 13 under 21-23 and 6 under 24-26 age range.
- The sum of body image and SNS in the age range 18-20 is 3746 & 3112 respectively. (Table. 1)
- The sum of body image and SNS in the age range 21-23 is 447 & 393 respectively. (Table. 1)
- The sum of body image and SNS in the age range 24-26 is 181 & 178 respectively. (Table. 1)
- The grand total of body image and SNS being 4374 & 3683 respectively. (Table. 1)
- It is seen that young adults (18-26) suffer through body image issues but the influence of social media is not that significant overall (Graph. 1)
- Although while analysing it at an individual level the impact of social media can be seen.

5.CONCLUSION:

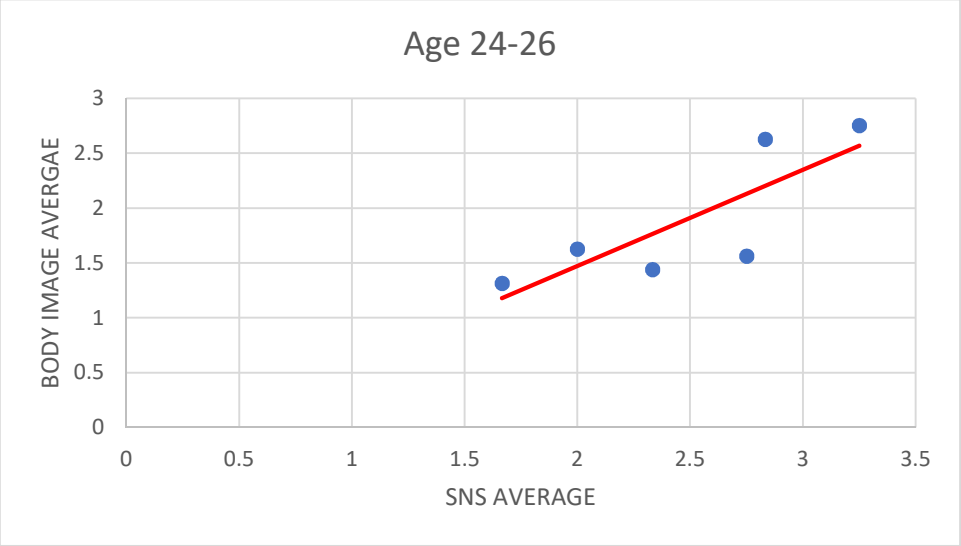
Graph. 2



Graph. 3



Graph. 4



- In graph 2, we can see a positive relation between the averages of body image and sns, but the relationship is week as the slope is steep. There is a very little influence of social media and body image issues in the age of 18-20.
- There is a negative relation between the averages of body image and sns, as the slope is very steep, in graph 3 and 4.
- But the impact of social media on body image issue can't be fully determined in the age range of 21 to 26 as the participants are less.
- But it can be concluded as there is a positive influence of social media on body image issues.
- Hence, proving the hypothesis.
  It is a positive thing that today's youth is not heavily impacted by social media. But one can't deny the existence of ideal beauty standards and body image issues. The flawed rules and far-fetched expectations about the shape, size of the body imposed on the youth is equally horrifying and illogical which can be very mentally and physically exhausting.
  We should not encourage such thoughts and beliefs in the society. People in our nation should stop comparing young those to people on TV, periodicals, and videos on social media and advise them to stop eating since it not only affects people emotionally but also physically. We need to encourage young adults to embrace their body and to feel comfortable in it. 'Every body is unique in itself' should be promoted worldwide.

5.1 Limitations:

- The questionnaire was circulated through google forms so we were not able to question and analyze the participants personally face to face.
- Few might have not filled the questionnaire on how the participants truly felt.
- Their mood during filling the questionnaire might affect how serious they were that time.
- The participants might have filled the form keeping in mind what might be socially acceptable responses.
- This questionnaire doesn't take into consideration how people who are already thin think about their body image.

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Metropolitan Metamorphosis: Examining the Ripple Effects of Migration on Navi Mumbai's Local Infrastructure

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Abstract: -

In this study, I focused into the transformative impact of migration on Navi Mumbai's local infrastructure. As people relocate to the city from various places, I aim to unravel the consequences on essential aspects such as roads, housing, and educational facilities. The objective is to comprehend how this migration influences the daily lives of both new arrivals and established residents. By closely scrutinizing these effects, I strive to identify opportunities for enhancing the urban environment and quality of life for all. My research provides a nuanced understanding of the evolving dynamics within Navi Mumbai, offering insights that can inform policymakers, urban planners, and community stakeholders. The goal is to facilitate informed decision-making for sustainable and inclusive development. Through this exploration, I contribute to the ongoing dialogue on creating a resilient and harmonious future for Navi Mumbai, considering the diverse needs and experiences of its growing population. This comprehensive investigation aims to lay the groundwork for strategic interventions that promote the overall well-being and prosperity of the community in the face of continuous urban evolution.

Keywords: *Urban Dynamics, Influx of Residents, Community Impact, Infrastructure Evolution, Socio-Economic Transitions, etc.*

Introduction: -

In the ever-changing process of urbanization, migration plays a vital role in shaping the dynamics of cities, influencing not only the lives of newcomers but also leaving an indelible mark on local infrastructure. This research embarks on a journey to explore the repercussions of migration on Navi Mumbai's local infrastructure, seeking to understand the multifaceted implications of this phenomenon. Utilizing a rigorous research methodology, a random sampling approach was adopted to collect information from the diverse and dynamic Navi Mumbai area. To ensure a representative cross-section of the population, five villages were randomly selected as the focal points for this study. Within each village, a systematic sampling technique was employed to choose 20 respondents, resulting in a comprehensive dataset drawn from a total of 100 individuals residing in Navi Mumbai.

The decision to employ a random sampling method stems from its effectiveness in capturing the heterogeneity inherent in the migrated population, allowing for a more nuanced examination of the impact on local infrastructure. By adopting this approach, the research aims to provide a balanced and unbiased representation of the varied experiences and perspectives within the selected villages. This study's primary focus is on unraveling the intricate interplay between migration and local infrastructure in Navi Mumbai, shedding light on the challenges and opportunities that emerge in the wake of population movements. As we delve into the

narratives of the selected respondents, a clearer picture will emerge, informing strategies and policies for sustainable urban development in the face of metropolitan metamorphosis.

Rationale of the Study: -

The study is motivated by the imperative to comprehend the transformative impact of migration on Navi Mumbai's local infrastructure. As urban sector continually evolve, the influx of residents from diverse backgrounds necessitates a meticulous examination of the associated consequences. This research aims to contribute vital insights that inform urban planning and policymaking. By strategically employing a random sampling method in five randomly chosen villages, the study seeks to capture the intricate socio-economic fabric resulting from migration. The findings are anticipated to furnish a comprehensive understanding of the challenges and opportunities posed by population movements, facilitating informed decisions for sustainable urban development in Navi Mumbai.

Objective of the study: -

1. To study the effects of Migration on Navi Mumbai's Local Infrastructure
2. To suggest measures to overcome the infrastructural problems arises due to migration.

Hypothesis Statement: -

Null Hypothesis (H0): There is no significant impact of migration on Navi Mumbai's Local Infrastructure.

Alternative Hypothesis (H1): There is significant impact of migration on Navi Mumbai's Local Infrastructure.

Research Methodology: -

The study is based on primary as well as secondary information. For collection of primary data, I used a schedule and interview method. I have prepared a schedule of selected questions and these questions were asked to respondents at the time of interview and data were filled in these schedules. For secondary information I have used the research papers, thesis related to my study area from the internet. Published reports of the government of India, Maharashtra and Navi Mumbai area used. Books related to migrated population and its impact on infrastructure are used as a secondary source. I have used a random sampling method for collection of information. From the Navi Mumbai area I have selected five villages randomly. From each village I have selected 20 respondents. Like this I have a total 100 respondents from Navi Mumbai.

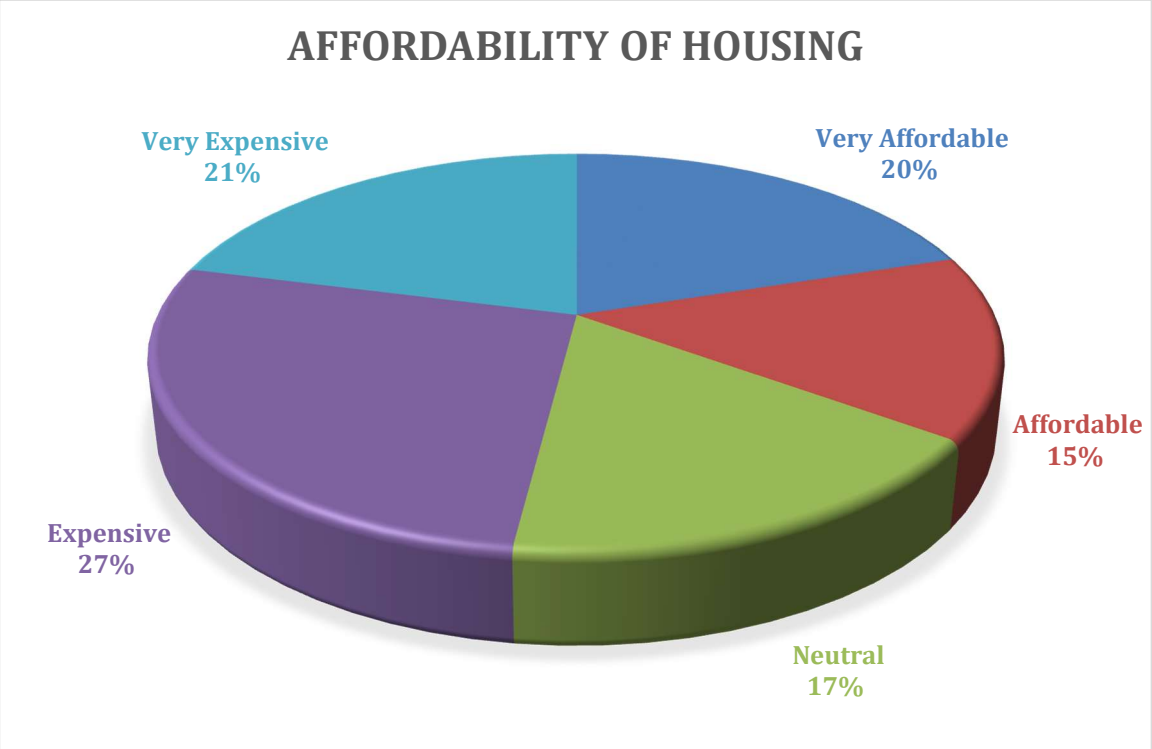
Review of existing Literature: -

1. Mahapatro, B. B., 2017, "Rural to Urban Migration in India: An Overview, Mahapatro's work provides a comprehensive overview of rural-to-urban migration in India. It delves into the key drivers, challenges, and socio-economic implications of this migration, offering valuable insights into the broader landscape of population movements within the country.
2. De, Utpal Kumar, 2016, "Impact of Migration on Socio-economic and Environmental Changes in Navi Mumbai", De's research focuses on the impact of migration on Navi Mumbai, exploring the socio-economic and environmental changes brought about by the influx of people. The study aims to understand how migration shapes the city's dynamics and contributes to broader changes in its social and environmental fabric.
3. Sengupta, Arjun, 2018, "Urban Infrastructure Development: A Comparative Analysis of Mega Cities", Sengupta's work undertakes a comparative analysis of mega cities, examining the patterns and challenges in urban infrastructure development. By comparing different urban centers, the research sheds light on the diverse approaches and outcomes of infrastructure planning and development in the context of rapid urbanization.

Data Analysis: -

1. How would you describe the affordability of housing after migrating to Navi Mumbai?

Fig. 1. Affordability of Housing



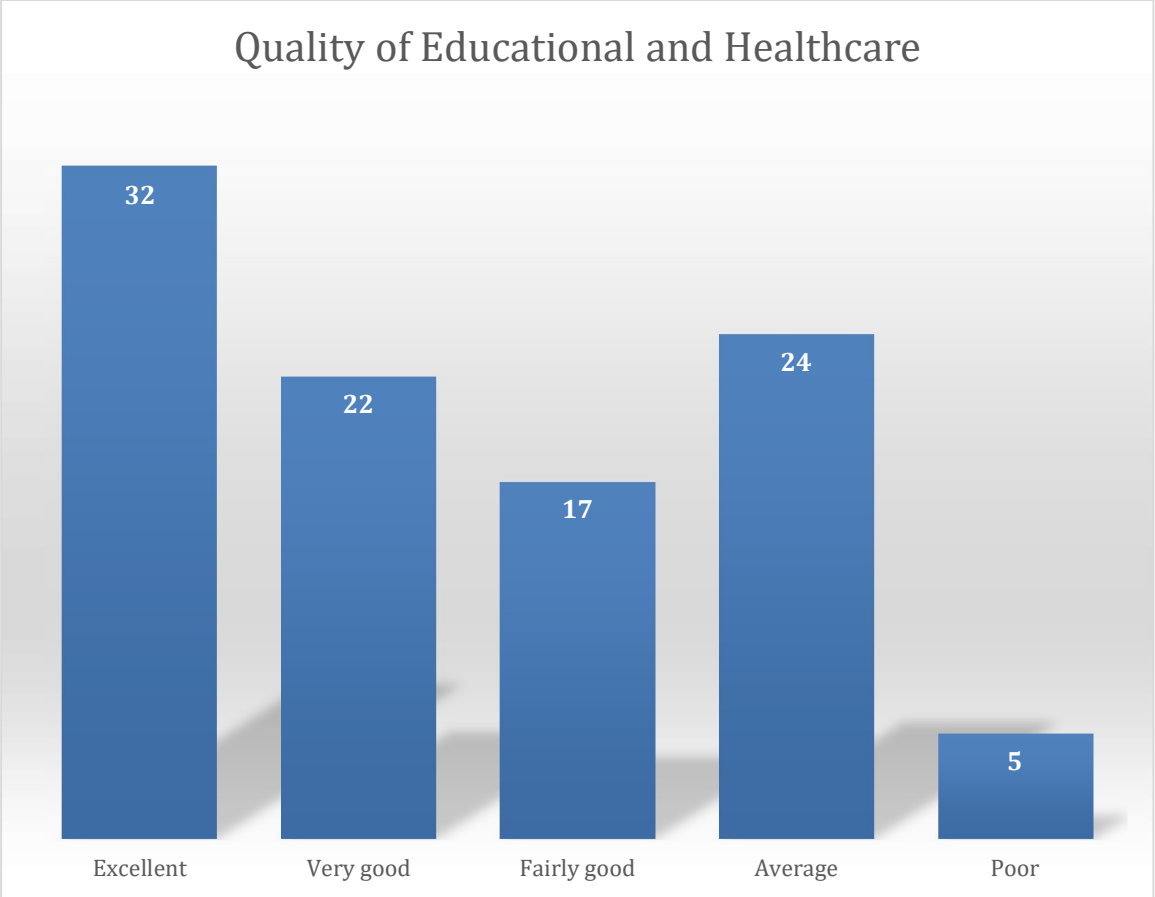
Source- Data collected through primary source

The pie chart depicting respondents' perceptions of housing affordability after migrating to Navi Mumbai offers a nuanced insight into the diverse perspectives within the surveyed population. Notably, 27% of participants describe housing costs as "Expensive," indicating a substantial portion facing challenges in finding housing within a budget. Conversely, 20% view housing as "Very Affordable," suggesting a positive outlook among a significant segment.

The "Very Expensive" category, chosen by 21%, highlights those who perceive housing at the higher end of the affordability spectrum. Additionally, 15% find housing "Affordable," signifying a balanced perspective, while 17% remain "Neutral," indicating a group with neither strongly positive nor negative perceptions. This visual representation enhances the understanding of the complexities within the migrated community's views on housing affordability in Navi Mumbai, contributing valuable insights for policymakers and urban planners.

2. What is the quality of educational and healthcare facilities in Navi Mumbai?

Fig. 2. Quality of Educational and Healthcare



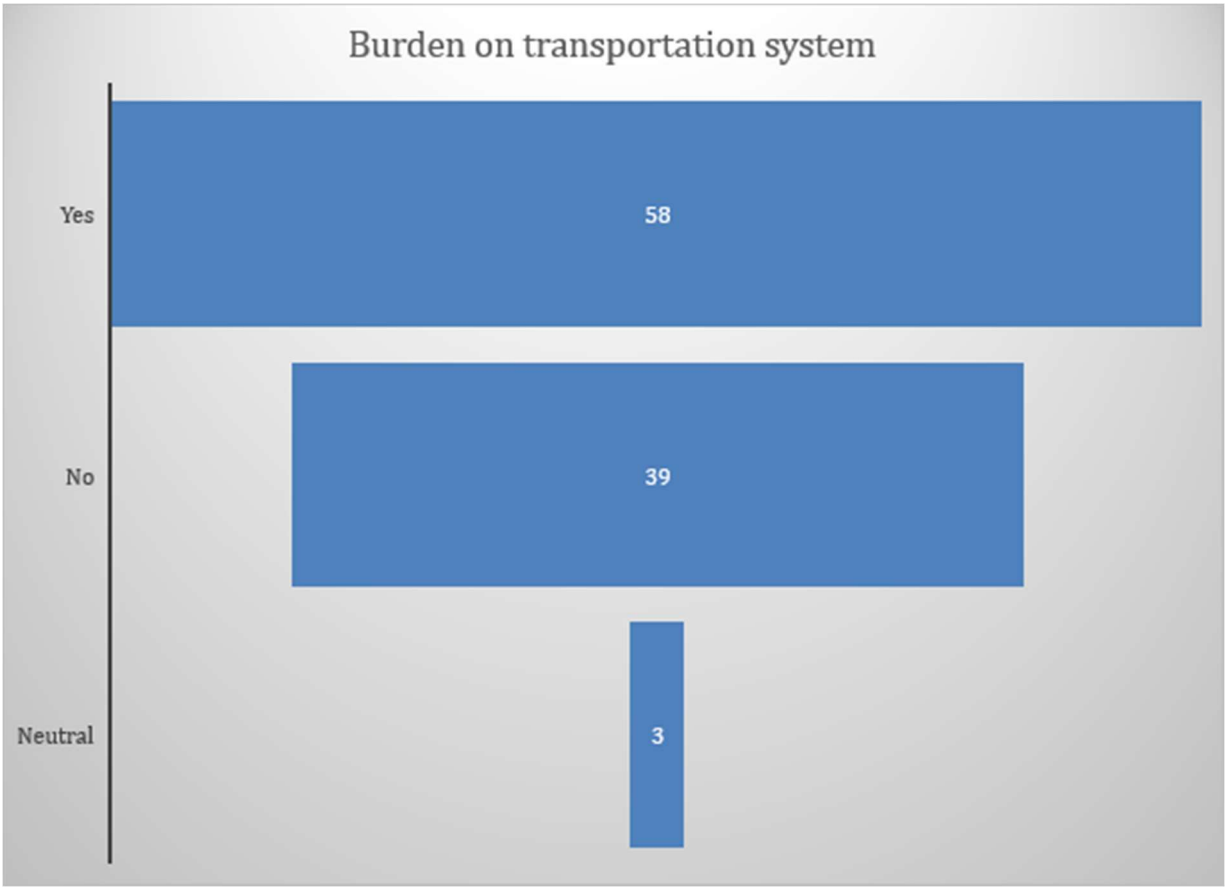
Source- Data collected through primary source

In assessing the quality of educational and healthcare facilities in Navi Mumbai, the responses from survey participants have been visually depicted through a bar chart. This chart effectively illustrates the distribution of sentiments regarding the existing facilities. The largest segment, comprising 32% of respondents, perceives the quality as "Excellent," indicating a substantial positive sentiment towards the educational and healthcare offerings in the region. Following closely, 22% of participants rate the facilities as "Very Good," reinforcing the overall positive outlook.

A notable portion, representing 17% of respondents, considers the quality to be "Fairly Good," adding nuance to the spectrum of opinions. Furthermore, 24% of participants regard the facilities as "Average," suggesting a middle-ground perception that neither strongly praises nor criticizes the existing conditions. A comparatively smaller percentage, constituting 5% of respondents, expresses a negative sentiment, labeling the quality as "Poor." While this proportion is relatively modest, it is crucial to acknowledge the diverse range of perspectives within the surveyed population.

3. Do you think that due to migration in Navi Mumbai, there is a burden on transportation system?

Fig. 3. Burden on transportation system



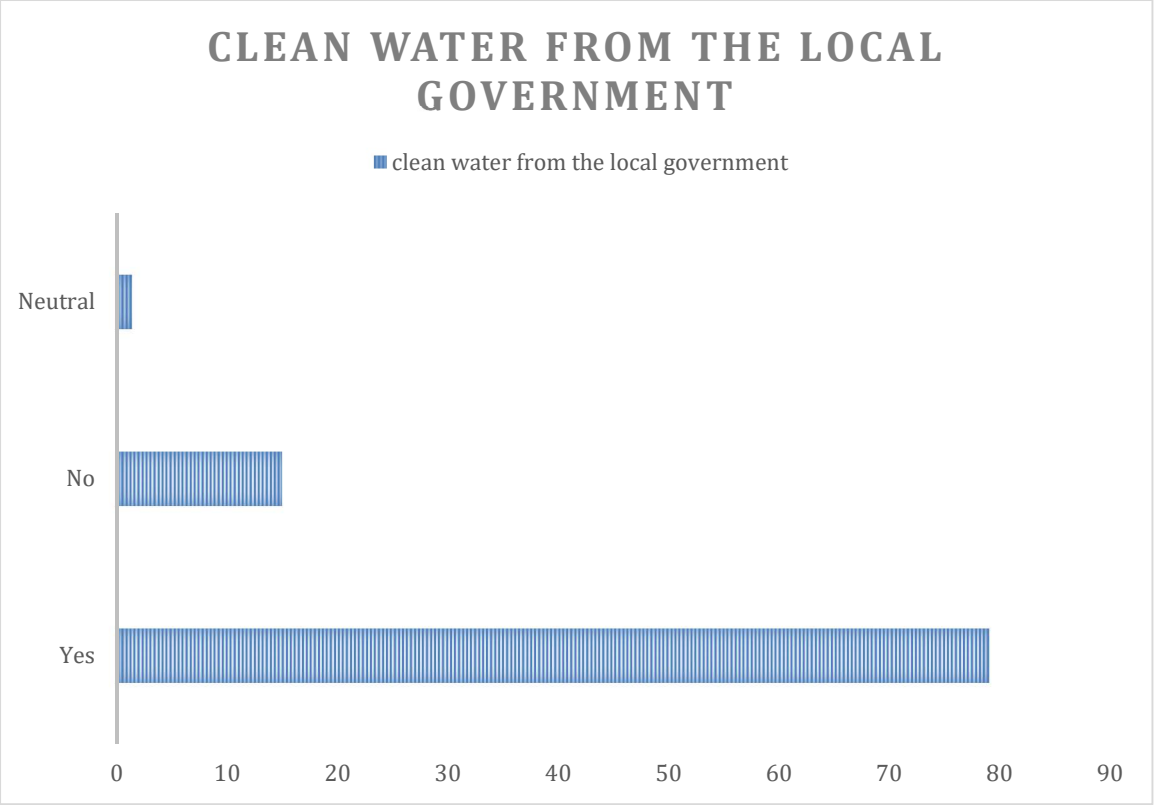
Source- Data collected through primary source

In evaluating the impact of migration on Navi Mumbai's transportation system, survey participants were asked to provide their perspectives on whether they believe there is an increased burden. The responses have been visually represented in a funnel chart, offering a clear overview of the prevailing sentiments. The majority of respondents, constituting 59%, assert that migration has indeed placed a burden on the transportation system in Navi Mumbai. This significant proportion signals a widespread concern among the surveyed population regarding the challenges posed by increased migration on the city's transportation infrastructure.

Conversely, a notable 39% of participants hold the view that migration has not substantially burdened the transportation system. This minority perspective suggests a more optimistic outlook, indicating that a considerable segment of the surveyed population perceives the transportation system as resilient and capable of accommodating the influx of migrants. A minimal 3% of respondents express a neutral stance on this matter. While this percentage is relatively small, it reflects a nuanced view within the surveyed population, acknowledging the complexity of factors contributing to the transportation dynamics in the context of migration.

