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MET INSTITUTE OF MANAGEMENT

MET MANAGEMENT REVIEW

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THE MET LEAGUE OF COLLEGES
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Bhujbal Knowledge City

Mahatma Jyotiba Phule
(1827-1890)

Shrimati Savitribai Phule
(1831-1897)

OUR FAITH

न चौर हार्यम् नच राज हार्यम् ।
न भातृभाज्यम् नच भारकारी ।।
व्यये कृते वर्धते एव नित्यम् ।
विद्याधनं सर्वधन प्रधानम् ।।

Knowledge can neither be stolen by a thief,
nor snatched by a king.
It is indivisible unlike ancestral property,
it never burdens the bearer,
it multiplies manifold when offered to others.
Knowledge is the supreme form of wealth.

MET INSTITUTE OF MANAGEMENT VISION

To emerge as a leading management Institute developing globally relevant, socially responsible and emotionally competent management professionals and entrepreneurs.

MET INSTITUTE OF MANAGEMENT MISSION

1. To empower management professionals with the latest applications offering conceptual and experiential learning.
2. To develop business leaders focused on principles of purpose, people, profit and planet.
3. To nurture managerial competence and a sustainable, growth mindset.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To apply the domain knowledge, interdisciplinary skills & technological proficiency as entrepreneurs and corporate professionals.
2. To exhibit value-based managerial competencies in fulfilling corporate and leadership responsibilities.
3. To facilitate lifelong learning for sustainable development and professional excellence.

Research Board

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MET League of Colleges

Mumbai Educational Trust (MET) is a conglomerate of premiere educational institutions, driven by a single-minded focus on imparting quality education, to make students sharp. Training is imparted round-the-clock, seven days a week. Projects and assignments are given utmost importance and students learn on the job. Application-oriented knowledge, garnered in the lecture halls, is applied to industry assignments. The faculty spares no effort to make the students razor sharp, so that they make their mark in the corporate world. No effort has been spared, to create an environment that encourages students, to push the limits of their minds. All this, to help young professionals face the challenges of life. And make their mark in the corporate world.

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At MET, over four thousands students and faculty are involved in delivering unique learning systems, through ultra modern infrastructure and academic rigour. MET Institutes are ISO certified, with affiliations to the University of Mumbai, Savitribai Phule Pune University, Directorate of Technical Education, All India Council of Technical Education, MSBTE, Pharmacy Council of India, C-DAC - Ministry of Communications and Information Technology, The Chartered Insurance Institute (CII), London.

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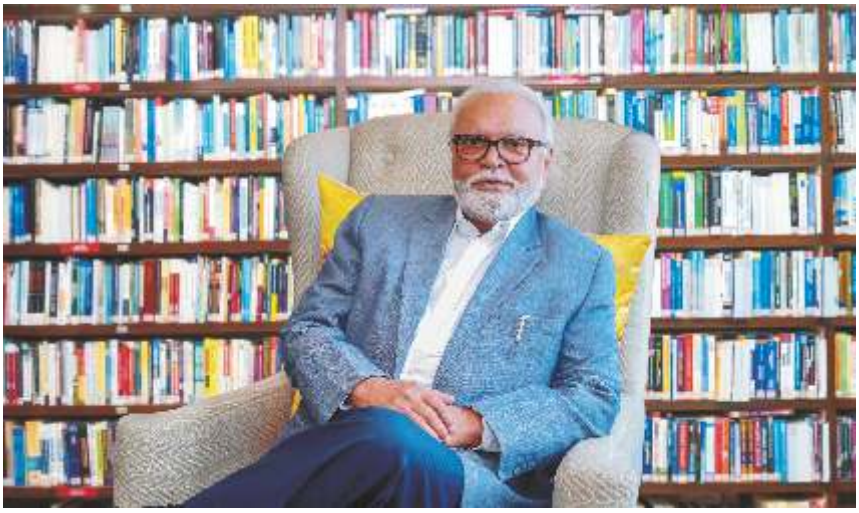
From the Chairman's Desk



"Every cloud has a silver lining."

- John Milton

The Hope is rising; Optimism is galloping and Faith is stirring hearts again, even before the overseers of nations announce that the worldwide phenomena of pandemic that inflicted health, financial and economic loss is over. Though the unexpected and impossible happened and we were caught off balance, newer ways of doing things are well within reach. MET Institutes rose to the challenge, energizing millions of young minds, fighting the adversity, we retooled, redesigned and delivered seamless digital learning engagements to the youth across the country quenching their thirst of knowledge.

We at MET have come up with alternative and augmentative education systems to ensure that there is no loss in the learning, equipping and empowering. We established seamless learning platforms across our campuses located at Bhujbal Knowledge City in Mumbai and Nashik delivering wholesome learning inputs, meeting stakeholder appreciation. With the return of partial or whole normalcy, we look forward to edify young minds in the virtual, hybrid or offline environment delivering world class inputs across Pharma, Engineering, Architecture, IT, Mass Media, Management, Animation and other domains, overcoming all past delivery hurdles. Blessed by the state of the art platforms and technologies accessed by us, our committed faculty and staff are leaving no stone unturned to ensure competency building and skilling surpasses demands of the marketplace. Through our MET Rishikul Vidyalaya we are continuing to expose the school kids, blending the traditional pedagogy with the Cambridge learning systems till the A Level.

We are building links and partnerships with global players for carrying forward the dynamic learning processes at both undergraduate and postgraduate levels. We are continuing our focus on injecting the spirit of Creativity-Innovation in the pedagogy so that the students are nudged and exposed to solution oriented, problem solving dynamic learning platforms, as the gateway to incubators and start-up culture.

Believing, the silver lining of the clouds will soon give way to the full bright sunshine.

Chhagan Bhujbal
Hon. Founder Chairman
Mumbai Educational Trust

About MET IOM

MET Institute of Management

Since its inception three decades ago MET Institute of Management, a top B-School in Mumbai has focused on developing industry ready management professionals shaped to cross industry threshold to seek their chosen place under the Sun. Academic and scholastic rigor are finely woven into application oriented skill sets which positions the MBA students to hit the ground running as they face the challenges of market place and society. The structured learning systems are blended with the latest tools and technologies offered by the digital world. Therefore, despite Pandemic, a unique online learning experience was offered to the management students.

The well-equipped libraries with 64,000 plus books and journals are e-enabled to offer robust theoretical inputs to the MBA students. The close connection and networking with industry integrated by thousands of corporate-successful alumni offers deep insights into the real business world and a vibrant industry academia platform.

Thus, despite statutory limitations students could access and benefit from our information and technology centers and learning aids supported by the latest audio visual facilities at our complex. A high-tech convention Centre, well equipped seminar halls and state of the art networked virtual classrooms provide a multidimensional exposure to the students as we offer a holistic immersion to the MBA students as they step into the global business arena. That is why MET Institute of Management is considered as one of the best MBA colleges in Mumbai. It remains a much sought after premium B-School in Maharashtra in which graduates and experienced MBA aspirants writing MAH-CET, CAT, CMAT, XAT, ATMA, MAT and other prestigious entrance exams seek to secure admission.

Director Speak

Dr. Swati Lodha
Director MET IOM

Dear Readers,

Greetings from the Research Cell of MET Institute of Management

The dimensions and impact of business research are changing as we proceed from a VUCA world to the BANI world, a new term coined by futurist James Cascio. This new Brittle, Anxious, Non-linear, and Incomprehensible world requires us to think about the purpose and the planet before profits.

And hence, the academic year 2022-23 has been dedicated to putting our planet first at our Institute. In sync with this prioritizing, a National Research Conference was organized at METIOM, and papers were presented during that research.

Sustainability in business talks about the effect companies has on the environment or society. Some of the global issues that sustainable business strategies aim to address today include natural resource depletion, climate change, income inequality, racial and gender imparity, and pollution. The researchers have tried to explore many of these issues through their papers presented at the conference which was attended by representatives of various higher educational institutions in Mumbai and sustainability professionals.

Dr. Pooren Chandra Pandey in his inaugural address emphasized the need of transitioning to a circular economy from the linear one as our commitment to scenario planning for generations ahead.

Prof Dr. Stanislav Ivanov, Varna University, Bulgaria spoke about the global business strategies shaping up sustainable practices in accordance with UN SDGs.

This issue comprises selected research papers presented during the Research Conference organized on April 30th, 2022 at METIOM campus. These papers explore and suggest various best practices, opportunities, and challenges that need to be implemented and addressed.

We hope to continue our research journey this year in the area of sustainability with our next International Research Conference to be organized in November in collaboration with the International Council of Circular Economy.

Do write to us to share your feedback and your research interests.

Happy Exploring

Dr. Swati Lodha
Director

Sustainable Urban Development and Livability

Mr. Rashmi Ranjan Mohapatra - Manager, Instrumentation, Hindalco Industries Limited

ABSTRACT

Sustainable cities are central to achieving all 17 Sustainable Development Goals (SDG). By 2050 cities will contain approximately 70% of the world's population and produce 85 per cent of global economic output. Policy and investment decisions made today will have a deep and long-lasting impact, based on the concentration of people and economic activities, and the long-term nature of urban systems and infrastructure.

Urban development should proceed in a well-planned, integrated, and inclusive manner, with city governments working together with businesses, civil society organizations, academia, and individuals, and with national governments, as well as the authorities in neighbouring urban towns and rural areas, and peer cities around the world. A robust "science of cities" can give urban policymakers around the world access to a body of knowledge and good practices.

Urban decision makers should take the central tenet of the 2030 Agenda to heart and ensure that no one is left behind in their cities and towns. That means prioritizing pro-poor development and access to decent jobs; high-quality public services, health care and education; sustainable transport; and safe and attractive public spaces for all, regardless of gender, age, ability, and ethnicity.

Governments, businesses, civil society organizations and individuals can use a range of policy, economic and communications tools to promote sustainable consumption and production patterns in cities, encourage densified habitat and decouple growth from environmental degradation.

Innovative governments, a committed private sector and an active citizenry can overcome inequalities and create livable cities in both developing and developed countries. livable cities offer high-quality services and increase "naturbanity", a close connection between people and nature, to enhance human health and well-being, protect biodiversity, and strengthen climate resilience, which is particularly important for vulnerable populations in coastal cities and those in informal settlements.

Keywords: **Livable, Sustainable, Cities, Biodiversity, Climate, Resilience**

Introduction

By 2030, 60% of the world's population close to 5 billion people will live in cities, and by 2050 that proportion will be nearly 70%. By 2050, if trends continue, as many as 3 billion urban dwellers will live in informal settlements, or slums. That same year, cities will produce 85% of global economic output. Projections show that 1 billion urban residents will be living in low-elevation coastal zones and are therefore at risk of flooding and natural hazards related to climate change. If current trends continue, at least 15% of the new urban population added between now and then will be living with some kind of disability.

The challenges are vast and multifaceted. Urban policy decisions have extraordinarily far-reaching impacts in poverty alleviation and reduction of inequalities, and in ensuring access to energy, transportation, waste management, food supply, water and sanitation, education, health care and others, not just for urban populations but also for the surrounding rural areas. For example, focus on inequality,

pollution, urban sprawl and resource use, greenhouse gas emissions and climate change are the key indicators towards successful path to achieving the 2030 Agenda will run through sustainable cities.

Methodology: This study was performed by reviewing the available published literatures, case studies, and different government and non-government organizations information from reports and official websites. Scientific literatures were collected through electronic means from the database of Science Direct, Springer, Research Gate, and Google Scholar but not in a systematic manner. From a large number of studies, this study compiles and presents the data and information which are relevant to meet the study goals.

1. Challenges for the Sustainable Urbanisation

1.1. Inequality: Cities are not immune to the severe income disparities and extreme inequalities that plague the world at large. There is often a wide income gulf between rich and poor, sometimes even within the radius of a few miles and between well-established residents and the recent migrants and urban poor who provide low-cost services. In addition, urban areas are often supported by surrounding rural areas that suffer from high rates of poverty. And the vulnerability of people living in informal settlements, often in exposed areas with inadequate infrastructure and low-quality housing, is exacerbated by climate change and the associated rising sea levels, flooding, landslides, heat stress, water scarcity and other threats. Persons with disabilities face difficult barriers to an active life in many cities around the world when the public transport, public buildings and commercial centers are not made accessible to them.

1.2. Pollution: Around 90% of people living in cities breathe air that fails to meet WHO standards (10 micrograms of particulate matter per cubic meter), and in low- and middle-income countries 97% of cities with more than 100,000 people fail to meet the standards. Cities are also producing solid waste at increasing rates, and in 2016, cities produced 2 billion tons of solid waste. The rates are projected to continue to rise, and, unless trends change, by 2050 the solid waste generated annually will increase by 70%. Globally, only 65 per cent of the urban population has access to municipal waste management (MWM).

1.3. Urban sprawl and resource use: In the developing world the land occupied by cities will triple by 2050, signaling a move towards the sprawl that already characterizes cities in developed countries. In many cases, that urbanization is proceeding organically, without planning, and with urban centers concentrating in coastal areas, residents live with a high risk of flooding, mudslides, and other disasters.

If development continues in the business-as-usual model, by 2050 the cities of the world will consume 90 billion tons per year of raw materials such as sand, gravel, iron ore, coal, and wood. Urban growth often involves destroying natural habitats and green space, with the resulting loss of biodiversity. Even accommodating more people in high-rise housing increases environmental and infrastructure stress, and recent studies show that low-rise, high-density housing may be more effective and sustainable. And while cities cover only 2% of the Earth's surface, their "water footprint"—the area covered by the sources of their water—accounts for 41% of the Earth's land surface.

1.4. Greenhouse gas emissions and climate change: Cities are responsible for 70% of the global greenhouse gas emissions from burning fossil fuels. In some cases, particularly in developing countries that are rapidly urbanizing, with the associated rise in income, city dwellers contribute more to greenhouse gas emissions per capita than their rural counterparts. Developing world and developed world cities contribute similar levels of greenhouse gas per capita, while rural dwellers in developing countries contribute much lower levels. On the contrary, in developed countries, urbanites often contribute much lower levels of CO2 than rural inhabitants in the same country.

In addition, cities have elevated temperatures compared with rural areas, a phenomenon known as the "urban heat island". In a recent systematic review of scientific articles from January 2000 to May 2016, urban growth was found to have a large impact on local temperatures, in some cases by up to 5ºC, and climate

change exacerbated the impact. Higher temperatures increase the risk of heat-related mortality.

Levers for transformation

A 2030 Agenda city will be a livable city with a flourishing economic base with decent jobs for all and a compact footprint with mixed land use, including residential, commercial, educational, and green public spaces. That city will leave no one behind and will be accessible to all, including women, youth, persons with disabilities and other vulnerable populations. Decision makers in the public and private sectors will move their cities towards achieving the 2030 Agenda using the levers of transformation for urban planning and land use, high-quality infrastructure and public services, transport systems and digital connectivity, as well as inclusive and participatory decision-making.

2. Solutions or the suggested framework

2.1 Good Governance

Sustainable cities will not arise organically, or by allowing business to proceed as usual or according to the directives of the market. Rather, urban development should proceed in a well-planned, evidence-based, integrated, and inclusive manner, with city governments working together with businesses, civil society organizations, and individuals, and with national governments, and the authorities in neighboring rural areas. In addition, city governments can learn from, and act in concert with, peer cities within their countries and around the world to increase the impact of their policies. Successful urban governance is inclusive and participatory, considering the priorities and values of all stakeholders and reflecting the unique character and history of a city's community. Promoting active decentralization or subsidiarity devolving responsibility to the lowest or least centralized level of governance that makes sense is important for effective policymaking, service provision and budgeting. Today, scholars recognize that there are many models of cities that is, various "urban fabrics" shaped in part by the ways their citizens live and move around, whether by walking, transit, or automobile and that the policymakers and other stakeholders closest to the ground are often best equipped to plan for a city's future.

Effective urban, and rural governance also serves to secure land and property rights, a critical issue, as currently less than 30% of the global population has documentary land rights. Studies show that people and the private sector invest more in land when they feel secure about access to land. Individual and collective land rights are important for the improved resilience of indigenous peoples, women, and other vulnerable groups.

2.2. Economy and finance

Integrally tied to questions of governance are the policy and business decisions that direct economic activity, build infrastructure, provide services, and drive innovation in urban areas and their surroundings. Massive infrastructure investment is needed over the coming decades, and investment decisions made now will shape the sustainability of the urban landscape for decades to come. Those investments, in buildings, transport, information and communication technology will spur economic growth and job creation, as well as enhance the quality of life for urban citizens.

The Climate Economy Report by the Global Commission on the Economy and Climate found that more compact and connected urban development, built around mass public transport, can create cities that are more economically dynamic and healthier and that have lower emissions, and could reduce urban infrastructure capital requirements by more than $3 trillion over the next 15 years.

The economic activity of cities needs to revolve around pro-poor development and access to decent jobs for all, with special attention to access for women, youth, persons with disabilities and other vulnerable groups. Government and the private sector need to invest in sustainable and technology-enabled industries and livelihoods that will help decouple growth from environmental damage.

2.3. Public participation:

In a city the degradation of the environmental commons is not an abstract phenomenon. People see it in the loss of green space and sense it in the polluted air. Left-behind populations live and struggle in slums sometimes a few feet away from wealthy communities and bustling commercial districts. Refugee tensions are a risk, as migrants escaping conflict and desperate situations seek opportunities in urban areas, placing

strain on the resources and infrastructure of the host cities. And when cities are not equipped to absorb the newcomers, the resulting rootlessness and anomie within the migrating populations can undermine their social development. But with an appreciation of the problems can come a communal spirit and a commitment to action. The unavoidable reality of environmental strain, pollution, and waste challenges, for instance, can spur citizen campaigns and social engagement. Many will follow initial first adopters, especially because the population of urban settings often skews younger, better educated and more environmentally conscious. City dwellers learn by observing and building on one another, breaking from old, unsustainable lifestyle choices, and pioneering new behaviors.

2.4. Science and technology

Cities are hubs of innovation and creativity, with their concentration of universities and research institutions, large commercial centers, infrastructure, and multiple outlets for social and cultural exchange. The trends are self-reinforcing, as highly educated individuals from rural and suburban areas are drawn to relocate to well-resourced cities, seeking professional opportunities and social and cultural enrichment. Recent studies have found that multinational corporations are investing the bulk of their research and development (R&D) funds in institutions based in global cities in developed and developing countries and establishing their regional headquarters in those same urban areas.

In developed and developing countries, technology is changing the way people live, with communication and digital connectivity making it possible for people work and interact online without leaving their homes. Commerce has been transformed, and online shopping for everything from groceries to medical prescriptions will continue to grow in a steep upward trend in all regions in the world, according to a recent study, with most of the growth occurring in densely populated urban areas. Policymakers and other stakeholders need to plan in a nimble and responsive way to take full advantage of the role that technology will play in the development of sustainable cities. In some cases, that means acknowledging that some of the value added of cities – the economies of scale in providing services – will become less significant as technology enables remote and virtual service provision. For those countries – notably small island developing States and landlocked developing countries – that are far away from global market centers, the new emphasis on e-commerce is requiring significant investment in logistics and transport services. Since 2016, the United Nations Conference on Trade and Development (UNCTAD) has conducted 17 Rapid eTrade Readiness Assessments to help least developed countries identify barriers to take advantage from e-commerce and the digital economy development. They underline the significant need for more assistance to those countries to ensure more inclusive outcomes from digitalization.

Smart cities, where technology is leveraged to improve the lives of urban citizens and help municipal governments provide services more effectively, are growing in all regions of the world. With access to a wealth of data, city planners and policymakers can cut down on traffic congestion and accidents, increase nature-based solutions to adapt for climate change, address pollution and other health and safety risks, reduce CO2 emissions, consider the logistical needs of a circular economy and design commercial areas that better meet the needs of consumers and business owners.

In addition to the science and innovation emerging from cities, effective urban development also benefits from a robust and comprehensive science about cities. Cities can learn from each other, and it is important that local and national governments, universities, research institutions, civil society organizations and businesses support a strengthened trans disciplinary, multifaceted urban science. The "science of cities" can be bolstered by investing in education and training of well-qualified urban planners and other professionals ready to address the multiple challenges of urbanization. An expert panel convened by Nature Sustainability found that cities of all sizes and locations would benefit from enhanced science-policy connections at the city level that bring together experts from all relevant disciplines. The panel called for cross-regional collaboration, the development of urban observatories, and a strengthened link between multilateral organizations and cities.

2.5. Integrated pathways to transformation

To be effective and sustainable, interventions in governance, economy, behavior, and technology should happen in an integrated and mutually reinforcing manner, with the municipal government holding the reins and working in close partnership with the national government, private business, academia, civil society, citizen groups and international organizations.

Governments and their partners will work towards creating livable cities, where people live free from poverty, free from the burden of inequality, including gender inequality, and free to pursue decent livelihoods with a guarantee of the essential social services needed to ensure the well-being of each citizen. Creating a livable city means strengthening climate resilience and addressing air pollution, especially for vulnerable populations in coastal cities and other urban areas. A livable city is also one fulfills the less tangible needs of its citizens, the need for connection to the heritage and character of a place, the need for links to nature and the surrounding rural areas that provide so many of the resources and services that enable urban life and the need for community cohesion and social ties.

As they move along the transformation pathway to livable cities, governments and their partners must work towards fully decoupling growth from environmental degradation and from the inequality that plagues so many cities today. Urban decision makers should take the central tenet of the 2030 Agenda to heart and ensure that no one is left behind in their cities and towns. That means prioritizing pro-poor development and access to decent jobs, effective public services, quality health care, education, safe drinking water and sanitation services, nutritious food, reliable transportation, and safe and attractive public spaces for all regardless of gender, age, ability, and ethnicity. Urban planning should be carried out in an inclusive manner, with particular attention paid to the needs of those living in informal settlements, refugees, and persons with disabilities. The nature of urban planning will vary according to the size and circumstances of individual cities, with secondary cities facing challenges related to their relative lack of resources.

2.6. Future city growth

Cities can create opportunities for employment, poverty alleviation and growth, and they are hubs of research and development (R&D), with concentrations of academic, scientific, and private sector institutions that drive innovation. The sheer number of people living in cities means that there is the potential for efficiency and large-scale progress. On the other hand, there is also the risk of locking in unsustainable infrastructure and urban designs that will affect large populations for generations to come. Buildings constructed now as well as urban systems like water, transport, energy, and others need to contribute to carbon-neutral cities if the world is to achieve the targets contained in the Paris Agreement. By 2030, the world is projected to have 43 megacities (i.e., cities with more than 10 million people). Nine of the 10 new megacities that will be added between now and then will be in the developing world. However, most urban dwellers of the future will not live in well-resourced mega cities but rather in secondary cities and other areas without well-defined boundaries and without adequate infrastructure. Although, generally, larger cities are well-resourced and economically powerful than their smaller counterparts, recent studies have shown that size is not destiny. A World Bank report on competitive cities found that several secondary cities were beating many larger cities in terms of job growth, productivity, and foreign direct investment (FDI). There are regional variations. In developed countries, local governments, businesses, civil society organizations, and individuals can use a range of policy, economic and communications tools to promote sustainable consumption and production patterns. Well-planned land use, effective urban public transport systems including active mobility (walking and biking), rapid scale-up of renewable energy and energy efficiency, and promotion of sustainable and technology-enabled businesses and jobs will all be important. Eliminating poverty in all its dimensions remains a top priority in developing countries, and decision makers in the Global South will also seek opportunities to follow a new, transformed development path that avoids the "grow now and clean up later" approach that characterized so much of the North's urban development.

3. Potential strategies of sustainable urban development and livability

It is assumed that all these environmental consequences are short-term. So, it is high time to make a proper strategy for long-term benefit, as well as sustainable urban development and livability. Similarly, to protect this globe, the home of human beings, united effort of the countries should be imperative (Somani et al., 2020).

Therefore, some possible strategies are proposed for global environmental sustainability (Figure 1).

Figure 1: Proposed strategies of sustainable environmental management.

3.1. Sustainable industrialization: Industrialization is crucial for economic growth; however, it's time to think about sustainability. For sustainable industrialization, it is essential to shift to less energy-intensive industries, use of cleaner fuels and technologies, and strong energy efficient policies (Pan, 2016). Moreover, industries should be built in some specific zones, keeping in mind that waste from one industry can be used as raw materials of the other (Hysa et al., 2020). After a certain period, industrial zones should have been shut down in a circular way to reduce emission without hampering the national economy. Again, industries especially readymade garments (RMG) and others where a huge number of people work, proper distance and hygienic environment should maintain to reduce the spread of any infectious communicable disease.

3.2. Use of green and public transport: To reduce emissions, it is necessary to encourage people to use public transport, rather private vehicles. Besides, people should encourage to use bicycle in a short distance, and public bike sharing (PBS) system should be available for mass usage, which is not only environment friendly but also beneficial for health.

3.3. Use of renewable energy: Use of renewable energy can lower the demand of fossil fuels like coal, oil, and natural gas, which can play an important role in reducing the GHGs emissions (Ellabban et al., 2014; CCAC, 2019). To maintain the daily needs and global economic growth, it is not possible to cut-off energy demand like a pandemic situation. Hence, use of renewable energy sources like solar, wind, hydropower, geothermal heat, and biomass can meet the energy demand and reduces the GHGs emission (Ellabban et al., 2014).

3.4. Wastewater treatment and reuse: To control the challenges of water pollution, both industrial and municipal wastewater should be properly treated before discharge. Besides, reuse of treated wastewater in non-production processes like toilet flushing and road cleaning can reduce the burden of excess water withdrawal.

3.5. Waste recycling and reuse: To reduce the burden of wastes and environmental pollution, both industrial and municipal wastes should be recycled and reused. Hence, circular economy or circularity systems should implement in the production process to minimize the use of raw material and waste generation (Hysa et al., 2020). Moreover, hazardous, and infectious medical waste should be properly managed by following the guidelines (WHO, 2020c). It is now clear that majority of the people (especially in developing countries) have a lack of knowledge regarding waste segregation and disposal issues (Rahman et al., 2020). So, government should implement extensive awareness campaign through different mass media, regarding the proper waste segregation, handling and disposal methods.

3.6. Ecological restoration and ecotourism: For ecological restoration, tourist spots should periodically shutdown after a certain period. Moreover, ecotourism practice should be strengthened to promote sustainable livelihoods, cultural

preservation, and biodiversity conservation (Islam and Bhuiyan, 2018).

3.7. Behavioral change in daily life: To reduce the carbon footprint and global carbon emission, it is necessary to change the mindset in our daily life and optimum consumption or resources like; avoid processed and take locally grown food, make compost from food waste, switch off or unplug electronic devices when not used, and use a bicycle instead of a car for shorter distances.

3.8. International cooperation

To meet the sustainable environmental goals and protection of global environmental resources, such as the global climate and biological diversity, combined international effort is essential (ICIMOD, 2020). Hence, responsible international authority like United Nations Environment Programme (UN Environment) should take effective role to prepare time-oriented policies, arrange international conventions, and coordination of global leaders for proper implementation.

Directly or indirectly, the pandemic is affecting human life and the global economy, which is ultimately affecting the environment and climate. It reminds us how we have neglected the environmental components and enforced human induced climate change.

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Adoption of Mobile Health (m-Health) Services by Patients for Sustainable Healthcare Development: A Qualitative Exploration

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Dr. Rajiv Gupte, Associate Professor, MET Institute of Management.
Dr. Nirmala Joshi, Associate Professor, MET Institute of Management.

ABSTRACT

Mobile health technology will enhance people's lives through raising healthcare awareness and knowledge, expanding the reach of healthcare services, and building a workforce of digitally competent healthcare workers. The adoption of mobile health is limited due to a lack of awareness, information, and interest among patients.

Objective: This study aimed to explore stages of adoption process and factors impacting adoption of mobile health applications

Methodology: The study was conducted in Mumbai. In total, 20 in-depth interviews were conducted. Respondents included users of fitness apps, people using mobile apps for online consultation and monitoring health parameters. Considering qualitative exploration, this study approached the investigation with three domains: stages in adoption process, hierarchy of involvement steps and various factors impacting adoption of mobile health applications.

Results: Patients expressed their interest in mobile health applications specially related to fitness. Mobile Health is considered to be good option for monitoring various health parameters. Patient's attitude towards health plays an important role in adoption of mobile health applications. Various critical factors like trust on healthcare application, facilitating conditions and usefulness are driving adoption of mobile health applications.

Contribution: This study will be useful for other researchers in the field of digital healthcare services. This will provide directional cues for developing m-health applications for enhancing adoption of such applications amongst patients which can be further validated through quantitative study.

Key words: m-Health, Mobile Health, Adoption, Qualitative, Digital Health

Introduction

Primary healthcare remains an important aspect of the health care system. Due to limited healthcare facilities, many times patients are forced to take inferior consultation and treatment for early-stage illnesses due to a lack of robust infrastructure. Limited primary healthcare results in delayed diagnosis and improper treatment. Also, delayed treatment increases the severity of the disease. A limited healthcare workforce is another concern for the healthcare industry. Due to facilities and opportunities in urban areas, most of the advanced healthcare facilities are concentrated in metro cities. Thus, primary healthcare should be taken on priority for better healthcare access and advanced care.

As per one of the reports from PwC, m-health service is likely one of India's top digital healthcare sectors with market size of 2,083 crore INR in 2015 and expected to grow to 5,184 crore INR by 2020. As a part of m-health services, information and expertise can be availed from cell phones, tablets, computers and wearable devices. Newly emerging wearable devices coupled with m-health applications and other sensor-based devices will enhance digital healthcare systems (Fagherazzi & Ravaud, 2019).

Lack of awareness, poor infrastructure, low expectations, and manual interventions are key barriers to the lower impact of digital health care services as per PwC. At the same time, some barriers like lack of information on m-health amongst professionals and low interest among users limit its usage. One of the most major non-technical failure factors is a lack of user acceptance. (Krebs & Duncan, 2015)

For technology-based services like m-health, it would be difficult to foresee the adoption processes in

which the interest can be triggered by health-related risks and added advantages of such services. Exploring this process to understand the adoption is critical (Kim, 2009). Positive attitudes toward system utilization are created by the notion that an individual will not feel uncomfortable when accepting innovation and will obtain higher practical benefits as a result (Venkatesh et al., n.d.)

This Study was aimed to understand the adoption process of mobile health services and various factors impacting adoption

Review of Literature

As per the research conducted in Burla, India, only 20% of medical professionals use computers on daily basis. The rest of the professionals refer to computers once a month on average. Even though students see computers as an important element of their medical education, they are rarely used (Maharana et al., n.d.). In a tertiary healthcare hospital in a metropolis like Mumbai, healthcare practitioners use and are aware of information technology at a low level. Considering the usage of health information by medical professionals, patients need to explore digital services for better reach.

According to Desai et al. (Desai, 2010), the prevalence of mild illnesses such as cough, fever, and diarrhea varies drastically depending on the socioeconomic status of the household. Poor and illiterate persons, as well as members of the scheduled tribe community, are more likely to have them. The prevalence appears to be decreasing as living conditions improve.

The expenditure ratio (health expenditure as a percentage of income) on health care in India, according to Barik et al. (Barik & Thorat, 2015), is 6% of monthly average income, which is greater than the standard criterion of affordability (5%) in developing nations. Furthermore, the burden of disease is disproportionately spread among different socioeconomic classes. Also. Indians have a relatively low level of health insurance coverage.

Fitness and nutrition were the most popular categories in m-health services, according to a poll of US mobile phone owners, with most respondents using them daily. However, Apps were not downloaded for several reasons, including a lack of interest, cost, and worries about third-party data collection. (Krebs & Duncan, 2015). Regarding theories and models applied to m-health adoption studies, the TAM model has been mostly used, followed by UTAUT. According to a meta-analysis, perceived usefulness, perceived danger, subjective norms, perceived ease of use, trust, and attitudes were all substantially and positively associated with behavioral intention (Zhao et al., 2018). A systematic literature review revealed seven key factors that were found to have a significant relationship with the actual adoption of health and wellness apps, according to (Aiman Azhar & Singh Dhillon, 2018): perceived usefulness, social influence, perceived privacy risk, perceived ease of use, self-efficacy, attitude, and behavioral intention.

Below is the summary of the major theories used for studying health and wellness m- health services

Author	Title	Country	Theory / Model tested	Variables tested
(Deng et al., 2018)	What Predicts Patients' Adoption Intention Toward mHealth Services in China: Empirical Study	China	TAM	Perceived usefulness Perceived ease of use Privacy risk Performance risk Legal concern Trust Adoption intention

(Alalwan et al., 2018)	Examining the Factors Affecting Behavioral In tention to Adopt Mobile Health in Jordan	Jorde n	TAM	Perceived usefulness Awareness, Social influence, Innovativeness Behavior intention
(Miao et al., 2017)	Factors that influence users' adoption intention of mobile health: a structural equation modelling approach	China	TAM	Perceived usefulness Perceived ease of use Technology Fear Subjective Norms Network Effect Cost Factor Existing degree of satisfaction Adoption intention
(Alloghani et al., 2016)	Technology Acceptance Model for the Use of M -Health Services among Health - Related Users in UAE	UAE	TAM	Usefulness Ease of Use Trust Security Overall Reliability
(Lee et al., 2018)	Factors Affecting User Acceptance in Overuse of Smartphones in Mobile Health Services: An Empirical Study Testing a Modified Integrated Model in South Korea	Korea	TAM	Perceived ease of use Perceived usefulness Perceived security Resistance to change Social norm Behavioral intention to use
(Alam, Hoque, et al., 2020)	Factors influencing the adoption of mHealth services in a developing country: A patient - centric study	Bangl adesh	UTAU T	Performance Expectancy Effort Expectancy Social Influence Facilitating Condition Perceived Reliability Behavioral Intention

(Dwivedi et al., 2016)	A generalized adoption model for services: A cross-country comparison of mobile health (m-health)	Bangl adesh	UTAU T2	Social influence Effort expectancy Waiting time Hedonic motivation Performance expectancy. Price-value. Facilitating conditions. Self-concept, Behavioral intention; Adoption behaviors

Methodology

The primary objective of this research was to explore the adoption process of m-health services and study various factors impacting the intention to adopt m-health services.

To analyze the behaviors of users of m-health services, an interpretative technique was used. The core focus of the research was on realizing the situation of m-health service usage from their experiences. The present research was intended to facilitate proper information sharing between researchers and users around the awareness of m-health services and the adoption journey. Considering the objective, a qualitative study was planned. In-depth interviews were conducted across Mumbai. With the metropolitan culture of Mumbai city, one can find people from different profiles in terms of language, culture, religion, and socioeconomic characteristics. Mumbai can be called as mini-India due to its diversity of the population.

As per 2011 census, Mumbai's population is 12.4 million. 20 in-depth interviews were conducted with m-health service users in Mumbai (Marshall et al., 2013). Sample selected purposively for this research. Participants' section criteria were on the usage of fitness or health maintenance services on regular basis as per the criteria given below in Table 1

Table 1: Sample size

Participant Category	**Profile**	**Sample size**	
		Male	**Female**
Fitness and Diet App Users	Using the Fitness app regularly for tracking health parameters and suggesting diet (At least 2-3 times a week)	5	5
Health maintenance App Users	Using Health apps at least once a quarter for consulting doctors virtually, booking appointments, Booking Lab tests, managing medicine schedules, Getting a health information	5	5
Total		**10**	**10**

A discussion guide was made as per the information areas of interest. This discussion guide was primary covering sections around awareness of m-health services, first exposure to such services, reasons for developing interest, desire for such services and the adoption process. The guide was also including various factors impacting the adoption process of m-health services.

Due to COVID 19 pandemic, all in-depth interviews were conducted through a virtual meeting platform i.e google meet. All these discussions were started with a warm-up section where participants were asked to introduce themselves followed by some generic pointers on their interest, hobbies, and their health-related routine practices. All in-depth interviews were recorded, and then important phrases were transcribed. Further data analysis was carried out with the help of qualitative analysis software Nvivo and Atlas ti.

Findings

m-health service adoption is an important aspect in improving healthcare access for sustainable health care initiatives. Faster access to healthcare services and convenience are found to be strong drivers of the adoption of m-health services. This research demonstrated various aspects of m-health service adoption from awareness to important factors driving the adoption of m-health services.

As per the word frequency count percentages across all in depth interviews, certain words
like Health, Google, online and personal and applications were coming multiple times. This indicates the interest levels of consumers in m- health digital services as given below.

Word	Weighted Percentage (%)
health	8%
google	3%
online	3%
personal	3%
applications	2%
digital	2%
doctor	2%
started	2%
doctors	2%
medication	2%
members	2%

Adoption process

Awareness and attention towards m-health services

Overall, awareness about m-health services has increased due to the seriousness of health and hygiene aspects because of the pandemic. COVID 19 has also helped in getting consumers' attention towards various m-health services. This includes services related to maintaining fitness, Yoga training and a diet for healthy weight. At the same time, various healthcare needs were answered on a virtual platform like teleconsultation. The primary source of awareness is digital media platforms like Facebook, Instagram, and YouTube. Few respondents have also received recommendations from their friends and family members. Users are aware of 2-3 different brands of fitness services like Healthyfyme, Google Fit, JEFIT, and Calorie counter.

Interest in m-health services

The primary motivation for generating interest in the health services is the need for good health and immunity that emerged due to COVID 19 pandemic. Many users have started using these services during lockdown when all other options of fitness and health were not accessible. Also, due to the unavailability of medical professionals and health care services, digital health services came up as a supportive hand in the emergency. Both external pandemic situations and an overall increase in smartphone users have resulted in generating consumer interest in various digital health services.

The Desire for m-health services

People have understood the importance of immunity and fitness in fighting against the pandemic of COVID 19. In the absence of proper medical facilities, most of the respondents have desired for m-health services for accessing medical facilities

Action for m-health services

Users have downloaded m-health services due to a strong desire to couple with the external pandemic situation. However, after downloading the applications and trying free services, most of the users liked the same and upgraded to a paid subscription. Getting paid subscriptions from branded players were driven by the discounts offered by the brands and the continence of getting multiple experts during multiple timeslots.

Factors influencing adoption of m-health services

The Usefulness of the services

Being a digital service and related to health, consumers evaluate the utility of the services. While evaluating new age m-health services in comparison with traditional services, the convenience of choosing service from multiple options, the convenience of using services as per the need, no waiting time, after sales service, 24X7 availability are some of the factors which drive the usefulness of m- health services as given below Chart 1

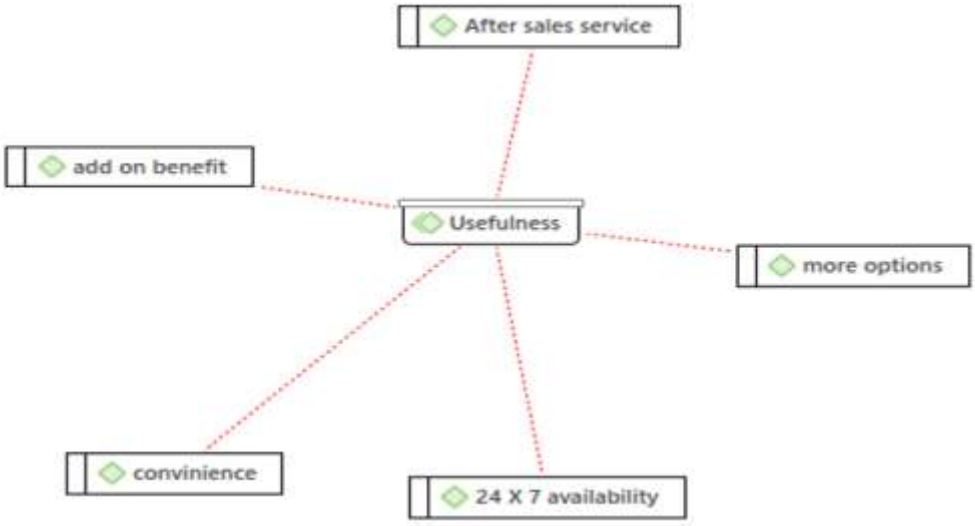

Chart 1: Network relationship between usefulness and other factors

The utility of m- health services is stated to be very high for vulnerable populations like patients with chronic ailments like diabetes and hypertension, Obesity, pregnant women etc. This group of the society needs closer monitoring of fitness, diet and medical parameters on the regular basis. m-health services can make their life easier by assisting them with their health goals. People are appreciating the utility of most of the m- health services

Ease of use

In the era of smartphones, all smartphone users keep multiple applications on their phones. Like other mobile applications which people use for

services like cab booking, and shopping, users find the layout and operations of the m-health service apps to be easy to use. Users have cited a few concerns for the geriatric population for whom managing such technology-related systems can be a challenge. However, operations are easy for getting information and attending online classes on fitness and diet. The use of m-health services for managing critical health parameters regularly is still considered to be challenging.

Social influence

Although people download m- health services for their purpose, friends and relatives from the society have influenced their usage, where they track daily fitness performance of each other and notify that on social media platforms like Facebook. In the world of social media, showcasing one's achievements on social media became a trend. Along with maintaining good health, people prefer to post their health-related achievements on social media to showcase to the external world. At the same time, they also track the health performance of their close friends

Price value

Some of the users are using paid subscriptions of the m-health services. The primary reason for a paid subscription is the economic cost of a subscription in comparison with the conventional alternatives. Also, the convenience of attending all health sessions as per your own schedule makes this a value for money proposition

Criticality of disease

Digital health services like online consultation with a doctor, booking doctors' appointments, booking lab tests etc are very useful services for minor health ailments like headaches, coughs and colds. However, when it comes to more severe/critical diseases, people prefer more in-person consultation and offline healthcare services. Criticality of the disease is based on the nature of disease i.e acute vs. chronic, high risk patient profiles where expert guidance needed in person as per the chart 2 given below

Chart 2: Network relationship between criticality of the disease and other factors

Data security

Data security is not mentioned as a concern by any of the respondents. People perceived that if they don't permit the app only when it's in use, the app will not interfere with other services and personal details on the phone. In addition to that, services coming up from good brands cannot afford to do such data breaches. Such data security breaches will impact their overall reputation. Although data privacy is mentioned as a concern in the literature review, users from Mumbai believe that the data security issues are taken care of by good brands.

Trust

Traditionally, most health and wellness services were offered through offline mode where the user used to interact with an expert personally. Considering the personal touch, doctors' awareness about family history and reliability of services has built confidence in traditional health services. While moving from traditional services to m-health services, trust in the m-health services becomes an important factor. However, branded players in the market, advances in technology and reviews from close friends and relatives have helped m-health services to gain trust amongst consumers at least for preventive fitness and diet-related services. Additionally, users can trust m-health services for acute ailments but are skeptical about critical illnesses. They trust more on the family doctor for managing their critical illnesses.

Health Belief

Overall, due to the severity of COVID 19, people were forced to think of a solution for maintaining their immunity and good health. For maintaining fitness and a good diet various m-health services have provided information, online classes, healthy food, monitoring health parameters as well as per chart 3 given below.

As the risk of getting COVID was very high, people were shifted to online health services. These online health services have helped people to consult doctors with a virtual platform. Due to the easy to operate layout and buzz on the social platforms, it was easy for consumers to learn about these health services and start operating them. When compared with m-health services for supporting health-related concerns, people are preferring their family doctor who knows their history, prior treatment, allergies etc. Familiarity with a doctor provides confidence to patients while receiving treatment.

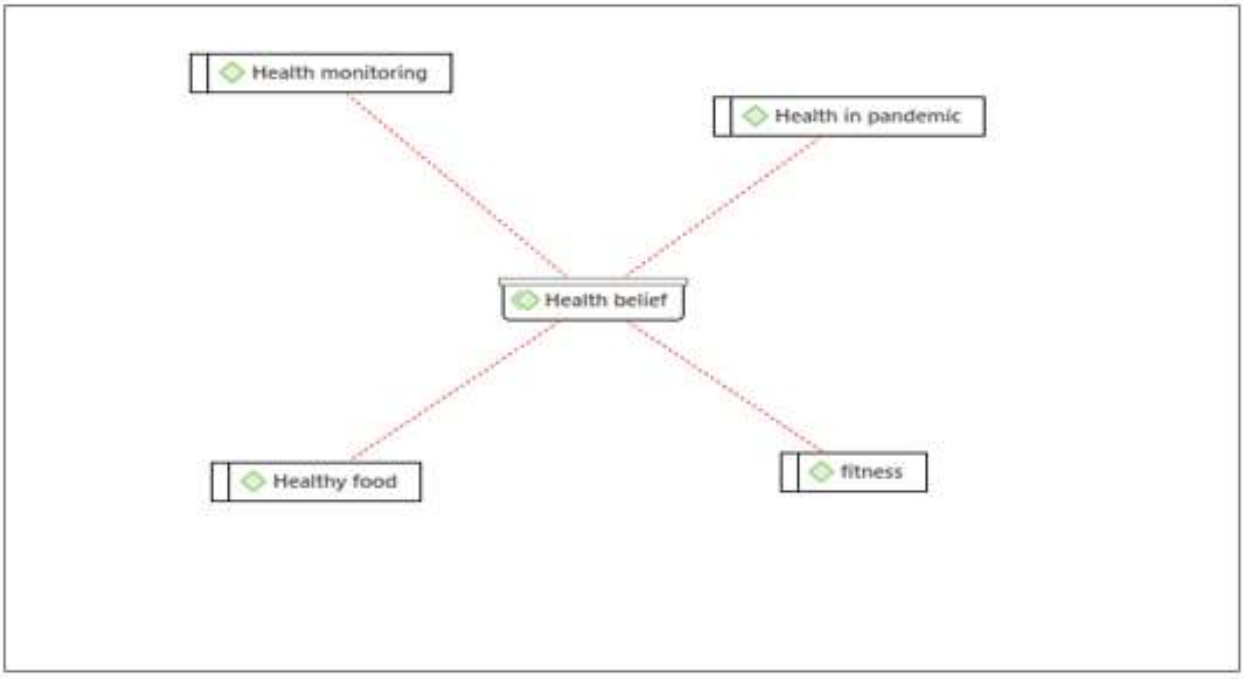

Chart 3: Network relationship between Health Belief and other factors

Facilitating conditions

An increasing number of smartphone users with the availability of internet data has helped users in accessing and using the services. Also, more options, personal attention, 24X7 availability time saving, good aftersales service are some of the facilitating conditions for generating interest in m-health service helped in getting paid subscription as given in chart 4 below.