4. Do you receive clean water from the local government?

Fig. 4. Clean water from the Local Government



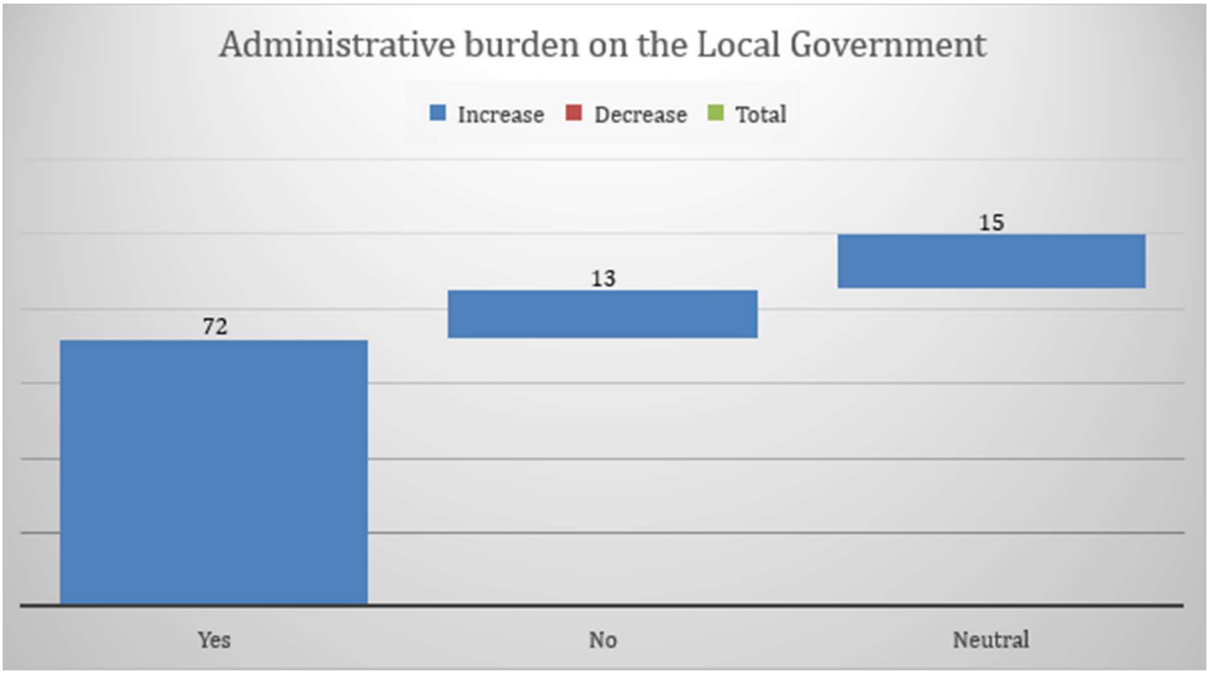
Source- Data collected through primary source

In investigating the accessibility of clean water from the local government, participants were asked to share their experiences, and their responses have been visually depicted in a bar chart for a concise representation. The preeminent portion, comprising 79% of respondents, attests to receiving clean water from the local government. This overwhelming majority suggests a prevailing positive sentiment among the surveyed population regarding the effectiveness of the local government in providing clean water services.

Conversely, a noteworthy 15% of participants indicate a lack of access to clean water from the local government. This substantial minority viewpoint highlights a segment of the surveyed population facing challenges in securing clean water, pointing to potential concerns or disparities in water supply infrastructure. A smaller yet non-negligible proportion, constituting 6% of respondents, adopts a neutral stance on the matter. This segment suggests a nuanced perspective, possibly indicative of participants who neither strongly affirm nor deny the adequacy of clean water provision by the local government.

5. Do you think that, Excessive migration has increased administrative burden on the Local Government?

Fig. 5. Administrative burden on the Local Government



Source- Data collected through primary source

In exploring the impact of excessive migration on the administrative responsibilities of the Local Government, participants were asked to express their opinions, and the outcomes have been visually represented through a waterfall chart for clarity and succinctness. The preeminent majority, accounting for 72% of respondents, assert that excessive migration has indeed escalated the administrative burden on the Local Government. This substantial percentage underscores a widespread concern within the surveyed population about the challenges and increased workload faced by the local administration due to migration.

Conversely, a relatively modest 13% of participants hold the view that excessive migration has not significantly heightened the administrative burden. This minority perspective suggests a more optimistic outlook, indicating that a segment of the surveyed population perceives the local administration as effectively managing the challenges associated with increased migration. An additional 15% of respondents adopt a neutral stance on the matter. This segment implies a nuanced viewpoint within the surveyed population, acknowledging the complexities surrounding the impact of excessive migration on the administrative responsibilities of the Local Government.

Conclusion: -

The survey findings indicate a prevailing positive sentiment among respondents regarding the provision of clean water by the local government (79% approval). However, concerns emerge regarding the impact of excessive migration on administrative burden, with a significant majority (72%) expressing apprehension. The quality of educational and healthcare facilities garners favorable reviews, with 54% rating them as "Excellent" or "Very Good." These insights underscore the multifaceted challenges and opportunities arising from migration in Navi Mumbai, necessitating strategic interventions to ensure sustainable urban development, address administrative burdens, and enhance essential services.

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Ecotourism Unveiled: Nurturing Sustainability in Natural Paradises

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Abstract:

Ecotourism, defined as responsible travel to natural areas fostering environmental conservation, community well-being, and visitor education, has garnered substantial attention for its potential to align tourism with sustainability goals 8.9 and 12. This research delves into the nuanced dimensions of ecotourism, exploring its role in fostering sustainable development while preserving delicate ecosystems. By examining its principles, benefits, and challenges, this paper aims to illuminate effective management strategies for achieving a harmonious balance between environmental conservation and economic prosperity. The paper also attempted to highlight institutional efforts for development of ecotourism through some case studies.

Keywords: Sustainable tourism, ecotourism, global tourism, community engagement and environmental conservation.

Introduction: Ecotourism has emerged as a pivotal force in the global tourism landscape, transcending traditional paradigms. This section introduces the concept, emphasizing its significance in promoting responsible travel practices that contribute to the preservation of natural environments and local communities.

Principles of Ecotourism: Understanding the foundational principles guiding ecotourism is essential for comprehending its objectives. This section elucidates key principles such as environmental sustainability, cultural sensitivity, and community engagement, laying the groundwork for the subsequent analysis.

Benefits of Ecotourism: Exploration of the multifaceted benefits derived from ecotourism is crucial for appreciating its positive impacts. This section delves into the economic, environmental, and socio-cultural advantages of ecotourism, showcasing its potential to foster sustainable development in natural paradises.

Challenges in Ecotourism: Identifying and analyzing the challenges faced by ecotourism initiatives is imperative for devising effective solutions. This section discusses issues such as over-tourism, greenwashing, and ethical concerns, highlighting the need for proactive management strategies.

Certification and Standards: Certification programs and standards play a vital role in ensuring the credibility and authenticity of ecotourism initiatives. This section examines global and regional certification bodies, emphasizing their contribution to maintaining ethical and sustainable practices within the industry.

Role of Stake holders in Ecotourism:

i. Government and NGO Involvement: Governments and non-governmental organizations (NGOs) are instrumental in shaping ecotourism policies and practices. This section explores their roles, emphasizing the importance of collaborative efforts for the effective management of ecotourism initiatives.

ii. Community Engagement and Empowerment: Involving local communities in decision-making processes is critical for the success of ecotourism. This section explores the significance of community engagement and empowerment, ensuring that the benefits of ecotourism are equitably distributed.

Principles of Ecotourism in practice: Case Studies

Examining successful ecotourism initiatives through case studies provides practical insights into effective management practices. This section presents notable examples, showcasing best practices and lessons learned from different regions.

Case Study - 1: Periyar Tiger Reserve, Kerala: Community-Led Conservation

Background: Periyar Tiger Reserve, located in the Western Ghats of Kerala, is renowned for its diverse flora and fauna, including the Bengal tiger. The ecotourism initiatives here emphasize community involvement and sustainable practices.

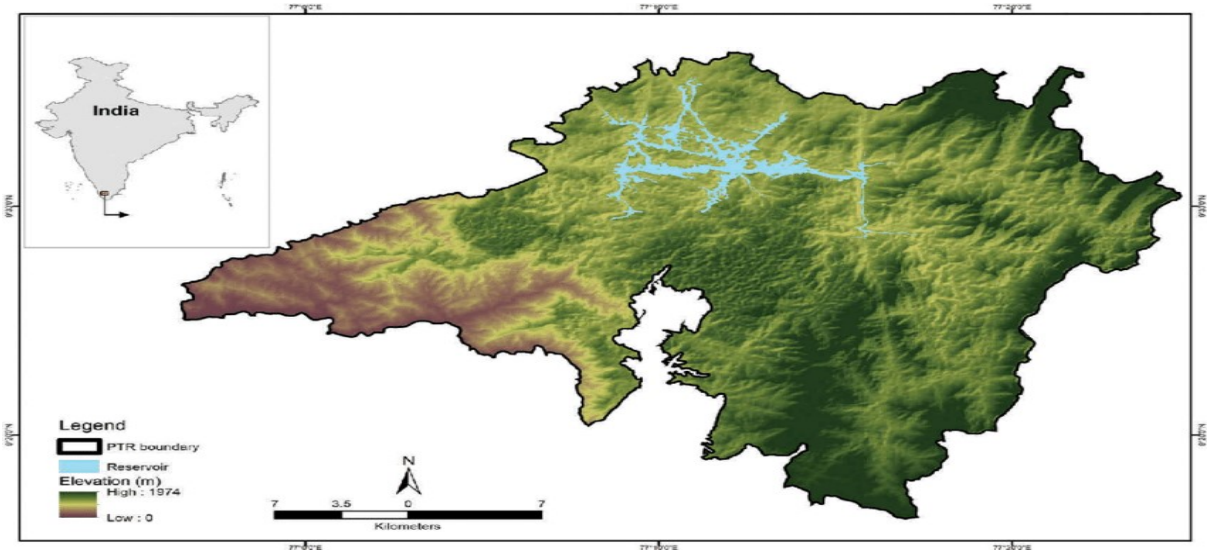
Key Features:

- Community Involvement: Local communities actively participate in ecotourism activities, providing guided nature walks, bamboo rafting, and cultural programs.

- Alternative Livelihoods: The reserve has introduced alternative livelihood programs, such as spice plantations and eco-friendly handicrafts, providing additional income to local communities.

- Conservation through Tourism: Revenue generated from ecotourism activities directly contributes to conservation efforts and anti-poaching measures.

Outcome: Periyar Tiger Reserve's community-led ecotourism has not only enhanced the local economy but also fostered a sense of ownership among communities, leading to better wildlife conservation.



Case Study - 2: Hemis High Altitude National Park, Ladakh: Biodiversity Conservation

Background: Hemis National Park, situated in the high-altitude regions of Ladakh, is home to the endangered snow leopard. The park's ecotourism initiatives aim to conserve biodiversity while promoting responsible tourism.

Key Features:

- Snow Leopard Tourism: The park offers guided treks for wildlife enthusiasts to spot the elusive snow leopard, contributing to awareness and conservation.

- Community Engagement: Local communities are involved in ecotourism activities, providing homestays, guided tours, and traditional cultural experiences.

- Research Collaboration: Ecotourism funds support scientific research on snow leopards, contributing valuable data to global conservation efforts.

Outcome: Hemis National Park's ecotourism approach has not only helped in snow leopard conservation but has also empowered local communities and enhanced scientific understanding of high-altitude ecosystems.

Case Study - 3: Sundarbans Mangrove Forest, West Bengal: Sustainable Mangrove Tourism

Background: The Sundarbans, the largest mangrove forest in the world, is a UNESCO World Heritage Site. Ecotourism initiatives in the Sundarbans focus on sustainable practices, emphasizing the unique mangrove ecosystem.

Key Features:

- Eco-sensitive Tourism: Tour operators adhere to strict guidelines to minimize disturbance to wildlife and ecosystems during boat tours.

- Cultural Experiences: Ecotourism programs include visits to local villages, allowing tourists to experience the unique culture of the Sundarbans.

- Mangrove Conservation: Revenue generated is reinvested in mangrove conservation projects, addressing challenges such as climate change and habitat degradation.

Outcome: Sundarbans' sustainable mangrove tourism has not only provided economic opportunities to local communities but has also contributed to the conservation of this critical and fragile ecosystem.

Case Study - 4: Khonoma Village, Nagaland: Community-Managed Conservation

Background: Khonoma, a Naga village in Nagaland, has gained recognition for its community-led conservation efforts. The village integrates traditional practices with ecotourism to promote conservation and sustainable development.

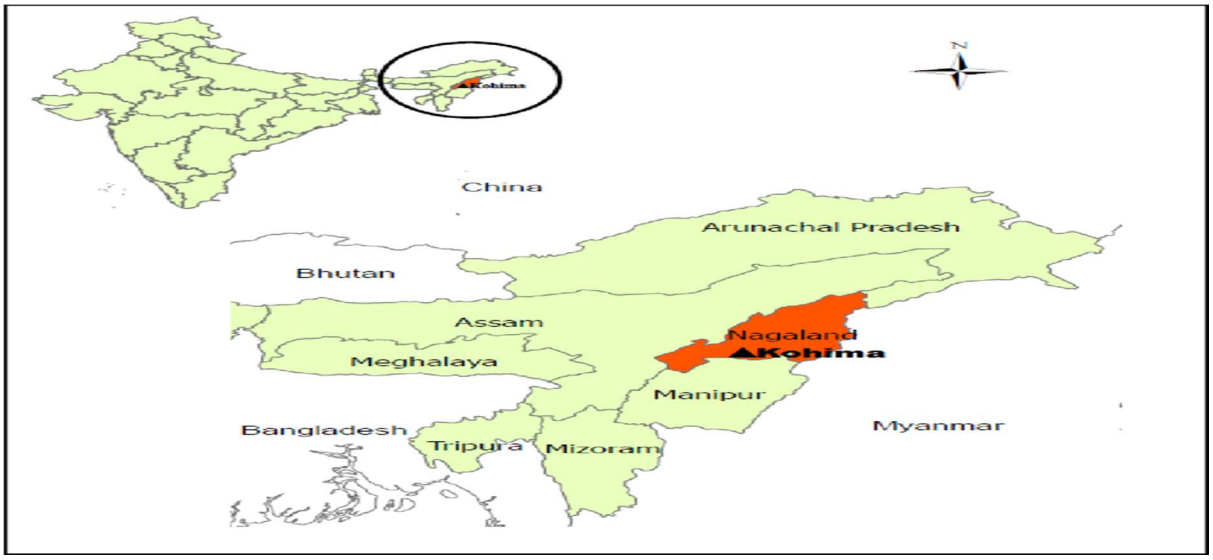
Key Features:

- Cultural Ecotourism: Tourists experience traditional Naga culture, including folk dances, traditional crafts, and village tours.

- Biodiversity Conservation: The village has designated community-managed forests, protecting flora and fauna and promoting sustainable harvesting practices.

- Conservation Fee: Visitors contribute to a conservation fee, directly benefiting community initiatives and environmental preservation.

Outcome: Khonoma's community-managed ecotourism has not only preserved the rich Naga heritage but has also demonstrated that integrating traditional practices with modern conservation can be a successful model for sustainable development.



These case studies from different regions of India showcase the diversity of successful ecotourism initiatives. They illustrate the importance of community involvement, biodiversity conservation, and sustainable practices in achieving a delicate balance between tourism and the preservation of natural and cultural heritage.

Recommendations:

The paper intends to recommend for the future management of ecotourism initiatives.

- Creating awareness about eco-tourism by sharing their experience through social media.
- Global collaboration for spreading conservation and sustainable tourism awareness.
- Emphasis needs to be placed on the importance of ongoing education, stakeholder collaboration, and the integration of technology for sustainable ecotourism practices.
- Research and development may be promoted to explore potential destinations for ecotourism.
- Government should add ecotourism as one of the key areas under Corporate Social Responsibility (CSR) guidelines so as to promote corporates for enhancement of ecotourism initiatives.
- Ecotourism may be popularised through advertisements and campaigns though ITDC (Indian Tourism Development Corporation).
- Government can frame policies to encourage participation of local people in development of ecotourism destinations.

Conclusion:

"Ecotourism Unveiled: Nurturing Sustainability in Natural Paradises" underscores the pivotal role of ecotourism in fostering sustainable development. Through a comprehensive exploration of its principles, benefits, and challenges, this research contributes to the ongoing discourse on responsible tourism practices, guiding the future management of ecotourism initiatives towards a harmonious coexistence between humanity and the natural world.

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Advancing Agriculture: Unveiling Trends, Challenges, and the Future of Vertical Farming in India and Beyond

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Abstract:

This study provides a comprehensive overview of the latest trends in modern farming in both India and globally. The research includes a comparative analysis of the benefits and achievements derived from modern farming practices versus traditional methods. Emphasis is placed on the challenges faced during the adoption and implementation of these modern techniques. The primary focus of the study is on Vertical Farming technologies and their future potential, addressing how they could bridge the ever-growing gap between food production and consumption. The data also highlights major Vertical Farming companies in India and evaluates their performance over the years. Projections indicate that the Vertical Farming market is expected to reach USD 27.42 Billion by 2030, with a CAGR of 27.3% during this period.

Drawing from the NAAS report on Vertical Farming, this research delves into the history of Vertical Farming, covering salient features, innovations, & sustainable ventures in India. It provides insights into the major crops grown using this technology, along with details about the structures and engineering inputs in this modern agricultural field. The study also sheds light on water and nutrient management efficiency in Vertical Farming, addressing the development and standardization of Drip irrigation and fertigation, as well as researchable issues related to Bio-stress. The final analysis & conclusion focus on the economics of vertical farming, challenges faced in India, and the future prospects of this advanced technology in the country.

Keywords: Vertical Farming, Hydroponics, Agriculture, India, World, Technology.

1. Introduction:

Modern Farming:

The term “modern farming” refers to the application of modern technology and practices to increase the agricultural output. Farming is very critical to the advancement of human civilization and welfare. Things have changed very drastically over the years in the agriculture and farming domain.

Farmers especially have now begun to understand the modernity of agricultural systems and the growing need for the use of modern techniques in agriculture.

Modern agriculture is an ever-changing approach to agricultural innovations and farming practices that helps farmers increase the efficiency and reduce the amount of natural resources

needed to meet the world's food, fuel and fiber demands. Modern farming practices allow farmers to increase productivity while decreasing environmental impact.

Modern agriculture is further driven by continuous improvement, using technology, digital tools and data and so on.

The importance of innovation in modern agriculture has grown significantly. The industry faces substantial challenges, including escalating costs of supplies, labor shortages, and shifts in consumer preferences towards transparency and sustainability. Agriculture corporations worldwide are increasingly acknowledging the urgency of finding immediate solutions to address these challenges. Fortunately, agriculture technology, also known as ag-tech, has emerged as a solution.

Ag-tech, a novel concept, involves the utilization of technology in farming and agricultural practices to enhance efficiency, productivity, and sustainability in food production. This encompasses various technologies such as precision agriculture, smart irrigation, biotechnology, and automation. Additionally, there have been notable technological advancements in indoor vertical farming, livestock technology, modern greenhouse practices, artificial intelligence, and blockchain, offering numerous benefits over traditional methods.

Indoor vertical farming, for instance, can boost crop yields, overcome limited land constraints, and reduce environmental impact by shortening the supply chain. This practice involves growing stacked produce in a controlled environment, minimizing the land space required compared to traditional farming. In some setups, vertical agriculture eliminates the need for soil, with hydroponic and aeroponic methods providing alternatives for nutrient-rich water and systematic spraying of water and nutrients on plant roots.

The advantages of indoor vertical farming are evident, from sustainable urban growth to increased crop yields and reduced labor costs. The technology allows precise control of variables like light, humidity, and water, ensuring year-round production with reliable harvests. Robotic assistance in harvesting, planting, and logistics further alleviates labor shortages in the agriculture industry.

Technological advancements in agriculture extend to various areas, including fertilizers, pesticides, seed technology, and more. Biotechnology and genetic engineering contribute to pest resistance and enhanced crop yields, while mechanization streamlines tilling and harvesting, reducing manual labor. Improvements in irrigation methods, transportation systems, and processing machinery further minimize wastage across the board.

Modern agriculture focuses on cutting-edge technologies such as robotics, precision agriculture, artificial intelligence, and blockchain. Looking back at the Green Revolution in 1960, India achieved foodgrain self-sufficiency by embracing modern agricultural methods like chemical fertilizers, pesticides, superior seeds, and proper irrigation. Over time, technological advances in India included the introduction of tractors, innovative tillage and harvesting equipment, irrigation methods, and air seeding technology, all contributing to improved food and fiber quality.

Farmers today can harness scientific data and technology to optimize crop yields and stay informed about the latest farming methods.

The Environmental Impact of Contemporary Agriculture: -

Critics often highlight the adverse effects of modern agriculture on the environment, particularly emphasizing issues like soil degradation, water pollution, and greenhouse gas emissions, which are major contributors to climate change.

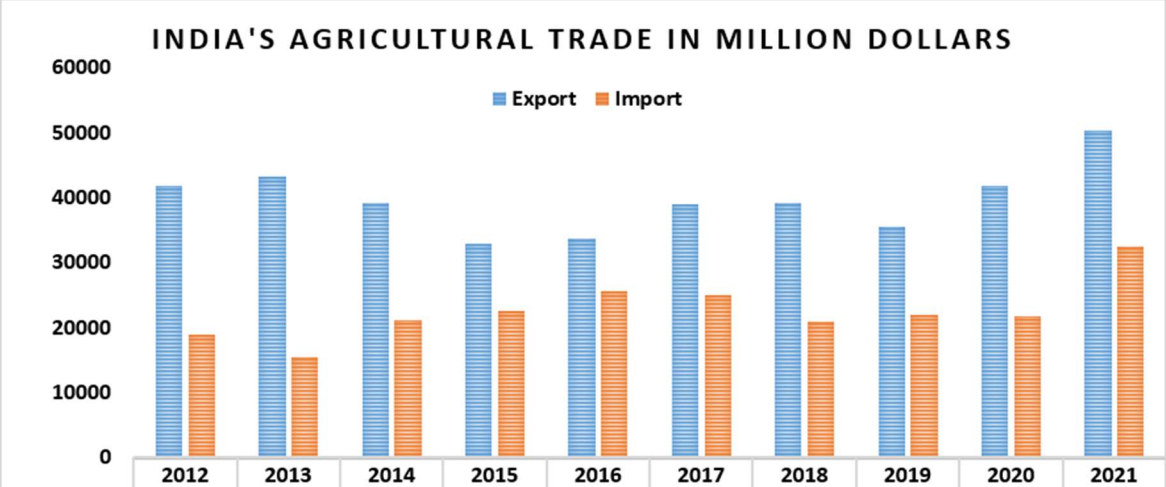
Pesticide Use: One of the most significant environmental impacts of modern agriculture is the use of pesticides. While pesticides are employed to eliminate insects harmful to crops, they pose a threat to birds, bees, and other animals that consume treated insects or plants.

Soil Pollution and Degradation: Fertilizers, integral to modern agriculture for enhancing plant growth, often contain chemicals that can lead to soil pollution if not disposed of properly. Soil degradation, resulting from activities like deforestation and intensive cultivation, diminishes soil quality, affecting fertility, structure, and water-holding capacity. This can lead to reduced crop yields, increased plant susceptibility to diseases, loss of biodiversity, and diminished carbon storage capacity.

Slash-and-burn techniques, employed in certain regions for clearing fields, contribute to rapid topsoil destruction and significant carbon emissions, exacerbating global warming.

Water Pollution: Modern agriculture heavily relies on irrigation systems that draw substantial amounts of water from rivers or groundwater wells. This can lead to water shortages in specific areas and cause flooding due to erosion caused by excessive fertilizer use.

Greenhouse Gas Emissions: The energy-intensive nature of modern agriculture contributes to greenhouse gas emissions. Livestock production, rice cultivation, land clearing, and burning for new fields release methane, contributing to global warming. A report estimates that modern agriculture is responsible for up to 25% of global greenhouse gas emissions, encompassing carbon dioxide from soil respiration, nitrous oxide from fertilizers, methane from livestock, and emissions from deforestation due to expanded farming activities.

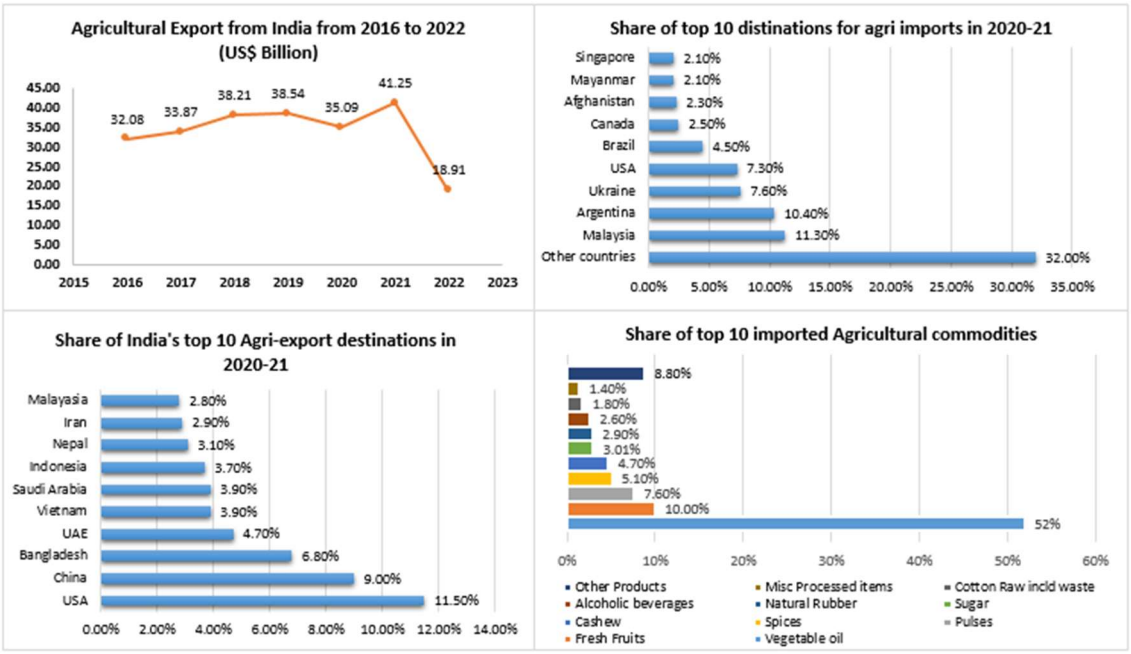


	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Export	41726.33	43251.66	39080.43	32808.64	33696.83	38897.21	39203.53	35600.47	41895.68	50240.21
Import	18978.33	15528.94	21151.77	22578.6	25643.4	24890.9	20920.34	21859.99	21625.05	32422.3

Source - https://www.ibef.org/economy (2022)

Indian agriculture has gone through a lot of changes for the export of its agricultural products.

The largest importers of India's agricultural products are India's neighbours like **Bangladesh, UAE, USA, Vietnam, Saudi Arabia, Nepal, Malaysia, and Indonesia.** The other importing countries are **Iran, Egypt, Iraq, and China.**



Source - https://www.ibef.org/economy (2022)

Indian agriculture has undergone significant transformations to facilitate the export of its agricultural goods.

Primary recipients of India's agricultural products include neighbouring countries such as Bangladesh, the UAE, the USA, Vietnam, Saudi Arabia, Nepal, Malaysia, and Indonesia. Additionally, countries like Iran, Egypt, Iraq, and China are also among the importers of Indian agricultural products.

In the fiscal year 2021-22, Bangladesh emerged as the foremost importer of Indian agricultural products, accounting for a substantial US$ 2.83 billion and comprising 11.46% of the total exports. Bangladesh holds a prominent position as the leading importer of agricultural and allied products, with a total import value of US$ 3.8 billion, closely followed by the UAE at US$ 2.3 billion. Meanwhile, the United States and China stand out as significant importers of India's marine products.

The Indian government has established thirteen Agri-Cel ls within Indian embassies across various countries, including Vietnam, the USA, Bangladesh, Nepal, UAE, Iran, Saudi Arabia, Malaysia, Indonesia, Singapore, China, Japan, and Argentina. These Agri-Cells operate to offer real-time insights aimed at enhancing Indian exports in these destinations. Their objectives encompass the promotion of trade, tourism, technology, and investment goals, facilitating a dynamic approach to furthering India's global agricultural engagement.

2. Objectives:

Following are the objectives of this study:-

1. To discuss about the methods, benefits and challenges of vertical farming.
2. To discuss about the cost benefit analysis of vertical farming.

3. Research Methodology:

This study is based on secondary data taken majorly from the below source websites and research articles:

- datamintelligence

- Krishijagran
- Researchgate
- Ibef.org (India Brand Equity Foundation) etc.

4. Review of Literature:

John Ikerd, University of Missouri, Columbia in his research article published on 2021-02-03, titled THE ECONOMIC PAMPHLETEER: Realities of regenerative agriculture, provides an assessment and analysis on regenerative agriculture which is a fairly latest phase in the sustainable agriculture movement. He opined that agriculture that does not meet the needs of the present is not good enough—for present or future generations and cannot be rightfully called as sustainable. Regenerative farming includes means and methods such as utilization of plant photosynthesis to sequester carbon, restore soil health, increase crop resilience, and restore the nutrient density of foods (Definition in The Carbon Under-ground & Regenerative Agri-culture Initiative, 2017). He emphasizes in his study that the communities and societies should willingly come together to make it economically feasible for farmers to create and sustain negentropic farming systems, which would in turn create a global culture of regenerative farming and agriculture.

Italian authors Bernardo Corrado de Gennaro and Maria Bonaventura Forleo, in their research article titled Sustainability perspectives in agricultural economics research and policy agenda, published 30th July, 2019, explores on the adoption of sustainable innovation in the food supply chain, developing models that assess the effect of climate changes on farm production, and also including impacts of "carbon footprint" and "winescape esthetic." The research papers used for their study discuss issues, propose future approaches that become a useful guide for future agriculture policies and developments.

5. Vertical farming- Methods, benefits and challenges:

Modern Methods Of Farming

This includes the following:

Aeroponics: Aeroponics is a method of growing plants without soil, where plant roots are suspended in an air or mist environment and are periodically misted with nutrient-rich water solution.

Aquaponics: Aquaponics is a sustainable farming method that combines aquaculture (raising fish) and hydroponics (growing plants in water), where fish waste provides nutrients for the plants, and the plants help purify the water for the fish.

Hydroponics: Hydroponics is a soilless farming technique where plants are grown in a nutrient-rich water solution, with their roots directly immersed or suspended in the solution, allowing for precise control over nutrient levels and environmental conditions.

Monoculture: Monoculture refers to the practice of cultivating a single crop species over a large area of land, often repeated over several consecutive seasons, which can lead to soil depletion, pest outbreaks, and loss of biodiversity due to lack of crop rotation

The agricultural sector in India is witnessing rapid technological advancements, yet it grapples with various challenges affecting productivity and sustainability. Here are key issues faced by the sector:

- Limited access to credit and financial services poses a significant hurdle for small and marginal farmers. Without affordable credit, they struggle to invest in essential modern farming equipment, quality seeds, and fertilizers, thereby limiting their productivity.
- The prevalence of small landholdings among average farmers leads to fragmented and uneconomical farming practices. This fragmentation makes it difficult for them to

embrace modern agricultural methods and technologies, ultimately resulting in lower productivity levels.

- Many Indian farmers still rely on traditional and outdated farming techniques, mainly due to limited access to information and a lack of awareness about modern practices. Resistance to change further impedes the adoption of advanced farming methods.
- India's agriculture sector heavily depends on monsoon rains, leaving it susceptible to droughts and irregular rainfall patterns. Inadequate access to irrigation facilities exacerbates this vulnerability, especially in regions with scarce water resources.
- Soil degradation and erosion are exacerbated by improper land use practices, excessive chemical inputs, and insufficient soil conservation measures. These issues lead to reduced soil fertility, increased susceptibility to pests and diseases, and ultimately, diminished agricultural productivity.
- Inadequate agricultural infrastructure, including insufficient storage and cold chain facilities, as well as limited rural road networks, contribute to post-harvest losses. These deficiencies increase production costs and hinder farmers' ability to fetch fair prices for their produce.
- Farmers in India often face market volatility and price fluctuations due to ineffective market linkages and intermediaries, as well as a lack of reliable price information. This leaves them vulnerable to exploitation and uncertain returns on their investments.
- Climate change and natural disasters, such as floods, cyclones, and droughts, pose significant challenges to the agriculture industry in India. These events can result in crop losses, livestock mortality, and increased vulnerability for farmers.
- Limited access to agricultural extension services, modern technologies, and scientific research impedes the adoption of innovative practices among farmers. Better dissemination of knowledge, training, and affordable technology solutions tailored to their needs are essential.
- Farmers often lack representation and empowerment in policy-making processes, leading to policies and initiatives that may not effectively address their specific challenges. Empowering farmers and involving them in decision-making processes is crucial for designing effective agricultural policies.

The challenges facing vertical farming in the country are diverse and cover various aspects related to education and training, technology and infrastructure, economic and policy issues, climate and environmental factors, and psycho-social aspects.

Addressing these challenges will likely require a multi-faceted approach involving education and training programs, improved technology and infrastructure, supportive economic policies, climate-resilient farming practices, and efforts to enhance the socio-psychological aspects of farming as a profession. Collaborative efforts from government, non-governmental organizations, and the community will be essential for sustainable solutions.

6. Data Analysis and Interpretation:

Cost-Benefit Analysis of Hydroponics in India:

1. Initial Investment Costs:

Infrastructure Setup: Initial setup costs for hydroponic infrastructure can range from INR 1 lakh to several lakhs, depending on the scale and sophistication of the system.

Technology Acquisition: Advanced technologies such as automated monitoring systems and climate control systems can cost between INR 50,000 to INR 5 lakhs or more, depending on the system's complexity.

Labor Costs: Labor costs for system setup, maintenance, and monitoring can vary but typically constitute a significant portion of the initial investment.

2. Operational Costs:

Nutrient Solutions: The cost of nutrient solutions varies depending on the type and quantity required. Annual expenditure on nutrient solutions can range from INR 50,000 to INR 5 lakhs or more for commercial-scale hydroponic farms.

Energy Consumption: Annual electricity costs for operating lighting, pumps, and climate control systems can range from INR 1 lakh to INR 10 lakhs or more, depending on the farm's size and energy efficiency measures.

Maintenance: Annual maintenance costs for equipment, nutrient replenishment, and pest control measures can range from INR 50,000 to INR 5 lakhs, depending on the farm's scale and complexity.

3. Benefits:

Higher Yields: Hydroponic systems can achieve 2 to 10 times higher yields compared to traditional farming methods, depending on the crop and growing conditions.

Water Efficiency: Hydroponic systems typically use 70-90% less water compared to soil-based agriculture, making them highly water-efficient.

Space Utilization: Vertical hydroponic systems can increase crop yields per square meter of land by up to 10 times compared to traditional farming methods.

Quality and Consistency: Hydroponically grown produce often commands premium prices in the market due to its superior quality, consistency, and longer shelf life.

Reduced Environmental Impact: Hydroponic farming can reduce water usage by up to 90% and eliminate the need for chemical fertilizers and pesticides, leading to a significant reduction in environmental impact.

4. Return on Investment (ROI):

Long-term Perspective: While ROI can vary depending on various factors, hydroponic farming ventures typically aim to achieve payback periods ranging from 2 to 5 years.

Market Demand: Growing consumer demand for fresh, locally grown, and pesticide-free produce can drive premium pricing and enhance the ROI for hydroponic farmers.

Government Support: Government subsidies, grants, and incentives for sustainable agriculture and technology adoption can help reduce initial investment costs and improve ROI.

5. Future Outlook:

Technological Advancements: Ongoing research and development in hydroponic technology are expected to lead to cost reductions, efficiency improvements, and productivity enhancements, further enhancing ROI.

Market Expansion: With increasing awareness and demand for hydroponically grown produce, the market for hydroponics in India is expected to expand rapidly, offering lucrative opportunities for investors and farmers alike.

Below is the breakdown of the one-time setup cost for hydroponic farming in an area of 5000 square feet in India:

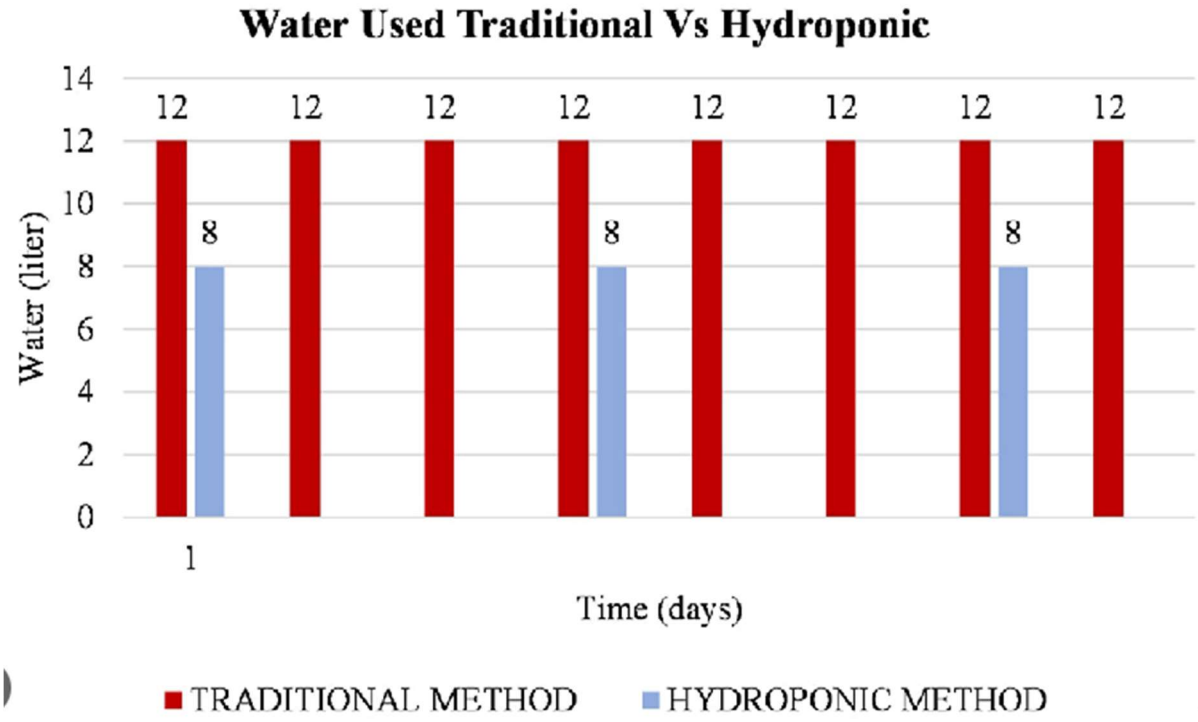
One-Time Setup Costs:

Polyhouse Shelter: Rs 6,00,000 which provides a controlled environment for crops, protecting them from adverse weather conditions and pests.

NFT System Setup: 4-Inch Pipes: Rs 7,00,000- main channels for nutrient circulation in the NFT system.

2-Inch Pipes: Rs 12,000- Distributes nutrient solution to individual plants within the system.

Pipe Connectors: Rs 1,20,000- Essential for assembling the NFT system, ensuring proper flow and distribution of the nutrient solution.



Source: Zaheer Ahmed Khan et al, Jan 2021

Additional Setup Costs:

- Stand Platform (40 Stands): Rs 1,00,000
- 20,000-Liter Tank: Rs 55,000
- 1,000 Plastic Tanks (2 Tanks): Rs 15,000
- 5,000-Liter Plastic Tank: Rs 22,000
- Water Pump (1 HP) (4 Pumps): Rs 30,000
- Water Pump (0.5 HP) (2 Pumps): Rs 10,000
- Net Cups: Rs 1,00,000
- Water Cooler: Rs 60,000
- RO System: Rs 50,000
- pH Meter: Rs 1200
- TDS Meter: Rs 2000
- Labor Cost: Rs 10,000

The one-time setup cost for hydroponic farming in India ranges from Rs 18,87,200 to Rs 20,00,000, covering essential infrastructure and equipment. Ongoing monthly expenses per cycle include electricity (Rs 15,000), seeds (Rs 20,000), fertilizer (Rs 20,000), labor (Rs 10,000), maintenance (Rs 5,000), and packing and transportation (Rs 10,000), totaling Rs 80,000 per cycle. With a total production of 3200 kg of produce, valued at Rs 350/kg, the total yield amounts to Rs 7,70,000. Calculating the profit margin per cycle by subtracting the investment (Rs 80,000) from the total earning (Rs 7,70,000) yields a profit margin of Rs 6,90,000.

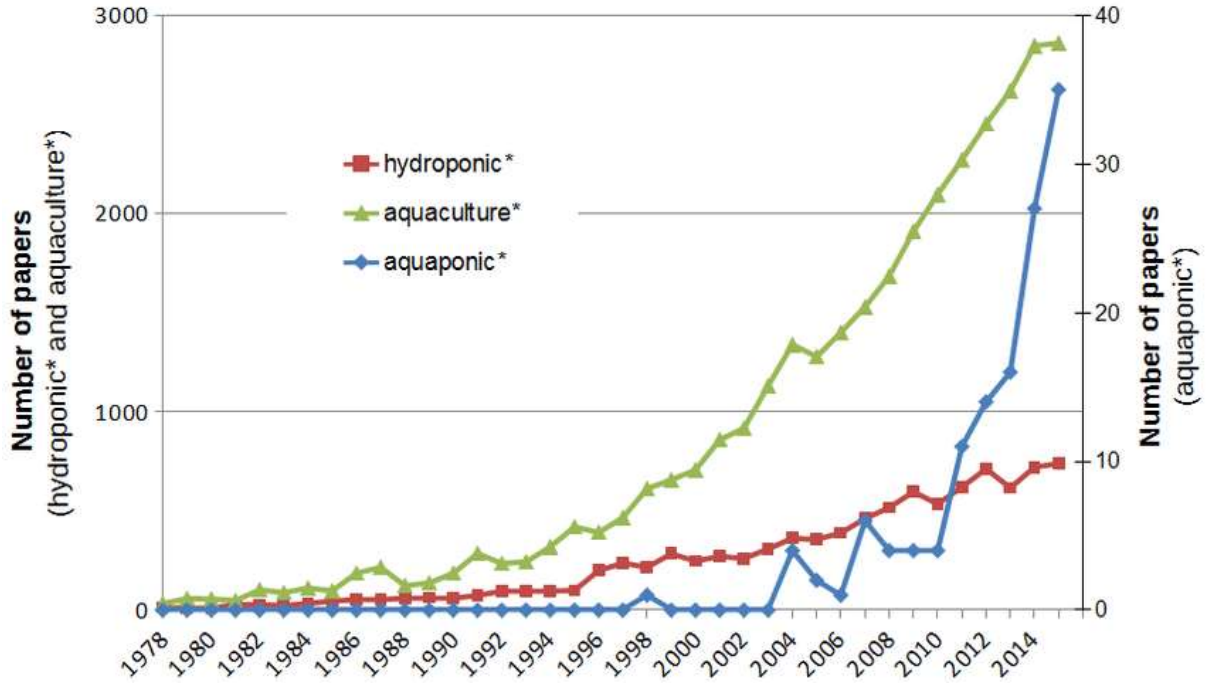
Therefore, the profit margin of hydroponic farming in India is Rs 6,90,000 per cycle.

For a 5000 square feet area, the total investment in hydroponic farming, including one-time and per-cycle costs, amounts to Rs 20,00,000. Calculating the one-time investment per square foot involves dividing the total investment by the total area, resulting in Rs 400 per square foot. Similarly, the per-cycle investment for one square foot is determined by dividing the per-cycle investment by the total area, yielding Rs 16 per square foot. Considering a total profit margin of Rs 6,90,000 for the 5000 square feet area, the profit per square foot is calculated by dividing the total profit margin by the total area, resulting in Rs 138 per cycle per square foot. (Krishi jagran, 2022)

The escalating demand for sustainable and protected farming practices, coupled with the higher crop yields achievable through hydroponic facilities compared to traditional farming, serves as the driving force behind the growth of hydroponics. As indicated in a study conducted by V. Chandrashekaran, the founder of a hydroponics technology company, the average annual yield of lettuce per acre was notably higher in hydroponic agriculture, ranging from 300-400 tons, compared to the 9-10 tons recorded in soil-based agriculture. This substantial difference in yield, along with the water-efficient nature of hydroponics, is anticipated to contribute to an increased adoption of hydroponic technologies within the agricultural community during the forecast period. The enhanced investment rate in hydroponics, driven by its capacity to deliver higher yields while minimizing water consumption, is poised to further encourage the shift away from traditional soil-based agricultural practices.

Vegetable Type	Soil agriculture avg per Acre	Hydroponics Agriculture avg per acre
Lettuce	9-10 tons	300-400 tons
Strawberries	20-25 tons	50 tons
Cucumber	15-20 tons	200 tons
Tomato	10-12 tons	180-200 tons
Bell Paper	10-12 tons	120-140 tons
Potato	8-10 tons	60-70 tons
Cabbage	6-7 tons	10-12 tons

Nevertheless, the global growth of the hydroponics market is hindered by notable challenges, primarily the lack of awareness among farming communities and the substantial initial investment and maintenance costs associated with hydroponics. A significant portion of farming communities, situated across different regions, possesses minimal knowledge about hydroponics and predominantly engages in competitive farming practices. The limited dissemination of information and experiences related to hydroponic technologies from one farming community to another has resulted in a widespread lack of understanding among farmers globally. This lack of awareness acts as a major constraint, impeding the broader adoption of hydroponic practices within the agricultural sector. Additionally, the high upfront investment and ongoing maintenance expenses associated with hydroponics present financial barriers that deter many farmers from embracing this advanced farming methodology.



Source: Ranka Junge, Mar 2017

Segmentation Analysis of the Hydroponics Market in India:

By Technology: The India Hydroponics market is categorized based on technology, including:

Nutrient Film Technique: Estimated to achieve a market valuation of USD XX thousand by 2027, rising from the initial value of USD 1286.64 thousand in 2018. This technique exposes plant roots directly to the nutrient solution, with a thin film flowing through flexible sheet channels. Products suitable for this technique include lettuce, various herbs, and baby greens. The average cost per installation of Nutrient Film Technique gulleys in 1 acre ranges between 23,000 and 30,000. The affordability and high productivity of this system, along with increased investments by hydroponic growers, drive the nutrient film segment's growth.

Drip System, Ebb & Flow/Flood Drain System, and Others: Additional hydroponic technologies contributing to the market's diversity and addressing various cultivation needs.

By Product Type: The India Hydroponics market is segmented by product type, comprising:

Fruits & Vegetables: Estimated to attain a market value of USD XX thousand by 2027, increasing from the initial value of USD 2544.15 thousand in 2018. This segment is projected to grow at a CAGR of 13.53% during the forecast period (2020-2027). Sub-segments include tomatoes, strawberries, cucumber, leafy vegetables, bell peppers, and others. Leafy vegetables dominate the market, with growing demand for high-quality fresh produce like lettuce, driven by commercial institutions, food chains, and restaurants.

Flowers: Another segment contributing to the hydroponics market, catering to specific market demands.

Consumer Markets: Hydroponically produced fruits and vegetables target various consumer markets, including retail, hotels, fast-food chains, railway catering, foreign food service companies, defense establishments, and NGOs. Leafy vegetables, especially lettuce, dominate the market due to increasing demand from commercial institutions. Presently, India imports 85% of exotic vegetables from neighbouring countries, with an expected annual growth rate of 15-20%.

Key Players in the Indian Hydroponics Market:

Prominent players in the Indian hydroponics market are employing key strategies to meet the rising demand for exotic and organic foods, including the establishment of new commercial plants in tier 1 in collaboration with regional producers and global technology providers.

- Major Players:
- DS Group
- Letectra Agritech Pvt Ltd
- Sparsh Bio Life
- Neoterra Farming Technologies Pvt Ltd
- Delhiponics
- Hydroherbs
- Simply Fresh Inc
- Junga Freshngreen Pvt Ltd
- Triton Food Works Pvt Ltd.
- Fresco

Market Dynamics: The market is anticipated to witness increased competition, with major global food chains potentially establishing hydroponic farms in India in the coming years.

7. Conclusion:

Modern agriculture, evolving over the last century, manifests in industrial farming and organic farming. Industrial farming, focused on maximizing output through large-scale monoculture and technological advancements, significantly impacts the environment. Soil degradation, water pollution, and greenhouse gas emissions emerge as major environmental concerns associated with modern agricultural practices.

Vertical farming indeed presents a promising solution to address various environmental and social challenges associated with traditional agriculture. The advantages mentioned highlight the potential positive impacts on sustainability, food security, and ecosystem health. However, as mentioned, the widespread adoption of vertical farming faces certain barriers, especially in terms of cost.

The initial high construction costs and maintenance expenses can be significant hurdles for many regions, including India. Overcoming these challenges will likely require technological advancements, innovations in construction methods, and perhaps government incentives or subsidies to make vertical farming more accessible.

It's worth noting that over time, as technology advances and more experience is gained in operating vertical farms, costs may decrease, making these systems more economically viable. Additionally, as the awareness of environmental and social benefits grows, there could be increased support and investment in sustainable agricultural practices like vertical farming.

Collaboration between governments, private enterprises, and research institutions could play a crucial role in promoting and implementing vertical farming on a larger scale. By addressing the financial barriers and promoting awareness of the long-term benefits, there may be an increased likelihood of widespread adoption and integration of vertical farming into the agricultural landscape.

In conclusion, while hydroponic farming in India involves initial investment costs and ongoing operational expenses, the potential for higher yields, water efficiency, premium prices for quality produce, and environmental sustainability contribute to its attractiveness. With

supportive government policies and technological advancements, hydroponics holds promise as a viable and profitable agricultural venture in India's evolving farming landscape.

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Net Zero by 2070: A Roadmap to a Decarbonised Future

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Abstract:

Achieving net-zero emissions by 2070 is a critical target to mitigate the worst impacts of climate change. This paper examines the goal of reaching net zero by 2070, analyses the methodologies for achieving it, and highlights key findings about its feasibility, challenges, and policy recommendations based on a review of relevant literature. It intends to make recommendations to address the challenges encountered along the path to net zero. It concludes by emphasising the importance of collective action and global collaboration in navigating this transformative journey. This paper serves as a foundation for further research and exploration on the subject. It can be expanded to include case studies of countries or regions that are actively working towards net-zero goals. Future research can examine sector-specific net zero targets and the potential impact of technological advancements on them.

Keywords: *Net Zero, Climate Change, Decarbonisation, Carbon Capture and Storage (CCS), Carbon Sinks.*

I. Introduction:

India announced its long-term goal of achieving net zero emissions by 2070 during the 26th session of the United Nations Framework Convention on Climate Change (COP 26[1]) in November 2021 (Ministry of Environment, Forest and Climate Change, 2023). Shukla (2023) mentioned the key milestones, including a timeline for achieving net-zero emissions by 2070. The following are the mid-term targets to reach the goal of net zero by 2070.

1. India aims to reduce its projected carbon emissions by 1 billion tonnes by 2030.
2. India plans to reduce its carbon emissions relative to its GDP by 45% from 2005 levels.

These targets are an improvement from the previously targeted emissions cut of 33-35% from 2005 levels (Shukla, 2023).