Other factors

m-health services are very easy to use for young and middle-aged people. However, it would be sometimes very tedious for the geriatric population who are not well versed with such technical systems. Services are very easy to use for young and middle-aged people. However, it would be sometimes very tedious for geriatric population who are not well versed with such technical systems.

Discussion

The findings of the study revealed the adoption process of m-health services in brief and key factors influencing its adoption. Overall Adoption starts with getting awareness and attention towards these m-health services and proceed with generating interest due to the offers and utility of the services. The interest generation step is followed by an evaluation of m-health products and services. Post satisfactory perceived performance of the services, users feel a desire to get this service and encourage to download and try these services.

Perceived risk of getting health issues, benefits of using m-health services, especially during emergencies, relationships with the doctor, impact the

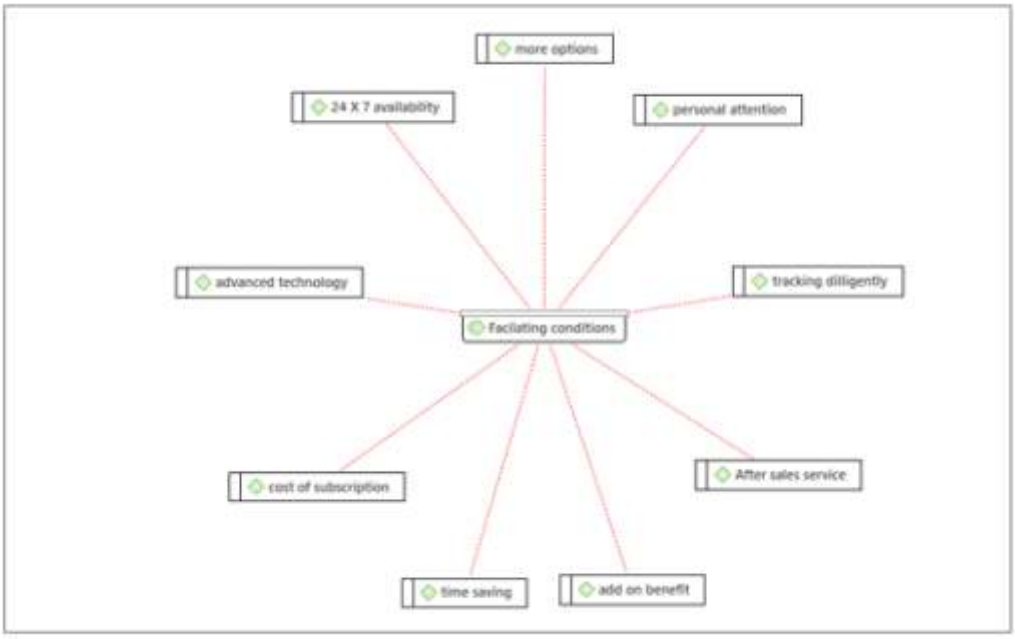

Chart 4: Network relationship between Facilitating conditions and other factors

acceptance of m-health services. People with higher vulnerability to lifestyle diseases are more precautious than healthy individuals. This indicates the findings are in line with the health belief model (HBM).

When we consider important factors impacting the adoption of m-health services, perceived usefulness had the strongest influence on adoption intention confirming the findings of previous studies that adopted perceived usefulness to explain adoption intention in the context of information technology products (Cheung et al., 2019). m-health services aid in the promotion of the concept of illness prevention, such as limiting continuing physical activity, consuming certain meals, and tracking the progress of potential and current patients which is in line with the previous study by Palos-Sachez et al.(Palos-Sanchez et al., 2021). Relative advantage versus traditional health services has a constructive effect on the adoption of m-health services as confirmed in a previous study by (Mehra et al., 2021). Social reputation and performance were seen to be important factors impacting adoption intention which was also reported by (Alam et al., 2018). Perceived usefulness added with easy to use the perception of m-health services confirms the Technology acceptance model (TAM) for the adoption of m-health services

Trust in m-health apps and doctors impact the adoption as it will help in the adoption of m-health services (Octavius & Antonio, 2021). Trust in the m-health services is also impacting the perceived risk of using services. Users who already have confidence in m-health services will have a lower level of privacy concern. Trust will provide a sense of security for users so that the perceived privacy risk will be lower. (Resti Fitriani et al., 2020). The current study also confirms a positive and significant relationship between price value with users' intentions to adopt smartphone fitness apps. (Dhiman et al., 2020). m-health services adoption process is faster amongst the younger consumers compared with older consumers primarily due to expertise in handling technology in line with the study conducted by (Deng et al., 2018)

Limitations of the study

The scope of this study is limited to m-health services users. Exploring the views of non-users, medical professionals etc. might help the project to make it better and develop a wider understanding of the issue. Moreover, the research was conducted with users in Mumbai. The findings do not represent the wider Indian population and thus cannot be generalized. Despite these limitations, the findings of the study are helpful to improve the understanding of the topic and highlight the importance of digital health adoption effectively.

Conclusion

The adoption process of m-health services starts with awareness and end up in product trial. M-health adoption follows the health belief model and

technology acceptance model. In addition to this, trust in the m-health services, relative advantages versus traditional health services, data privacy concerns and demographic factors like age impact the adoption of m-health services.

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Conceptual Framework of Adoption and Implementation of Technological Challenges – A Road towards Sustainable Development

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ABSTRACT

As we all know that nothing can be produced without the involvement of factors of production. However, the involvement of intensification of various factors of production differs from product to product, region to region and firm to firm around the world. In this regard, without any second thought or opinion that technology is holding the driver's seat in economics, the road takes forward. Nothing is so important around the world that it is not giving any significant efficient contributions to the respective sectors, industries and firms in a state. Predominantly, technology allows progress toward efficient production and better goods and services. Nonetheless, in reality, the advancement of technological progress used is very complex, especially in highly populated developing countries like India with respect to policy implications and the decision-making process of the firms or the industry. Since, the bilateral linkage is observed by technological advancement with different variables like education, socio-economic growth, innovation, production and turnover ratio and so on. But, the likelihood of impact on reduction in the demand for labour force, widening of inequality in the distribution of wealth among the people and social responsibility needs to be ensured for the welfare by the regulators are also not to be neglected. The advancement of technologies and adoption of the same on the one side increases the flow of knowledge expansion, cooperation among the investors improves emerging businesses around the world. On the other side, the fabrication and challenges on multiplication of various inventive activities of the corporate world like automated systems, big data, development of information and communication technologies, artificial intelligence, patient, recipes, protocol, routine instructions and manuals also become inevitable to sustainable development. This paper is intended to review the challenges of adoption and implications of technological advancement toward sustainable socio-economic growth.

Keywords: **Automation, Communication, Duplication, Intensification And Sustainability.**

Introduction

Certainly, nobody denies that technology is the composition of knowledge and tools which simplifies and makes out the factors and resources easily, efficiently, effectively, creatively, and innovatively in the transformation process of goods and services. The growth and development of technological advancements are not only shaping the countries' economy at the domestic level even across boundaries around the world. Self-reliance and sustainable development are the focused slogans of the state around the world in the recent past. Many forums including the World Bank, IMF, and UN councils are predominantly extending their fullest effective support, consideration, and consciousness in the attainment of those goals. In this regard, the key impact of technological advancement on self-reliance and sustainable development of the state is needed to be protected and allotted with sufficient resource mobility and recognition. The technological changes after the implementation of LPG (liberalizations, Privatization, and globalization) i. e. the 90s have grown unimaginable state with respect to socio-economic, political, cultural, behavioural, and environmental aspects around the world. The rapid technological advancements around the world are also grown with multiple tasks and challenges. On the one side, the innovation systems and approaches are made out of the compositions of various elements invented in different parts of the world. It highlights the improved and expected existing extensive cooperation, strategies, and policy changes build to manage effective inventions and innovations at the regional, national, and international levels.

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Objectives of the Study

This article is made of the following objectives:

1. To review the conceptual framework of technology advancement theories relevant to sustainable development.
2. To evaluate the impact of technology transformations on various socio-economic indicators of sustainable development.
3. To analyze the challenges of technological advancements with respect to various contributors to sustainable development.

Methodology of the Study

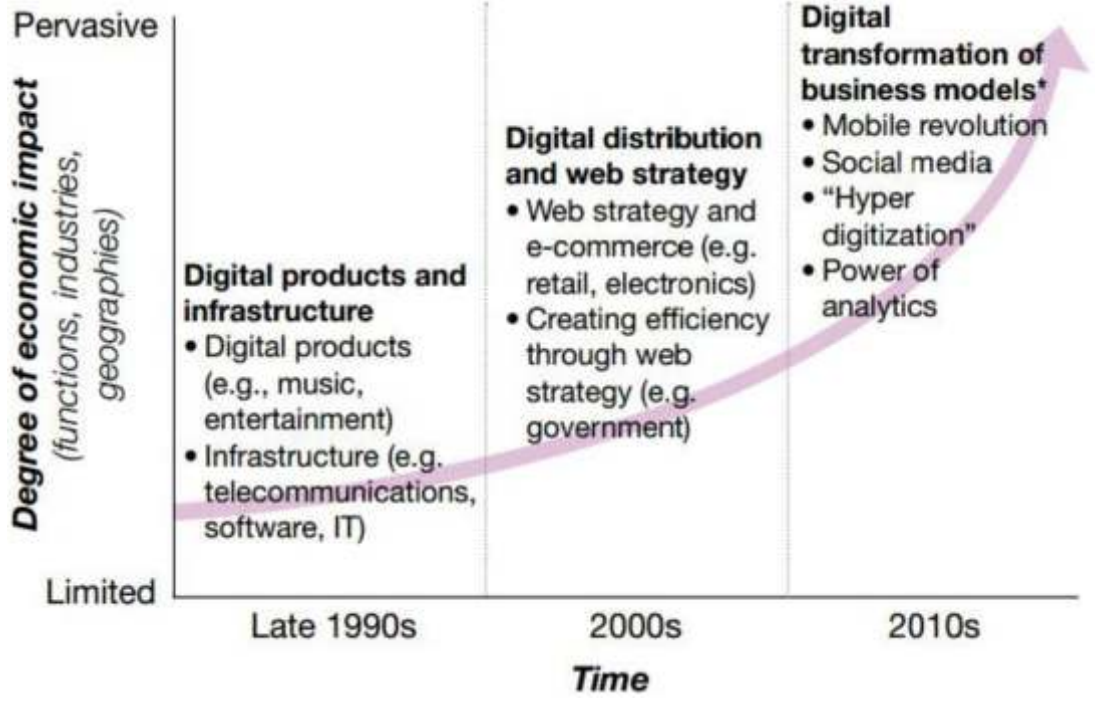
This paper is carried out with secondary sources. The theoretical economic models relevant to sustainable development with different socio-economic indicators such as standard of living, employment, income, communication, and human capital investments in health and education status of the state are evaluated in this paper.

Evolution Path and Theoretical Review of Technological Advancements

Presently, the whole world is focusing on self-reliance on technology to solve socio-economic and environmental issues. Certainly, technological advancements such as artificial intelligence, biotechnology, blockchain management, 3D actions, drone technologies, nanotechnology, renewable energy technologies, robotics, satellite, and virtual learning advancements were all have taken the cultural and socio-economics into new paradigms. But the technological advancements along with the provision of freebies by the regulators (Government) on the other side also emerge challenges like migration, low wage rates and unemployment in the labour market. The commission of the Economic and Social Council itself understood the need for appropriate applications of science and technology and innovations for the attainment of effective sustainable development without which the achievement of the same will be highly impossible by 2030.

Attaining profit maximization is one of the prime objectives of the firms. The mechanisms such as increasing productivity, improving real income, and reduction of costs are the ways that help firms faster to achieve their objectives. UNCTAD has demonstrated the potential applications of frontier technologies to accelerate the progress to the attainment of sustainable development goals.

Chart – 1: Evolution Path of Digital Transformation

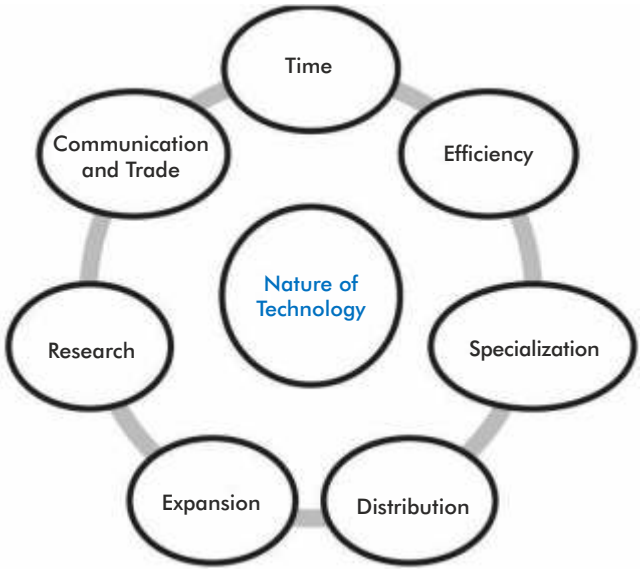


Source: Digital Transformation and Sustainability

The evolution of digital transformation over a period of time is projected in chart – 1. The degree of economic impact with respect to functions, industries and locations over the period of time is correlated in the chart. A direct relation is observed between economic variables and the time period in the flow chart since the 90s.

the techniques, capacity, business and market, involvement of the research and development and ICT impacts on trade. The nature of the technology component is also represented in the flow chart below.

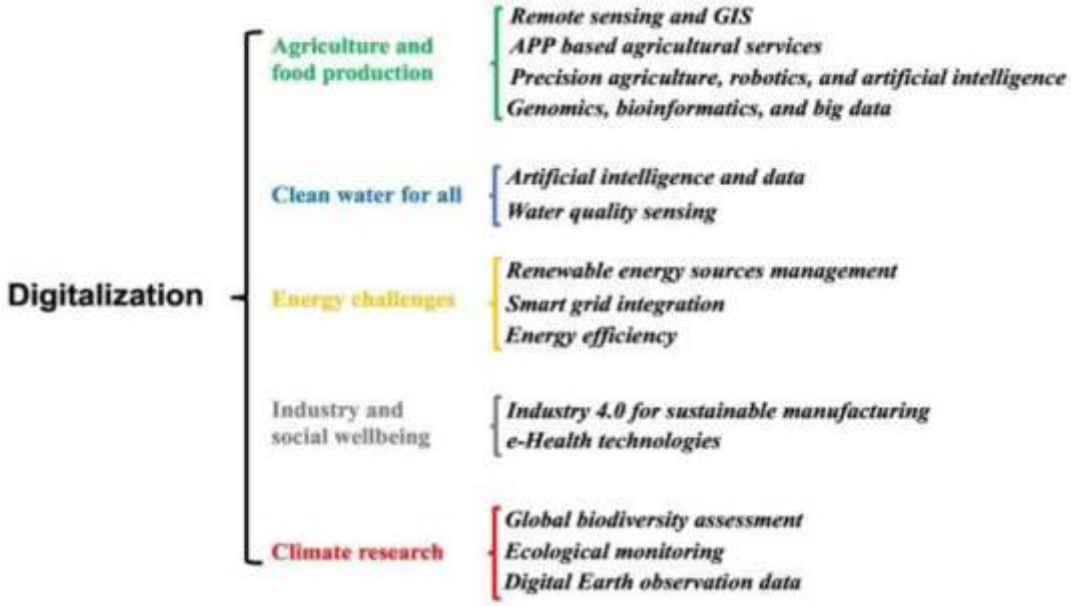
Chart – 2: Nature of Technology Components



The nature of technology and its advancement is based on 7 core components time element, the efficiency of allocation and distribution, specialization and skill development, expansion of

The summary of the digital transformations to the sustainable development process of the state is presented in chart – 3. The description of digitalization and technological advancement to various sectors are also discussed in this section.

Chart - 3: Summary of the digitalization related to sustainable development goals



Source: ELSEVIER–Science of the Total Environment

(1) **Agriculture Sector**

One of the recent reports has revealed that around 795 million people which means every 9th person are undernourished around the world. Most of them are from rural and developing nations. Indian economy is still considered a rural and agrarian economy; the majority of the people are living in rural regions and are based on agriculture and its allied activities. The impact of technological advancements in those sectors and in allied activities has highly influenced and affected the socio-economic status of the state. To some extent, the concept of "disguised unemployment" is controlled and eliminated in the agriculture sector by the implementation of technological advancements. Hence, it also made the regulators and policymakers think and create alternative employment opportunities for those unemployed people in the rural areas through SMEs, SHG, and MGNREGA with various preparatory and supportive works to strengthen the self-reliance and sustainable rural economic base of the country. The strong support and rapid implementation of MSME effectively and widely provide an improved platform for the people dwelling in the towns, cities, and corporation regions. Similarly, SHG and MGNREGA equally contribute to the dwellers in small towns and in rural regions in India. Generally, these types of policy executions are not only provided employment opportunities but also help to eradicate the vicious circle of poverty in the state. MSME schemes extend their support to nearly 50 different types of industry and service sector-based activities, SHG is focused on more than 30 sorts of business activities and MGNREGA tries to extend their activities with 10 broad categories like Watershed, Irrigation, and Flood management works, Agricultural and Livestock related works, Fisheries, Rural Drinking water, and Sanitation related works.

The impact of communication advancements and information sharing of production techniques across the world in agricultural productivity and similarly promotion of organic-based agro products is also felt by the people. Technological advancements like remote sensing, drones, and artificial intelligence in the agriculture sector facilitate precision farming and reduce chemical input usage and response to variability in agricultural crop production. Hence, machine learning with drone and satellite imagery helps agriculturists to predict and carry out the ecological and economic weeding performance to maximize their quality plant hybrid yields. The continued research by the agencies and sufficient financial assistance for those works by the regulators provide a more innovative path to rapid technological changes and for the various dimension of food security and food systems forward to sustainable development. As a result, the attention of small landholders to enable putting suitable governance structure and in the flow of innovative scientific knowledge sharing.

(2) Power and Energy Sector

The regulation of decentralization of power and renewable energy sectors has made room to extend electricity services to rural areas over a period of time. The increased investments into those sectors along with technological effective and efficient contributions have declined the prices for renewables, wind and solar generations in the international market.

Most of the developing countries' strategies have been made to them provide significant room for the advancement of renewable energy technologies around the world. The Republic of Chile is recognized as a pioneer in the electricity sector by the adoption of an energy mix with renewable energy transition. Canada was also working hard to prove that as the pioneer in the field and to become a leader in the clean technology sector along with unique challenges to access long term capital in the international market by recapitalizing to sustainable development. Hence, the improved machine learning algorithms techniques combined with artificial intelligence and innovative energy technologies help to forecast wind farm outputs, productions, energy delivery and distributions of the grids. Though the continuous rise in the general prices of petroleum products in developing countries like India is being an alarming factor for market transactions but the innovation of the advanced electric battery-based automobile industry is really the best alternative mechanism to the dynamic market demand. The history also provides evidence to us that the market

share of electric passenger care in China got increased from 2.1 per cent to 4.2 per cent in 2017 – 2018. This kind of innovation process not only is alarming the target need of demand and supply chain management of power and energy systems but also stimulates R & D towards affordability, regulatory environment, cooperation among the international bodies for knowledge sharing, policy learning, capacity building and development of interconnected infrastructure grids.

(3) State of Economy

As Schumpeter has rightly pointed out in his theory of invention that the structural transformation of technological capabilities and market expansion promotes alternative sources of income and employment access and opportunities. As a result, the reduction of costs in frontier technology and increased opportunities to faster the progress from low wage to higher wage industrial activities increased and improved the beneficiaries' value chains in the developing countries around the world. A country like China is playing a leadership with respect to technological advancement in the production of photovoltaic, wind, and solar thermal heating, and Brazil was identified as the second-largest producer of liquid biofuels for transport. However, developing countries are making their level best to support smart manufacturing innovative systems of road map to economic growth. The multidimensional economic transformations such as incubators, accelerators, smart specialization, and technology parks need to be supported by the policy regulations.

(4) Social Inclusion

A country like India took an initiative and implemented policy regulation of Aadhar to enable the financial inclusion of 128 crore people through demographic data with biometrics. Hence, the development of crypto transactions, blockchain technologies, digital identity, land registration, and many more financial transactions with the wide support of technological advancements in recent decades. The production, sales, and usage of digital techno-gadgets have increased significantly around the world in recent years. It is being a platform to improve the gross root social network movements for knowledge creation and innovation among academicians, activists, and practitioners. Hence, it is also uplifting the solidarity of socio-economic status of the underprivileged, marginalized, and poor entrepreneurs across the groups.

(5) Medical and Healthcare Sector

The growth of science and technology with respect to the medical and healthcare sector is also unimaginable. The development of comprehensive ICT solutions in a country has made Egypt a pioneer in the transformation of telemedicine, assessing medical and health-related services during the time of emergencies, crises, and critical situations by connecting physicians and field experts immediately in no time across the globe. As history revealed some communicable and chronic diseases such as dengue, and malaria could have been completely controlled due to rapid technological changes in the medical sector. The emergence of PPP into the healthcare sector including R & D, development of medical infrastructure, proactive policy changes, and involvement of the government is also evidence of technological advancements.

(6) Educational Sector

Since 2010, the need and importance of digital platforms were felt by the people for multi-purpose and gradual growth observed across the world. But the unforeseen existence of Covid 19 and the pandemic situation brought the inevitability of the digital platforms and the significant increment at the grass-root level including the educational sector with limitless participation and with best packages. The imbibed characteristics of the 2k kids and untired interest of the youth men and women in the usage of the open internet access have improved the potentiality and accessibility of benefits of high-quality study materials and attending lectures, sharing content, methods, innovative ideas, self-paced learning and optimizing data analytics on the platform in the recent past. Most developing countries were started using 3D tools to enhance the curiosity of the learners in primary, high, and higher secondary school education systems and in the higher education institutions, colleges, and universities across the state.