At a summit in New Delhi, G20 countries agreed on the need to phase out unabated coal power but did not set a timeline or emission reduction goals. However, the declaration marked a significant advancement in climate negotiations, with the 20 countries accounting for more than 80% of global emissions agreeing to phase out coal for the first time(https://www.thehindu.com/, 2023). Developed countries, including the United States, Britain, Canada, and Japan, target net zero by 2050. China has committed to reaching net zero

[1] COP stands for Conference of the Parties, and the summit was attended by the countries that signed the United Nations Framework Convention on Climate Change (UNFCCC), a treaty that came into force in 1994. This was the 26th COP summit and was hosted in partnership between the UK and Italy (National Grid, n.d.).

by 2060, while India has committed to reaching that goal by 2070 (https://www.thehindu.com/, 2023).

Achieving net-zero emissions by 2070 is a critical target to mitigate the worst impacts of climate change. This paper examines the goal of reaching net zero by 2070, analyses the methodologies for achieving it, and highlights key findings about its feasibility, challenges, and policy recommendations based on a review of relevant literature. It intends to make recommendations to address the challenges encountered along the path to net zero. It concludes by emphasising the importance of collective action and global collaboration in navigating this transformative journey. This paper serves as a foundation for further research and exploration on the subject. It can be expanded to include case studies of countries or regions that are actively working towards net-zero goals. Future research can examine sector-specific net zero targets and the potential impact of technological advancements on them.

According to Bhushan (2023), the Intergovernmental Panel on Climate Change (IPCC) contends that global carbon emissions must fall dramatically, from 36 gigatons per year to zero or near zero by the middle of this century (around 2050). The IPCC clearly states that this target is achievable by reducing fossil fuel use and increasing the speed of carbon removal from the atmosphere (Bhushan, 2023).

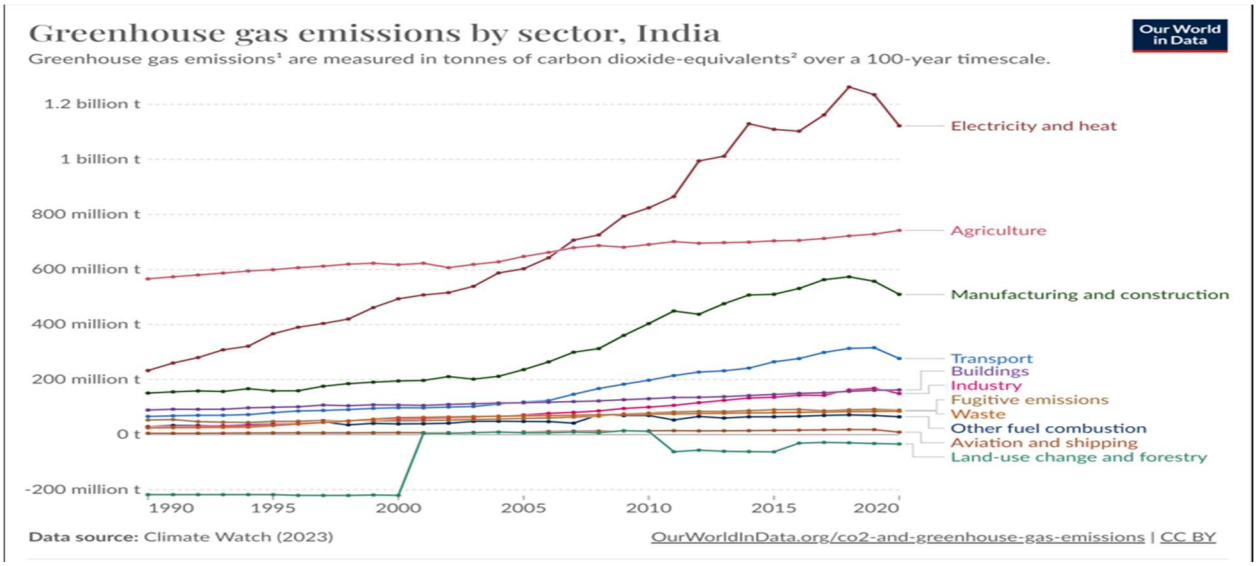


Figure 1: Greenhouse gas emission by Sector, India (1990 - 2020)

Figure 1 depicts the trend in India's greenhouse gas emissions by sector over the period 1990-2020. The top three sectors contributing to India's greenhouse emissions in 2020 are electricity and heat (1.12 billion tonnes), agriculture (742.91 million tonnes), and manufacturing and construction (509.45 million tonnes). The transport sector is positioned in the fourth position, contributing 276.44 million tonnes to greenhouse gas emissions.

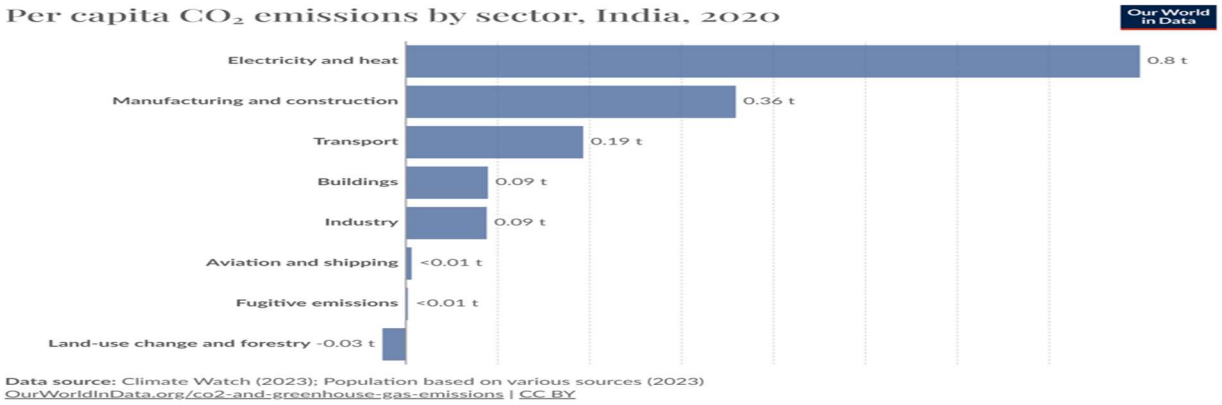


Figure 2: Per Capita CO_2 emissions by Sector, India, 2020

This paper is organised in the following manner. Section I provides background on India's commitment to reducing carbon emissions in the future. Section II deals with the research objectives and methodology. Section III defines and explains the concept of "net-zero" emissions. Section IV analyses the literature, covering the methodologies and pathways proposed for achieving net zero by 2070. Section V assesses the feasibility and challenges of reaching net zero within this timeframe. Section VI makes recommendations to address the challenges arising from India's pursuit of the net zero goal. Section VII concludes by highlighting the potential economic, social, and environmental benefits of achieving net zero. It emphasises the necessity of international cooperation and collaborative action to realise this global goal.

II. Objectives and Methodology:

This paper aims to explore the possible implications of India's commitment to the Net Zero target and its impact on various sectors. It examines the pathways leading to the net zero target and the timeline. This paper follows a qualitative approach, critically reviewing available literature, policy documents, international reports, and reputable websites.

III. The definition and concept of "net-zero" emissions:

Net-zero emissions refer to balancing the human-caused GHG emissions released into the atmosphere with the removal of these emissions over a specified period (OECD and IEA, 2021).

Net zero refers to achieving a balance between anthropogenic[2] greenhouse gas emissions and their removal from the atmosphere. This can be achieved through emissions reductions across various sectors and natural or technological carbon removal strategies. Thus, net zero is where a country is not adding to the overall amount of greenhouse gases in the atmosphere (Menon, 2022).

IV. Pathways to Net-Zero:

Pathways to net-zero refer to the strategies and actions needed to achieve a balance between greenhouse gas emissions and removals, resulting in no net contribution to global warming (Penman, 2021). The net-zero emissions pathway presented in the IEA report suggests that the world economy in 2030 will be some 40% larger than today but use 7% less energy. The report provides a global view, but countries start in different places and finish at different times. Advanced economies have to reach net zero before emerging markets and developing economies and assist others in getting there (IEA, 2021).

[2] originating in human activity

The Asia Society's (2022) High-Level Policy Commission Report on Getting Asia to Net Zero proposes a comprehensive and balanced set of policy frameworks for India that cover all sectors and include both incentive-based and regulatory (command and control) strategies. The report gives regulatory and market-based measures to achieve net zero emissions by 2070. Some of the key recommendations for the policy frameworks include:

1. Implementation of carbon pricing across the economy, starting with the most energy-intensive sectors, by 2025 will encourage electrification and innovation in low-carbon solutions (The Asia Society, 2022).
2. Using carbon revenues to fund energy efficiency investments and subsidies for low-carbon technologies (The Asia Society, 2022).
3. Introduction of a policy on priority, restricting the use of coal.
4. Strengthening financial subsidies for renewable power and electric vehicles to achieve price parity this decade (The Asia Society, 2022).
5. Investment in R&D to bring pre-commercial low-carbon technologies like carbon capture and storage and hydrogen to market in the coming years.
6. Imposing stricter biofuel mandates and corporate responsibility requirements on businesses to invest in reforestation and natural carbon sinks.

These policies, if implemented effectively, can help India achieve net zero emissions by 2070 and, potentially earlier, by 2050 (The Asia Society, 2022).

According to Mallya & Elango (2024), India aims to achieve 'net zero' emissions by 2070, with a focus on decarbonising industries responsible for 28% of the country's greenhouse gas emissions. India is exploring the role of carbon capture, utilisation, and storage (CCUS[3]) technologies to address emissions from hard-to-abate sectors like steel and cement.

Mallya & Elango, 2024 state that CCUS technologies can help India reduce emissions from its steel and cement industries by capturing carbon emissions at the source, such as furnaces and kilns, before they enter the atmosphere. Carbon capture and storage (CCS) involves injecting captured CO_2 into underground rock formations or trapping it in minerals as carbonates (Mallya & Elango, 2024). This reduces greenhouse gas emissions. These technologies provide a viable path to reducing emissions from difficult-to-abate industries such as steel and cement (Mallya & Elango, 2024).

Carbon capture and storage (CCS) is a three-step process that involves capturing carbon dioxide at the source, i.e., from power plants or industrial activities, transporting it, and storing it deep underground (National Grid, 2023). India is urged to invest in innovative CCUS technologies, integrate CCU into national green hydrogen missions, assess basalt resources for safe storage, and develop regulatory frameworks to accelerate the adoption of CCUS across industries (Mallya & Elango, 2024).

[3] The International Energy Agency (IEA) defines Carbon Capture, Utilisation, and Storage (CCUS) as a group of technologies for capturing CO2 from large and stationary CO_2 emitting sources, such as fossil fuel-based power plants and other industries (NITI Aayog, 2022). CCUS also involves the transport of the captured CO2 (typically by pipeline or by shipping, rail or trucks) to sites, either for utilisation in different applications or injection into geological formations or depleted oil & gas fields for permanent storage and trapping of the CO2 (NITI Aayog, 2022).

A knowledge paper released by Deloitte Touche Tohmatsu India LLP in 2023 mentions that there is a need for customised decarbonisation strategies across various industry sectors, as well as an expansion of domestic renewable energy manufacturing capacity. The paper lays out a roadmap for India's energy transition, outlining the challenges, opportunities, and recommendations for achieving a sustainable and low-carbon future. Deloitte Touche Tohmatsu India LLP estimates significant investments of around US$300 billion annually between 2022-2070 to bring about an energy transition in India. The paper further emphasises the need for innovative financing models to attract private investment to realise this target (Deloitte Touche Tohmatsu India LLP, 2023).

International organisations, academic institutions, and individual researchers have all put forth different plans for reaching net zero by 2070. These plans focus on a two-track approach- viz., reducing emission levels at sources and eliminating the existing stock of carbon dioxide in the atmosphere. We may summarise the suggested pathways to net zero emissions as follows.

1. **Rapid decarbonisation[4] of industries**: significant cuts in greenhouse gas emissions from all industries, especially the energy, transportation, and manufacturing sectors. These industries contribute significantly to carbon emissions.
2. **Green Energy Transition:** decarbonising the energy sector by deploying renewable energy sources such as solar, wind, hydropower, geothermal, etc., increasing energy efficiency, and phasing out fossil fuels, which are the main cause of carbon dioxide emissions.
3. **Technological Innovations:** Utilising innovative technologies for carbon capture, storage, and Utilisation, and green hydrogen production[5].

Green hydrogen can enable the use of domestically abundant renewable energy resources across regions, seasons, and sectors, providing numerous sources of use, either as a fuel or as an energy source for industries (National Green Hydrogen Mission, 2023). It can directly replace fossil fuel-derived sources of energy in petroleum refining, fertilizer production, steel manufacturing, etc.

4. **Decarbonisation of the Transportation Sector:** Hydrogen-powered long-haul automobiles and marine vessels can help to decarbonise the transportation sector (National Green Hydrogen Mission, 2023).
5. **Nature-based solutions:** protecting and restoring forests, wetlands, and other natural ecosystems that absorb and store carbon dioxide and act as carbon sinks[6].
6. **Behavioural changes:** shifting individual and societal consumption patterns towards sustainable practices and reduced emissions.

V. Feasibility and Challenges:

In this section, we will examine two independent research studies conducted by Chaturvedi and Malyan (2021) and Shukla (2023) related to the feasibility of potential pathways to achieving a net zero target. They investigated the feasibility and challenges of these potential paths to

[4] Decarbonisation means reducing the amount of greenhouse gas emissions that a society produces as well as increasing the amount that is being absorbed (UNDP, 2023).

[5] Hydrogen production via electrolysis is being explored as both renewable (wind, solar, hydro, geothermal) and nuclear energy options (Hussain & Nishat, 2022). These hydrogen production pathways result in virtually zero greenhouse gas and criteria pollutant emissions (https://www.energy.gov/, n.d.)

[6] A carbon sink is anything that absorbs more carbon from the atmosphere than it releases—for example, plants, the ocean and soil (clientearth.org, 2020).

meeting India's net zero targets within the time frame specified.

The study by Chaturvedi & Malyan (2021) addresses the gap in India-specific analysis on the implications of a net-zero target by modelling four alternative peaking and net-zero-year scenarios for the country. The scenarios range from the most ambitious (2030 peaking – 2050 net-zero) to the least ambitious (2050 peaking – 2080 net-zero). Chaturvedi and Malyan's (2021), analysis focuses on carbon dioxide emissions from India's energy sector and considers different technology availability scenarios related to carbon capture and storage (CCS) and hydrogen. The study provides sectoral pathways based on these scenarios to offer actionable policy insights for India's transition towards a net-zero future. Based on the sectoral pathways outlined in Chaturvedi and Malyan's (2021) study, the following actionable policy insights are provided for India's transition to a net-zero future.

1. In the power sector, coal-based power generation must peak by 2040 and then drop by 99% between 2040 and 2060.
2. Electricity generation is expected to increase rapidly, with solar energy accounting for a significant portion of the electricity supply system.
3. The commercial availability of hydrogen is highlighted as a key technology for achieving net-zero targets.
4. Consideration of alternative scenarios with and without carbon capture and storage (CCS) technologies to understand their impact on emissions reduction pathways.
5. Recognition of the need for sector-specific strategies and transitions across electricity, transport, buildings, and industrial sectors to align with net-zero goals (Chaturvedi & Malyan, 2021).

These findings emphasise the significance of sectoral planning, technology adoption, and policy interventions in facilitating India's transition to a sustainable and low-carbon future in line with net-zero goals (Chaturvedi & Malyan, 2021).

Shukla (2023) emphasises the importance of decarbonising the energy mix[7], lowering emissions from coal-fired power plants, and addressing emissions from oil and gas operations and transportation. Additionally, Shulka (2023) discusses India's initiatives to promote alternative fuels, modern biomass energy use, and the development of renewable energy capacities. Shulka (2023) emphasises India's role in leading the developing world in emissions reduction, as well as opportunities for global investment and collaboration in the country's transition to a low-carbon economy. Shulka (2023) provides insights into India's strategies, challenges, and opportunities in achieving its net-zero emissions commitment. Two factors that pose a major challenge in attaining the emission targets are population growth and rapid urbanisation.

Shukla (2023) pointed out the following challenges India may face in managing emission targets while dealing with population growth and rapid urbanisation:

1. Unprecedented growth in energy demand driven by population growth and the pursuit of sustainable development goals.

[7] Energy mix refers to the breakdown of energy consumption in a given geographical area, broken down by energy source (for example: renewable energy, natural gas, coal, petroleum etc.) (greenly.earth, 2020).

2. Increased manufacturing, mining, and infrastructure development activities.

3. Need to decarbonise the energy mix, which primarily consists of fossil fuels (Shukla, 2023).

4. India's per capita energy consumption is almost one-third of the world average, but the country is poised to contribute 25% of global energy consumption over the next two decades, according to the International Energy Agency (IEA, 2022)

5. Balancing the trade-off between economic development and emission reduction goals.

6. Ensuring access to affordable, reliable, sustainable, and modern energy for all by 2030 as part of the Sustainable Development Goals (Malhotra, 2022).

7. Managing emissions amidst rapid urbanisation and infrastructure expansion.

8. Securing international financial and technological assistance to meet net-zero targets (Shukla, 2023).

VI. Recommendations to address the challenges:

Achieving net zero by 2070 is ambitious and presents a significant challenge. To address the challenges, we can propose the following recommendations:

1. **Plan for financial resource requirements**: We need to plan for the massive financial investments required in India's energy economy. To achieve net zero emissions by 2070, the IEA estimates that India's energy economy will require $160 billion per year on average between now and 2030. That is three times the current investment level. As a result, achieving net zero requires access to low-cost long-term capital (IEA, 2022).

2. **The need for international collaboration:** Shukla (2023) emphasises that to achieve India's net-zero targets, it is estimated that at least USD 10 trillion in investments would be required to decarbonise the domestic power, industrial, and transport sectors. Continued investments in clean energy, infrastructure, and research necessitate international collaboration and public-private partnerships. Political will and diplomacy are needed to attract climate finance from developed countries.

3. **Developing and deploying technology on a scale**: It is critical to develop and deploy innovative carbon-removal technologies on a large scale. Given India's sectoral composition and sources of CO_2 emissions, CCUS technologies will play an important and integral role in ensuring the country meets its stated climate goals by deep decarbonising energy and CO_2 emission-intensive industries such as thermal power generation, steel, cement, oil and gas refining, and petrochemicals (NITI Aayog, 2022).

4. **Planning for socially inclusive transition**: Asia Society Policy Institute (2022) states that the transition to net zero must be socially inclusive, ensuring a fair and equitable distribution of benefits and costs. India will want to ensure a just and equitable transition for its workforce currently employed in fossil fuel industries. Asia Society Policy Institute (2022) reports the possibility of losing nearly 5 million jobs in primary and fossil fuel sectors during this transition.

5. **Reskilling the workforce**: The loss of jobs in fossil fuel-using sectors will be offset by new opportunities in the industry and services sectors. Asia Society Policy Institute (2022) mentions that approximately 12 million more jobs will be created by 2060. Thus, additional policies and investment will be needed to reskill displaced workers and train India's future workforce to access new employment opportunities in a net zero economy (Asia Society Policy Institute, 2022).

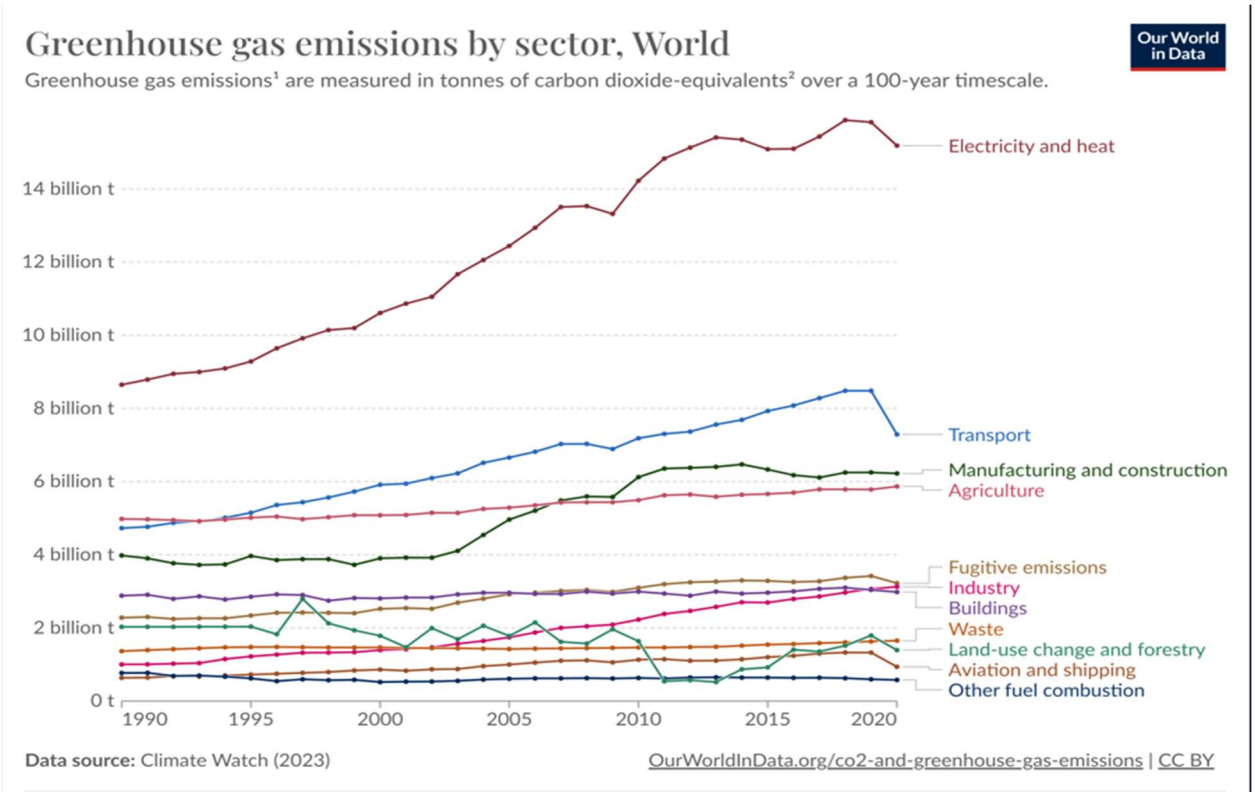
6. **Managing emission-intensive fossil fuel-consuming sectors/industries**: Most fossil fuel-consuming sectors are transitioning to cleaner, greener alternative fuels. However, certain industries that produce essential commodities such as steel, cement, fertilisers, etc. cannot immediately decarbonise, as this would require switching production to completely different methods (Mallya & Elango, 2024). Which would require new plants or technologies to be

established. Apart from the massive costs needed to replace infrastructure, such a switchover could take a very long time. These industries are essential for economic growth and are highly price-sensitive (Mallya & Elango, 2024).

VII. Conclusion:

Achieving the net zero goal requires urgent action, international cooperation, and unwavering commitment from governments, businesses, and individuals alike. This necessitates a collective approach that prioritises innovation, social equity, and a just transition towards a decarbonised future. Reaching net zero by 2070 is an ambitious but necessary goal to avert the catastrophic consequences of climate change. While significant challenges exist, the potential benefits for the environment, economy, and public health make it a worthwhile endeavour. By embarking on this transformative journey, we can create a more sustainable and prosperous world for generations to come.

Appendix 1 Greenhouse gas emissions by sectors, world



Appendix 2 Ten Key Solutions to mitigate climate change

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A Study on Transforming Indian Banking Landscape with Artificial Intelligence

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Abstract:

This research explores the revolutionary effects of artificial intelligence (AI) on India's banking sector. Rapid technological breakthroughs are causing a paradigm shift in the banking industry, and artificial intelligence (AI) is emerging as a major driver of this change. The study investigates many aspects of this development, looking at how AI applications improve Indian banks' productivity, client satisfaction, and risk management. The research starts out with summarising the problems facing the Indian banking sector at the moment. The use of AI technologies, such as natural language processing and machine learning algorithms, to automate repetitive processes, save operating costs, and boost overall operational efficiency is then covered in detail. Additionally, the study looks into how AI-driven analytics can help provide individualised customer experiences by providing information on the financial needs, preferences, and behaviour of the target audience. A crucial topic covered in the paper is risk management, since artificial intelligence (AI) models are used to identify fraudulent activity and determine creditworthiness more precisely. A thorough grasp of the prospects and challenges is provided by the examination of the regulatory environment and ethical issues surrounding the use of AI in banking. This paper clarifies the changing role of AI in transforming the banking industry, accelerating digital transformation, and setting up Indian banks for future success in a more competitive and technologically advanced financial landscape using a combination of empirical analysis and case studies.

Introduction:

In an age of unparalleled technical progress, the Indian banking industry is leading the way in a radical makeover, with artificial intelligence (AI) emerging as a key driver of change. This research delves into the deep influence artificial intelligence (AI) is having on India's banking sector, revealing the complex relationship between efficiency, technology, and customer-focused approach. Traditional banking paradigms are being questioned as the fourth industrial revolution develops, making it necessary to reevaluate strategy in order to remain competitive and relevant. This evolution has been anchored by the introduction of AI technologies, such as machine learning and natural language processing, which have completely changed the way banks function, engage with their clientele, and handle risks. In light of this, the study aims to

examine the various ways that artificial intelligence is affecting the complex network of financial services.

In light of the varied and ever-changing banking landscape in India, the goal of this study is to offer a thorough grasp of the current situation by identifying the obstacles banks must overcome and the potential AI has to help them do so. The study aims to unearth the complex tapestry of AI-driven technologies that are bringing Indian banks into a new era of efficiency and responsiveness, from reducing everyday operations to providing tailored client experiences and strengthening risk management procedures. This study aims to provide insights that not only illuminate the present but also pave the way for a future where technology is used to redefine the very essence of banking in India by exploring the subtleties of AI adoption in the Indian banking sector.