Similarly, the technological advancement also

gives a way for the faculty and research community to collaborate in open labware sharing for quick, better experiments at low cost with various fields of sciences like Natural Sciences, Nano Science, Biotech, Neuroscience and so on. On the other side, this sort of integration of digital learning mechanisms is being a greater challenge and makes inter-experiment of learning curiosity to both teacher-researchers fraternities around the world with respect to assessments and strategies.

Impact and Challenges of Technological Transformations to Sustainable Development

Technological advancements are also likely to have positive and disruptive effects on the attainment of sustainable development from various aspects. Certainly, the emerging new technological applications not only provide an enormous opportunity in the progress of sustainable development goals but also disrupts the market economy, worsen social divides and raise normative questions. The adoption of new innovative technological pathways facilitates the policymakers for good directions, distributions and diversifications, and also helps to avoid unwanted blocks, challenges and issues faced in the earlier systems in the context of sustainable goals.

(1) Labour Market and Employment

Technological advancements like artificial intelligence, big data and machine learning have an impact on market transactions and on economic indicators such as employment, productivity and growth. The impact of automation differs according to a range of factors, level of industrialization, factor costs, production costs and capacities, skill development strategies, demography, infrastructure and policy implications. Even UNCTAD was also taken the initiative to review the methodology used to estimate the impact of automation on the job market and from the earlier studies, it found that predominantly about the job losers rather than job creators. Moreover, digital automation may also affect men and women differently. On the one side, women hold high-risk jobs and are underrepresented in the field of science, engineering and technologies which increases job opportunities in the labour market demand. On the other hand, women are employed in the less risky automation jobs used to get less pay than men for the same job. Despite the development of trade conduciveness and the increasing employment opportunities, the dynamic technology platform leads to wider income inequalities and polarization. Hence, technological advancements and innovations increase the plant's production capacity but on the other hand, it reduces the intensification of the labour force and ultimately oversupplies of job seekers in the labour market and finally reduces the bargaining power of the trade union with respect to their wage determination and working conditions. The effect of rapid technological changes highlights the need and importance of lifelong skill development updating the learning process. The development of a new innovative social compact novel approaches helps the people to deal with social safety nets and technological disruptions transitions. Hence, the required socio-economic implications through policy experimentations especially in developing countries.

(2) Socioeconomic Divergence

The likelihood of divergence of the existing gap with respect to socioeconomic aspects at the micro and macro level of the state due to technological changes is being another important vivid challenge of the state around the world. The change in the inter temperament of the factor intensifications between capital and labour resources in the production process perpetuates the milestones of socioeconomic status of the people within and between countries among rich and poor, rural and urban and women and men in the state. Recent studies had revealed that the use of information and communication advancements of the developed states are more than 4 times higher than in the least developed countries. As a result, it exacerbates socioeconomic divergence between countries at the frontier of rapid technological change. This situation alarms the rulers, administrators and policymakers to adopt and exercise innovation policy through the development of their technological advancements to cope with the attainment of sustainable development. Some of the studies also observed the increasing gender digital gap between men and women in the job market with respect to science, engineering technology and mathematics. For instance, in the leading machine learning-based

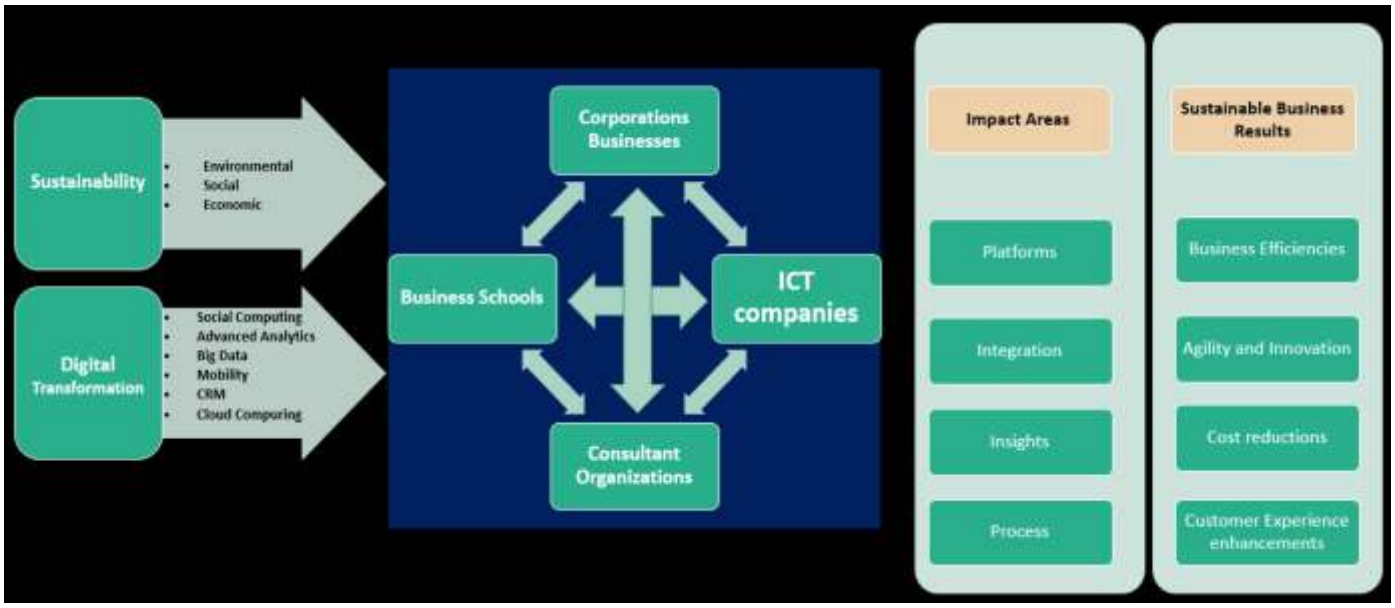
research only 12 per cent of the women represents. Hence, the biases were also observed in some of the applications of artificial intelligence or in big data due to a smaller number of women represented in those areas.

Policy Implications for Sustainable Development

Technology advancement provides a way toward sustainable development through the emergence of socio, economic and environment. The policy implication toward sustainable development with the support of national science, technology and innovations, regional and international cooperation and multidimensional stakeholders are described here.

As the flow chart has explicitly revealed that the sustainability of the state is based on three important paradigms such as social, economic, and environmental factors. But the digital transformation of the state has been based on the composition of social computing, advanced analysis, big data, mobility, CRM and cloud computing, and so on. The impact of the policy implications of the regulators on various business activities and outcomes and sustainable development is based on numerous elements and indicators. Unlike the adoption of appropriate policy implementations and support of the rulers, administrators and bureaucrats the progress delivery of sustainable development would be impossible irrespective of whether old or new technological innovation changes around the world. The agency of the National innovation system needs to interact with both public and private institutions for the adoption of new technology involved in the production process of the organisation. The growth and development of the economic systems of the firms and industry of the state are based on core technological innovation systems such as R&D, education system, civil society, consumers and policy regulators. The National science agency provides a pathway to use important technologies and for capacity building of SME based organisations. The basic mantra of consistency of those organisations is promoted through the design and development of appropriate policy and strategies adoptions. Gender and technology inclusive innovation policies may help the youth and women to take part as entrepreneurs or innovators. In the informal settings, innovation is also considered a source of sustainable development for the given informal small craft-based businesses to play a vital role in the adaption of external innovations to local conditions and to fill the gap when the production system change. Even the countries so specific on technology advancements, innovation, national science and technology-specific strategies translate those strategies and policies into tangible effects on pressing developmental

Chart – 4: Policy Implications and Technological Frameworks



Source: ELSEVIER–Science of the Total Environment

challenges and it is a critical issue.

Digital connectivity and policy are the key features and benefits of the digital economy. Digital competency is the combination of generic and technology skills which enable the understanding of the people on media, about what is retrieved and communicated with a variety of digital tools and applications. The proper education policies and training platforms are expected to be provided to all on digital skill development. The perpetual of this process not only develops the required potential investment in the basic ICT infrastructure, reliable energy supply and regulations but also ensures a competitive market space to provide the accessibility of the affordable quality product.

The stakeholders' cooperation in the regional, national and international communities can extend their support to rapid technological change towards sustainable development and helps to prevent it from widening socio-economic inequalities and environmental degradation. The increase in such support prevents the evolving digital economy from income inequalities. For instance, the share of ICT technology has grown a considerable collaboration in scientific research over the recent decades around the world. Hence, this process improves the understanding of networks' formation, norms, motivations, dynamics and internal control mechanisms of the market economy. The initiatives and contributions of the multi-stakeholders are also influenced their participants' resources to raise awareness about major challenges like gender digital diversifications.

The Outcome and Limitations of the Study

A summary review of the conceptual framework and drawbacks of the study are presented here.

- The conceptual framework review of the study seeks a common platform between digital parameters and business processes for the sustainable development of the state.
- The technological advancement and digital transformation of study mainly focused to analyze the impact and challenges of the elements such as artificial intelligence, big data, business innovations, social computing, customer and employee relationship management, labour market, and capital intensification characteristics in terms of sustainability rather than traditional information technology technologies.
- The technological advancements and innovative business models keep the organization's strategy, operations, process, finance, and external forces very conducive and up to date by addressing the challenges and issues in the way management and different stakeholders deal with them.

The study is also subjected to the following limitations.

1) The study is fully based on secondary data which is subjected to the suitability of the organizations differs from region to region and strategy to strategy.
2) Though technological advancements and digitalization has become part and parcel of the human being and inevitable in the modern industrial world still it is a herculean task and challenge to developing countries.
3) The study consists only the conceptual framework of the technological advancements and its impacts on qualitative aspects, therefore no statistical evidence and estimation of the impact on various socio-economic indicators are not provided in the study.

Conclusion

The self-reliance, consistency, and sustainable development of a country are significantly dependent on the rapidity of technological changes toward the aim of policy execution and extensive support, cooperation, and consciousness of the workforce at all levels. The advancement of digitalization during COVID 19 increased opportunities to rethink the decision making of the state to apply technology in a new and meaningful way. The phenomenal opportunities to the existing firms, industries and enterprises which can use the data for more sustainable dynamic solutions. Hence, the present digital transformation is delivering the required sources, innovations and ideas to all stakeholders for their success. As the studies of Zegveld and Cramer revealed that where there is an increment in the purchasing power of the people to 70 per cent then there would be an incredible reduction in the

discharge of waste flows per product unit which would help the system to achieve the objective of sustainable developmental society. Hence, if the whole world wants a platform for the likelihood of equitable resource distribution with respect to the purchasing power of all the individual who expects to live at the same standard of living the total productivity of the state needs to be increased 10 times higher than the present. The perpetual impact of continuous rise in the growth of the population and environmental changes would raise the standard of material income status of the people around the world reflecting the same sort of consumption patterns of the industrialized countries. When the moment capacity of human ingenuity in the form of technology to preserve their lifestyle and also ensures an ever-increasing the level of consumption for everyone, and also the impulses the necessity of redesign the technological system rather than continue to apply the opt techniques of long term self-satisfactory events. The likelihood of fundamental social changes is ultimately based on optimum technological progress and the priorities are given to it by different stakeholders.

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The Impact of Employment of Women on ESG Scores

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ABSTRACT

Women are an important aspect of the society and corporates. As per the ESG guidelines disclosures have to be made for Environmental, Social and Governance aspect. ESG scores reflect the quality of these disclosure. Diversity and Inclusion form an essential aspect of such reporting whereby the representation of women employees in corporates is reflected.

Representation of women must be a deliberate effort by the corporates not only it is essential for well-being of the society but because it improves ESG scores and attracts investors and in the long run the value of the organisation.

Objective: The objective of this research is to find out women's representation in corporate.
To study prevailing employment practices of corporate especially with respect to women
To study the impact of women employees on corporate sustainability, performance and value

Keywords: Women Employees, BRR, ESG, ESG scores, Diversity and Inclusion.

Introduction:

A study by the International Finance Corporation reveals that private-sector players are increasingly partnering in international initiatives that identify best practices and practical approaches that companies can implement to improve women's inclusion in governance and the economy—not only because it is the right thing to do but also makes business sense (Gender Equality, Infrastructure and PPPs A PRIMER 2 Gender Equality, Infrastructure and PPPs, 2019). According to a World Bank Group report, increasing local women's engagement in projects can lead to increased firm productivity and help private companies innovate, grow, and perform better(WORLD BANK GROUP Gender Equality, Poverty Reduction, and Inclusive Growth, n.d.). According to McKinsey, companies that have more gender diversity are 21% more likely to experience above-average profitability (Hunt et al., 2018). Hiring women is good because the companies have access to a pool of talent who will herald innovation and productivity, who have multi-tasking abilities, have superior people and soft skills, are empathetic and hence less likely to be in conflict.

ESG which stands for Environment, Social and Governance forms an important factor of sustainability reporting. ESG reporting is compulsory in India in the form of Business Responsibility Reporting (BRR). According to the findings of the CRISIL ESG compendium, investors take ESG reporting as an important risk management tool and study it in detail before making their investment decisions. Under BRR Principle 3 stands for reporting on how businesses should promote the wellbeing of all employees which records the total number of employees and the total number of women employees. It is important that the companies should realise that having more women employees onboard is not for a matter of tick in the box or a Business Responsibility Reporting practice, but is important for the growth, value and competitive advantage of the company.

CRISIL has come up with ESG score which finds out the track record, trends and disclosures by companies to provide a relative, assessment on all material ESG parameters relevant in the Indian context based on information available in public domain wherein the score is assigned on a scale of 1-100, with 100 denoting the best-in-class ESG performance in which the evaluation analyses three annual reporting cycles through fiscal 2020.

So, having more women employees is important to corporate sustainability practices, overall performance and long-term value of the company as is reflected in the ESG score of the company

Literature review

According to WBCSD Sustainable Development Reporting can help the companies by evaluation of

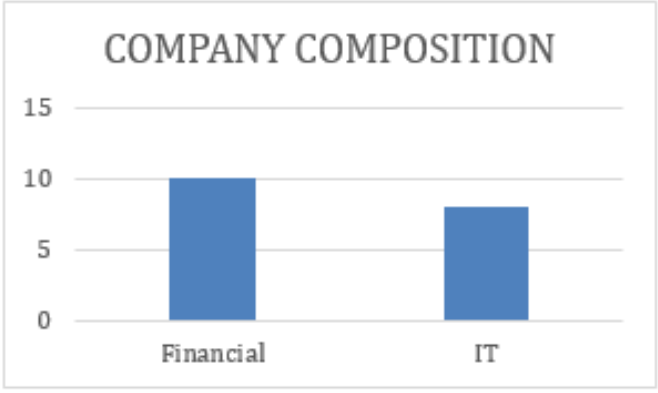
corporate performance in environmental, social and economic terms (Heemskerk et al., n.d.). There is evidence of a willingness to engage and communicate clearly the results of sustainability strategies to interested stakeholders and overall, there appears to be a developing acceptance amongst large corporations that efforts towards improved corporate sustainability are not only expected but are of value to the business (Klettner et al., 2014). Sustainability Development Reporting can also be called as ESG reporting ie., Environmental, Social and Governance Reporting. The Ministry of Corporate Affairs released the National Voluntary Guidelines on Social, Environmental and Economic Responsibility of Business (NVG-SEE) in July, 2011 which includes nine core principles thus making ESG reporting compulsory in India. As per Census 2011, India's population was 121.06 Cr and the females constituted 48.5% of it. In 2011, the sex ratio (number of females per 1000 males) at all India level was 943 and the same for rural and urban areas are 949 and 929 respectively (Vikaspedia-Status of women in India). However, the fifth edition of the National Family Health Survey (NFHS) confirmed signs of a demographic shift in India. For the first time since the NFHS began in 1992, the proportion of women exceeded men: there were 1,020 women for 1,000 men(Ministry of Health and Family Welfare India Fact Sheet, n.d.). Sustainable Development Goals 5 of the United Nations Agenda 2030 that is devoted to "Achieve gender equality and empower all women and girls". The World Economic Forum states that gender equality is not just the concern of half of the world's population; it is a human right, a concern for us all, because no society can develop – economically, politically, or socially – when half of its population is marginalized.Recent research by Bloomberg Economics estimates that "if women's education and employment levels were the same as men, the global GDP would increase by $20 trillion in 2050". It also states that "70-80 % of the consumer purchases are made by women". Very few women are in boards of directors despite the views of diversity and inclusiveness supported in the professional and academic literature and since women out-number men, population-wise diversity in business is important as after all, it serves the clients and the customers who are part of business (Pareek et al., 2021). From the empirical evidence the authors found association between increasing the female employees ration and reduction in tax avoidance, they found that by increasing the ratio of female employees a company can improve its sustainability in terms of tax avoidance by forming a risk-averse and conservative corporate environment (Rhee et al., 2020). Research has established that the relationship between Managers' individual dynamic capabilities (IDC) with the social commitment of the manager is greater when the company's leader is a woman (Buil-Fabregà et al., 2017). According to the authors the presence of women in top positions and the implementation of sustainable activities improve both the financial performance and value of the company (Bannò et al., 2021).

Methodology:

The secondary sample for the study is of the companies listed in NSE for the year 2017-18, 2018-19, 2019-2020 and CRISIL ESG compendium for the average of the three years. The basis of the study is secondary data from Annual reports, Sustainability Reports, ESG reports, Business Responsibility Reports, IFC Primer, World Bank Report etc. Eighteen Companies from IT and financial sectors have been chosen as sample representatives.

Theoretical construct:

Though it is obvious that ESG and its reporting is growingly important to corporations there is very little information on integrated, uniform, comparable and explicit data about ESG especially on how the companies are performing on that account. One such initiative by CRISIL due to their access to databases has been available on the public domain. This paper takes Eighteen Companies from the IT and financial sectors and studies the representation of women employees among total employees of the companies.



Annexure

TABLE 1: Composition of Companies

S#	Company Name	Sector
1	Infosys Ltd	IT
2	Mindtree Ltd	IT
3	Tata Consultancy Services	IT
4	Wipro Ltd	IT
5	Kotak Mahindra Bank Ltd	Financial
6	HDFC Ltd	Financial
7	Axis Bank Ltd	Financial
8	Larsen & Toubro Infotech	IT
9	ICICI Bank Ltd	Financial
10	State Bank of India	Financial
11	HCL Technologies Ltd	IT
12	Bajaj Finserv Ltd	Financial
13	RBL Bank Ltd	Financial
14	Aditya Birla Capital Ltd	Financial
15	Muthoot Finance Ltd	Financial
16	Coforge Ltd	IT
17	Yes Bank Ltd.	Financial
18	L & T Technology Services Ltd	IT

As can be seen from the Table 1 Eighteen companies have been taken for study comprising mainly of IT and Financial sector.

TABLE 2: ESG Scores of Companies

S#	Company Name	Sector	E-score	S-score	G-score	ESG-score
1	Infosys Ltd	IT	86	68	81	79
2	Mindtree Ltd	IT	84	69	76	77
3	Tata Consultancy Services	IT	68	70	83	75
4	Wipro Ltd	IT	75	65	80	75
5	Kotak Mahindra Bank Ltd	Financial	74	63	81	74
6	HDFC Ltd	Financial	65	67	81	72
7	Axis Bank Ltd	Financial	68	66	77	71
8	Larsen & Toubro Infotech	IT	70	66	76	71
9	ICICI Bank Ltd	Financial	62	69	78	70
10	State Bank of India	Financial	63	72	73	69
11	HCL Technologies Ltd	IT	55	63	80	67
12	Bajaj Finserv Ltd	Financial	63	59	70	65
13	RBL Bank Ltd	Financial	65	60	67	65
14	Aditya Birla Capital Ltd	Financial	66	57	62	63
15	Muthoot Finance Ltd	Financial	63	58	67	63
16	Coforge Ltd	IT	41	63	79	62
17	Yes Bank Ltd.	Financial	62	63	58	61
18	L & T Technology Services Ltd	IT	41	61	76	60

Table 2 details individual scores of Environment, Social and Governance score of the companies.

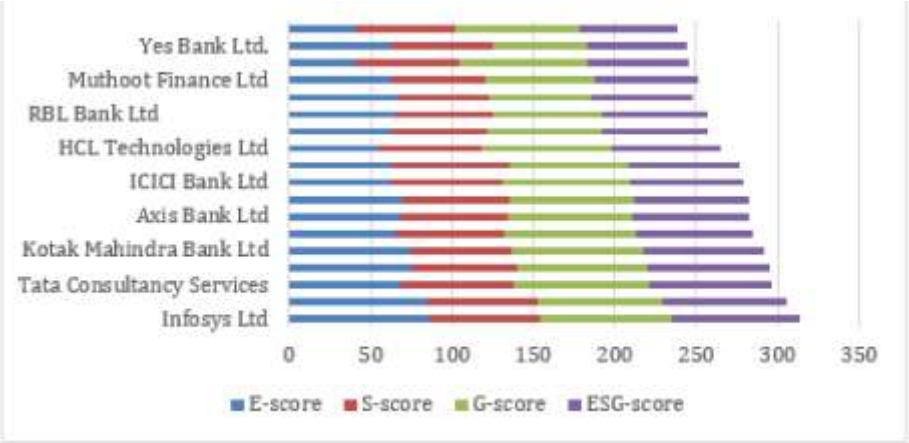


TABLE 3 - Data on Women Employees

Sr. No.	Company Name	Total employees	Total women employees		Total employees	Total women employees		Total employees	Total women employees	
		2018		%	2019		%	2020		%
1	Infosys Ltd	204107	73717	36	228123	83671	37	242371	91679	38
2	Mindtree Ltd	17723	5187	29	20204	6272	31	21991	7124	32
3	Tata Consultancy Services	394,998	139,487	35	424,285	152,114	36	448,464	162,220	36
4	Wipro Ltd	163827	57339	35	175690	61843	35	188270	65895	35
5	Kotak Mahindra Bank Ltd	35717	7488	21	41953	9649	23	50034	10292	21
6	HDFC Ltd	2575	640	25	2840	724	25	3095	791	26
7	Axis Bank Ltd	59614	13424	23	61940	14419	23	74140	17052	23
8	Larsen & Toubro Infotech	24139	6877	28	28168	8154	29	31437	8154	26
9	ICICI Bank Ltd	82,724	23,153	28	86,763	25,079	29	99,319	30,590	31
10	State Bank of India	263538	62582	24	256756	62578	24	249448	63062	25
11	HCL Technologies Ltd	120081	28819	24	137965	34353	25	150423	40313	27
12	Bajaj Finserve Ltd	25	3	12	50	9	18	83	24	29
13	RBL Bank Ltd Financial	5300	1058	20	5843	1365	23	7221	1760	24
14	Aditya Birla Capital Ltd	35	8	23	32	8	25	29	6	21
15	Muthoot Finance Ltd	23455	6692	29	24224	4219	17	25554	5744	22
16	Coforge Ltd	8343	1977	24	9207	2526	27	10074	2677	27
17	Yes Bank Ltd.	18,238	3,294	18	21,136	3,861	18	22,973	4,256	19
18	L & T Technology Services Ltd	12307	2439	20	14855	2867	19	17176	3273	19

Table 3 reflects the number of women employed as compared to the total number of employees. As can be seen from the data there is low representation of women employees as compared to the total number of employees in the organisations.