Objectives:

1. To Evaluate Indian Banks' Present AI Adoption Situation.
2. To Investigate AI's Effect on Cost-Reduction and Operational Efficiency.
3. To Assess AI's Impact on Personalization and Customer Experience.
4. To Analyse AI's Effects on Regulatory Compliance and Risk Management.

Hypothesis:

1. Null Hypothesis (H0): There is no significant difference in the extent of AI adoption across various Indian banks.

Alternative Hypothesis (H1): There are variations in the level of AI adoption among different Indian banks, indicating diverse approaches to implementing AI technologies.

2. Null Hypothesis (H0): The integration of AI technologies does not significantly contribute to operational efficiency and cost reduction in Indian banks.

Alternative Hypothesis (H1): AI applications lead to a statistically significant improvement in operational efficiency, resulting in cost reduction for Indian banks.

3. Null Hypothesis (H0): There is no substantial impact of AI-driven analytics on enhancing customer experience and personalization in Indian banking services.

Alternative Hypothesis (H1): AI-driven analytics significantly contribute to improved customer experiences and personalised services, leading to increased customer satisfaction.

4. Null Hypothesis (H0): The integration of AI in risk management has no significant impact on fraud detection, credit assessment, and regulatory compliance in Indian banks.

Alternative Hypothesis (H1): AI models play a crucial role in enhancing risk management practices, resulting in improved fraud detection, more accurate credit assessments, and better compliance with regulatory standards.

Review of Literature:

1.Gupta and Jain's (2019) paper, which was presented at the 2019 IEEE Calcutta Conference, offers a thorough analysis of artificial intelligence (AI) in the banking industry. This study looks at how AI is changing the banking business and what applications and ramifications it has. The authors' comprehensive synthesis of existing literature enhances our comprehension

of AI's dynamic role in defining banking's future, providing insightful analysis for scholars, practitioners, and policymakers operating in the sector.

2. In the International Journal of Scientific & Technology Research, Mittal and Sinha (2020) provide a case study on how artificial intelligence (AI) is being used to change the banking industry in India. With an emphasis on the useful uses of AI, the study adds to the expanding corpus of information on the technical advancements in the financial sector by offering insightful information about the particular tactics and results of integrating AI in the Indian banking sector.

3. Rana and Sharma (2018) present their research at the 3rd International Conference on Computing, Communication, and Automation, examining the effects of artificial intelligence (AI) in the banking industry. The paper explores how AI technologies are transforming banking operations and highlights how they are doing so. The writers add to the conversation on AI's incorporation into the financial sector by analysing the issues covered during the conference and providing perspectives on its wider effects.

4.In their paper that was published in the Journal of Banking and Financial Technology, Choudhary and Agarwal (2021) look into the use of artificial intelligence (AI) in the Indian banking industry. The report offers a comprehensive analysis of the environment with an emphasis on both opportunities and problems. The writers provide insights that are helpful for practitioners and policymakers in the financial technology sector by shedding light on the complex dynamics involved in integrating AI within the particular context of Indian banking.

5. In their work, which was presented at the 2020 International Conference on Intelligent Sustainable Systems, Shukla and Sharma (2020) examine the revolutionary effect that Artificial Intelligence (AI) has on customer experiences within Indian banks. With an emphasis on customer-focused AI applications, the study investigates how these technologies transform interactions within the banking industry. The writers provide insights into the changing role of AI in improving customer experiences within the Indian banking industry by going into the details that were covered during the conference.

6. Bhatia and Dhingra highlight the game-changing potential of artificial intelligence (AI) in the banking industry in a 2019 paper that they published in the International Journal of Advanced Research in Computer Engineering & Technology. The paper explores the revolutionary potential of AI technologies and emphasises how important they are to the transformation of banking operations. The writers emphasise how AI has the ability to completely change the financial services and customer engagement landscape by offering new perspectives to the conversation about its critical role.

7. In their work given at the 2018 IEEE Gujarat Section International Conference, Patel and Patel (2018) investigate the uses of artificial intelligence (AI) in the Indian banking industry. With an emphasis on real-world applications, the study looks at how AI technologies are applied in the Indian banking industry. Through their insightful contributions to the conference, the writers expand on the knowledge of the particular uses and possible benefits of AI in the ever-changing Indian banking industry.

8. Agarwal and Kumar (2017) present a thorough analysis of artificial intelligence's (AI) application to risk management in the banking industry. The study, which was published in Procedia Computer Science, critically looks at the role AI models play in identifying and reducing risks in the banking industry. Through a comprehensive analysis of existing research, the writers provide insightful perspectives on how risk management is developing, highlighting artificial intelligence's potential as a key instrument for strengthening risk management protocols in the banking sector.

9. Sharma and Gupta (2020) add to the conversation about artificial intelligence (AI) by emphasising how it can improve operational effectiveness in Indian banks. The report, which was presented at the 2020 International Conference on Intelligent Computing and Sustainable Systems, examines particular AI applications and tactics that boost operational efficiency. The authors offer insights into how AI technology might be used to optimise operational procedures in the Indian banking industry by looking closely at the specifics that were presented at the conference.

10. The regulatory issues surrounding the use of artificial intelligence (AI) in the Indian banking industry are examined in detail by Singh and Garg (2019). The study, which was presented at the 2019 International Conference on Intelligent Computing and Control Systems, offers important new insights into how difficult it is to integrate AI while still abiding by legal requirements. Through an analysis of the issues raised at the conference, the writers add to our knowledge of the complexities surrounding regulatory observance and provide insightful advice for the ethical integration of AI in Indian banking.

Methodology:

Research Design:

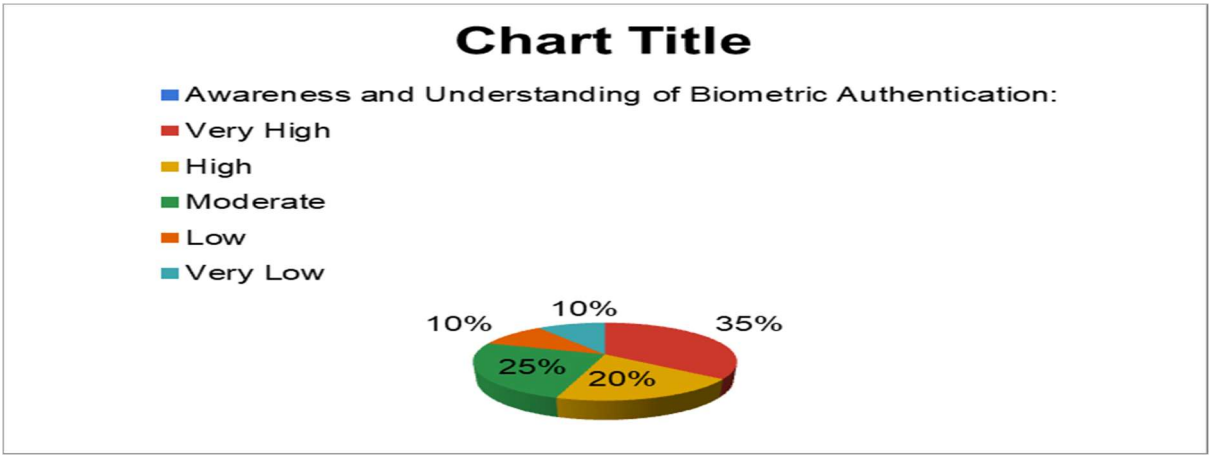
A stratified random sample of 150 participants was used to gather quantitative information about demographics. Twenty five participants were interviewed in semi-structured interviews that yielded qualitative insights. Descriptive statistics, correlation, quantitative regression, and qualitative thematic analysis were all used in the analysis. Strict ethical guidelines were followed.

Sampling:

The sample size used was 150. To collect quantitative demographic information and responses to the "A Study on Transforming Indian Banking Landscape with Artificial Intelligence" survey, a Google form was made.

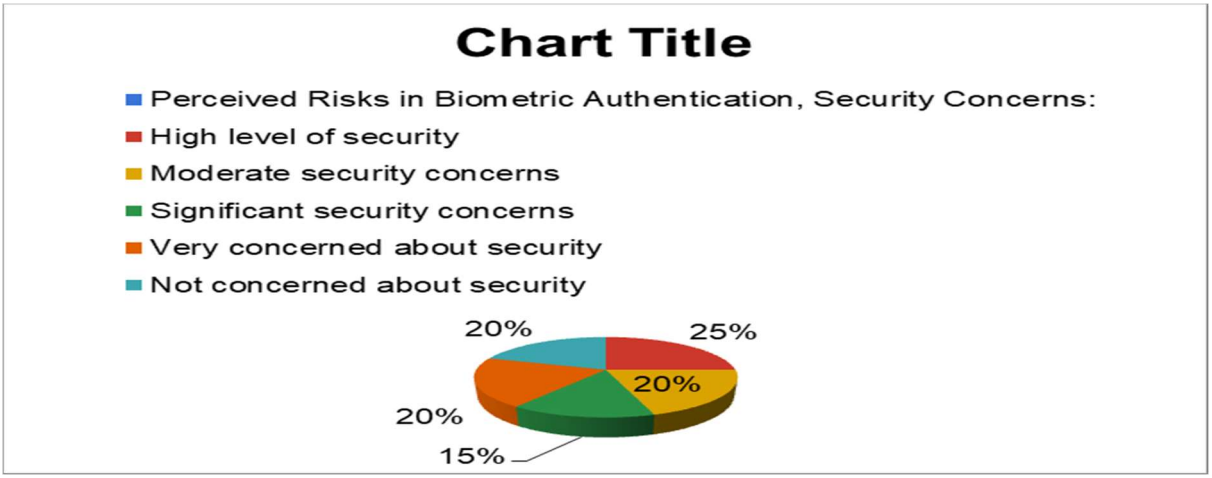
Data Analysis:

Awareness and Understanding of Biometric Authentication:	
Very High	35
High	20
Moderate	25
Low	10
Very Low	10



Interpretation: With 35 choosing "Very High" and 20 choosing "High," the majority of respondents demonstrate a high level of awareness and understanding of biometric authentication. These groups include a total of 60% of participants, suggesting that respondents are broadly knowledgeable on biometric authentication theories and tools.

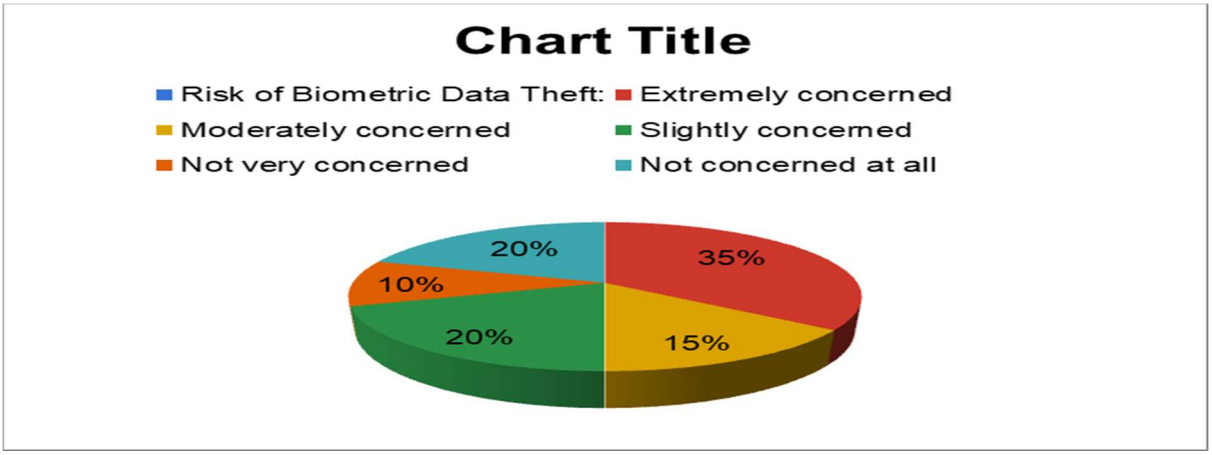
Perceived Risks in Biometric Authentication, Security Concerns:	
High level of security	25
Moderate security concerns	20
Significant security concerns	15
Very concerned about security	20
Not concerned about security	20



Interpretation: The survey shows that opinions on the security threats associated with biometric authentication differ. 35% of individuals report having moderate to serious security concerns, compared to 25% who express a high degree of security. Furthermore, 20 respondents expressed a strong anxiety regarding security, highlighting a noteworthy

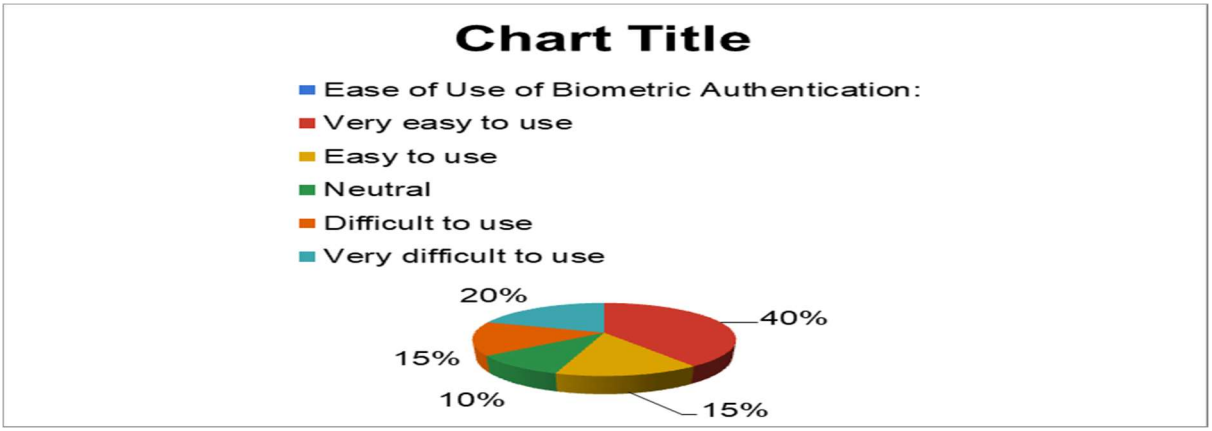
apprehension. Twenty people, however, express no worries about security, demonstrating a range of viewpoints.

Risk of Biometric Data Theft:	
Extremely concerned	35
Moderately concerned	15
Slightly concerned	20
Not very concerned	10
Not concerned at all	20



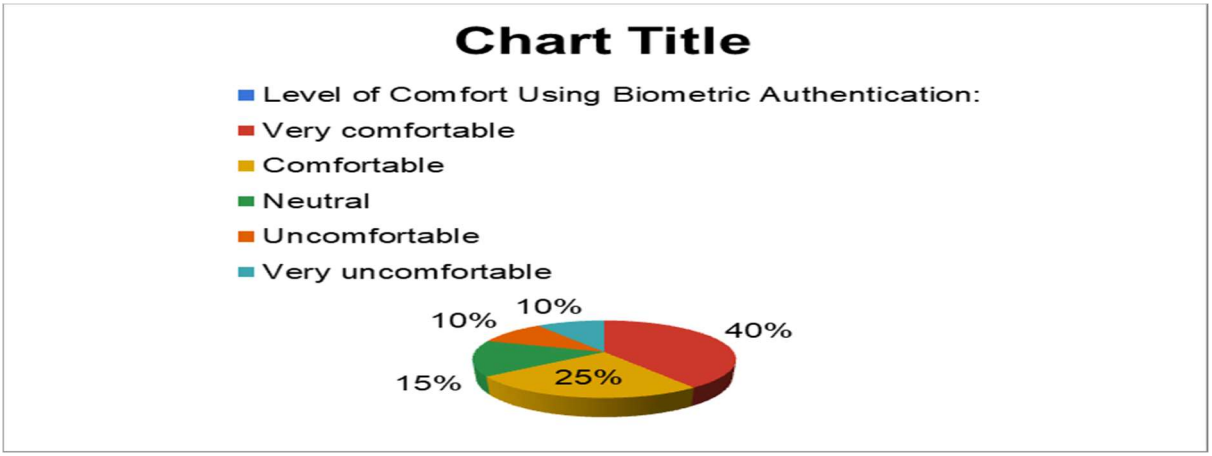
Interpretation: A variety of worries are voiced by participants about the possibility of biometric data theft. Notably, 35% of respondents expressed moderate to slight concerns, and 35 respondents expressed significant concern. However, thirty people show varying degrees of anxiety or express no concern at all, indicating a range of viewpoints regarding the possibility of biometric data theft.

Ease of Use of Biometric Authentication:	
Very easy to use	40
Easy to use	15
Neutral	10
Difficult to use	15
Very difficult to use	20



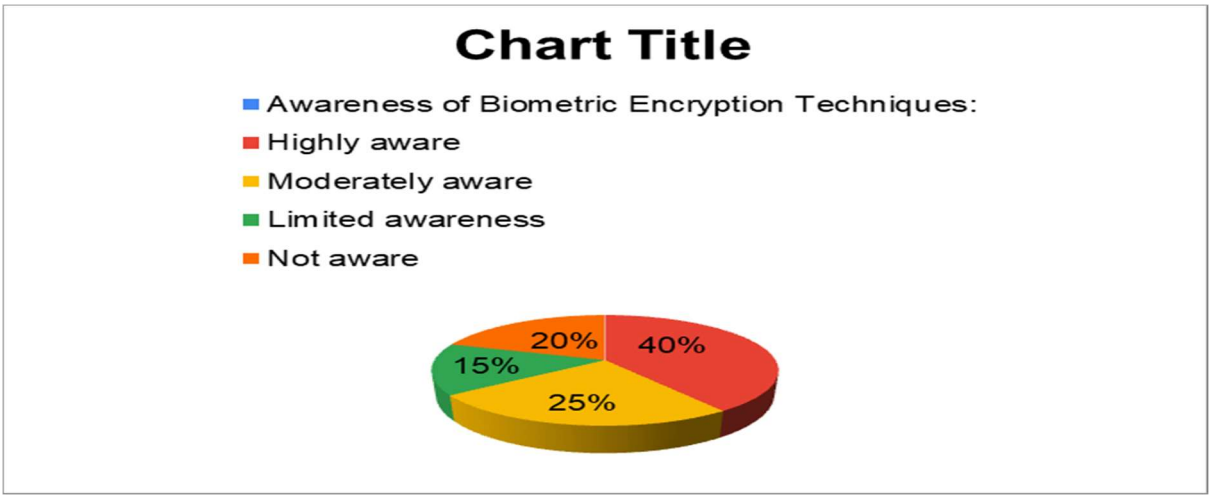
Interpretation: The majority of respondents—40 saying it's "Very easy," and 15 saying it's "Easy"—find biometric authentication to be simple to use. Nonetheless, a noteworthy 35% report having some trouble, with 15 stating that it is "Difficult" and 20 stating that it is "Very difficult," revealing that opinions on how simple biometric authentication is vary.

Level of Comfort Using Biometric Authentication:	
Very comfortable	40
Comfortable	25
Neutral	15
Uncomfortable	10
Very uncomfortable	10



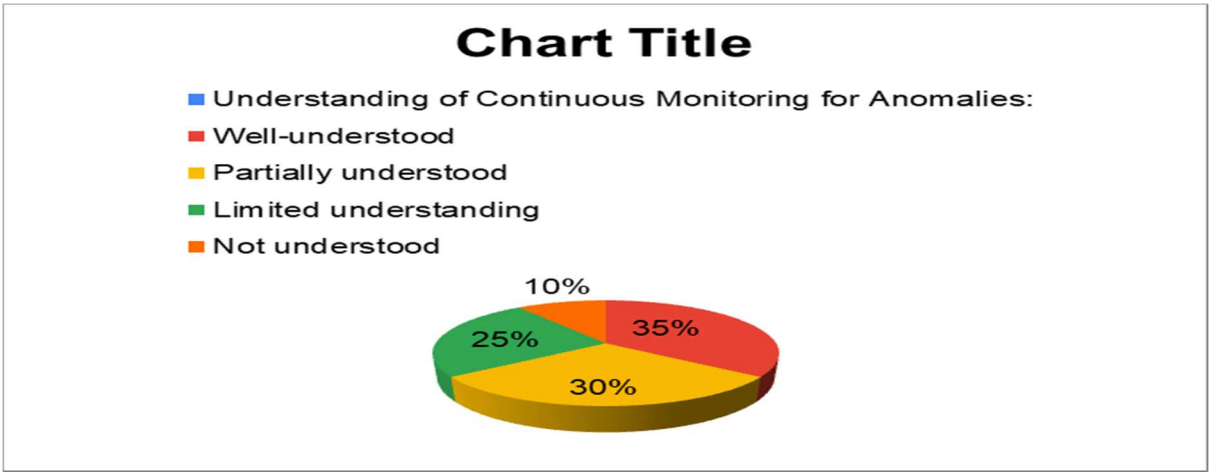
Interpretation: The findings indicate that participants utilising biometric authentication felt quite comfortable, with 40 reporting "Very comfortable" and 25 reporting "Comfortable." Ten people said it was "uncomfortable," and ten more said it was "very uncomfortable," indicating that just a small portion of people found it uncomfortable. Most responders are generally comfortable using biometric authentication.

Awareness of Biometric Encryption Techniques:	
Highly aware	40
Moderately aware	25
Limited awareness	15
Not aware	20



Interpretation: Regarding biometric encryption approaches, a significant number of participants exhibit a high level of understanding; forty of them indicated that they are "Highly aware." Different participants have varying levels of awareness regarding this component of biometric authentication; another 25 people show moderate awareness, while 15 and 20 participants show limited awareness and lack of awareness, respectively.

Understanding of Continuous Monitoring for Anomalies:	
Well-understood	35
Partially understood	30
Limited understanding	25
Not understood	10



Interpretation:

The participants' comprehension of ongoing observation for irregularities in biometric identification varies. 35 respondents say it is "well-understood," whereas 25 have a limited grasp and 30 merely express a partial understanding. Ten individuals, however, state that they are not very familiar with this element.

Conclusion:

This study concludes with a dynamic and changing picture of the revolutionary effects of artificial intelligence (AI) on the Indian banking sector. The results highlight the disparities in AI implementation among banks, underscoring the necessity of a comprehensive comprehension of the industry's varied tactics and methods. Empirical data indicates a favourable relationship between AI integration and operational effectiveness, demonstrating appreciable gains in a variety of jobs from customer service to standard operations.

The report highlights the critical role that AI-driven analytics play in personalization and reveals a fundamental shift in the customer experience. A major change from previous banking models is that customers now enjoy personalised services and frictionless interactions. Furthermore, AI's impact on risk management is clear, as seen by improved fraud detection and more precise credit evaluations. But two major obstacles stand out: complying with regulations and ethical issues. The study emphasises how important it is for banks to appropriately manage these complications, taking algorithmic biases and data privacy into account. Additionally, it is determined that ongoing skill development for bank employees is essential to the successful integration of AI.

In the future, the research suggests taking a proactive stance when it comes to adjusting to changing legal frameworks and international standards. It shows how Indian banks will use AI in the future to spur innovation and increase their competitiveness, not only as a technical tool. The study's findings offer a basis for strategic decision-making as the banking industry develops, highlighting the significance of responsible AI adoption in determining the direction of Indian banking.

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A Study on Impact of 5+3+3+4 Model of New Education Policy on Students

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National Education Policy 2020 (NEP 2020): On July 29, 2020, the Union Cabinet adopted NEP 2020 (New Education Policy 2020), which replaced the current 10+2 +3 school system with a new 5+3+3+4 structure. Arrangement 5+3+3+4 Given the elimination of intermediate education, a recommended school education policy is made.The field of education is complicated due to its frequent changes. Many years ago, the Intermediate and degree programs only required two years of study following 11 years of education. Pre-University lasts for three years after a one-year degree is added. Three years of study for the degree and twelve years of education. Operating for a number of years is the 10+2+3. Right now, the school recommends a four-year degree for eleven-year-olds. It is beneficial that the curriculum is evolving in tandem with technology advancements because of the period's developments. However, switching up the study years won't really benefit you.

Key words: new education policy, 5+3+3+4 structure, Nep 2020

Introduction:

On July 29, 2020, the Union Cabinet adopted NEP 2020 (NEP 2020), which would replace the current 10+2 school system with a new 5+3+3+4 structure. The proposal proposes replacing the current 10+2 school education framework with a 5+ 3+ 3+ 4 education system, which will encompass the ages of 3 to 18 years and include kindergarten/play school instruction inside the official education structure. Krishnaswamy Kasturirangan, the former ISRO chief, served as the Chairman of the National Education Policy in 2020. The new education policy intends to make the school system more inclusive and equitable. The Government of India issued the first NPE in 1968 under Prime Minister Indira Gandhi, the second in 1986 with Prime Minister Rajiv Gandhi, and the third in 2020 under Prime Minister Narendra Modi.

The Union government introduced the National Education Policy (NEP) on July 29, 2020, with the goal of changing the country's education system, aligning it with future demands while remaining "rooted in Indianness." In early August 2021, Karnataka became the first state to issue an order to adopt the NEP. The NEP 2020 is based on five guiding pillars: access, equity, quality, affordability, and accountability. It will prepare our students to face the numerous national and global issues of today and the future. The FLN (foundational literacy and numeracy) National Education Policy 2020 (5+3+3+4) system requires students to spend 5 years in the foundational stage, followed by 3 years in the preparation stage, 3 years of study in the middle stage, and ultimately 4 years in the secondary stage.

The phases are grouped based on the stages of intellectual development that a kid goes through in early childhood, school, and high school. The new education system began at the national level and is being implemented in all states of India. However, implementation takes time owing to a variety of circumstances. Each state has its own educational infrastructure and rules, therefore they must make the required modifications to comply with the new system. This

involves educating instructors, modifying curricula, and ensuring sufficient resources are available. The New Education Policy 2020's 5+3+3+4 curricular and pedagogical framework is broken down by age and class. It is based on the cognitive and developmental phases of children. The new 5+3+3+4 school structure consists of 12 years of schooling and 3 years of preschool (Anganwadi or Balvatika). The 5+3+3+4 model is an innovative approach to education in India. It aims to satisfy the diverse needs of students and promote inclusion throughout their educational journey. By extending the foundation stage (3 to 8 years), the student understands the importance of early childhood education to lay a solid foundation for future learning. This means that children from all backgrounds, regardless of socioeconomic background, have the opportunity to receive a quality education from the start. Under the Indian 5+3+3+4 education system, there are no additional qualifications for students. Stress is relieved because the child goes to school during the same time.

The National Education Policy 2020, with its 5+3+3+4 model of education, will include pre-kindergarten and kindergarten classes in primary and secondary schools and will include sports schools in global "formal education". This approach focuses on the differences between curricular and extracurricular activities and academic and professional needs. This approach is like a well-built house with a solid foundation, walls to support the roof, and a roof to protect from the elements. The framework ensures that all aspects of the overall educational experience are considered. This strong foundation creates an environment where students can grow and develop, allowing them to reach their full potential.

The policy calls for replacing the current 10+2 school education structure with a 5+3+3+4 education system aimed at ages 3 to 18, including pre-school/play school in the formal education structure. This system was implemented to meet the different needs of society and to adapt education to the needs of the modern world. The focus is on developing practical skills, critical thinking, creativity and social life alongside academic knowledge.

Some states have made progress in implementing the new system, while others are planning and preparing for the transition. Implementation points may vary from state to state based on individual circumstances. The new policies are controversial and controversial. Some of the concerns raised were the need for adequate infrastructure, the availability of trained teachers and the potential impact on the existing education system. However, the aim of the new system is to provide a comprehensive and balanced education to students, to prepare them for future challenges. The advantages of the modern education system are the focus on practical skills, critical thinking and holistic development. Our goal is to provide students with the skills they need to succeed in the 21st century. By integrating vocational training and vocational education, we offer students more career-focused options.

Although there are some challenges and objections, it is important to remember that the new education system was designed with the interests of the students in mind. We strive to create an inclusive, diverse and dynamic learning environment. One of the key features of this model is the emphasis on experiential learning. This encourages educators to adopt innovative teaching methods that go beyond traditional textbook courses. Through hands-on activities, project-based learning, and real-world experiences, students are actively involved in the learning process. This approach not only improves their understanding of academic concepts, but also develops critical thinking, problem solving and collaboration skills. Another important aspect of the 5+3+3+4 model is the introduction of vocational training from secondary school (from 14 to 18 years old). This recognizes that not all students have the same interests and aspirations, and that there are many careers they can explore. By offering career courses alongside academic programs, students have the opportunity to develop practical skills and gain industry-specific knowledge. It encourages inclusion by celebrating and encouraging diverse talents and abilities.

Review Of Literature:

Dr. Smitha S in his research paper "National Education Policy (Nep) 2020 - Opportunities And Challenges In Teacher Education" has mentioned the Indian government has introduced the National Education Policy 2020 to boost the education sector and transform the nation into an equitable knowledge society. They also stated that policy aims to provide high-quality education to all, with a focus on teacher education. The policy recommends moving the teacher education system to multidisciplinary colleges and universities, with a 4-year integrated B.Ed. becoming the minimum degree qualification for school teachers by 2030. The paper analyzes the opportunities and challenges in the Teacher Education Sector.

Alok Kumar in his research paper New Education Policy (NEP) 2020: A Roadmap for India 2.0 has maintained that the National Education Policy 2020 (NEP 2020) is a comprehensive plan to revamp India's education system and establish a roadmap for the 21st century. Approved by the Indian cabinet on July 29, 2020, NEP 2020 aims to increase student enrolment in all educational institutions by 2030. It proposes progressive reforms in existing education and governance systems. This preliminary review of the policy document serves as a basis for future research with empirical data. The vision is to create India 2.0, a global leader in education, with NEP 2020 aiming to make India a global hub in education by 2030. It is a progressive document with a strong understanding of the current socio-economic landscape.

Dr. Sarika Kumari in her research paper NEP 2020 challenges teachers education The National Education Policy 2020 (NEP 2020) outlines India's new education system, aiming to transfer the education system by 2030. It outlines a comprehensive framework for elementary, higher, and vocational training in rural and urban India. Teacher education will be progressively moved into multidisciplinary colleges and universities, with a minimum degree qualification of teacher knowledge and pedagogy by 2020. By 2021, a comprehensive national curriculum will be developed, ensuring passionate, qualified, and professionally trained teachers.

Prabha Singh Parihar, Dr. Seema Ghanghas, Dr. Waseem Ahmad Khan in their Research paper "National Education Policy 2020 and Gender Inclusiveness" mentioned that disparities between men and women persist in society, and school textbooks and curriculum play a crucial role in promoting gender equality. However, the formation of gender stereotypes in youngsters is aided by all aspects of education. A comparative analysis of Indian educational institutions using the New Policy 2020 reveals flaws in the system and suggests India still has a long way to go in achieving SDGs 4 and 5. Researchers propose solutions to revolutionize India's educational landscape and examine the Education 2030 Framework's recommendations for gender-inclusive public education.

Harshith Divakar in his research paper REVITALIZING ACADEMIA: UNPACKING THE NATIONAL EDUCATION POLICY 2020 This study aims to find out the interoute connections between National Education Policies 2020 (NEP) and the future of learning, offering a comprehensive analysis of the policy's adjective challenges and informative potential in reshaping higher education institutions. The paper also informing the various challenges that can blocked the NEP 2020 educational landscape. Ultimately, the purpose of the paper is to shed light on the broader implications of the NEP, details about how NEP 2020 is offering a foundation for informed insure and strategic decision-making in the realm of Endian higher education .

Anchal Saxena in her research paper THE GLIMPSE OF NEP 2020 has stated that the Indian government aggregated feedback from 2.5 lakh village-level stakeholders to two national parliamentary level committees, after more than 50 months of consultations and workshops. The paper also states about NEP 2020 and a large step in the field of Education focusing on the elementary-level of education to higher education in India. shae also mentioned that The focus of the NEP 2020 on transforming the Indian Education System by 2021. Thus, it is very much required to review all the aspects of the Indian education system in its reference. The aim of this research paper is to discuss the various domains of education under NEP 2020. This research paper will provide deep insight to readers about various aspects of NEP 2020 for the transformation of the education system in India. NEP2020 ensures Universal Access at all levels of schooling from pre-primary school to Grade 12. The NEP 2020 aims at making India, a global knowledge superpower.

Rupesh S. Wankhade in his research paper HIGHER EDUCATION AND NEP-2020 has mentioned that higher education significantly impacts a country's economy, social status, technology adoption, and human behavior. The government's education department is responsible for enhancing GER to include all citizens in higher education offerings.

RESEARCH METHODOLOGY:

2.1 Introduction:

This explains the study's research design, target population, sample strategy, data gathering methods, and data analysis methodologies. This research study on impact of new education policy (5 + 3 + 3 + 4) on is based on the perception of teachers. The Indian New Education Policy 2020 introduces a 5+3+3+4 curricular framework, breaking down the education system into 12 years of schooling and 3 years of preschool. It focuses on holistic development, practical skills, critical thinking, creativity, and social life, offering a comprehensive, balanced education for students aged 3-18. Implementation may vary depending on individual circumstances.

2.2 Objectives of the study:

.a To understand the 5 + 3 + 3 + 4 model.

b To compare the old model i.e.10+2 with the new model i.e. 5 + 3 + 3 + 4.

c Impact on students of 5 + 3 + 3 + 4.

Hypothesis:

H_0: There is no positive association between stages of development of kids and skill improvement.

H_1.There is a positive association between stages of development of kids and skill improvement.

H_0: 5 + 3 + 3 + 4 model is not significantly associated with skill development as compared to the old model.

H_2: 5 + 3 + 3 + 4 model is significantly associated with skill development as compared to the old model.

H_0: There is no association between teachers' perception and rating given to the New Education Policy.

H_3: There is association between teachers' perception and rating given to the New Education Policy.

2.4 Research design

The research design acts as a blueprint for the study, outlining the plan and structure. In this case, a descriptive survey method was used for data collection. Surveys are a popular and effective way to gather information from participants.

2.4.1 Instrument design:

To collect responses from the population, the questionnaire included a combination of questions that allowed for both detailed and specific answers, as well as questions that provided predefined response options. The questionnaire was carefully designed with a variety of question formats, such as multiple choice, ranking, and checklist questions. After conducting a pilot study, the questionnaire was refined based on the feedback received. The final stage involved testing the reliability and content validity of the instrument. The survey aimed to gain insights into the perspectives of teachers and students regarding the new education policy and to identify the challenges faced by students.

2.4.2 Collection of data:

To collect data for this study, we used both primary and secondary methods. We collected data using questionnaires and personal interviews. The survey focused on understanding perspectives on the new education policy and identifying student challenges. We refined the questionnaire based on feedback and tested its reliability and validity. For primary data, we distributed questionnaires in Mumbai city and conducted direct personal interviews, Structured questionnaires were also used.

Secondary data was collected from various sources like journals, articles, newspapers, and management books. We refined the questionnaire by incorporating feedback and included multiple choice, ranking, and checklist questions. The survey aimed to gain insights into teachers's perspectives on the new education policy and identify the challenges students face. During the final stage, we tested the reliability and content validity of the instrument.

2.4.3 Sampling plan:

When we're unable to study the entire population, it becomes essential to gather representative samples in order to grasp its characteristics. The universe in this case refers to the geographical area of Mumbai's suburban region and its population. Sampling is the process of selecting individuals for a study in a manner that they accurately represent the larger group they were chosen from.

Limitations of study:

Based on the primary data we gathered from 80 respondents in Mumbai, it might not fully represent the perceptions of teachers and students on a larger scale. Plus, we had time constraints. So, we also collected secondary data from various sources like government websites, newspapers, magazines, and books.

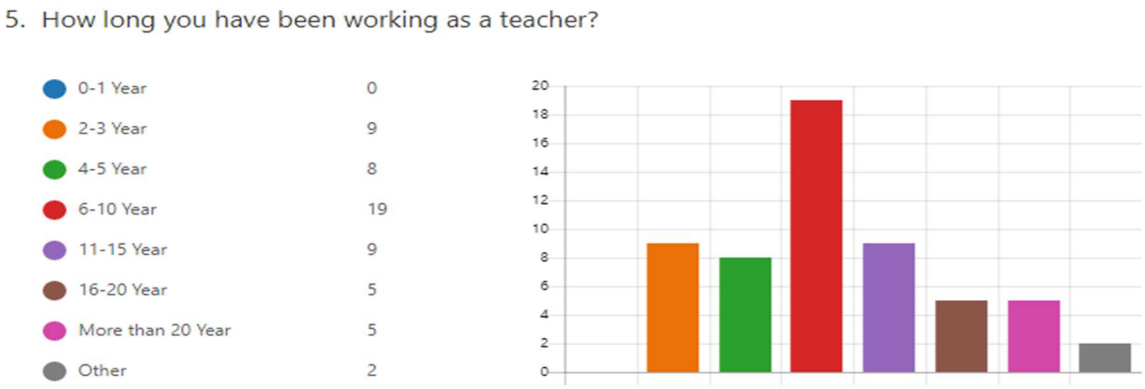
Data analysis

This section provides the analysis of collected data which are guided by the objective of the research and the proposed conceptual framework. As stated in the previous content, data was collected in the form of structured questionnaires utilizing only physical form as a medium of distribution. Out of the 15 issued questionnaires, all respondents provided constructive feedback for the study.As we can see in fig. 1 all the respondents are teachers and the following table shows their years of experience.

No. of years of experience	No. of respondent
0-1 Years	0
2-3 years	9
4-5 years	8
6-10 Years	19
11-15 Years	9
16-20 years	5
More than 20	5

As we can see in the fig.1 and table 1, more than 19 teachers were surveyed and have 6-10 years experience. this is important because experienced teachers will give more reliable answers for NEP 2020.

Fig 1.



As we see in fig 2. Out of 57 respondents 56 respondents have information about the 5+3+3+4 model of NEP 2020. They acquired the information through various online and offline sources .

Fig. 2

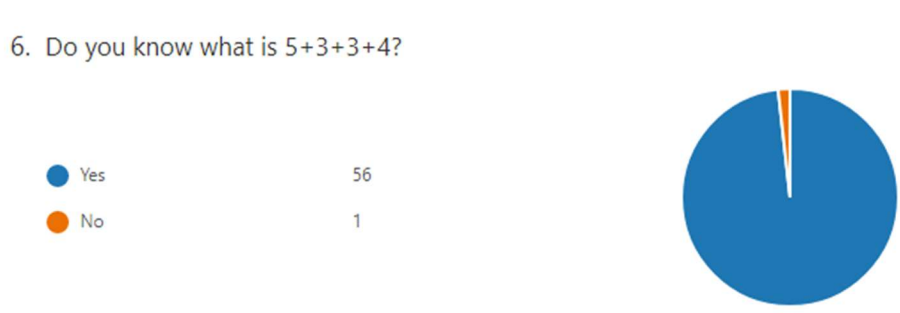


Fig. 3. The main aim of this research is to know the perception of teachers about new education policy . Hence, in the search for the perception 57 respondents were surveyed.

Discuss the implications of the 5+3+3+4 structure in terms of aligning education with the developmental stages of children. The highlights of the NEP benefits such as improved learning outcomes, reduced dropout rates, and enhanced employability skills.Mention how this structure facilitates a more inclusive and equitable education system by addressing the diverse needs of learners.As shown in fig . 3 we have given Stages and aim of stages.

Table 2. as stated below is the observed value of development of skills of kids as per stages (Class wise) of development .

Table of observed value of development of skill as per stages as per NEP 2020

stages of study/ skill development	Social skills	Subject specific knowledge	Communication skills and creativity	Research and problem solving skills	Total
First Stage (5Yr- Preschool)	19	10	25	3	57
Second stage (3Yr - Std 3 to 5)	15	15	19	8	57
Third stage (3Yr- Std 6 to 8)	6	26	17	8	57
Last stage (4Yr - Std 9 to 12)	6	13	8	30	57
Total	46	64	69	49	228

Table 2.

The following table shows the expected value of development of skills as per stages of development of kids as per NEP 2020. Table 3 is the expected value of development of students.

Table of expected value of development of skill as per stages as per NEP 2020

stages of study / skill development	Social skills	Subject specific knowledge	Communication skills and creativity	Research and problem solving skills	Total
First Stage (5Yr- Preschool)	4.75	2.5	6.25	0.75	14.25
Second stage (3Yr - Std 3 to 5)	3.75	3.75	4.75	2	14.25
Third stage (3Yr- Std 6 to 8)	1.5	6.5	4.25	2	14.25
Last stage (4Yr - Std 9 to 12)	1.5	3.25	2	7.5	14.25
Total	11.5	16	17.25	12.25	57

Table 3.

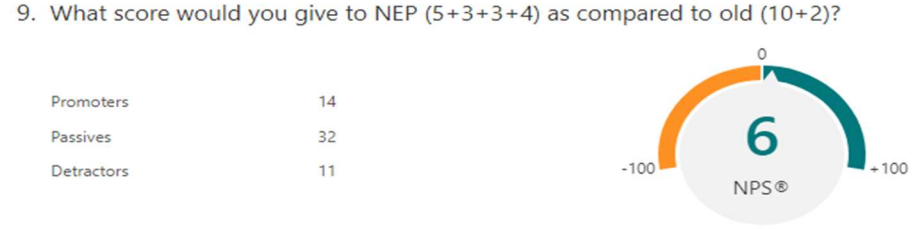
Observed vale	Expected Value	(O-E)	(O-E)2	(O-E)2/E
19	4.75	14.25	203.0625	42.75
10	2.5	7.5	56.25	22.5
25	6.25	18.75	351.5625	56.25
3	0.75	2.25	5.0625	6.75
15	3.75	11.25	126.5625	33.75
15	3.75	11.25	126.5625	33.75
19	4.75	14.25	203.0625	42.75
8	2	6	36	18
6	1.5	4.5	20.25	13.5
26	6.5	19.5	380.25	58.5
17	4.25	12.75	162.5625	38.25
8	2	6	36	18
6	1.5	4.5	20.25	13.5
13	3.25	9.75	95.0625	29.25
8	2	6	36	18
30	7.5	22.5	506.25	67.5
				513

Table 4.

Significance level taken as 0.05(5%) and confidence level is 0.95%. To implement chi square test first we find out the deviation between observed value and expected value as shown in table 4

- The chi-square value of 513 exceeds the critical value of 16.916 (based on the 0.05 significance level and 9 degrees of freedom).
- This indicates a very strong deviation from the expected values and suggests a significant association between the categorical variables being analyzed.
- In practical terms, it implies that there is likely a relationship or dependency between the variables, rather than the observed frequencies occurring by random chance alone.
- Hence, with such a large chi-square value relative to the critical value and given the degrees of freedom, we have rejected the null hypothesis, indicating that there is a significant association between the variables being tested.

Fig. 3



Sample mean ($\bar{x}$) = 7.50877193
Population mean (μ) = 10
Population standard deviation (σ) = 1.489520621
Sample size (n) = 57

We can now calculate the Z-test statistic using the formula:

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$Z = \frac{7.50877193 - 10}{\frac{1.489520621}{\sqrt{57}}}$$

Let's compute the value of Z:

$$Z = \frac{-2.49122807}{\frac{1.489520621}{\sqrt{57}}}$$
$$Z = \frac{-2.49122807}{0.197673764}$$
$$Z \approx -12.59$$

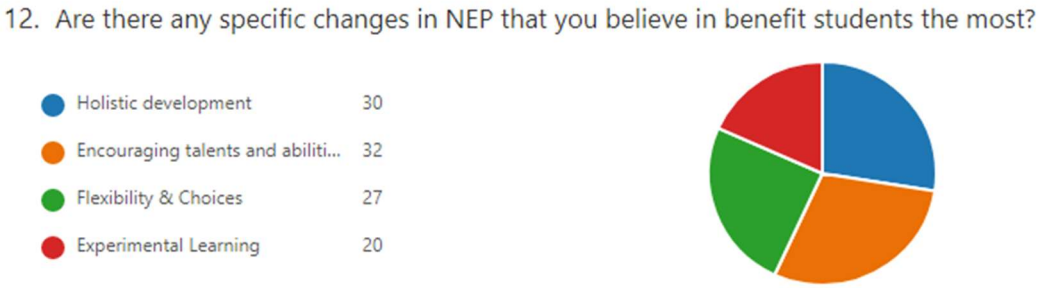
Now that we have the correct Z-test statistic value, we can interpret it. A Z-test statistic of -12.59 indicates that the sample mean is approximately 12.59 standard deviations below the population mean. Regarding the p-value, when using the Z-test statistic, we would typically look up the corresponding p-value from a standard normal distribution table or use software to calculate it. Given the extremely large magnitude of the Z-test statistic, the p-value would be essentially zero, indicating strong evidence against the null hypothesis (that the sample mean is equal to the population mean).

In this case, the sample mean of 7.50877193 is significantly lower than the population mean of 10.Therefore, the interpretation is that there is very strong evidence to reject the null hypothesis, suggesting that the sample mean is significantly different from the population mean.

Fig.5

Respondents were asked about the challenges in implementing NEP 2020 so they pointed out that encouraging talents and abilities will be more challenging and holistic development will also be the second most challenging task as shown in fig. 5&6

Fig.6



Significance level taken as 0.05(5%) and confidence level is 0.95%. To implement chi square test first we find out the deviation between observed value and expected value as shown in table 5

Table 5

Observed value of expectation of teacher about NEP 2020						
Positive perception of teachers / Rating scale	1 star	2 star	3 star	4 star	5 star	TOTAL
Yes	0	1	7	16	2	26
No	0	0	1	0	0	1
May be	0	0	10	19	1	30
TOTAL	0					57

Table 6

Expected value of expectation of teacher about NEP 2020						
Positive perception of teachers / Rating scale	1 STAR	2 STAR	3 STAR	4 STAR	5 STAR	TOTAL
Yes	0	0.4561403509	3.192982456	7.298245614	0.9122807018	11.85964912
No	0	0	0.01754385965	0	0	0.01754385965
May be	0	0	5.263157895	10	0.5263157895	15.78947368
TOTAL	0	0.4561403509	8.473684211	17.29824561	1.438596491	27.66666667

Table 7

Chi square table value				
Observed vale	Expected Value	(O-E)	(O-E)2	(O-E)2/E
0	0	0	0	0
1	0.4561403509	0.5438596491	0.2957833179	0.6484480432
7	3.192982456	3.807017544	14.49338258	4.539136302
16	7.298245614	8.701754386	75.72052939	10.37516869
2	0.9122807018	1.087719298	1.183133272	1.296896086
0	0	0	0	0
0	0	0	0	0
1	0.01754385965	0.9824561404	0.9652200677	55.01754386
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
10	5.263157895	4.736842105	22.43767313	4.263157895
19	10	9	81	8.1
1	0.5263157895	0.4736842105	0.2243767313	0.4263157895
				84.66666667

Based on calculated information that the tabular value of the chi-square statistic at a significance level of 0.05 (with 8 degrees of freedom) is 15.51, and our calculated chi-square value is 84.66, we can make the following interpretation:

Degrees of freedom (df): With 8 degrees of freedom, our analysis involves a contingency table with several categories or variables. The calculated chi-square value (χ^2) of 84.66 is much larger than the tabular value at a significance level of 0.05 (15.51). This indicates a substantial difference between the observed and expected frequencies in your data. Since the calculated chi-square value exceeds the critical value at a significance level of 0.05, the p-value associated with this chi-square value is very small, practically approaching zero.

Hence ,Given that the calculated chi-square value significantly exceeds the critical value at a significance level of 0.05, we would reject the null hypothesis. This suggests strong evidence to conclude that there is a significant association between Teacher perception about NEP 2020 and rating given by them for the policy. In other words, the observed differences in frequencies are unlikely to have occurred by chance alone, indicating a genuine relationship between the variables.

Fig.7

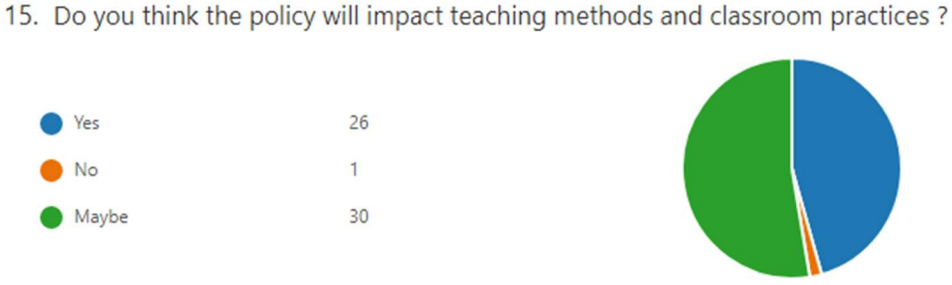


Fig.8

As we can see in fig.8 the average rating of 3.70 given for existing NEP 2020 policy Hence, we can conclude that the New Education policy seems to provide encouragement and it will holistically help the country to shape the future generation.

Conclusion

1.As the details of the first hypothesis tested is as under :

- The chi-square value of 513 exceeds the critical value of 16.916 (based on the 0.05 significance level and 9 degrees of freedom).
- This indicates a very strong deviation from the expected values and suggests a significant association between the categorical variables being analyzed.
- In practical terms, it implies that there is likely a relationship or dependency between the variables, rather than the observed frequencies occurring by random chance alone.
- Hence, with such a large chi-square value relative to the critical value and given the degrees of freedom, we have rejected the null hypothesis, indicating that there is a significant association between the variables being tested.

Hence , we have concluded that there is indeed a positive relationship between the stages of development of children and their skill improvement, based on your analysis or research findings.It's important to ensure that the conclusion aligns with the hypotheses and that the interpretation accurately reflects the results of the analysis or study. If the evidence supports a positive association, then the null hypothesis would be rejected in favor of the alternative hypothesis.

2. **As the details of the second hypothesis tested is as under :**

Now that we have the correct Z-test statistic value, we can interpret it. A Z-test statistic of -12.59 indicates that the sample mean is approximately 12.59 standard deviations below the population mean.

Regarding the p-value, when using the Z-test statistic, we would typically look up the corresponding p-value from a standard normal distribution table or use software to calculate it. Given the extremely large magnitude of the Z-test statistic, the p-value would be essentially zero, indicating strong evidence against the null hypothesis (that the sample mean is equal to the population mean).

In this case, the sample mean of 7.50877193 is significantly lower than the population mean of 10.Therefore, the interpretation is that there is very strong evidence to reject the null hypothesis, suggesting that the sample mean is significantly different from the population mean. Hence we can conclude that The NEP 2020 has positive association as compare to old one .