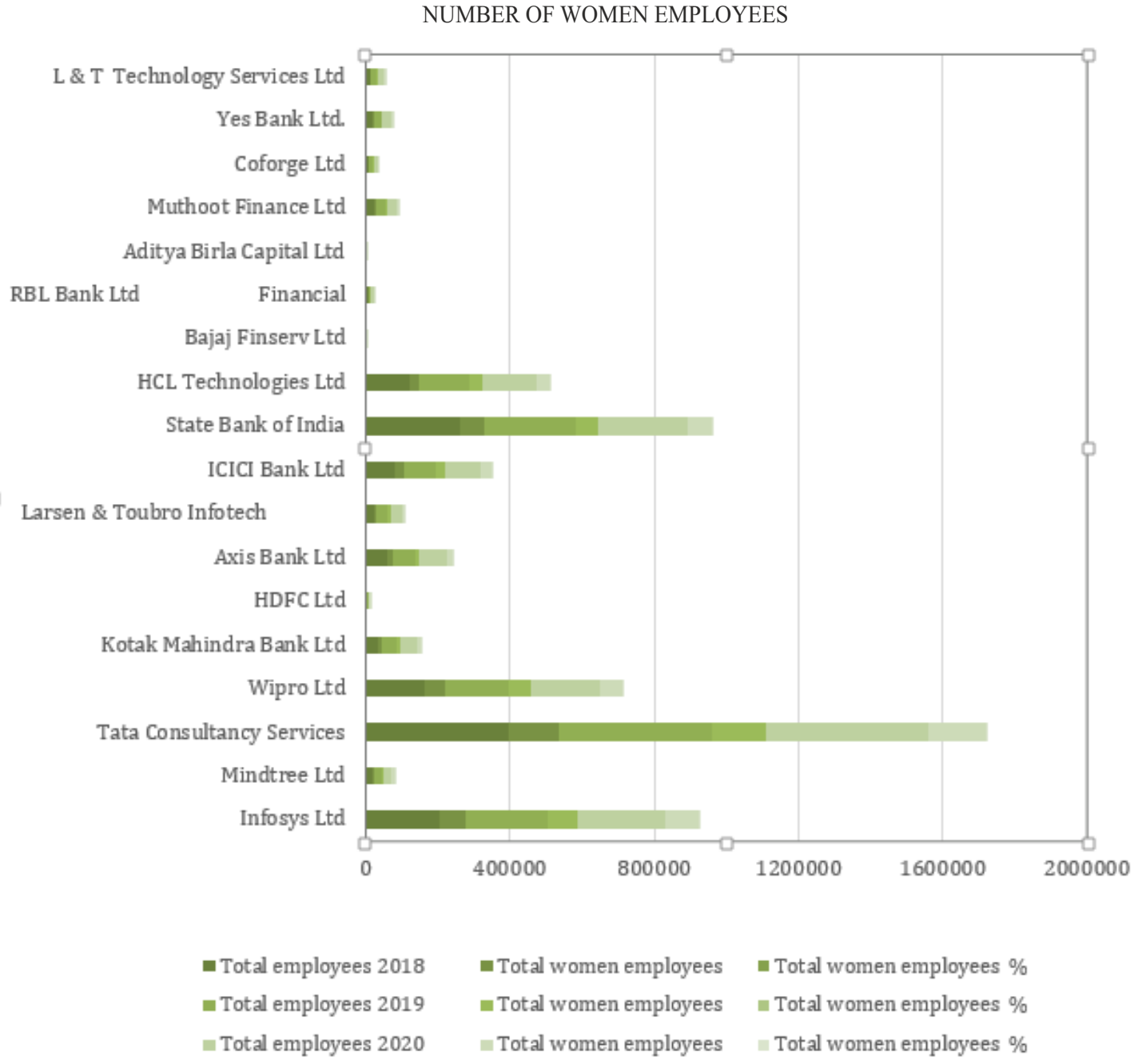
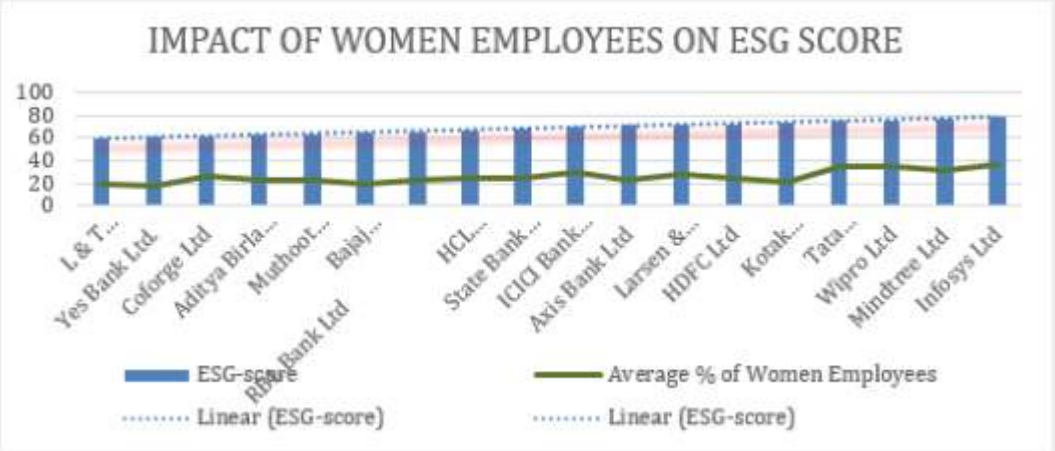


TABLE 4

SR. NO.	Company Name	Sector	ESG-score	Average % of Women Employees
1	L & T Technology Services Ltd	IT	60	19
2	Yes Bank Ltd.	Financial	61	18
3	Coforge Ltd	IT	62	26
4	Aditya Birla Capital Ltd	Financial	63	23
5	Muthoot Finance Ltd	Financial	63	23
6	Bajaj Finserv Ltd	Financial	65	20
7	RBL Bank Ltd	Financial	65	22
8	HCL Technologies Ltd	IT	67	25
9	State Bank of India	Financial	69	24
10	ICICI Bank Ltd	Financial	70	29
11	Axis Bank Ltd	Financial	71	23
12	Larsen & Toubro Infotech	IT	71	28
13	HDFC Ltd	Financial	72	25
14	Kotak Mahindra Bank Ltd	Financial	74	22
15	Tata Consultancy Services	IT	75	36
16	Wipro Ltd	IT	75	35
17	Mindtree Ltd	IT	77	31
18	Infosys Ltd	IT	79	37



As can be seen in Table 4 higher the percentage of women in the organisation, higher is the ESG score.
ESG information might be valued by investors because of its ability to give information on risks that are not traditional and is helpful in evaluating and comparing the "quality" of management in portfolio companies but most importantly there is a growing movement to integrate ESG into mainstream investing, with Millennials—and particularly Millennial women—showing especially strong support (Ailman et al., 2017).

Having understood the impact women on the value of corporates some of the ways their representation can be increased are as follows:

1. **More representation of women at top level:**

Corporates have to take steps to break the glass ceiling and encourage more opportunities for women in the managerial especially in the board of the company.

2. **Increasing percentage of women being employed:**

Conscious efforts must be taken to ensure hiring of women. The hiring must be based on merit and should not be influenced by preconceived notions and prejudices against women.

3. **Mentor/sponsorship program:**

Members of senior management should act as mentors and adopt individual women employees to groom and train them for career growth. Sponsorship program must be encouraged to motivate women employees to take up bigger challenges.

4. **Training and development/Employee awareness programs:**

Continuous training and development programs should be arranged specifically for women employees to ensure their updating of latest knowledge and upskilling. Steps should be taken to increase employee awareness on various issues like POSH (Prevention of Sexual Harassment)

5. **Flexible working hours:**

Flexible work arrangements should be made for women employees without them losing on the benefits and privileges of full-time work

6. **Remote working arrangement:**

Covid 19 has not only proved that that remote work is possible but has thrown up a lot of opportunities for the same and so it should be continued for women employees wherever possible.

7. **Onsite/nearsite child care support:**

One of the main reasons for women employees leaving the workforce is lack of childcare support especially when their children are young. So wherever possible onsite child care support or tie up with nearsite child care support should be provided in the form or nursery/daycare facilities

8. **Second career programs:**

Corporates can hire women with previous corporate experience who had to take a career break due to some compulsions. They can encourage and incorporate them by re-skilling and counseling them.

9. **Maternity/Paid sabbaticals:**

One of the main reasons for women leaving the workforce is due to birth of a child or taking care of sick parent. Paid sabbaticals during such time will help to retain women employees.

Results:

The study reveals that there is no uniformity in reporting about such an important component of the labour workforce. Some companies have a very transparent disclosure of the details of women employed while some companies have given minimum details as to only the number of women employees. There is very less representation of women in Corporate India

Contribution:

The contribution to knowledge in this paper is that though women represent half of the population of our country their representation in corporate is very much lacking. Women are an important aspect of society and are influencers in buying products and services.
Uniformity in reporting practices will help us understand the impact of women employees on corporate sustainability and whether it varies. Though some papers talk about impact of women in board in sustainability there is no research on impact of women employees on sustainability in India.

Limitations of the study:

Only two sectors and eighteen companies have been taken here for study due to time constraints. The study can be extended to more companies and sectors.

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A Study on Schemes of Government of Maharashtra and Municipal Corporation of Greater Mumbai for Sustainable development and Women Empowerment.

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ABSTRACT

Purpose: The main aim of the paper is to study Schemes for Sustainable development and Women Empowerment. Women participation and empowerment are fundamental women's rights to enabling women to have control over their lives and put forth influence in society.

Approach: Identifying the perception of the rural and urban women population towards the schemes and adapting to the fast-changing business environment. Skills and entrepreneurship development is a key to improving household productivity, employability and income-earning opportunities for women and also for enhancing sustainable development and livelihoods.

Research Limitations: This study is purely theoretical and it is based on secondary data sources.

Originality/Value: In this proposed study, the details of different schemes of Maharashtra state Government and Mumbai Municipal Corporation for women shelf Help Groups are showcased and how it is giving direct impact on improving their sustainable socio-economic status. The critical part of education is to empower women through skill and entrepreneurship development. Women are an integral part of our society. Therefore it has become a central issue for empowering women.

Paper Type: Field Work

Keywords: Schemes for Women Skill and Entrepreneurship Development, Empowerment, Sustainability

1. Introduction

Skill and Entrepreneurship development is not an end in itself. It is a way to fulfill another end. Skill entrepreneurship can be developed through education and commitment. As education is a milestone for women empowerment. Hence skill entrepreneurship development enables women to respond to take opportunities to challenge their traditional roles and to change their livelihoods. Skills and knowledge are the motivating factors of the economic growth and community development of any country. They have become even more important in this increasing pace of globalization. Women entrepreneur is one who takes initiative and risks to set up a business enterprise and runs it in the face of risk and uncertainty for the purpose of generating self-employment, income and growth. She identifies opportunities and assembles the necessary resources to capitalize on them. Now a day's number of schemes and programs are there to promote self-employment among women. A number of state and center government institutions and non-government organizations are engaged in the field of promoting entrepreneurship among women. Vocational Training programme aim to provide skills and confidence to women from economically backward families and help them to achieve economic and social independence. Women have always been marginalized and relegated to the status of subjugated class in the Indian society. Due to lack of specific implementation of plans, local communities especially women have remained outside the scope and benefits of government schemes and programmes. Women have not actively participated in their emancipation due to their lack of economic independence and illiteracy. There is a need to address the issue by raising the status of women. In this study

it will be discussed about various initiatives and schemes of women and child welfare department, Government of Maharashtra and Municipal Corporation of Greater Mumbai.

2. Literature Review

2.1 Laxmi Narayan (2015) stated that much of the work to improve the condition for women however is being done at the grassroots level, where some Indian and foreign NGOs are engaging with the male community in an effort to elevate women in society.

2.2 Singh (2015) in the paper "Challenging the concept of risk in relation to women's entrepreneurship" aims to challenge the myth of risk-averseness among women entrepreneurs and analyses risk in the context of gender. It explores risk perceptions and examines the relationship between the concept of risk and women's socially attributed roles. Risk is shown as a gendered concept which needs to be widened to suit the experiences of women entrepreneurs and the influences of the gendered expectations of care dictated by the socioeconomic environment.

2.3 V Krishnamoorthy and R Balasubramani (April 2014), identified the important women entrepreneurial motivation factors and its impact on entrepreneurial success.

2.4 Seema Pandey (2015) in her study focused on attitudes, problems and work environment for working women in various strata of society.

3. Research Methodology

All data relating to this paper are collected from secondary sources. Besides these other required information has been collected from different journals, internet based sources and reports and publications of Government of Maharashtra women and child welfare department and Municipal Corporation for Greater Mumbai (MCGM). The present paper makes an attempt.

- To define the concept of skill development and entrepreneurship development for women SHG.
- To provide information of Maharashtra state government and MCGM schemes relating to skill development and women entrepreneurship.

4. About the Programs and Schemes

The principle of gender equality is enshrined in the Indian Constitution in its Preamble, Fundamental Rights, Fundamental Duties and Directive Principles. The Constitution not only grants equality to women, but also empowers the State to adopt measures of positive discrimination in favor of women. The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women. The 73rd and 74th Amendments (1993) to the Constitution of India have provided for reservation of seats in the local bodies of Panchayats and Municipalities for women, laying a strong foundation for their participation in decision making at the local levels.

Women and children together constitute about 67.7% of the country's population, as per 2011 Census. Empowerment and protection of women and children, and ensuring their wholesome development is crucial for sustainable and equitable development of the country. The Ministry of Women and Child Development is the apex body of Government of India for formulation and administration of regulations and laws related to welfare and development of women and children in the country. It came into existence as a separate Ministry with effect from 30th January, 2006; earlier, it was the Department of Women and Child Development set up in the year 1985 under the Ministry of Human Resource Development. The Ministry was constituted with the prime intention to address gaps in State action for women and children and for promoting inter-ministerial and inter-sectorial convergence to create gender equitable and child centered legislation, policies and programs.

Specific Programmes for Women Empowerment through skill and entrepreneurship programs in Maharashtra and in Mumbai city are been implemented from last 15 years. Women Empowerment and Skill Development Scheme by Government of Maharashtra as well as Municipal Corporation for Greater Mumbai (MCGM) are as follow.

4.1 Some of the schemes of **Government of India** are been implemented by **Maharashtra Government** in urban and rural areas for the women Self Help Group members for the skill and entrepreneurship development. Most of the schemes are coming under the welfare, health, education and safety related areas. Details of the few skill and entrepreneurship schemes are as under.

4.1.1 Mahila Shakti Kendra (MSK) Scheme: The budget speech (2017-18) of the Finance Minister announced setting up of "Mahila Shakti Kendra" is meant to provide "one stop convergent support services for empowering rural women with opportunities for skill development, employment, digital literacy, health and nutrition". Accordingly, a new sub-scheme namely Mahila Shakti Kendra (MSK) under the Umbrella Scheme Pradhan Mantri Mahila ShashaktikaranYojana (PMMSY) has been approved for implementation during 2017-18 upto 2019-20.The Scheme is providing an interface for rural women to approach the government for availing their entitlements and for empowering them through awareness generation, training and capacity building. Student volunteers will encourage the spirit of voluntary community service and gender equality. These student volunteers will serve as "agents of change" and have a lasting impact on their communities and the nation.

Objective: The new scheme MSK is envisaged to work at various levels. While, National level (domain based knowledge support) and State level (State Resource Centre for Women) structures will provide technical support to the respective governments on issues related to women, the District and Block level Centres will provide support to MSK and also give a foothold to women empowerment schemes including 640 districts to be covered in a phased manner. Community engagement through Student Volunteers is envisioned in 115 most backward districts as part of the MSK Block level initiatives. Student volunteers will play an instrumental role in awareness generation regarding various important government schemes/ programmes as well as social issues that have an impact on lives of women in a given block (or equivalent administrative unit, when such blocks are not in place).

Strategy: Women empowerment is multi-dimensional and the services provided under MSK will build upon by leveraging available resources of variety of schemes/programmes of the government at the district/block level. Student volunteers will cater to awareness about government schemes/ programs, 4 training and capacity building for empowerment of rural women through block level intervention. They will provide an interface for rural women to approach the government for availing their entitlements. Accordingly, mechanisms at national, state, district and block level have been provided under the Scheme. The scheme will be implemented through the State Government /Union Territory Administration.

Activities:

- Prepare Action Plans based on women issues specific to the State/UTs with the approval of State Department of Social Welfare/Women & Child Development.
- Identify existing or potential problems in achieving convergence of government programmes, schemes and services
- Coordination with different departments/ agencies/missions in the state to identify factors in the design, process & delivery of schemes/legislations.
- Facilitate and monitor implementation of DLCW and MSK- Block Level activities.
- Liaison with the existing institutions and structures for monitoring and reviewing government schemes with a gender perspective.
- Develop partnership models with Panchayati Raj Institutions (PRIs), Civil Society Organisations (CSOs) and Private Sector for initiating activities that promotes women's empowerment.
- Identify best practices (Government, Civil Society Organisations, PRI) in various sectoral areas like health, education, microfinance, livelihoods, etc. from a gender perspective, document initiatives and disseminate within the state.
- Send regular reports on the status of implementation of various women centric schemes and programmes (including DLCW and MSK) in the state
- Contribute to the national repository of information of best practices in the realm of women empowerment.

4.1.2 Mahila Arthik Vikas Mahamandal (MAVIM) is the State Women's Development Corporation of Government of Maharashtra, established on the 24th February, 1975 on the occasion of International Women's year. MAVIM has been declared as a Nodal agency by Government of Maharashtra on 20th January 2003 to implement various women empowerment program through Self Help Groups (SHGs).

Mission of MAVIM

The mission of the corporation are "To bring about gender justice and equality for women, investing in human capital and the capacity building of women, thus making them economically and socially

empowered and enabling them to access sustainable livelihoods." The main objectives of MAVIM are to:

- Organization women through Self Help Groups
- Build the overall capacities of women
- Enhance self confidence amongst women
- Entrepreneurial development of women
- Synchronize employment opportunities & market linkages
- Promote women's initiative for equal opportunities, prosperity & participation in governance.
- Build grassroots institutions over SHGs as a way forward to sustainable development.
- Tejaswini Maharashtra Rural Women Empowerment Program.

The Tejaswini Maharashtra Rural Women Empowerment Program has been implemented with the assistance of the Government of Maharashtra and IFAD (International Fund for Agricultural Development). This program is aimed at providing stability and sustainability to the SHG movement in the state.

It is based on following four work components.

- ·Grassroots Institution Building
- ·Micro Finance Services
- ·Livelihood & Micro Enterprise Development
- ·Empowerment of Women (Social equity)

4.1.3 Women and Child Development Commissionerate

The Women and Child Development Commissionerate is working for Social, Economic and Political Empowerment of women and children through various policies and programmes. This includes creating awareness, mainstreaming gender concerns, providing institutional and legal support for enabling the needy women and children to develop to their full potential. Some of the key functions of the WCD Commissionerate are:

- Implementing legislations, policies, programmes and schemes for social and economic empowerment of women and protection and development of children.
- Implementation of Integrated Child Protection Scheme.
- Set Up and Control rehabilitation homes for women and children such as Children Homes, Shelter Homes for Women, Observation Homes, Special Adoption Agencies, After Care Homes and so on.
- Coordinating with the parent department, other govt. departments, govt. of India for convergence of programmes relating to women and children.
- Skill up gradation for employment to the asset less and marginalized women and Improving access of women to micro credit finance.

4.2 Schemes of Municipal Corporation for Greater Mumbai (MCGM)

The Municipal Corporation of Greater Mumbai (MCGM) is the body responsible for providing all essential urban services in Mumbai as well as for the implementation of government schemes for the benefit of the general public. The Swarna Jayanti Shari Rozgar Yojna (SJSRY) of the central government and the Gender Budget of the MCGM, are both schemes implemented by MCGM to economically empower the disadvantaged women in Mumbai.

Even though, Mumbai is a cosmopolitan city, more than half of its population lives in slums, where density of population is extremely high. Life in slums is particularly stressful for women and children, since slums also lack in proper infrastructure, due to its mostly unauthorized development. There are not even individual toilets and water supply is intermittent. Drainage facility is also very preliminary. The households in slums are economically weaker. Hence, MCGM decided in 2009-10 to introduce a Gender Budget to focus on schemes and issues of women in the city of Mumbai. The schemes focusing on women development are aiming at improving education, health and economic standards of girls and women.

The MCGM works in the community to mobilize women from low-income families and encourages them come together and form self-help groups (SHGs) to improve their socio-economic conditions by accessing these schemes. With the help of these schemes, SHGs are linked to banks where they can get facilities like credit and savings. These groups are also given subsidies for their loans along with training in more than 65 different trades so that they can start their own small-scale enterprises and become socioeconomically independent, sustian and empowered. At present, there are thousands of women who have come together to form these groups in Mumbai and are poised to start their own microenterprises. The funds are being allocated under the gender budget, which was included in this year's

outlay. Under this budget, a special financial provision had been made for several schemes for women and child welfare.

These schemes include basic skill training in courses through which women can earn a living. These schemes can be availed by women whose families fall below the poverty line (BPL).

4.2.1 The Budget Estimates for schemes as below

(a) Economic and Social upliftment

- Self-employment for deserving women
- Provision for Adhar Kendra
- Self-employment for deserving Divyang women
- Training for self-defense/skill upgradation
- Various activities under Adhar Project / Shelter to homeless
- Revolving Fund for Self Help Group (SHG)
- Subsidies for Micro Enterprises of Self Help Groups
- Provision for Dilasa
- Expenditure on Programmes (exhibition, Intel. Day for Sr. Citizens, Women's Day etc.)
- Hostel for women & working women
- Software development for various schemes of Gender Budget
- Running counselling center for Women
- Providing Babysitting facilities in all wards for working parents
- Provision for financial assistance to widows of AIDS diseased
- Provision for implementation of substantial programme to upgrade social status of women
- Provision for implementation of special programme for education of children who born due to unfortunate incidents rape case and for self-employment to their mothers

(b) Educational upliftment

- Provision for Right to Education
- Incentive to girl students for Std. 7th of Municipal School
- Special assistance to girl students studying in municipal schools for higher education. Provision for School Articles
- Provision for consumables
- Virtual Class Room
- Scholarship to students in Municipal high schools who secured higher percentage of marks in the SSC examination
- Vocational /Motivation / Guidance Lecture on Professional Courses
- Incentive & Scholarship to Divyang Students
- Pradnya Shodh Exam expenses to Students
- Beti Bachav Beti Padhav Expenses
- Expenses for Mainstreaming of out of School children
- Reimbursement to BEST for Bus Fare to Municipal Students
- Balkotsav, Excursion & Scouting related Rallies, sports programme & Functions
- Payment to Balwadis (Teachers & Assistants) - Creation of Language Lab / Vidnyan Kutuhal Bhavan
- Establishment / Development of CBSE Board MCGM schools in City, Western & Eastern Suburb

(C) Health and Sanitation –

- Mother Child Protection Programme.
- Providing artificial limbs to Divyang female and children's.
- Structural/major repairs to various maternity homes.
- Upgradation of maternity homes including purchase of equipment / replacement of lifts - Upgradation and extension of NICU at various peripheral hospitals.
- Construction of toilets at various places in Mumbai.
- Higher charges for sanitary napkin machine.
- Installation of Sanitary Napkin Vending machines in various public toilet for Women.