3.**As the details of the third hypothesis tested is as under :**

Based on calculated information that the tabular value of the chi-square statistic at a significance level of 0.05 (with 8 degrees of freedom) is 15.51, and our calculated chi-square value is 84.66, we can make the following interpretation:

Degrees of freedom (df): With 8 degrees of freedom, our analysis involves a contingency table with several categories or variables. The calculated chi-square value (χ^2) of 84.66 is much larger than the tabular value at a significance level of 0.05 (15.51). This indicates a substantial difference between the observed and expected frequencies in your data. Since the calculated chi-square value exceeds the critical value at a significance level of 0.05, the p-value associated with this chi-square value is very small, practically approaching zero.

Hence ,Given that the calculated chi-square value significantly exceeds the critical value at a significance level of 0.05, we would reject the null hypothesis. This suggests strong evidence to conclude that there is a significant association between Teacher perception about NEP 2020 and rating given by them for the policy. In other words, the observed differences in frequencies are unlikely to have occurred by chance alone, indicating a genuine relationship between the variables.There is association between teachers' perception and rating given to the New Education Policy.

Overall, the "5+3+3+4" policy is seen as a transformative initiative aimed at improving the quality, equity, and relevance of school education, ultimately contributing to the overall development and well-being of children and society.

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Spoken Word Poetry: The Unheard Voices of Women

Ashima Syal

INTRODUCTION

The speck of culture has always been very wide. The term culture can be looked upon through a realm of varied activities such as human interaction, communities, celebrations, entertainment, and through arts such as music, dance and drama. Performance is one of the prominent aspects of culture. When it comes to poetry, performance has always been on the forefront. In Indian culture, in earlier times a community of like minded poets gathered together for the recital of poetry in the form of " Kavi Sammelans and Mushairas". Poetry has always been one of the most gripping and thought-provoking aspects of literature. It is very interesting to see how poetry as a genre has been evolving constantly. In contemporary times, poetry has become a tool for the suppressed. It has become an emerging voice, through the medium of which the youth gives a glimpse of rupture, rage, fury as well as celebration. A form of poetry which is gaining popularity in modern time is Spoken Word Poetry.

Spoken word poetry, also known as Slam poetry or Performance poetry, brings forth the fact that poetry is not just meant for the pages, it can be performed out loud in front of an audience. Spoken word poetry breaks away from the conventions of traditional poetry and challenges the very notion of how poetry should be performed. It is associated with hip-hop culture. This form of poetry has its ties with storytelling and monologue theater. What makes this genre of poetry more engaging and impactful is the connection which the spoken word artist establishes with their audience. Such a form of poetry addresses issues which are relevant to society.

In recent times, Spoken word poetry has emerged as a form of self-expression especially for the women in India. Through the medium of spoken word poetry, the women are able to raise a voice against the prevalent gender bias, body shaming, sexual identity, politics of gender and the body. What I find most interesting about Performance poetry (Spoken Word) is the fact that it mobilizes the poetic devices which are not elements of written poetry. The voice of the speaker can be mingled with music, musical sounds, several visual and theatrical devices. All these elements enhance the verbal poem. This itself

shows how spoken word poetry has a very open and flexible nature.

The roots of performance poetry lie in Oral Poetry. While defining a poem as "Oral", it is necessary to take into consideration three crucial factors, composition, transmission and performance. The main feature that distinguishes Oral Poetry from the written form is Performance. When we look at the most widely known and practiced forms of Performance poetry such as Rap, Blues, and hip-hop. A notable aspect which needs to be thought about when one thinks about all these forms of performance is the very fact that all these forms were born from a need of self-expression and relief from a lifestyle which was brutal.

Thus, my research paper will be divided into two parts, the first part will explore how the very genre of spoken word poetry becomes a reflection of the culture of the contemporary. My research will focus on Women Spoken Word Poets. The second part of my research will focus on answering how institutions of power such as the media result in the changing dynamics of performance in Spoken Word Poetry.

The growing popularity of performance poetry in India can be determined by slam poetry competitions that are organized in various Indian cities. These competitions give an open platform to people to speak their heart out. Nowadays with the advent of technology, Spoken word poetry has been getting the platform to evolve further. Spoken word poetry delves into the journey from the page to the stage. Expression is an arbitrary pearl bound to be exhibited by every human kind. Stage in the advent of Spoken word gives the performers a space to depict their thoughts unapologetically. This form of poetry is used by women to express all the issues that they face in society.

LITERATURE REVIEW

Katherine Michalko, in her study, sees the effect of Poetry on the development of voice in writing. When spoken word is used in the classroom it creates an expressive platform for the students. The aspects of Spoken Word Poetry exploits what type of a writer a student will be as it allows the writer to write and perform poems which reflect their identity, thus spoken word becomes a mode of self exploration for the students.

Sara Tornquvist, in her study reveals how Spoken Word Poetry is used as a tool to lower speaking anxiety among Swedish EFL Learners. Jeanna Kewerling, in her Study " Exploring Youth Spoken Word as a site of Critical Pedagogy implies how the spaces which are designated for Spoken Word Poetry subvert dominant relations of power through

a constant stream of negotiations. By using Spoken Word Poetry, it is seen that the teens have their own literate identities, and begin to look at themselves as writers and they are seen acting on their self perception.

SPOKEN WORD : THE UNFILTERED VOICE OF CONTEMPORARY WOMEN

" My body is a brand called validation, at the back of my neck, at the back of my neck is a brocade shining tattooed as a symbol of the product that I have become from head to toe, to head a part of me and every part of me has sought validation at some point of time my eyes to begin with I started wearing contact lenses giving away my thick glasses because at eight years of age I overheard my grandfather saying in another room that nobody marries a girl who wears a churnman" the above mentioned lines are from the poem " Validation" by Preeti Vagnani. These lines up frontly depict how women are thought of as creatures who constantly are strangling themselves to seek validation, they are being judged even on the spectacles they wear, by their own close people. This poem depicts the satirical demeanor of validation, it's the society which disgraces the word validation.

"I asked my ma. Instead of looking for grooms who are fair, let's look for grooms who treat people fairly". These are lines from Aranya Johar's poem a Brown Girl's Guide to Beauty. Indian society has a patriarchal structure, in this structure marriage holds a pedestal, parents existing in the society run behind finding grooms for their daughters, as they see it as their sole responsibility. Through these lines, Aranya makes it clear that looking for fair, handsome grooms should not be the priority of parents when it comes to marriage, rather how men treat people around them, whether these grooms carry the fervor of treating those around them on fair and equal terms. This poem being voiced by Aranya, is very significant as the contemporary women are women, who are not obligated to serve men in the duty of marriage, and even if by choice they get married, they themselves will only get married to grooms who treat them equally on all grounds.

Thus, the above two poems depict how through the advent of Spoken Word, women are gaining a sense of empowerment. They are voicing their unfiltered opinions, the genre of Spoken word is flexible, it does not have to be rhythmic, the stage allows it to be raw, rugged, unapologetic, a true of self expression is visible through the spoken word poems above. This form of art is emerging as a source of self expression, a culture which is bold and guards its opinionated ground powerfully.

NEED FOR MORE RESEARCH IN THE FIELD OF SPOKEN WORD POETRY

Spoken Word Poetry is an upcoming form of poetry, it is very popular among the youth. A society, a country is considered to progress only if it works on grounds of equality. In India, there are still many households where the choice a woman makes is always questioned, be it her clothes, sexuality, the career she chooses to pursue, a woman has to always answer the prevalant question " Why". Indian society is wrapped in the lens of patriarchy, in contemporary times, the women are emerging as bold, confident, strong beings. In my opinion, there is a need for more research in the field of Spoken Word Poetry, because through spoken Word Poetry women are getting a platform to express their views and opinions and they can challenge society on all fronts when it comes to being overshadowed by the clutches of society's judgment.

RESEARCH AIMS :

The Research aims to answer the following :

In what way does Spoken Word Poetry as a subset of the culture engage in community building.

.Culture brings forth the question of what is desirable and meaningful in relation to power. In this light, how does Spoken Word Poetry reflect itself as a culture which increases power.

.How does Performativity become the artistic output of culture through the medium of Spoken word Poetry.

METHODOLOGY

The Research questions will be answered through the lens of Performance Studies as performance studies takes into account everyday performances and put forth the depiction of social, professional, gender, race, race, class, media roles. Examining Spoken Word Poetry in the wake of Performance Studies will help conceptualize the terms power and culture, it will also help to see how language acts as the essence of culture and becomes a basic force in defining social relationships.

RESEARCH METHODS

Observation : Observing women Poets in Spoken Word Poetry gatherings, listening to their works of poetry in a spoken word setting will help analyze the genre of spoken word in a detailed and minute manner.

Interview : The chosen Spoken Word Women Poets will be interviewed about how choosing Spoken Word as a form of expression gives them a sense of empowerment.

RESEARCH CONCLUSION

Through my Research I aspire to conclude how the very form of Spoken Word Poetry comes across as a genre of poetry through its open and dynamic nature emerges as a strong voice of women. I aspire to see how language in the wake of performance becomes a source of power for the Women Spoken Word Poets.

INSPIRATION BEHIND CHOOSING PERFORMANCE POETRY FOR MY RESEARCH:

I'm a published Poet and my writing made me choose to delve into the field of performance poetry in depth. I have always been a student of literature and literature helps to expand the realm of art. When poetry is performed on stage, it gives a new dynamic to culture. I have been visiting cafes in the city of Mumbai where I reside and I have been narrating my poems in front of an audience. Through my experience of performance of poetry on stage I have observed that it enhances the whole experience of poetry for the listener as well as the performer, this close observation and my own writings inspired me to take up this topic for my research.

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An Empirical Study of Spatio-Temporal Patterns of Air Quality in Dombivli City, Maharashtra

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Abstract

Urbanization and industrialization are increasing in different parts of the world. Increased concentration of migrants to urban centers and concentration of manufacturing industries in urban centers have led to different types of pollution. Dombivli is one of those important urban centers where large number of chemical manufacturing units are in operation. Due to large chunk of migrants from different parts of the country, the population of suburban cities like Dombivli in MMR (Mumbai Metropolitan Region) is increasing exponentially. Increased number of vehicles and resultant traffic flow is also responsible for pollution in these urban centers. This paper is a sincere attempt to analyze impact of industries and vehicular traffic on Air Quality in Dombivli city. An empirical approach has been used for analysis of spatio-temporal patterns of air quality in Dombivli city. Results of the study indicate that MIDC area, railway station area, Kalyan-Shil road, Manpada road, P&T colony etc. have poor air quality whereas air quality is better in Dombivli West area as compared to those in Dombivli East. Diversification of transportation routes and promoting use of public transport could prove to be effective measures for improving air quality in the study area.

Keywords: Air Quality, Air Quality Index, chemical industries,

Introduction

Environmental Consciousness is one of the focus areas of Sustainable Development Goals 2015-2030 proposed by United Nations Development Programme. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.

In the view of UNDP's SDGs, it is indeed necessary to plan and implement strategies for improving quality of environment of local areas by addressing local environmental issues. The "glocal" (think globally and act locally) approach will help to achieve the global goals of sustainable development.

Considering the focus areas of SDGs, it was felt important to take up and address local environmental issues at institutional level and work on environmental consciousness. Internal Quality Assurance Cell of our institution has taken up initiative to conduct field based survey

for assessment of air quality in different parts of Dombivli city and come out with empirical evidences of air quality in the city for further policy implications.

The review of existing literature indicate that several attempts have been made to analyze air quality in urban areas by many researcher. One of the earlier attempt was made by Bishoi et al., (2009) toto compare air quality in New Delhi using factor analysis and USEP methods. The study revealed that air quality based on factor analysis is proved to be better than other indices. Mamta & Bassin, (2010) empirically analyzed ambient air quality in New Delhi using different parameters. Kanchan et al., (2015) reviewed air quality indexing systems in different parts of the world such as US based EPA, CAQI, IAQI, AAQI, PI, AQDI and ORAQI. Sarmadi et al., (2021) made an attempt to evaluate impact of onset of COVID pandemic on air quality of 87 capitals of different industrial countries. Ramesh, (2023) attempted to predictair quality index using machine learning algorithm in New Delhi, Bangalore, Kolkata and Hyderabad. The review of literature reveals that empirical approach to assessment of air quality is most appropriate to understand urban impact on quality of air.

Rationale of the Study

Dombivli is one of the important suburbs of Muumbai along central railway line. Dombivli is an important hub for Chemical industries. A large number of establishments of chemical industry in the immediate vicinity of the residential areas has led to increasing concentration of pollutants particularly those responsible for air and water pollution. On 22nd January 2014, Dombivli received "green rain", environmentalists said the incident points to a larger pollution problem in the Mumbai metropolitan region and other areas in the state (TOI, 23rd January 2014). The deposition of green water in and around MIDC area of Dombivli seems to be a case of pollution manifesting itself. Pollutants in the air may have reacted with rainwater; thus reducing air pollution, but adding to water and soil pollution. These problems have raised a question mark on the effectiveness of the pollution control policies and actions of the state government's various agencies concerned. They should conduct accurate and transparent speedy chemical tests of the green water and decide the causative factors and organizations. There are a total of 450 companies in MIDC Phase 1 and MIDC Phase 2 in Dombivli (E), out of which 250 deal in chemicals with some using hazardous substances. Locals have been raising the issue of pollution since the last several years.

This ambient air quality monitoring network comprises of 84 active ambient air quality monitoring sites covering 12 major cities in the state. The network includes both manually operated Ambient Air Quality Monitoring Stations (61) and Continuous Ambient Air Quality Monitoring Stations (23).

Unfortunately, there is only one ambient air quality monitoring site for Kalyan Dombivli Municipal Corporation located in Kahdakpada area of Kalyan. There is no dedicated air quality monitoring station for Dombivli, one of the largest polluted cities in Maharashtra. Keeping in mind the gravity of the issue, there was a dire need to evaluate the air pollution parameters empirically in different parts of the city and find out its association with several soci-economic activities predominant in the area. With this motive the present study was conducted during November and December 2021.

Aim and objectives of the Study

The aim of the study was to measure and evaluate Air Quality Index (AQI) in Dombivli city and suggest policy measures to control air pollution in the study area. The aim of the study is divided into following specific objectives.

1. To study spatial patterns of air quality parameters in the study area.
2. To measure Air Quality Index for selected locations in the study area.
3. To suggest appropriate measures for mitigating problem of air pollution in the study area.

To achieve the objective of the study stated above, appropriate methodology has been followed. The details of materials and methods adopted for the study are described in subsequent sections.

Materials and Methods

The present study is based on empirical evidences on air quality parameters in the study area.
As discussed in the previous sections, there is no dedicated network of ambient air quality monitoring stations in Dombivli, there is a need to measure and record air quality parameters physically in different parts of the city to understand the spatial variations in air quality.
The present study is based on actual measurement and monitoring of air quality parameters in the study area. A handheld air quality monitoring system was used to record the observations. In the beginning, a field sheet was prepared to conduct filed work including the coding of sites to be visited, locational details, air quality parameters and their readings etc. Stratified sampling method was used to identify the sample sites for field work and 92 sites have been identified for the same. The care was taken to incorporate all major locations in Dombivli and no place is omitted to achieve complete picture of the issue for the entire study area. The location parameters (coordinates and elevation above sea level) of each filed site have been recorded using handheld Global Positioning System (GPS).
Following parameters of ambient air quality have been considered for the study;

1. Humidity, formaldehyde (HCHO),
2. Total volatile organic compounds (TVOC)
3. Micron-sized fine particulate dust / aerosols (PM 2.5/PM10).

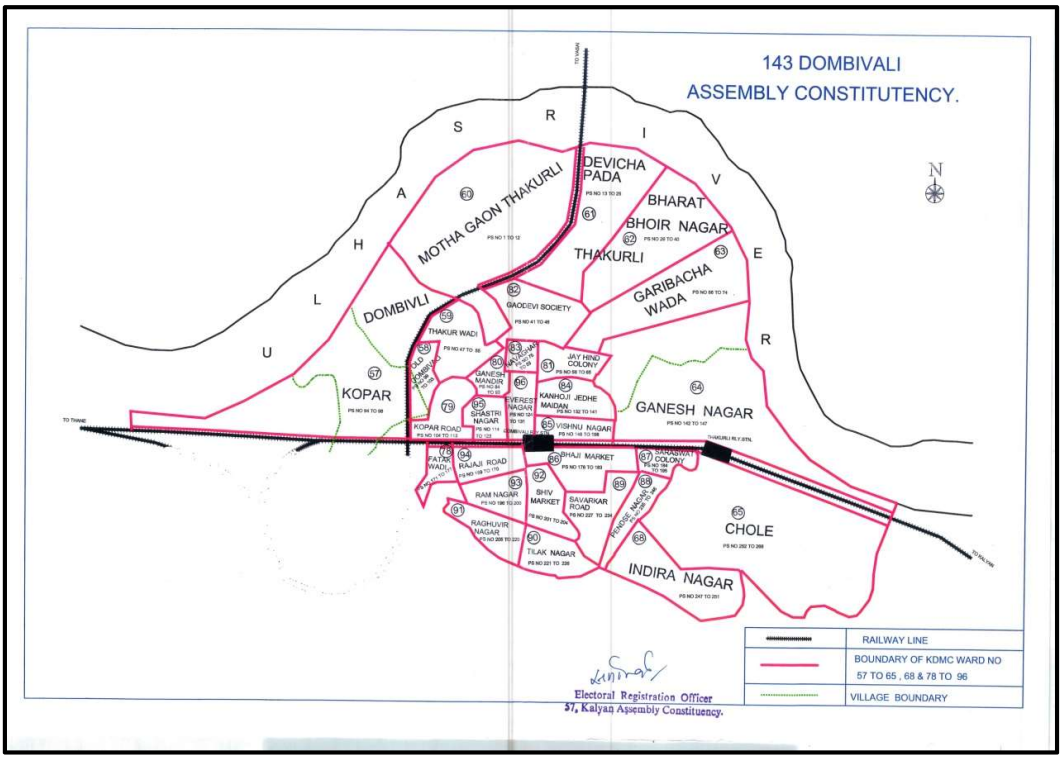
After configuring the handheld air quality monitoring device, the air quality parameters for selected filed sites have been monitored both during morning time (8.00 am to 9.30 am) and evening time (7.00 pm to 8.30 pm), so as to achieve both spatial and temporal variation in the data recorded during the field study.
The data recorded during the field survey were tabulated, classified, analyzed, and mapped subsequently.

About the study area

Dombivli is a town in Kalyan Tehsil of Maharashtra which lies at a distance of about 20 kilometers from Thane and around 6 kilometers from Kalyan (fig. 1). This town is a thickly populated suburb of Mumbai with a total population of about 11, 93,000. Most of the residents of Dombivli are literate and the place is the first literate town in Maharashtra and the second

one in India. The town is a small and cultural one with majority of population following Hinduism.

Fig. 1 Study Area



Dombivli is an important industrial area of the state having an industrial zone lying on the eastern side of the Mumbai highway. A number of eminent literians, musicians, actors, authors and dramatists are residing in the city.

Dombivli Town came into being as Gajabandhan village. The old Dombivli forms west flank and is embraced by Ulhas river. The east flank is the arm of the Municipal Corporation and a major part of the budget is used for its development.

History of this town is dated to the medieval period while there are still no major evidences of the early habitation of Dombivli. This town was first documented on stone inscriptions in the year 1075 by Harpal Dev. These inscriptions are situated at Mahul village located near the port Turbhe. These stone writings in Dombivli refer to its existence in the year 1396 – 97.

As per the population count, Dombivli has an estimated population of about 11, 93,000. The population of the town has increased consisting of a major portion of Maharashtrians who speak Marathi language. Dombivli town boasts a cosmopolitan population consisting of Maharashtrians, Gujrathis, Jains, Tamilians, Kannadigas, Punjabis, Malayalee's and a major population of the Khojas. Dombivli is honored as the first ever fully literate town of Asia but has been taken over by a town in Kerala. There are several schools in the town which offer for Primary and Secondary education to the children.

Dombivli is well connected to Mumbai and various surrounding regions via various modes of transport. Visitors can easily reach the town by railway, bus, rickshaw or taxi. The railway station of Dombivli has been set up in the year 1887. Initially, there was only one cabin that was used for ticketing as well as for signaling. Also, the railway tickets were firstly stamped as

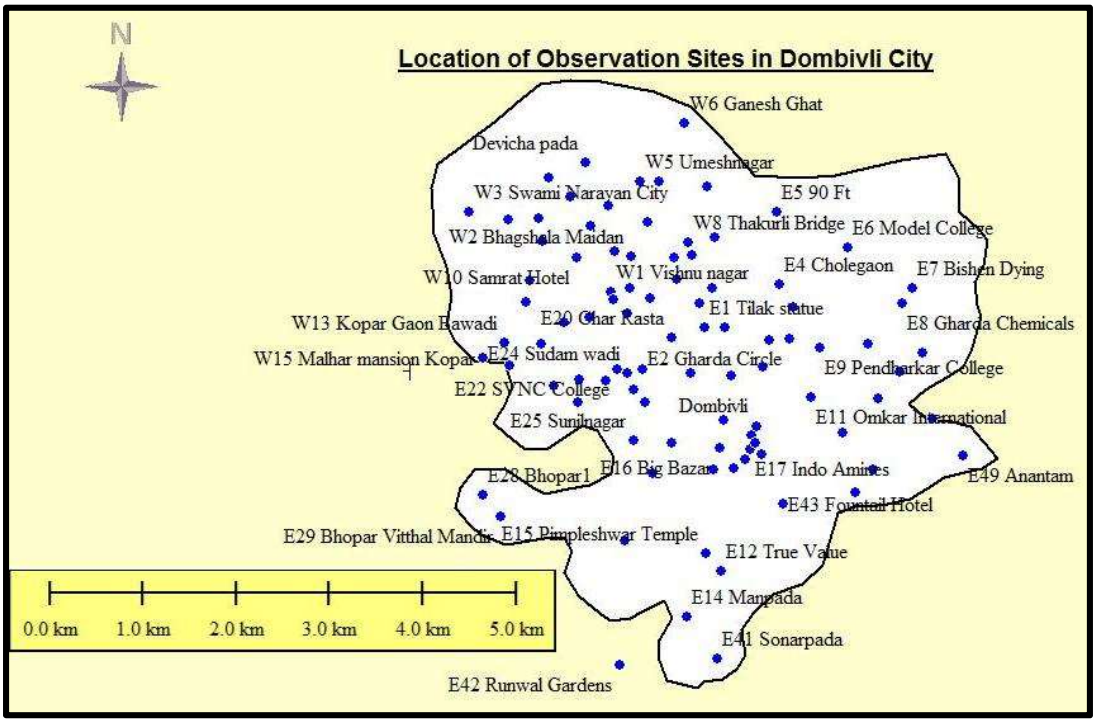
"Dimali" but efforts were made to rename the station as "Subhash Nagar". The Chhatrapati Shivaji International Airport is the nearest airport to Dombivli lying at Mumbai.

Dombivli is a well known commercial place located in the state of Maharashtra. Maharashtra Industrial Development Corporation is a big industrial complex which has been developed around Dombivli. It is a well known place for its rapid industrial growth having major industries such as dye's, paints, chemical and heavy metal factories. Some of the popular industries of Dombivli include Vicco Labs, Gharda chemicals, Deepak Fertilizers, Llyod Steel etc.

Spatial Distribution of Sample Sites for field investigations

The spatial distribution of the sample sites selected for the study is given in the following figure (Fig. 2)

Fig. 2. Spatial distribution of field observation sites



The above figure portrays the distribution of the sample sites selected for the field investigations. It is evident from the figure that there has been a sizable number of observation sites and they are well distributed across the study area.

Distribution of Air quality parameters in the study area

Different parameters for evaluating ambient air quality have been recorded and tabulated subsequently. For the sake of convenience the field sites have been classified into following clusters.

1. Dombivli MIDC area
2. Kalyan-Shil Road
3. 90 Ft road
4. Dombivli (East) Residential Areas
5. Dombivli (West).

The spatial Distribution of Air quality parameters are given in Tabulated format as follows.

Dombivli MIDC area

Dombivli MIDC area is characterized by concentrations of chemical industries. Several chemical establishments like Gharda Chemical, Indo Amines and many more are situated in this cluster.

The temporal and spatial distribution of air quality parameters in Dombivli MIDC area reveals that the amount of concentration of air pollutant is high as compared to other clusters in Dombivli. Moreover, the concentration of air quality parameters is also found to be greater in the evening time (Table 1).

Table 1. Air quality parameters in Dombivli MIDC Area

Location	Morning				Evening			
	HCHO	TVOC	PM 2.5	PM 10	HCHO	TVOC	PM 2.5	PM 10
Bistien Dying industry	0.033	0.746	125	145	0.038	0.849	137	164
Gharda Chemical gate 13	0.027	0.405	117	136	0.035	0.546	129	155
Pendharkar College	0.028	3.186	132	150	0.029	3.186	144	169
Bharat Petroleum	0.032	1.066	129	149	0.037	1.066	141	168
Indo Amines	0.042	0.17	148	163	0.047	0.246	160	182
Indo Amines 2	0.042	1.58	157	169	0.042	1.58	169	188
Indo Amines 3	0.041	1.49	167	176	0.041	1.49	179	195
Indo Amines 4	0.042	1.52	159	173	0.042	1.52	171	192
Indo Amines 5	0.042	1.47	157	184	0.042	1.47	169	203
Indo Amines 6	0.041	1.48	143	198	0.041	1.54	155	217
Bistien Dying industry 2	0.041	0.547	182	194	0.041	0.547	194	213

(Source: Field survey)

1. Kalyan-Shil Road

Kalyan – Shil Road is one of the areas with high vehicular traffic density (Table 2). It is characterized by concentration of vehicles and heavy traffic almost the whole day.

Table 2. Air quality parameters recorded in Kalyan – Shil road area

Location	Morning				Evening			
	HCHO	TVOC	PM 2.5	PM 10	HCHO	TVOC	PM 2.5	PM 10
True value	0.038	0.514	145	168	0.039	0.6102	157	187
True value 2	0.037	0.511	126	143	0.039	0.536	138	162
Manpada	0.032	2.506	123	142	0.037	2.506	135	161
Pimpleshwar	0.048	3.15	126	147	0.049	3.012	138	166
Sonarpada 2	0.037	1.54	161	170	0.042	1.57	173	189
Sonarpada 3	0.038	1.56	162	168	0.046	1.69	174	187
Bypass 2	0.04	2.014	151	179	0.04	2.014	163	198
Bypass 3	0.042	2.003	158	162	0.042	2.003	170	181
Bypass 4	0.039	2.04	152	159	0.045	2.04	164	178
Bypass 5	0.039	2.014	149	169	0.042	2.014	161	188
Regency 1	0.036	0.216	134	170	0.036	0.216	146	189
Regency 2	0.035	0.224	146	172	0.035	0.315	158	191
Anantam	0.038	0.541	153	179	0.038	0.541	165	198
Anantam 2	0.033	0.103	154	182	0.038	0.129	166	201
B.Petroleum	0.032	1.066	129	149	0.037	1.066	141	168

(Source: Filed survey)

The spatial and temporal distribution of air quality parameters along Kalyan – Shil Road reveals that the amount of concentration of air pollutant is high probably due to heavy

vehicular traffic. Moreover, the concentration of air quality parameters is also found to be greater in the evening time.

2. 90 Ft road

This area is located to the northern limits of Dombivli and at proximate distance from both Thakurli and Kalyan Railway Station. Ninty Feet road is comparatively newly developed area. Several sky scrapers have been developed in this area most of which are residential apartments. One of the peculiar feature of this area is its proximity to MIDC and Kalyan creek at the mouth of Ulhas river. Despite of being residential zone, the air quality in this area is poor probably due to industrial effluents (Table 3.).

Table 3. Air quality parameters recorded in 90 ft area

Location	Morning				Evening			
	HCHO	**TVOC**	**PM 2.5**	**PM 10**	**HCHO**	**TVOC**	**PM 2.5**	**PM 10**
Nursary	0.024	0.451	135	157	0.029	0.451	147	176
Cholegaon	0.03	0.208	107	122	0.037	0.31	119	141
90 ft eantry	0.043	6.039	410	480	0.049	6.159	422	499
Model College	0.034	0.197	136	157	0.039	0.231	148	176

(Source: Field survey)

Almost all the locations in 90 feet areas indicate higher values of air quality parameters in the evening time.

3. Dombivli (East) Residential Areas

Dombivli East area is residential zone located at proximate distance from Dombivli Railway Station and almost is at the heart of the city. Traffic congestion is most important contributor to air pollution in this area (Table 4).

Table 4. Air quality parameters recorded in Dombivli East residential area

Code	Location	Morning				Evening			
		HCHO	TVOC	PM 2.5	PM 10	HCHO	TVOC	PM 2.5	PM 10
E1	Tilak statue	0.029	0.437	87	100	0.039	0.477	99	119
E2	Gharda Circle	0.031	7.598	142	164	0.038	7.645	154	183
E9	Pendharkar College	0.028	3.186	132	150	0.029	3.186	144	169
E11	Omkar International School	0.05	0.248	194	219	0.057	0.312	206	238
E16	Big Bazaar	0.048	0.453	100	116	0.05	0.453	112	135
E17	Indo Amines	0.042	0.17	148	163	0.047	0.246	160	182
E18	Ice factory	0.049	1.488	198	230	0.051	1.488	210	249
E19	Gaon Devi	0.046	3.197	135	158	0.049	3.197	147	177
E20	Char Rasta	0.033	3.148	94	110	0.039	3.148	106	129
E21	Railway Station	0.041	3.102	132	112	0.041	3.102	144	131
E22	SVN College	0.038	0.292	146	125	0.039	0.249	158	144
E23	Tukaramnagar	0.037	0.311	151	127	0.037	0.379	163	146
E24	Sudamwadi	0.039	0.287	150	120	0.042	0.315	162	139
E25	Ayre Road	0.038	0.293	146	126	0.038	0.41	158	145
E26	Patkar School	0.037	0.279	147	119	0.048	0.326	159	138
E27	Tandan Road	0.038	0.297	149	118	0.046	0.312	161	137
E28	Bhopar 1	0.034	0.087	102	109	0.034	0.102	114	128
E29	Bhopar2	0.033	0.079	110	104	0.039	0.134	122	123

E30	Naddivli 1	0.034	0.124	125	112	0.038	0.129	137	131
E31	Nandivli 2	0.035	0.159	127	116	0.042	0.201	139	135
E32	Nandivli 3	0.033	0.149	122	118	0.039	0.159	134	137
E37	Nandivli 4	0.034	0.167	164	189	0.051	0.201	176	208
E38	Nandivli 5	0.035	0.162	161	179	0.039	0.243	173	198
E39	Naddivli 6	0.034	0.166	160	190	0.04	0.166	172	209
E51	Ramchandranagar	0.037	0.124	149	184	0.037	0.128	161	203
E52	Dombivli Gymkhana	0.036	0.148	138	169	0.042	0.152	150	188
E53	SIA College	0.035	0.216	137	157	0.037	0.216	149	176
E54	Gograss wadi	0.037	0.118	146	159	0.037	0.141	158	178
E55	Phadke road 2	0.039	1.013	168	167	0.039	1.013	180	186
E56	Phadke road 3	0.039	1.021	142	164	0.039	1.021	154	183
E57	Sawarkar road	0.037	0.417	148	169	0.037	0.417	160	188
E58	Joshi Highschool	0.036	0.415	142	162	0.04	0.415	154	181
E59	Jalaram mandir	0.034	0.315	168	179	0.034	0.514	180	198
E60	Pendse nagar	0.033	0.347	171	192	0.037	0.492	183	211
E61	Manjunath school	0.04	0.264	179	199	0.04	0.264	191	218

(Source: Filed Survey)

Pollution levels in Dombivli east areas are found to be higher during evening time due to traffic congestions in the evening time.

4. Dombivli (West)

Dombivli West cluster is dominated by residential zones with some commercial establishments. Several parameters especially suspended particulate matter is found to be less concentrated in this area probably due to less traffic congestion and constructional activities (Table 5).

Table 5. Air quality parameters recorded in Dombivli West area

Location	Morning				Evening			
	HCHO	TVOC	PM 2.5	PM 10	HCHO	TVOC	PM 2.5	PM 10
Vishnunagar	0.026	0.199	105	122	0.034	0.199	117	141
Bhagshala maidan	0.03	0.003	78	90	0.038	0.031	90	109
Swami Narayan School 1	0.023	0.003	59	68	0.029	0.0126	71	87
Umesh nagar 1	0.029	0.133	72	82	0.032	0.133	84	101
Umeshnagar Ganesh Mandir	0.029	0.0112	70	80	0.035	0.0219	82	99
Ganesh Ghat	0.028	0.003	57	66	0.031	0.0125	69	85
HP petrol pump 1	0.018	3.146	52	60	0.031	3.146	64	79
Kopar bridge 1	0.019	0.003	49	55	0.031	0.032	61	74
Gopi mall 1	0.023	4.678	77	89	0.035	4.678	89	108
Samrrat hotel 1	0.023	0.183	63	73	0.031	0.219	75	92
Dwarka Hotel	0.028	0.501	100	116	0.032	0.501	112	135
Shastri nagar 1	0.021	0.158	74	84	0.038	0.168	86	103
Kopar 1	0.019	0.003	46	53	0.034	0.0321	58	72
Kopar 2	0.021	0.004	49	59	0.029	0.0132	61	78
Kopar 3	0.02	0.0035	51	57	0.026	0.0104	63	76
Kopar 4	0.022	0.003	52	54	0.028	0.0126	64	73
Shastri nagar 2	0.022	0.152	79	89	0.026	0.152	91	108
Samrrat hotel 2	0.024	0.0038	79	76	0.027	0.012	91	95
Samrrat hotel 3	0.023	0.0037	72	79	0.029	0.0112	84	98
Samrrat hotel 4	0.024	0.0039	74	72	0.031	0.0039	86	91
Swami Narayan School 2	0.024	0.003	71	68	0.031	0.005	83	87

Swami Narayan School 3	0.023	0.003	69	67	0.029	0.004	81	86
Umesh nagar 2	0.028	0.133	89	80	0.31	0.133	101	99
Umesh nagar 3	0.027	0.134	82	84	0.034	0.134	94	103
Umesh nagar 4	0.026	0.132	81	85	0.026	0.198	93	104
Umesh nagar 5	0.028	0.133	86	89	0.028	0.679	98	108
HP petrol pump 2	0.02	3.102	101	102	0.029	3.102	113	121
Kopar bridge 2	0.024	0.0035	84	86	0.031	0.0054	96	105
Kopar bridge 3	0.025	0.0038	81	84	0.029	0.0061	93	103
Gopi mall 2	0.024	4.112	110	92	0.024	4.112	122	111

Pollution levels in Dombivli west areas are comparatively less during day time whereas concentration of air quality parameters are found to be more during evening time caused by heavy vehicular traffic.

Spatial patterns of Air Quality Index in the study area

The measurement of AQI is done using guidelines of Central Pollution Control Board (CPCB). The classification of Air quality by CPCB is as follows (Table. 6).

Table 6. Classification of Air Quality based on CPCB Index

Good (0–50)	Minimal Impact	Poor (201–300)	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	Very Poor (301–400)	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	Severe (>401)	Respiratory effects even on healthy people

Table 7. AVERAGE AQI IN SELECTED LOCATIONS OF DOMBIVLI CITY

Code	Location	AQI	Code	Location	AQI	Code	Location	AQI
E7	Bistien Dying industry	**313**	E1	Tilak statue	**230**	E57	Sawarkar road	**331**
E8	Gharda Chemical 13	**307**	E2	Gharda Circle	**326**	E58	Joshi Highschool	**326**
E9	Pendharkar College	**318**	E9	Pendharkar College	**318**	E59	Jalaram mandir	**346**
E10	Bharat Petroleum	**316**	E11	Omkar International School	**366**	E60	Pendse nagar	**348**
E17	Indo Amines	**331**	E16	Big Bazaar	**273**	E61	Manjunath school	**355**
E33	Indo Amines 2	**338**	E17	Indo Amines	**331**	W1	Vishnunagar	**141**
E34	Indo Amines 3	**345**	E18	Ice factory	**369**	W2	Bhagshala maidan	**109**
E35	Indo Amines 4	**339**	E19	Gaon Devi	**321**	W3	Swami Narayan School 1	**137**
E36	Indo Amines 5	**338**	E20	Char Rasta	**253**	W4	Umesh nagar 1	**180**
E40	Indo Amines 6	**357**	E21	Railway Station	**318**	W5	Umeshnagar Ganesh Madir	**173**
E62	Bistien Dying	**357**	E22	SVN College	**329**	W6	Ganesh Ghat	**130**
E12	True value	**358**	E23	Tukaramnagar	**333**	W7	HP petrol pump 1	**113**
E13	True value 2	**314**	E24	Sudamwadi	**332**	W8	Kopar bridge 1	**103**
E14	Manpada mandir	**312**	E25	Ayre Road	**329**	W9	Gopi mall 1	**197**

E15	Pimpleshwar	**314**	E26	Patkar School	**330**	W10	Samrrat hotel 1	**150**
E41	Sonarpada 2	**341**	E27	Tandan Road	**332**	W11	Dwarka Hotel	**273**
E42	Sonarpada 3	**342**	E28	Bhopar 1	**280**	W12	Shastri nagar 1	**187**
E43	Bypass 2	**347**	E29	Bhopar2	**302**	W13	Kopar 1	**97**
E44	Bypass 3	**338**	E30	Naddivli 1	**313**	W14	Kopar 2	**103**
Code	**Location**	**AQI**	**Code**	**Location**	**AQI**	**Code**	**Location**	**AQI**
E45	Bypass 4	**334**	E31	Nandivli 2	**315**	W15	Kopar 3	**110**
E46	Bypass 5	**332**	E32	Nandivli 3	**311**	W16	Kopar 4	**113**
E47	Regency 1	**320**	E37	Nandivli 4	**343**	W17	Shastri nagar 2	**203**
E48	Regency 2	**329**	E38	Nandivli 5	**341**	W18	Samrrat hotel 2	**203**
E49	Anantam	**335**	E39	Naddivli 6	**340**	W19	Samrrat hotel 3	**180**
E50	Anantam 2	**335**	E51	Ramchandranagar	**332**	W20	Samrrat hotel 4	**187**
E10	Bharat Petroleum	**316**	E52	Dombivli Gymkhana	**323**	W21	Swami Narayan School 2	**177**
E3	Nursary	**321**	E53	SIA College	**322**	W22	Swami Narayan School 3	**170**
E4	Cholegaon	**297**	E54	Gograss wadi	**329**	W23	Umesh nagar 2	**237**
E5	90 ft entry	**532**	E55	Phadke road 2	**346**	W24	Umesh nagar 3	**313**
E6	Model College	**322**	E56	Phadke road 3	**326**	W25	Umesh nagar 4	**210**
W29	Kopar bridge	**210**	W27	HP petrol pump 2	**277**	W26	Umesh nagar 5	**227**
W30	Gopi mall 2	**302**	W28	Kopar bridge 2	**220**			

(Source: Field Survey)

Major Findings

Following are major findings of the study.

1. Dombivli MIDC area is reported to be most polluted area in Dombivli.
2. Dombivli West is least polluted area in Dombivli City.
3. Traffic Congestion, industrial effluents and burning of fossil fuels are major causes of air pollution.
4. The average AQI of Dombivli is 291.84 which classified as poor quality air.
5. The problems such as breathing discomfort to people on prolonged exposure of smoke are common in Dombivli.
6.

Suggestions

1. Traffic regulations.
2. Shifting of MIDC away from residential areas
3. Use of renewable energy.
4. Control use of fossil fuels.
5. Public awareness.
6. Promote public transportation.
7. Increase density of automatic air quality motoring network.

Conclusions

Good air quality and pure water quality is necessary for sustenance of human civilization. However, due to increased human interventions in the natural environment, the quality of air has been deteriorated to the extent beyond bearable limit. The present study made a sincere attempt to highlight the areas with poor air quality in Dombivli city and find out factors responsible for the same. Such kinds of empirical studies needs to be undertaken to understand

the level of air pollution so that it can help to take necessary policy measures to control air pollution in other urban centers.

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A Study of Parenting Style Among Adolescence

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ABSTRACT

The present study has been made to find out the parenting style among Adolescence. A sample of 50 Adolescence from College was randomly selected. In this descriptive survey type method investigator used Children's perception of parenting scale by Dr. Anand pyaari and Dr. Rajkumari Kandla. For analysis of data descriptive statistical techniques and and ANOVA was done by using SPSS Software. were used. The result shows 1) Male adolescence High Level Democratic parenting style than Female adolescence. 2) Female adolescence High Level Autocratic parenting style than Male adolescence. 3) Male adolescence High Level Accepting Parenting Style than Female adolescence.4) Male adolescence High Level Rejecting Parenting Style than Female adolescence. 5) Male adolescence High Level Over protecting parenting style than Female adolescence.6) Male adolescence High Level Over demanding parenting style than Female adolescence.

KEYWORDS: *parenting style, Male, Female, and Adolescence.*

INTRODUCTION

Adolescence, the transitional period between childhood and adulthood, is widely recognized as a critical phase of growth and development. According to the World Health Organization, individuals aged 10 to 19 fall under the category of adolescents. During this stage, young individuals embark on a journey of discovering how to effectively navigate their emotions and establish meaningful relationships. Numerous studies have consistently highlighted the significant impact of parenting style on the overall well-being of adolescents.

Parenting involves the support and nurturing of a child's physical, emotional, social, and intellectual growth from infancy to adulthood, encompassing more than just the biological connection between parent and child. The style of parenting is commonly seen as a combination of parents' attitudes and behaviors that shape their interactions with their children, impacting the effectiveness of socialization efforts across various situations and establishing an emotional and interactional atmosphere that mirrors their overall approach. The diverse parenting styles can significantly influence a student's study habits, interests, motivation, academic performance, subject choices, career paths, and accomplishments. Furthermore, an unhealthy parenting style can lead to various issues concerning physical health, self-esteem, relationships, family dynamics, social integration, education, career opportunities, financial stability, moral values, cultural practices, and religious beliefs among students.

There are four main parenting styles recognized in psychology today: Authoritative, Neglectful, Permissive, and Authoritarian. Each style has its own unique characteristics and elicits different responses from children. It's crucial to keep in mind that every parent-child relationship is unique, so there isn't a one-size-fits-all approach to parenting. This guide aims to help you understand your parenting style and offers general suggestions on how to raise a content, responsible, and successful individual in society.

REVIEW OF RELATED LITERATURE

Bi Xinwen et al. (2018) found in their study that the youth whose parents followed neglectful and authoritarian parenting styles reported higher parent- youth conflict intensity as compared to indulgent parents. The youth reported that the highest levels of cohesion with both parents were with authoritative parents, followed by indulgent, authoritarian and neglect parenting styles. Girls reported more cohesion with mothers who followed authoritative or indulgent parenting styles than boys.

Rai, Pandy and Kumar (2009) studied perceived parental rearing style and personality among 50 adolescent Khasi boys and girls each. The result revealed that boys perceived significantly more rejection and lesser emotional warmth from fathers as compared to girls.

Swarupa and Prabha (2008) studied social maturity levels of adolescents belonging to different parenting styles. Results revealed that adolescents raised under democratic, permissive, and authoritarian parenting styles had high, moderate, and 74 low levels of social maturity, respectively. Additionally, girls were socially more mature than boys.

Trishala and Kiran (2015) conducted a research on how perceived parenting styles affect emotional maturity in teenagers. The main goal was to analyze emotional maturity and perceived parenting styles in adolescents. They selected a group of thirty boys and thirty girls, aged 14 to 19, and gave them an emotional maturity scale and a perceived parenting styles inventory-2. The results showed that there was no gender gap in emotional maturity, but there were variations in perceived parenting styles among adolescents. Those with autonomy and responsive parenting styles displayed higher emotional maturity compared to those with demanding parenting styles.

Vijaya Laxmi, and Manjula Kadapatti (2012) this study indicated that boys and girls differ significantly in their perception towards parenting styles.

STATEMENT OF THE PROBLEM

To Study of parenting style among Adolescence.

OBJECTIVE OF THE STUDY

- To find out the autocratic parenting style on Male and Female adolescents.
- To find out the democratic parenting style on Male and Female adolescents.
- To find out the Accepting Parenting Style on Male and Female adolescents.
- To find out the Rejecting Parenting Style on Male and Female adolescents.
- To find out the over-protecting parenting style on Male and Female adolescents.
- To find out the over-demanding parenting style on Male and Female adolescents.

HYPOTHESIS OF THE STUDY

- There is no significant difference between Male and Female adolescents' with dimension on democratic parenting style.
- There is no significant difference between Male and Female adolescents' with dimension on autocratic parenting style.
- There is no significant difference between Male and Female adolescents 'with dimension on Accepting Parenting Style.
- There is no significant difference between Male and Female adolescents 'with dimension on Rejecting Parenting Style.
- There is no significant difference between Male and Female adolescents 'with dimension on over protecting parenting style.
- There is no significant difference between Male and Female adolescents 'with dimension on over demanding parenting style.

METHODOLOGY

SAMPLE:-

Total sample of present study 50 adolescence, in which 25 were male adolescence and 25 female adolescence. Both groups sample College Students from Aurangabad Dist. in Maharashtra. Purposive Sampling Method was selected and the subject selected in this sample was age group of 16-18 year.

RESEARCH DESIGN:-

Simple Designs used in the present study

VARIABLES USED FOR STUDY

1) **Independent variable :- Gender**- 1) Male adolescence 2) Female adolescence
2) **Dependent variable :- parenting style** 1) democratic parenting style 2) autocratic parenting style 3) Accepting Parenting Style 4) Rejecting Parenting Style 5) over protecting parenting style 6) over demanding parenting style

TOOLS:-

The Children's Perception of Parenting Scale (CPPS) was created by Dr. Anand Pyari and Dr. Raj Kumari Kalra. This assessment evaluates six different parenting styles: Democratic, Autocratic, Accepting, Rejecting, Over-protecting, and Over-demanding. It consists of 44 items and utilizes a five-point scale with options including strongly agree, agree, undecided, disagree, and strongly disagree. Each response is assigned one mark. The test's reliability was determined to be 0.70 through the test-retest method.

PROCEDURES OF DATA COLLECTION:-

In the current research, a sample of 50 individuals was utilized, with two instruments being administered to both individuals and a small group. The participants were grouped into small groups consisting of 10-15 subjects. Tests were conducted and a field copy of each test was gathered. The entire data collection process followed the same procedure.

STATISTICAL ANALYSIS

During the initial phase, the data underwent analysis using descriptive statistical techniques such as calculating the mean and standard deviation. Additionally, ANOVA was conducted using the SPSS software.

RESULTS AND

Table No. 01. Mean SD and F Value of Gender on parenting style.

Sr. No	Factor	Gender	Mean	SD	N	DF	F Value	Sign.
Table 01(A)	Democratic parenting style	Male adolescence	45.92	5.70	25	48	7.90	0.01
		Female adolescence	68.50	8.50	25			
Table 01(B)	Autocratic parenting style	Male adolescence	64.10	6.70	25	48	9.50	0.01
		Female adolescence	75.60	9.12	25			
Table	Accepting	Male adolescence	74.50	7.90	25	48	6.99	0.01

Sr. No	Factor	Gender	Mean	SD	N	DF	F Value	Sign.
01(C)	Parenting Style	Female adolescence	62.50	11.50	25			
Table 01(D)	Rejecting Parenting Style	Male adolescence	70.56	6.50	25	48	7.90	0.01
		Female adolescence	50.80	5.91	25			
Table 01(E)	Over protecting parenting style	Male adolescence	70.80	5.40	25	48	9.80	0.01
		Female adolescence	50.40	7.75	25			
Table 01(F)	Over demanding parenting style	Male adolescence	70.50	5.20	25	48	10.12	0.01
		Female adolescence	56.80	4.13	25			

DISCUSSION

Observation of the Table 01(A) indicated that Democratic parenting style of the mean and SD value obtained by the Male adolescence 45.92± 5.70, and Female adolescence was 68.50 ± 8.50. It is observed that the calculated 'f' value (7.90) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on Democratic parenting style.) is accepted it mean that Male adolescence High Level Democratic parenting style than Female adolescence.

Observation of the Table 01(A) indicated that Autocratic parenting style of the mean and SD value obtained by the Male adolescence 64.10 ± 6.70, and Female adolescence was 75.60 ± 9.12. It is observed that the calculated 'f' value (9.50) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on Autocratic parenting style.) is accepted it mean that Female adolescence High Level Autocratic parenting style than Male adolescence.

Observation of the Table 01(C) indicated that Accepting Parenting Style of the mean and SD value obtained by the Male adolescence 74.50 ± 7.90, and Female adolescence was 62.50 ± 11.50. It is observed that the calculated 'f' value (6.99) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on Accepting Parenting Style.) is accepted it mean that Male adolescence High Level Accepting Parenting Style than Female adolescence.

Observation of the Table 01(D) indicated that Rejecting Parenting Style of the mean and SD value obtained by the Male adolescence 70.56 ± 6.50, and Female adolescence was 50.80 ± 5.91. It is observed that the calculated 'f' value (7.90) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on Rejecting Parenting Style.) is accepted it mean that Male adolescence High Level Rejecting Parenting Style than Female adolescence.

Observation of the Table 01(F) indicated that Over protecting parenting style of the mean and SD value obtained by the Male adolescence 70.80 ± 5.40, and Female adolescence was 50.40 ±

7.75. It is observed that the calculated 'f' value (9.80) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on over protecting parenting style.) is accepted it mean that Male adolescence High Level Over protecting parenting style than Female adolescence.

Observation of the Table 01(F) indicated that over demanding parenting style of the mean and SD value obtained by the Male adolescence 70.50 ± 5.20, and Female adolescence was 56.80 ± 4.13. It is observed that the calculated 'f' value (10.12) is High than the table value (0.01 = 3.94 and at 0.05 = 6.90 levels). That is to say that this hypothesis is rejected and Alternative hypothesis (There is significant difference Between Male and Female adolescence with dimension on over demanding parenting style.) is accepted it mean that Male adolescence High Level Over demanding parenting style than Female adolescence.

CONCLUSION

1) Male adolescence High Level Democratic parenting style than Female adolescence.
2) Female adolescence High Level Autocratic parenting style than Male adolescence.
3) Male adolescence High Level Accepting Parenting Style than Female adolescence.
4) Male adolescence High Level Rejecting Parenting Style than Female adolescence.
5) Male adolescence High Level Over protecting parenting style than Female adolescence.
6) Male adolescence High Level Over demanding parenting style than Female adolescence.

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