(d) **Development of Children Parks with modern equipment & Recreation Facilities**

- Thus MCGM is aiming for providing all the basic amenities to its citizens with special focus on girls and women by taking along more than 50% women elected representatives.

4.2.2 Impact of the project during the FY 2020-21

Self-employment for deserving women

This scheme is launched in the year 2013 by MCGM. To empower self-help groups by providing them with training, revolving funds, loan interest subsidy and other equipment like sewing machines sets, sanitary pads. As of now more then 1,50,000 women are trained under Bachat Gat Scheme. During the last financial year 227 sanitary pad machines, 227 sewing machines sets was provided with the budget provision of Rs 13 crore in 2020-21.

Training for skill development

Under this, total 3,859 women trainees were trained for making sanitary pads catering and sewing. The proposed budget for implementation of this scheme in 2020-21 is of Rs 6 crore.

Employment skill training

Institute for Design of Electrical Measuring Instrument (IDEMI) skill training will provide training to 233 trainees. The budget provision of Rs 50 lakh is proposed in 2020-21.

Revolving Funds for Self Help Group (SHG)

345 BPL self-help group and 908 orange, yellow ration card holding SHG are benefited by this scheme. The budget provision for this scheme is of Rs 4 crore is proposed in year 2020-21. Revolving fund to area level federation is of Rs 30 lakh. Loan interest subsidies for SHG's. The budget for Rs 30 lakh is proposed for 2020-21, for the 227 SHG, they will be benefited by this scheme.

Schemes for differently-abled

Under this scheme, BMC has given 100 per cent concession in bus fare to blind and differently-able person while travelling in the Brihanmumbai Electric Supply and Transport (BEST) undertaking's non AC buses, for this budget of Rs 6 crore is proposed in 2020-21.

Scheme for self-employment to the Divyang

Differently able persons, a budget of Rs 3 crore was proposed during 2019-20 to distribute color Xerox machines. The total number of beneficiaries were 254 for self-employment. In the years 2020-21, Rs 4 crore was proposed.

Self-propelled scooters for differently abled persons has been provided,

For procurement of the same Rs 70,000 or 85 per cent of the cost of the scooter whichever is less will be provided to the differently abled beneficiaries are 511. In year 2020-21, Rs 5 core was proposed.

5. Role of Vocational Training Provider (VTP's) in implementing these schemes:

In Mumbai, the CDOs and COs are actively involved at the ward and community level to organise the SHGs. For the implementation of the skill training programme, MCGM has appointed some of the reputed Vocational Training Provider (VTP's) Skill Training Institutes from Mumbai region. Every financial year, more than 10,000 women are benefited from short term skill training at the community level or at the institution level from the VTPs training centres in Mumbai. These skill training includes courses such as beautician, cooking, tailoring, mehendi, artificial jewellery making, candle and agarbatti making, paper conversion, basic computer training, bakery products etc. More than 13000 women received training from one such VTP, the Don Bosco Centre for Learning, Kurla training institute under this programme.

The vocational training is designed for 100 hours. After the completion of training all women are expected to start their businesses at the individual level or in a group. However, most of the women do not come forward to take initiative to start their own businesses for a variety of reasons.

Entrepreneurial Skill Training programme is another important component or area which needs to be focused upon for SHG women to start their business and become successful entrepreneurs. Some of the women do take the initiative and start business after the short term skill training programme. However, due to improper knowledge of entrepreneurial skills, most women face problems in management, marketing, production, maintaining product quality, accounting and budgeting.

To tackle this issue of the Women Self Help groups, the MCGM asked some of the institutes to design a short term EDP programme for the training women for different skills under the Gender Budget programme. At the same time MCGM asked some of the corporate agencies to take the initiative to support the EDP program from their CSR budget. More than 1800 women received training from the training institute under this programme.

6. Conclusion:

The subject of empowerment of women has becoming a burning issue all over the world including India since last few decades. Inequalities between men and women and discrimination against women have also been age-old issues all over the world. Thus, women's quest for equality with man is a universal phenomenon. Skill and Entrepreneurship is an important tool to empower the women in the country by increasing Family, Economic, Financial and Social Status. From the above study it has been

safely concluded that Entrepreneurship brings gender equality and also improves the overall status of women in the family, society and in the nation. Despite the fact that Maharashtra state government and MCGM has framed and implemented various supportive measures, skill training programs and women entrepreneurship schemes in India remains alarmingly low. In Maharashtra only Mumbai and Pune Municipal Corporation is having separate gender budget to various skill and entrepreneurship programs. It is better to have separate programs for the women SHG's at Municipal level so that women will get direct benefit of the scheme and implementation will be faster. State scheme has been implemented at larger level so impact of the state program is lessor the Mumbai municipal corporation programs. Majority of the women owned establishments are concentrated in unregistered sector and hence are unable to reap the benefits of government support. Impact assessment of existing policies and schemes may reveal novel ways in which women entrepreneurship can be nurtured. Women entrepreneurship is a diverse and complex domain which requires extensive and intensive research endeavors for decoding its dynamics.

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A Study of Active Pharmaceutical Ingredients Disposition of Waste

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ABSTRACT

API (Active Pharmaceutical Ingredient) means *the active ingredient which is contained in medicine*. For example, an active ingredient to relieve pain is included in a painkiller. Developing and producing Active Pharmaceutical Ingredients (APIs) includes various processing steps, such as *reaction, crystallization, separation and purification, solvent swap, and solvent exchange*. Active Pharmaceutical Ingredients or APIs are also known as bulk drugs and a term that is often heard in business news. An active ingredient is the ingredient in a pharmaceutical drug or pesticide that is biologically active. The similar terms active pharmaceutical ingredient and bulk active are also used in medicine, and the term active substance may be used for natural products. Active Pharmaceutical Ingredients are the active ingredients contained in a medicine.

The issue of disposal of wastes from these API companies, as well as the development and implementation of efficient collection strategies, is an important concern. This research looks into the factors that have an impact on the disposition of wastes from these companies, and how are these addressed by local government bodies.

The *pharmaceutical industry* discovers, develops, produces, and markets drugs or pharmaceutical drugs for use as medications to be administered to patients with the aim to cure them, vaccinate them, or alleviate symptoms. Pharmaceutical companies may deal in generic or brand medications and medical devices. They are subject to a variety of laws and regulations that govern the patenting, testing, safety, efficacy using drug testing and marketing of drugs.

Keywords: Active Pharmaceutical Ingredient, API, Bulk Drugs, Disposition of Waste

Introduction to pharmaceutical industry:

The pharmaceutical industry has a number of unusual characteristics that make it very different from what people normally think of as industry. It is also an industry replete with contradictions; for example, despite the undisputed fact that for over a century the industry has made a major contribution to human wellbeing and the reduction of ill health and suffering, it is still regularly identified by the public in opinion surveys as one of the least trusted industries, often being compared unfavourably to the nuclear industry. It is undoubtedly one of the riskiest businesses in which to invest money, yet it is perceived by the general public to be excessively profitable. The major pharmaceutical companies rightly promote themselves as being research-based organisations, yet most people believe that they spend more on marketing than on research. Despite the acknowledged risks and costs associated with pharmaceutical development, many citizens still believe that pharmaceuticals should be being developed to meet all human needs and that when developed they should be given away to everyone on the basis of need.

This opening chapter aims to provide a basic understanding of how the industry works and attempts to provide an explanation for some of its contradictions. The objective is to provide a backdrop to the business so that the challenges of the issue of pharmaceuticals in the environment can be better understood.

Note that the words “medicine,” “pharmaceutical”

and "drug" are often used interchangeably and the word "drug" can also mean both a medicine and an illegal substance, depending on the context. In this chapter the word "pharmaceutical" is arbitrarily assigned to the end-products of the pharmaceutical industry that are used by patients. The word "drug" is mainly used for potential pharmaceuticals whilst under development by the industry.

Importance of study

Active Pharmaceutical Ingredients are the active ingredients contained in a medicine. It is that part of the medicine that produces the intended therapeutic effects. For example, in a painkiller, the active ingredient relieves pain. In the OTC drug Crocin, the API is paracetamol. Only a small amount of the API is required to produce the effect and so the medicine contains only the required amount of the API. Some drugs contain multiple APIs to treat varied symptoms.

API is the most important raw material in the production of medicines. The quality of active ingredients in a drug has a direct effect on the safety and efficacy of that drug. Poorly manufactured and contaminated active ingredients have been associated with negative health outcomes, including death, in a number of incidents over the past decades.

An active ingredient is the ingredient in a pharmaceutical drug or pesticide that is biologically active. The similar terms active pharmaceutical ingredient and bulk active are also used in medicine, and the term active substance may be used for natural products. Active Pharmaceutical Ingredients are the active ingredients contained in a medicine.

Objectives of study

Pharmaceutical waste can enter the environment in following way: In effluents discharged from manufacturing sites. Detailed quantification for any individual pharmaceutical is difficult, but there is general agreement that the latter source dominates the global environmental input, with effluent discharges and the disposal of unused medicines making relatively small contributions.

1. To get to know about an Active Pharma Ingredient company & its process as regards its disposition of its wastes.
2. Also how the disposition of waste is monitored by various local government authorities & their functioning.

HYPOTHESIS

H0: Disposition of treated effluents / wastes does not have impact on sustainability of the environment

H1: Disposition of treated effluents / wastes have an impact on sustainability of the environment

Major challenges faced by pharma company: The pharmaceutical industry is economically important both for employment and for economic balance. However, it must constantly face many challenges that question the sustainability of a number of laboratories.

The pharmaceutical industry in some ways resembles an iceberg. These very well-known companies, which are loosely defined as research-based pharmaceutical companies, represent of the market in terms of finance. However, they correspond to only a small fraction of the industry as a whole, with >90% of pharmaceutical companies, known as generic companies, being largely invisible to the general public. In turn, these generic companies produce the vast majority of all pharmaceuticals sold.

Challenges faced by pharma company:

1. Water Pollution
2. Air Pollution
3. Supply Chain Disruption
4. Workforce Optimization
5. Need For Agility And Transparency

This research throws light on one of the major challenge i.e WATER POLLUTION & how the API companies treat these wastes following the Rules & Regulations given by local government bodies.

Process of waste disposition

STEP 1: The local government bodies in charge of waste disposition management have all the API companies registered with them. As in their basic details (company name, address, contact, email etc.)

STEP 2: A mail is sent out to these companies regarding the disposal of effluents from the factories. i.e. when to start the disposal of wastes and when to stop.

STEP 3: The companies have to abide by instructions of the authorities.

Government authorities handling the treatment of effluents from the pharma companies

Prevention mainly involves waste reduction by materials substitution, process modification/ optimisation, waste stream segregation and solvent waste recycling.

There are also ways that you can take action to reduce pharmaceutical waste in water. Advocating for improved technology at water treatment plants, stricter regulations on agricultural antibiotics and higher water standards can help reduce the levels of waste in our waters.

Also there are various Government Organizations / Bodies which address the Pharma companies which helps reducing the various problems associated with disposition of Wastes.

Some of the Organizations include:

1. Central Pollution Control Board (CPCB) - Statutory organisation, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.It serves as a field formation and also provides technical services to the Ministry of Environment and Forests of the provisions of the Environment (Protection) Act, 1986. Principal Functions of the CPCB, as spelt out in the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981.
   (i) To promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and
   (ii) To improve the quality of air and to prevent, control or abate air pollution in the country.

2. Maharashtra Pollution Control Board (MPCB) - Is implementing various environmental legislations in the state of Maharashtra, mainly including Water (Prevention /and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, Water (Cess) Act, 1977 and some of the provisions under Environmental (Protection) Act, 1986 and the rules framed there under like, Biomedical Waste (M&H) Rules, 1998, Hazardous Waste (M&H) Rules, 2000, Municipal Solid Waste Rules, 2000 etc. MPCB is functioning under the administrative control of Environment Department of Government of Maharashtra.

Some of the important functions of MPCB are:

- To plan comprehensive program for the prevention, control or abatement of pollution and secure executions thereof,
- To collect and disseminate information relating to pollution and the prevention, control or abatement thereof,
- To inspect sewage or trade effluent treatment and disposal facilities, and air pollution control systems and to review plans, specification or any other data relating to the treatment plants, disposal systems and air pollution control systems in connection with the consent granted,
- Supporting and encouraging the developments in the fields of pollution control, waste recycle reuse, eco-friendly practices etc.
- To educate and guide the entrepreneurs in improving environment by suggesting appropriate pollution control technologies and techniques
- Creation of public awareness about the clean and healthy environment and attending the public complaints regarding pollution.

3. Common Effluent Treatment Plants (CETP) - The concept of effluent treatment, by means, of a collective effort, has assumed reasonable gravity by being especially purposeful for cluster of small scale industrial units. Common effluent treatment plant (CETP) not only helps the industries in easier control of pollution, but also act as a step towards cleaner environment and service to the society at large. Small scale industries, by their very nature of job cannot benefit much from economies of scale and therefore the burden of installing pollution-control equipment, falls heavy on them. Realizing this practical problem, under the policy statement for abatement of pollution the Govt. Advantages of

CETP PLANTS :

- The Common treatment is always cheaper than small scattered treatment units.
- Availability of land which is difficult to be ensured by all individual units in the event they go for individual treatment plants.
- Contribution of nutrient and diluting potential, making the complex industrial waste more amenable to degradation.
- The neutralization and equalization of heterogeneous waste makes its treatment techno-economically viable.
- Professional and trained staff can be made available for operation of CETP which is not possible in case of individual plants.
- Disposal of treated wastewater & sludge becomes more organized.
- Reduced burden of various regulatory authorities in ensuring pollution control requirement.

Conclusion

On understanding the various processes followed by Pharmaceutical company, there were following observations:

1. There are instructional e – mails sent by the local government bodies to start / stop the effluent flow; from the companies.
2. The local authorities treat these effluents from the companies.
3. The companies have to abide by the guidelines given by the local government authorities.
4. As a result of which the rivers alongside the companies & industrial area are kept clean & maintained properly.
5. Thus Null Hypothesis proves to be wrong & Alternate Hypothesis proves to correct.

Discussion

On discussion with the panel it was concluded that this paper had to focus more on the wider aspects of the problem as in the area of research, research should be done on more companies instead of restricting to a single company.

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The Next Generation of Packaging – Driving Towards Sustainability

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ABSTRACT

The role of packaging can neither be ignored nor overlooked, making it a crucial element of the marketing mix. The term "eco-friendly packaging" is no longer just a buzzword. The way companies handle packaging is going to develop and alter as a result of a worldwide shift toward combating climate change. Rather than being a secondary consideration, ecologically friendly sustainable packaging will become increasingly significant. Especially in an incredibly competitive industry that is food, sustainable packaging gives a competitive advantage to food and beverage brands and allows them to hold an identity of their own.

This research mainly aims to understand the role of sustainable packaging in the food industry, its logistical and branding roles while identifying the various elements that make a good packaging design and how food and beverage brands can develop strategies to better cater to customer needs and wants. This research is based on primary quantitative data along with an intensive analysis of research papers, articles, and journals. The findings suggested that the sustainable packaging industry is a competitive market but yet still untapped to its maximum in India. However, the spread of knowledge today has made brands aware of it, and they are consciously making efforts to incorporate sustainability in their food packages. Customers are able to point out the difference between sustainably packaged products from a sea of average packaging designs and actively want to be associated with environmentally focused brands. Incorporating sustainable packaging also helps brands increase their brand identity and leverage brand awareness to tap into newer and potential customers.

Keywords: **Sustainable Packaging, Food and Beverage Industry, Branding, Loyalty, Environment Friendly**

Introduction

Over the past two decades the interests of all the stakeholders of an organisation have been increasing shifting towards making packaging more sustainable. If we take a moment to recall the last purchase we made, be it something we could eat, drink, apply or wear the first image that comes to our mind is the initial packaging of the product which makes a lasting impression on the customer's mind. Packaging's importance in the safe delivery and transportation of items along the food supply chain cannot be underestimated. A good package especially in the food and beverage category should guarantee that food quality and safety are maintained, right from transit through storage of the product to reduce food waste and loss (Otto et al., 2021). However, some of the biggest drawbacks of packaging are that it adds to the cost of the product and its carbon footprint as it is usually disposed of shortly after use. Thus, contributing adversely to the world's environmental impact. For product packaging paper is one of the most common materials used followed by wood, glass, metal, and different sorts of plastics and polymers including cardboard (Magnier and Schoormans, 2015).

Today companies are increasingly conscious that not just a wonderful product, but even superior packaging is required to impress their customers. Recent packaging research has highlighted and emphasised sustainability and how packaging materials can be made more environmentally friendly (Vila-Lopez N et al, 2020). Sustainable packaging is technically defined as packaging that has a minimal

environmental effect based on life-cycle assessments (Glavič & Lukman, 2007). On the other hand, a sustainable package may be defined as "a packaging design that invokes expressly or implicitly the container's environmental-friendliness" (Magnier L et al, 2015). Sustainable packaging is known by various different words today but they all mean the same thing. Some of the synonyms for sustainable packaging are 'Green packaging', 'eco-green packaging,' 'eco-friendly packaging, or 'recyclable packaging,' that makes use of environmentally friendly materials for packaging while keeping in mind that the products are functional and safe for both human health and the environment (Pauer, 2019).

Sustainable packaging is a novel and new concept that has received a lot of attention in recent years. It is, without a doubt, a critical problem to examine in order to achieve the Sustainable Development Goals, with social and economic ramifications (Fonseca L, 2020).

Only 21 out of 46 papers assessed by Ketelsen et al. were focused on consumer responses to ecologically friendly packaging, indicating that this field of study is under-explored and suggesting the need for additional research in this area. To date, little research has assessed how consumers weigh these attributes with regards to sustainable packaging and the key motivators that lead customers to shift their purchase decisions from products with conventional packaging to products with sustainable packaging. Furthermore, this research aims to cover the unexplored gap addressing various business and consumer dimensions with regards to sustainable packaging. This paper aims to close this information gap by diving deep into finding out the motivators that lead customers towards purchasing products with sustainable packaging and how brands can adapt their offerings to best suit the customers growing needs.

Thus, the value of product packaging is multifaceted, and it may go a long way toward establishing a positive first impression and fostering long-term brand loyalty. Thus, making sustainable packaging critical for preserving food quality, avoiding food waste, and lowering the usage of preservatives in food.

Purpose

This paper aims to examine and highlight the shifts in packaging that have taken place from traditional ways of packaging to adopting sustainable and eco-friendly packaging today. It deals with the in-depth study of the factors that motivate and attract customers to adopt products with sustainable packaging as the go-to-option for their day-to-day food and beverage purchases. This paper is also designed to call attention to and discuss the different functions of sustainable packaging in the food industry, its influence on consumer buying behaviour and its importance on branding. This will help brands better devise strategies to adapt their packaging and marketing campaigns to reach their target audience effectively.

Literature Review

Concerns over single-use packaging waste are combining with other strong trends to force significant changes in consumer packaging (Berg et al., 2020). Regulators are taking action, and fast-moving consumer goods (FMCG) businesses and retailers are making strong pledges to enhance package sustainability and radically rethink their packaging systems (Guillard et al., 2018). A few FMCG firms have already begun to investigate smaller, reusable packaging in order to swiftly transform into sustainable packaging, lowering costs and elevating the company's total value development objectives. Unilever and Walmart, for example, are collaborating with Algramo on an app-driven, intelligent reusable packaging solution that has flourished throughout the lockdown (Gupta S, 2022).

Packaging is an important part of the solution to the major difficulties of sustainable food consumption, since it helps to reduce the environmental impact of packaged foods. These issues will be addressed through creative and innovative sustainable packaging (Toyota & World Economic Forum, 2018). Sustainable packaging is defined as packaging with a low environmental impact, recyclable, and safe for humans. It's also known as "environmentally friendly packaging." Sustainable packaging comes with a great deal of

advantages. It complies with product price and performance benchmarks. It makes use of renewable energy that can be obtained, created, transported, and recycled. This packaging style uses raw materials that can last for the duration of the product's life cycle (Henia K, 2021). Today customers find the use of excessive and over packaging off-putting. Plastic packaging is a big issue in today's food packaging, with people debating the environmental impact of these polymers.

However, on the other hand, paper-based packaging is seen as a more environmentally friendly alternative to the plastic and polystyrene packaging that is presently used for various food items. Consumers are eager to spend money on environmentally friendly items. When it comes to everyday purchases, they are looking for items that are recyclable or made from sustainable materials. Companies who wish to attract eco-conscious customers are working hard to fulfil the need for environmentally friendly packaging (Oloyede & Lignou, 2021). Sustainable packaging is important to eco-conscious customers. Today customers care a lot about the environment and are prepared to support businesses that share their concerns and want to support firms that safeguard the environment. Shoppers desire to support environmentally responsible businesses.

This, along with their understanding of their role in the supply chain, indicates that they are prepared to change in order to uphold their principles and companies who wish to attract eco-conscious customers are working hard to fulfil the need for environmentally friendly packaging (Gilsenan, 2019). Brands can adopt a comprehensive approach to sustainability by engaging in several areas and making sustainable packaging visible to consumers. It will also be necessary to have a detailed understanding of end-user segments: there is no general answer, and customers do not always know what to anticipate in terms of package sustainability. Brands should interact with their value-chain partners as soon as possible in order to be proactive, using an experimental approach to producing solutions and effectively expressing narratives about them. Finally, brands should not focus just on sustainability without considering COVID-19's implications for hygiene and food safety, as well as other megatrends like e-commerce. As sustainability is a major industry-shaping trend, the approaches adopted during COVID-19 would not be enough to address the trend.

Thus, brands have a unique opportunity to redesign their packaging portfolios, generate growth, and capture value by knowing today's consumer preferences (Feber et al., 2020). Price, brand, quantity, use-by-date, nutrition information, and eco-labels affect customer awareness, perceived importance, and purchase decisions (Grunert et al., 2014). Individual variables, product qualities and marketing, and societal factors are the three areas that influence green buying behaviour. Green purchasing is an action decision made by consumers through a theoretical mechanism or a fragmented environment, and customers are rational and sociable individuals. (Zhang & Dong, 2020). As it has now become a priority for both companies and customers – more than ever before – sustainable packaging is becoming a new trend and a need for brands to adopt sustainable packaging for their products. To protect the environment and boost brand loyalty among eco-conscious consumers, businesses must embody the ideals of "Reduce, Reuse, and Recycle." Thus, the green movement has resulted in a slew of new environmentally friendly packaging alternatives to conventional materials. Sustainable packaging appeals to brands because it generates a win-win scenario for the company, the client, and society as a whole (Henia K, 2021).

Methodology

For the research methodology primary quantitative data was adopted, and results from primary research via an online survey were analyzed. For this a quantitative survey was conducted, whereby convenience sampling was used. The questionnaire consisted of 3 parts - the first focusing on awareness, the second on attitude towards sustainable packaging and its impact on brand loyalty and positioning and the third section focused on the perception and motivating factors to the customers towards sustainable packaging in the food industry. The data were analysed using SPSS software, several statistical tests were performed and data was compiled. A detailed and triangulated secondary data analysis was also used by reviewing fundamental

literature in journals, articles, and published papers to identify and analyse the disruption caused by sustainable packaging and customer motivation factors. The target audience belonged to the age group of 18-46 years. The final sample size achieved was 74. SPSS 24 was used for the data analysis.

Data Collection and Analysis

The following insights were drawn after going through the data analysed from primary surveys.

TABLE 1: Age Groups

Age			
		Frequency	Per cent
Valid	18-24	27	36.5
	25-34	18	24.3
	35-44	10	13.5
	45+	19	25.7
	Total	74	100.0

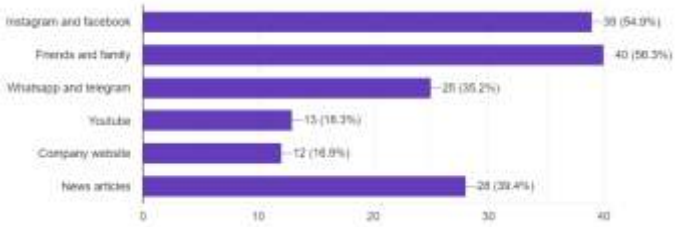
The sample size is composed of a mix of different age groups and generations. Young Millennials (18-24) make up 36.5% of the respondents, followed by elder GenX (45+) making up 25.7%, older millennial (25-24) constituting 24.3% and finally young GenX (34-44) constituting 13.5%. This helps highlight that millennial and GenX are the main focus target audience for this research. (Lifshitz I, 2016) Millennials have become the largest consumer generation in the retail trade in recent years, and food and beverage brands must keep a careful eye on Gen X and Boomer purchase decisions since their packaging functionality preferences are likely to alter as their population ages.

TABLE 2: Awareness levels of respondents towards sustainable packaging

Awareness			
		Frequency	Per cent
Valid	yes	68	91.9
	No	6	8.1
	Total	74	100.0

Awareness amongst the respondents is extremely high for sustainable packaging with regards to the food and beverage industry. 91.9% of the respondents were aware of the concept of sustainable packaging, showing that it is more than a buzzword today. People are shifting their attention towards being aware of the packaging of daily food products purchased by them. (Oloyede & Lignou, 2021) To alleviate consumers' understanding of what constitutes a sustainable product, as well as their difficulty in identifying what constitutes a sustainable product, they need to be better informed and educated about the packaging manufacturing process in order to make better judgments.

GRAPH 1: Channels through which respondents learn about sustainable packaging



A major source of information for respondents about sustainable packaging in the food and beverage industry was mainly derived from social media platforms. Instagram and Facebook were the most popular, followed by messaging platforms like WhatsApp and telegram and then eventually YouTube videos. The influence of peers and family also plays a great role in spreading awareness and knowledge about sustainable packaging. As sustainable packaging is yet a relatively new concept in India and people do not have the complete and exact knowledge about sustainable packaging, many people also greatly rely on news articles and company websites to get information straight from the source. Thus, it shows that food and beverage brands should meet customers where they are and leverage channels that suit the customer demographics the best while relying heavily on positive PR and spreading informational news content over websites and print mediums. (Scanlux Packaging, 2021) Brands that are honest and real are important to Generation Z and millennials. They want raw footage and honesty, and they won't be fooled by hollow promises. Generation X is seeking for brands that reflect their beliefs, but they are less insistent on openness. Generation Z demand complete openness and verification of what businesses actually do and this should come across through all the brand communications across all platforms.

TABLE 3: Level of identification of food products based on their packaging

Identification of food products based on their packaging			
		Frequency	Percent
Valid	yes	55	74.3
	No	7	9.5
	sometimes	12	16.2
	Total	74	100.0

Furthermore, along with awareness the identification factor is also high amongst the respondents showing that they are not only aware but also take to notice and pay special attention to actually identifying and differentiating between product packaging. 74.3% of the respondents could clearly distinguish between food products on the basis of the packaging while 16.2% of the respondents were still unsure regarding product packaging differentiation. This goes to show that customers not only actively distinguish between products based on their packaging but also identify the packaging in dept which allows them to notice the shift made by brands towards sustainable packaging.

TABLE 4: Cross tabulation of awareness and identification levels of sustainable food packaging

Awareness * identification of food products based on their packaging (Crosstabulation)					
		yes	no	sometimes	Total
Awareness	yes	52	6	10	68
	no	3	1	2	6
Total		55	7	12	74

The respondents who showed a high awareness of sustainable packaging could easily identify such products based on their packaging. On the other hand, it was also noticed that while awareness regarding sustainable packaging was present, sometimes people found it hard to identify products on this basis. Thus, highlighting that due knowledge must be spread via various awareness campaigns and new articles to the customers to leverage their awareness and lead to better brand and product packaging identification- helping brands stand out in the market. (Petro G, 2021) When compared to previous generations, Gen Z and millennial consumers appear to be the most conscious of environmental concerns and sustainable behaviours and it's possible that their influence on older generations, such as Gen X, can have a great impact.

TABLE 5: Level of encouragement to buy products with labelling specifying 'sustainable', 'organic' etc. written on the package

Encouraged to buy products that have the words 'sustainable', 'healthy', 'organic' etc. written on its package			
		Frequency	Percent
Valid	yes	58	78.4
	no	4	5.4
	maybe	12	16.2
	Total	74	100.0

Overall, 78.4% of the respondents are encouraged to buy products that have the words 'sustainable', 'healthy', 'organic' etc. written on its package, with only merely 5.4% of the respondents being unphased by such words on packaging. 16.2% of the respondents were also unsure- showing that sustainable packaging is still at a very nascent stage in India and people need more information and knowledge about sustainable packaging of food products and its benefits that would help create a positive image and encourage them better to look for such words on product packaging. When (Rokka J. et al 2008) compared green packaging with several product attributes and how these attributes affect consumer choice, they discovered that one-third of the consumers in the study agreed that environmentally labelled packaging was one of the most important criteria in their decision.

TABLE 6: Cross Tabulation of age and level of encouragement to buy products with labelling specifying 'sustainable', 'organic' etc. written on the packages

Age * encouraged to buy products that have the words 'sustainable', 'healthy', 'organic' etc written on its package Crosstabulation					
		yes	no	maybe	Total
Age	18-24	16	2	9	27
	25-34	15	1	2	18
	35-44	9	1	0	10
	45+	18	0	1	19
Total		58	4	12	74

When we further dive into the encouragement factor

by words like 'sustainable', 'healthy', 'organic' etc. written on food packages, it is observed that there is a health balance better younger millennial being encouraged when it comes to encouragement to purchase based on sustainable packaging labelling. However, on the other hand older millennial and Gen X are lesser inclined towards such words on product packaging and are just starting out to actively look for such words to be mentioned on food product packaging. This goes to show that that the 35+ age group is much more affected by the growing sustainability trends while younger millennial are yet to realise its importance. Eco-efficiency, according to the World Corporate Council for Sustainable Development (WBCSD, 2000), is a way to link business and environmental goals by "generating more value with less impact", thus making it more attractive to customers. The (Evergreen packaging report, 2020) suggests that demand for recyclable or compostable packaging made of renewable materials, packaging processes that regenerate or protect natural resources, and regenerative and sustainable production practises will be led by millennials. Millennials prefer doing business with organisations that share their objectives and assist them in making decisions that are consistent with those priorities. According to their study, 64% of millennials believe "paying extra for eco-friendly items is worth it to them," compared to only 38% of Gen X.

TABLE 7: Cross Tabulation of age and likeliness to try a new product based on its eco-friendly packaging

Age * Likliness to try a new product based on its eco-friendly packaging Crosstabulation							
		highly unlikely	Unlikely	Neutral	Likely	highly likely	Total
Age	18-24	1	2	4	11	9	27
	25-34	0	0	1	13	4	18
	35-44	0	0	0	5	5	10
	45+	0	0	1	10	8	19
Total		1	2	6	39	26	74

While older millennial and GenX are more motivated to make purchases based on labelling highlighting sustainability on packaging they are also likely to go ahead and try a new food products based on its eco-friendly packaging, proving that they are increasingly turning towards sustainable packaging today. However, when we look at younger millennial they are extremely open and have a very high likelihood of trying new products based on their eco-friendly packaging. This aligns with the millennial characteristics of wanting to try and experiment new things and concepts. A study by (Evergreen packaging report, 2020) found that younger customers were 23% more likely than older generations to pay for sustainable packaging, with no significant differences in income brackets or between Millennial, Gen Z and Generation X.

TABLE 8: Cross tabulation of level of encouragement to buy products with labelling specifying 'sustainable', 'organic' etc. written on the package and packaging impact on brand positioning

Encouraged to buy products that have the words 'sustainable', 'healthy', 'organic' etc. written on its package * packaging of products helping in brand positioning (Crosstabulation)				
		yes	no	Total
encouraged to buy products that have the words 'sustainable', 'healthy', 'organic' etc. written on its package	yes	58	0	58
	no	3	1	4
	maybe	11	1	12
Total		72	2	74

As proved earlier that millennials and GenX are encouraged to purchase and try products based on their eco-friendly packaging, majority of the respondents also feel that their awareness and feelings towards eco-friendly packaging eventually also does lead to better brand positioning in their minds, thus showing that in order for brands to build their positioning in an extremely clutter market space today, turning towards sustainable packaging will help them differentiate themselves from the competitions while also positively building to their brand positioning in the minds of customers across generations. (Steenis N et al. 2017) stated that having sustainability signals on packaging was a crucial element in determining how packages varied as judged by consumer responses to packaging design. A study by (Trivium Packaging, 2020) highlight that some materials are associated with the term "premium," providing chances for food and beverage brands to position their products in that category. Consumers saw glass and metal as more valuable than other materials.

TABLE 9: Cross tabulation of willingness to pay extra for sustainable packaging and the Impact of sustainable packaging on customer loyalty

Willingness to pay extra for sustainable packaging * Impact of sustainable packaging on customer loyalty (Crosstabulation)						
		Impact of sustainable packaging on customer loyalty				
		No impact	Neutral	Positive impact	brand loyalist	Total
Willingness to pay extra for sustainable packaging	0-10%	1	7	9	5	22
	11-20%	0	2	26	11	39
	21-30%	0	0	10	2	12
	31% +	0	0	1	0	1
Total		1	9	46	18	74

Price is a crucial factor that is to be taken into consideration. With sustainable packaging being adopted by brands will also lead to an increase in the price of products due to the premium in its packaging. Willingness to pay is a crucial factor to be considered, which will have a direct and indirect impact on brand loyalty. A price hike of an extra up to 20% will help create a positive impact on brand loyalty as customers 'always want more for less' as seen by the majority of the respondents. A price hike over 30% will not lead to increased brand loyalty and hence should be avoided by brands in the initial days as the concept of sustainable packaging is still growing in India. Price and product quality are determined to be the key driving forces of customer purchase intent (Martinho et al., 2015). Millennials are willing to pay for a compelling narrative and will reward you with brand loyalty. They seek for food and beverage brands that reflect their beliefs and base their purchasing decisions on them. As a result, values like accountability and sustainability are crucial criteria for them (Scanlux Packaging, 2021).

TABLE 10: Cross tabulation of level of awareness and impact of sustainable packaging on customer loyalty

Awareness * Impact of sustainable packaging on customer loyalty (Crosstabulation)						
		Impact of sustainable packaging on customer loyalty				
		No impact	Neutral	Positive impact	brand loyalist	Total
Awareness	yes	0	8	42	18	68
	no	1	1	4	0	6
Total		1	9	46	18	74

Thus, once sustainable packaging has reached the stage of a growing or mature market then price hikes can be thought about by the brands, as by then both-awareness and adoption of sustainable packaging will be high amongst the customers, and as awareness goes on increasing amongst the customers so will the brand loyalty thus helping sustainable packaging drive a positive impact on brand loyalty.

TABLE 11: Factor Analysis of motivators driving respondents to opt for sustainable packaging over conventional packaging

Factor Analysis- Rotated Component Matrix[a]		
	Component	
	Brand benefits	Functional Benefits
Greater product protection	0.267	0.769
Enhanced usability	0.453	0.690
Increased shelf life of products	0.199	0.866
Attractiveness and appeal	0.806	0.234
Brand adopting it	0.790	0.360
Price	0.399	0.679
Environment friendly	0.777	0.241
Product reusability	0.649	0.375

On conducting a factor analysis, it can be concluded that there are two main factors responsible for driving customers to shift from purchasing products normal packaging to purchasing products that adopt sustainable packaging. These factors are broadly the brand benefits that include brand name, product reusability, aesthetics and environment friendly as the main motivators. Many key quality indicators, particularly for customers, have been given by (Williams et al.2007), that are protection and preservation of the product, declaration of contents, recyclable material, conveys a specific brand and fitting in storage areas are just a few of them.

The second factor is the functional benefits that include better product packaging, improved shelf life, price and enhanced usability. (Klooster R, 2002) emphasises the need of taking into account all functional requirements for packaging systems throughout the design phase. (Olsmats C, 2002) emphasises the strategic importance of packaging for brands, as well as the need to establish a balance between its many purposes.

TABLE 12: Regression coefficients identifying most important motivating factors that drive respondents to shift from conventional packaging to sustainable packaging

Coefficients[a]					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	4.000	0.090		0.000
	Brand Benefits	0.502	0.090	0.528	**0.000**
	Functional Benefits	0.275	0.090	0.289	0.003
a. Dependent Variable: I will choose products with sustainable packaging in the future					

Furthermore, the significance value of brand benefits is 0.000, thus concluding that brand benefits are the most important variable that plays the primary role of a motivator for customers shifting towards sustainable packaging. Functional benefits then comes in as a motivating factor with significance value being 0.003. This helps show that brands must lay more emphasis on first heavily spreading awareness and marketing the brand benefits of sustainable packaging and then focus on the functional related benefits that include product protection, usability and longer shelf life. (Oloyede & Lignou, 2021) Food and beverage companies packaging may be tailored to each company's unique needs and goals, depending on aspects such as consumer input on environmental concerns and brand expectations, followed by the functional requirements of the product-packaging system, such as shelf-life or product protection.

TABLE 13: Correlation between the willingness to purchase products with sustainable packaging in the future and motivators

Correlations										
		I will choose products with sustainable packaging in the future	Greater product protection	Enhanced usability	Increased shelf life of products	Attractiveness and appeal	Brand adopting it	Price	Environment friendly	Product reusability
I will choose products with sustainable packaging in the future	Pearson Correlation	1	.257*	.464**	.313**	.438**	.388**	.577**	.557**	.522**
	Sig. (2-tailed)		0.027	0.000	0.007	0.000	0.001	0.000	0.000	0.000
	N	74	74	74	74	74	74	74	74	74

The motivating factors driving customers to choose a food product with a sustainable packaging over normal packaging in the future are mainly the product reusability and price. Sustainable packaging is also extremely eco-friendly creating less waste and pollution, thus also making it a very important motivator. Environmental and resource efficiency are considered as significant aspects of packaging solutions. (Svanes E. et al, 2010) For the industry and customers, environmental sustainability has become a priority. Most corporations have concentrated on one or two factors, such as reduced package weight per unit product or the avoidance of ecologically damaging materials such as PVC. However, more systematic and holistic consideration of a product's environmental standpoint is required than has been realised in recent years. Thus, these 3 variables (product reusability, environmentally friendly and price) have a strong positive correlation with the ability to motivate customers to choose sustainable packaging in the future. This is followed by a moderate positive correlation between attractiveness and enhanced usability and the name of the brand adopting it with willingness to purchase. According to a study by (Oloyede & Lignou, 2021) customers are creatures of habit, thus they would usually stick to well-known brands and only consider the package after they had purchased it or arrived at their location. Customers stated that convenience and price take precedence over all other considerations. They claimed that ecologically friendly packaging must stand out from other packaging on the shelf if it is to attract consumers, and that the design of the products was not eye-catching or appealing enough. The least correlation that isn't significant is between greater product protection and increased shelf life. Thus, showing that customers want product packaging that helps in product preservation and usability while being reasonably priced and having a good aesthetic design.

Thus, the outcomes of this study add to the body of information about consumer attitudes and reactions to environmentally friendly packaging materials. The concept of 'sustainable consumption,' which states that customers have a duty to reduce the environmental effect of their purchases via thoughtful product selection and proper disposal. Manufacturers may help in this process by giving consumers guidance. At its most basic level, this is the concept that all products should provide actual social benefit to users while also generating economic profit for the brand (Papanek, 1971). Customers want sustainable packages to have all of a package's usefulness while also being environmentally friendly. The findings are similar to those of (Ertz et al. 2017), who found that customers were hesitant to pay more for ecologically friendly "green" drinks packaging, and (Barber N. 2010) who found that just 28% of consumers were prepared to pay more for environmentally friendly "green" drink packaging. Thus, ecologically beneficial aspects on packages and expressed a strong need for knowledge regarding the packaging's long-term viability (Banterle A et al., 2012) and by successfully enclosing and safeguarding items as they move through the supply chain and by promoting informed and responsible consumption, the sustainable packaging system contributes significant value to society. (Svanes E, et al. 2010)

MANAGERIAL IMPLICATIONS-

Based on the findings, brands need to undertake extensive marketing to first spread awareness and build curiosity around sustainable packaging and then in the next phase be more focused towards promoting products that have adopted sustainable packaging with emphasis given it the design and usability. Brands should focus on using extensive social media marketing to reach the millennial target audience while leveraging print mediums and news articles to cater to GenX. Efforts must be taken to not cause major incremental shifts in the price of the products with sustainable packaging, as while millennials would be more willing to spend extra, Gen X wouldn't be as willing to shell out extra for sustainable packaging. Brands should first focus on building the brand and functional benefits of their sustainable packaging as that is a major motivator for customers. The packaging should not only focus solely on aesthetics but must integrate reusability and increased shelf life of products with clear labelling for sustainability.

FUTURE SCOPE

The future scope of this study would lay in diving deeper and understanding the packaging preferences

of customers - what materials and types are they more attracted towards and evaluation of different prototype sustainable packaging designs. It will also be interesting to find out the customer motivators with respect to sustainable packaging at different stages of the product life cycle. Finally, a staged study on how food and beverage brands have been incorporating sustainable packaging elements and adopting to trends will be helpful in understanding the timely progression made by brands as the awareness around sustainable packaging keeps growing in India.

CONCLUSION

Sustainable packaging is a relatively new concept in India and is slowly gaining greater awareness amongst the masses. As the awareness increases people are able to identify and differentiate conventional packaging from sustainable packaging easily. It was seen that heightened awareness leads to greater product identification thus, in order to drive this, due knowledge must be spread via various awareness campaigns. GenX is more influenced by content seen in print media and news articles while millennials are more influenced by the content they consume on social media. Friends and family remain a very crucial source of information for both millennials and GenX, as their opinions and recommendations matter a lot when it comes to trying new products with sustainable packaging for the first time. Labelling that explicitly implies sustainable packaging also plays a very important role in encouraging customers to try products. While older millennials and GenX actively buy more products with sustainable packaging, younger millennials are extremely open and have a high likelihood of trying new products based on their eco-friendly packaging. However, customers aren't extremely willing to spend a lot more on products with sustainable packaging when it comes to spending. Thus, efforts must be taken to not cause major incremental shifts in the price of the products with sustainable packaging and designing of packaging should be kept minimal. The findings clearly highlight that sustainable packaging appeals across generations, and that the majority of younger customers are prepared to pay only upto 15-20% more for environmentally friendly packaging.

Brand benefits and functional benefits are the main motivators with enhanced usability, environmental friendliness and price having a strong positive correlation with the ability to motivate customers to choose sustainable packaging in the future. Thus, right now the main focus for brands should be on building awareness and capitalising on the functional benefits of sustainable packaging to drive their marketing campaigns around it as this will help improve their brand positioning and lead to increased customer loyalty. Marketing campaigns should first start with informational and educational content then followed by promotional and topical content around sustainable packaging. Different customer archetypes should be derived and specific strategies must be devised to meet the customers where there are to lead to great adoption - helping brands stand out in the market.

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Primary Agriculture Credit Societies' Economic Impact on Gross State Domestic Product for Long-Term Agricultural Development

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ABSTRACT

Economic growth with social justice has been an important objective of Indian and state planning. The Gross State Domestic Product (GSDP) is one of the important indicators to measure the economic development of the State/UT. India is an agrarian economy since decades. Indian agriculture sector accounts for 17-18% of India's Gross Domestic Product (GDP) and provides employment to 60% of the country's workforce. Agriculture sector provides raw materials to industry and industry provides essential inputs to the agriculture sector and service sector plays a significant role as middle path. This sector's financial reliance has transitioned from the informal to the formal sector, which includes commercial banks, microfinance institutions, and cooperative credit organisations.

The research objective of this paper is to understand the performance of Primary Agriculture Credit Societies (PACS) and to study the economic impact of the number of PACS on the Gross State Domestic Product for sustainable or long-term agricultural development. The scope of the study covers the western zone of India which includes Goa, Gujarat and Maharashtra for the last twenty-two years i.e., from 2002-03 to 2019-20. The study is based on the secondary data: research papers and Journals, Government published documents.

The study analysis the data using p-value and regression equation. The result reveals that the aggregate numbers of the PACS have increased in India over the study period. In terms of paid-up capital, total reserves, total borrowings, working capital, number of borrowers, and GSDP, Goa comes out on top. As per the results of the hypothesis testing, for all the three states, we accept the hypothesis i.e., there is a negative relationship between the primary agriculture credit societies and gross state domestic product of agriculture and allied activities. The loans disbursed by the banks for agricultural loans have been seeing a steady rise in non-payments due to several factors. Such loans are leading to Banks writing off such loans as bad loans and take a loss upon themselves. The Banks also must lend such loans under the Priority Sector Lending (PSL) scheme which leads to compulsory lending and banks are not able to sustain over a long run. The study is focused on implementing a better system to securitize such loans so that banks which lend have their loans secured and increases the opportunities in the debt market for investors. The managerial implication of the study includes bringing better products and securing the interest of the banks. The study would also help in sustainable existence of small lending institutions which get bankrupt due to rising NPAs generated out of agricultural loans.

Keywords: **Primary Agriculture Credit Societies (PACS), Gross State Domestic Product, Agriculture Sector, Growth Rate, Western Zone.**

INTRODUCTION

Agriculture is extremely important to the Indian economy. Agriculture supports more than 70% of rural families. Indian agriculture has shown extraordinary endurance during the COVID-19 period. The agriculture sector could withstand the COVID-19 shock and registered over 17% of total GDP and employing more than 60% of the population. The Agriculture and Allied sector's proportion of overall Gross Value Added (GVA) in the economy was 20.2 percent in 2020-21, according to statistics issued by the National Statistics Office

(NSO) in the Periodic Labour Force Survey (PLFS). Furthermore, the agriculture sector employs 45.6 percent of regularly working people, suggesting that 45 persons out of every hundred in India are employed in the agriculture sector directly or indirectly. Over the decades, as indicated in Table 1, the proportion of the people engaged in agriculture has decreased.

The agricultural and associated sector has fared well in the aftermath of COVID 19. The industry grew at a rate of 3.6 percent in 2020-21, and 3.9 percent in 2021-22. The sector's contribution of total GVA increased to 20.2 percent in 2020-21 and 18.8 percent in 2021-22, according to data from the Department of Agriculture and Farmers Welfare (DAFW). Higher expansion in associated industries against crop sectors has obvious repercussions in terms of the former's growing importance in overall agricultural GVA versus the latter. It is worth mentioning that livestock, fisheries, and aquaculture's share of total agricultural GVA has risen over time.

It is also observed from Table 1, the input is higher than output in India. Several factors have been identified in the social science literature as the most important sources of productivity change in agriculture. These can be divided into three categories, namely- General factors, Institutional factors, and Technological factors. The general factors are pressure of population on agriculture, rural environment, role of non- farm services, lack of professionalism, no uniformity in monsoons, soil fertility. The institutional factors include size of holdings, pattern of land tenure, and lack of organization. The technological factors are lack of proper irrigation facilities, old methods of production, lack of proper government support, lack of entrepreneurship lack of crop management, agriculture finance, inadequate research etc.

Agriculture finance is one of the important inputs, which is made available by number of institutional and non-institutional agencies. To deal with institutional agricultural credit, we have a multi-agency approach. Cooperative credit is an important sector of the broader co-operative movement. In fact, the movement arose from the need for credit by farmers in the nineteenth century, who were exploited by non-institutional credit agencies.

Commercial banks were nationalised over the last century to enhance financial access for India's poor in rural areas, and they spanned every sector of the economy (Basu 2006). It was also made mandatory for the banks to provide subsidised credit to rural households. India now has over 32,000 commercial and regional rural bank branches, 14,000 cooperative bank branches, 97,961 Primary Agriculture Credit Societies, thousands of mutual fund sellers, several non-bank finance companies, and a large post office network with 154,000 outlets that must focus on deposit mobilisation and money transfer. Various institutional entities (commercial banks, Microfinance Institutions, and Cooperative Credit Societies) have begun to give loans to farmers with an effortless process and terms.

In a country where 60 percent of the population lives below poverty line, most of the farmers are small and marginal farmers and landless labourers, 35% people are illiterate (UNESCO 2017). Cooperatives are the best sector to address and improve the socio-economic conditions of poor farmers. Usually Primary Agricultural Co-operatives (PACS) are ground-level cooperative credit institutions that provide farmers with short-term (S.T.) and medium-term (M.T) agricultural loans for a variety of agricultural and farming activities. It operates at the gram panchayat and village levels. However, the total disbursement of S.T. loans is higher than that of M.T. and L.T. loans. The viability of PACS is determined by the agricultural profiles of the region.

However, because farmers are economically poor, credit with the lowest rate of interest is critical for them to use all these factor inputs that are responsible for agricultural change. And the PACS is playing a key role by providing lower-cost financial assistance to its member farmers and bringing a meaningful change. Also, farmers who use sustainable practices will use less non-renewable energy, use fewer chemicals, and conserve scarce resources. When considering the rising population and demand for food, keeping the land healthy and replenished can go a long way. As a result, studying the economic impact of primary farm credit societies on the gross domestic product is critical for long-term agricultural development.

Related Literature

Several works of literature were studies to understand the evolution of cooperatives in India, importance of agricultural credit pre/post-

independence, institutional credit for agriculture and allied activities, government of India and agriculture credit etc.

Agriculture and allied sectors gave birth to the cooperative movement in India. The problems of rural indebtedness and the resulting conditions of farmers created an environment for chit funds and cooperative societies toward the end of the nineteenth century. The problems of credit, supplies of inputs and marketing of agricultural produce were solved by pooling their meagre resources. The Cooperative Credit Societies Act of 1904 ushered in the Indian cooperative movement, providing the path for the establishment of Thrift and Credit Cooperatives. The subsequent Cooperative Societies Act 1912 made it easier to establish other types of cooperatives.

Like other occupations, agriculture also require finance for development as the Indian farmers are poor and depends on credit. The farmer's debt increases due to irregularities and drought situations. They spend more on non-productive activities rather than on fertilizers, irrigation, land development etc. Marketing of agricultural goods is more complex as it requires infrastructure facilities like storage, cheap transport, market information on prices and agricultural credit.

During the pre-independence period, Money Lenders and Indigenous Bankers played a dominant role in the supply of credit to agriculture. Later it was recognised as a social good and changes were made by appointment of Rural Credit survey committee in August 1951.

The PACS are the basic level institutions of the short-term and medium-term credit structure for farmers. These organisations also provide seeds, fertilisers, insecticides, agricultural equipment, and farm produce marketing. These societies will provide short and medium-term credit with repayment terms of one year and three to five years, respectively. These societies set credit limits on an annual basis. The Reserve Bank of India, the Banking Commission, the National Commission on Agriculture, and the Working Group on Cooperatives (chaired by T.A. Pai) all recommended that all farmers be able to obtain all types of credit through a single point of contact.

Basu (2006) in his report emphasized the government's effort to improve the link between inadequate finance and the rural poor. The paper delves into the many forms of rural finance sources, as well as their credit penetration and shortcomings. Agriculture being a risky venture, financiers are reluctant due to high NPAs and lack of collateral. He further shares, despite the growth of microfinance and partnership between the government, non-government organization and banks, still informer sector lenders retain a strong presence in rural India. As a result, the agricultural sector's contribution to national GDP has decreased dramatically.

Khan (2014) addressed various issues and challenges of agricultural credit in India. Most people in rural areas rely on non-farm activities to supplement their income. Rural population is un-bankable as agriculture economically is riskier than industry and trade. Furthermore, he stated that creating an inclusive rural financial system is difficult because the rural economy is imperfect, lacking in information, communications, and infrastructure, as well as the geographical spread of the rural population and the diversity of needs for small-ticket financial transactions.

Certain factors, such as Gross Domestic Product (GDP), interest rates on bank lending, financial performance of banks (NPAs, asset quality, capital adequacy ratio, etc.), commodities prices, and consumption increased inclination, according to Bhuyan (2017), play a key impact in credit banks.

According to Chand (2004), most agricultural development efforts during the green revolution focused on high-potential areas such as Uttar Pradesh, Haryana, Punjab, Tamil Nadu, and Andhra Pradesh, which account for half of India's new irrigated land. In Eastern and Central India, output and productivity growth have developed slowly. Yusuf (2014) in his article brought into notice- in Northern India, many farmers rely on vendors for loans to purchase crops, equipment, and pesticides. Due to inaccessibility and high transaction fees, this was ineffectual. Climate change and financing trends have led in a plateauing of production in the region, necessitating greater funding to maintain production. Because of sectoral limits, the formal measures implemented by the government and corporate institutions to combat poverty in the region lack enough funding and have proven unsuccessful. The number of persons who have access to bank-based rural financing is quite

low. Because credit and marketing are not integrated in cooperative societies like PACS, they are ineffectual in providing access to financing.

Co-operative banking should be made strong and efficient to confront the challenge in a competitive environment, according to Yashoda (2017), to boost the efficiency of the PACS and to serve the rural farming people. Despite issues such as a lack of adequate and trained staff, lack of professional management, lack of necessary funds, poor industrial relations climate, lack of professional management, political interference, change in economic conditions, overdues, and farmers' limited source of income, Chakrabarty (2010) recognised that rural cooperative credit institutions with a vast network of PACS have an enormous potential to increase the flow of credit to agriculture.

Financing, particularly PACS and cooperative banks along with climate change, played a crucial role in allowing farmers to pool their production and resources in the region's agricultural progress (Zwerdling 2009).

According to the Directorate of Economics and Statistics, Gross State Domestic Product (GSDP) is the total value added by various economic sectors (agriculture, industry, and services) produced within the state's borders measured without duplication over the course of a year. It is one of the indicators of a state's economic growth. It is calculated by deducting the subsidies from the sum of gross value added and taxes.

GSDP = Gross Value Added + Taxes – Subsidies.

Individual sector-level Gross Value Added (GVA) is estimated using the methods provided by the Central Statistics Office in the 2004-05 base (CSO). The methodology for estimating GVA vary per industry. Production Approach calculates five sectors: agriculture and animal husbandry, forestry, fishing, mining, and quarrying, and registered manufacturing. Expenditure Approach is used to calculate the Construction sector. The remaining industries (Unregistered Manufacturing, Electricity, Gas & Water Supply, Trade, Hotel & Restaurant, Railway, Other Means of Transport, Storage, Communication, Banking & Insurance, Real Estate, Ownership of Dwellings & Business Services, Public Administration, and Other Services) are calculated using the Income Approach.

According to Pathak and Shah (2021), the GSDP of agriculture and related activities is influenced by a variety of factors such as climate, location, and the proportion of the people engaged in such activities.

Research Gaps and Significance of the Study: As previously stated, India is primarily an agrarian economy, with agriculture employing more than half of the population. PACS provides short-term credit to small and marginal farmers. The timely delivery of loans will assist rural farmers in increasing agricultural productivity, resulting in overall economic growth. Based on the several studies, the level of concentration on PACS in general is exceptionally low, even though multiple research articles in cooperative banking have been contributed. There is a lack of focus on how the PACS have been instrumental in the upliftment of the poor rural farmers.

This empirical study focuses on the understanding of PACS, function of PACS in empowering the economically and socially disadvantaged rural poor. The current study is based on the examination of primary agricultural credit societies in the western zone of the country over the last twenty years. It thus focuses on how these credit institutions have aided these underserved groups in India.

III Research Methodology

The study is based on secondary data available in the form of books, articles, annual reports, audit reports, progress reports of various cooperative credit institutions. These were referred to draw the concept and approaches on the cooperative organization in general and particular in India.

The research objective is:

1. To gain a better understanding of PACS' performance in terms of their number, membership, paid-up share capital, total reserves and deposits, borrowings and working capital, short-term loan issues, loans, and advances per state. This will reveal the extent to which PACS is used in rural areas, as well as the extent to which it is used.

2. Second, to ensure long-term agricultural development in India's western zone, researchers are looking at the economic impact of primary farm credit societies on the gross state domestic product.

Scope of the study:

The goal of the study is to determine the influence of PACS on GSDP in three states in India's western zone, namely Goa, Gujarat, and Maharashtra, from 2002-01 to 2019-20.

Data Collection:

The current analysis relies solely on secondary data. The data has been collected from National Federation of State Cooperative Banks Ltd (NFSCoB), Reserve Bank of India, Indiastat- e-resource of socio-economic statistical information of India and other government published documents.

Hypothesis:

The purpose of this study is to see if there is a link between the number of primary agriculture credit societies (independent variable) and the Gross State Domestic Product (dependent variable) (Agriculture and Allied activities)

H0: There is a negative relationship between the number of primary agriculture credit societies (independent variable) and gross state domestic product (Agriculture and Allied activities)

H1: There is a positive relationship between the number of primary agriculture credit societies (independent variable) and gross state domestic production (Agriculture and Allied activities)

Statistical tools:

To determine how much growth has happened in each state, the researchers examine at zonal statistics. To meet the normalcy condition, the dependent variable is log-transformed before being used to calculate the growth rate. The growth rate is then calculated using the semi-log approach as follows:

$\ln (Yt) = a + b.t$; where Yt is the variable of interest, a is constant, b is the growth rate coefficient, and t denotes time (t = 1 to 22).

Because data for 2001-02 was not available, the rate for 2002-03 was not calculated in the tables on growth rate of various parameters.

To check the impact of PACS on GSDP of selected states p-value and regression analysis is used.

Findings and Data Analysis

Cooperatives have grown rapidly in recent years. In terms of geography, the cooperatives have a 100% penetration rate through the principal Agriculture Credit Societies (PACS). The share of cooperatives in agricultural credit finance and their growth trajectory demonstrate that this sector has significant potential to expand its reach and serve farmers and others involved in linked activities. This section of the study gives the findings to better understand the PACS' performance and economic impact on the GSDP for long-term agricultural growth.

Trend analysis is used to examine the current research. Using the semi-log growth equation, the researchers calculate the growth rate of various heads.

Growth rate in number of PACS:

Table 2 displays the number of PACS and the rate of increase in the number of PACS. Over the twenty-two-year study period from 2002–03 to 20019–20, it was discovered that the number of PACS in three states grew at a reasonable rate. PACS that are viable, possibly viable, dormant, defunct, and others make up the total number of PACS.

Among the three states, Maharashtra has the maximum no of PACS and Goa with the minimum number. There is a vast difference between the three states. Over the last 22 years Goa had a maximum no of PACS in the year 2004-05 and a minimum of seventy-five in the year 2008-09. after that, the number has gone down. There was a slight increase in the number to hundred in the year 2012-13.

Figure 1: No of PACS in three states

Except for Maharashtra (which has a negative growth rate of –0.82), the growth rate in the number of PACS in three western states shows that the other two states, Goa, and Gujarat, have a positive growth rate. Goa has an 8.25 percent growth rate, while Gujarat has a 0.54 percent growth rate. As a result, the western zone's performance has been underwhelming. It is, in fact, unsatisfactory.

Growth rate of Membership in PACS: In the cooperative sector, the aspect of membership is

critical to success. This is because members contribute a set amount and make deposits, which helps the institutions' financial stability and liquidity. Total membership growth includes tribal communities like scheduled castes, scheduled tribes, small farmers, rural artisans, and other marginal farmers.

From the above table 3, it is apparent that the importance of PACS in the states of western zone is increasing, as evidenced by the fact that membership strength of these institutions is expanding with a positive pace. The average growth rate of membership of PACS is highest in Gujarat i.e., 15.13 percent, Goa with 13.41 percent and lowest in Maharashtra with 4.18 percent..

Growth rate in Paid-up Share Capital: Paid up capital is the amount of money the primary agricultural credit society has received from different stakeholders. The major stakeholder is the government.

The table 4 shows the average growth rate of paid-up capital is highest in Goa with 31.47 percent, Gujarat with 7.29 percent and lowest in Maharashtra with 6.4 percent.

Growth rate in Total Reserves of PACS: Total reserves of PACS in the states of western zone show a growth with the highest in Goa 63.14 percent, followed by Gujarat 14.73 percent and Maharashtra 8.88 percent.

Growth rate of total deposits of PACS: The table 6 below shows the growth rate of total deposits of PACS in the states of western zone. Gujarat has the highest growth rate in total deposits of 27.87 percent, Goa with 15.36 percent and Maharashtra with 0.06 percent.

Growth rate of total borrowings of PACS: Table 7 below shows the growth rate of total borrowings of PACS in the three states of western zone. Goa is having the highest average total borrowings of 130.96 percent, which is more than 100 percent. Whereas Gujarat is having the average total borrowings of 11.20 percent and Maharashtra with the lowest of 6.00 percent.

Growth rate of working capital of PACS: Working capital is the excess of current assets over current liabilities of the primary agricultural credit societies. The PACs' working capital is primarily drawn from Central Co-operative Bank (CCB) borrowings, with a small percentage derived from owned money and deposits. Table 8 shows the growth rate of working capital in the three states of western zone. The average growth rate of working capital is highest in Goa with 23.51 percent, Gujarat with 10.02 percent, and Maharashtra with 5.84 percent..

Growth rate of number of borrowers of PACS: The following table provides an overview of the number of borrowers from economically and socially disadvantaged groups, such as scheduled castes, scheduled tribes, small farmers, rural artisans, and other borrowers who use these low-cost lenders to meet their funding needs. From the table 9 below, it can be immediately seen that the except for Goa, the growth rate of number of borrowers is continuously declining. The average growth rate in Goa is 39.95 percent whereas in Gujarat it is minus 0.62 percent and similarly in Maharashtra minus 9.78 percent.

Growth rate in Gross State Domestic Product of Agriculture and Allied activities: In this study the level of production of agriculture and allied activities which is a dependent variable and an especially important macro-economic indicator. It includes Agriculture, Horticulture, Animal husbandry, Fishery, Soil and water conservation, Poultry, dairy farming, Agriculture Marketing, Milk-fed financial institute, and social forestry. Table 10 shows State wise GSDP (Agriculture and Allied activities) at Current Prices. The average growth rate of state-wise Gross State Domestic Product of agriculture and allied activities of Goa and Gujarat are remarkably close despite having variations in the other parameters. The average GSDP of Goa is 15.06 percent, followed by Gujarat of 14.75 percent and Maharashtra with 7.88 percent.

Relationship between number of PACS and GSDP through regression analysis

Regression analysis is done for one of two purposes: To predict the value of the dependent variable for individuals for whom some information concerning the explanatory variables is available, or to estimate the effect of some explanatory variable on the dependent variable. The regression has been conducted using Excel in the MS office. The level of significance considered is 95%. The degree of freedom is same as the data has been taken for the period of 2002-03 to 2019-20. Table 11 shows the data

used for regression analysis.
In the ANOVA table, Significance f is the p-value to check the validity of the model. For the validity of the model, we frame the null hypothesis that is the model is statistically significant, the model is statistically significant. If the p-value is less than 0.05, the model is statistically significant, and the stronger the evidence -you should reject the null hypothesis. A p-value higher than 0.05 is not statistically significant and indicates strong evidence for the null hypothesis. Table 12 below shows the results of the hypothesis testing, for all the three states, we accept the Null hypothesis i.e., there is a negative relationship between the primary agriculture credit societies and gross state domestic product of agriculture and allied activities.

The regression equation for GSDP and PACS in the three western zone states is shown in table 13.

Table 13: Regression Equation for GSDP and PACS of western zone

The regression equation shows the influence of the independent variable on the dependent variable which is represented by the Beta values(m) in the equation. The slope of the regression line is what it is called. It depicts the change in the dependent variable because of a change in the independent variable of one unit. As seen in the above table, for the Goa state-one per cent increase in the independent variable will decrease by 0.03 units. Similarly, for Gujarat state one per cent increase in the independent variable will decrease the by 1.33189022 units. Whereas for Maharashtra state, one per cent increase in the independent variable will increase the dependent variable by 1.723810716 units. Maharashtra have positive beta values, indicating that an increase in PACS in these states will result in an increase in GSDP from agriculture and allied activities. The intercept (constant) of Goa, Gujarat and Maharashtra is negative, indicating that even if the state does not have any PACS, it will still produce the same Gross State Domestic Product (GSDP).

In regression statistics table 14, shows multiple R (r =correlation coefficient). The correlation coefficient is positive for the three states. But when we look at the slope, Goa and Gujarat has negative slope, therefore the correlation coefficient must also be negative i.e., -0.035218662286107 for Goa and -1.33189902238566 for Gujarat. The slope for Maharashtra is positive so the correlation coefficient will also be positive.

The coefficient of determination R squared (R2) tells the per cent of variation that is explained by the regression. For Goa, 1.80 percent of the variation in y is explained by x and 98.2 per cent is unexplained. For Gujarat, 10.1 per cent of the variation in y is explained by x and 89.9 per cent is unexplained. For Maharashtra 0.055 per cent in y is explained by x and 99.99 per cent is unexplained.

CONCLUSION AND MANAGERIAL IMPLICATIONS

PACS, which have been around for more than a century, are in critical need of a new policy push. They may be able to help Atmanirbhar Bharat achieve its goal. Due to the fast-changing financial system that emphasises efficiency, profitability, technology, and sustainability, cooperatives' share in rural credit has dwindled, and their relevance has dwindled.

The current study examines the economic impact of financial credit facilities such as PACS on the Gross State Domestic Product (GSDP) to promote long-term agricultural development. PACS has no substantial economic impact or association with the GSDP of agriculture and associated activities, according to hypothesis testing utilising statistical techniques. Lack of active participation by members, lack of professionalism, lack of corporate governance, politicisation, bureaucratization, ageing and unenthusiastic personnel, and so on are some of the elements that contribute to small impact. The number of PACS has also decreased as commercial banks have gained a larger piece of the market.

What is more significant is that the Goa holds the highest position in the growth rate of paid-up capital, total reserves, total borrowings, working capital, number of borrowers and GSDP still the overall economic impact of PACS on GSDP is insignificant.

Some of the limitations of the present study include the inability to conduct research for all the six zones of PACS in India due to time constraints.

The managerial implication of the study includes bringing better products and securing the interest of the banks. The study would also help in sustainable existence of small lending institutions which get bankrupt due to rising NPAs generated out of

agricultural loans.

VI. Future Areas of Research

Future studies on the same topic can be conducted covering all the zones. Other variables apart from GSDP can be studied like employment opportunities, income rise, and repayment aspects for rural artisans, small farmers, marginal farmers, Scheduled tribes, and scheduled castes.

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Table 1, the proportion of the people engaged in agriculture has decreased.

	1951	1961	1971	1981	1991	2001	2011	2021
Proportion of Population	69.9	69.5	69.7	60.5	59	58.2	54.6	39.4
Contribution to GDP	51.9	46.3	40.5	35.4	28.5	22.4	14.4	18.8

Source: Compiled from Registrar General of India and Central Statistics Office, First Advance Estimates of National Income, 2021-22

Table 2: Total Number of PACS in the western zone of India over the period of 2002-03 to 2019-20.

	In Numbers			Growth rate		
Year	Goa	Gujarat	Maharashtra	Goa	Gujarat	Maharashtra
2002-03	87	8176	23340	N/A	N/A	N/A
2003-04	84	8482	20866	-3.45	3.77	-10.60
2004-05	255	9093	20984	203.57	7.21	0.57
2005-06	75	8487	21045	-70.59	-6.70	0.29
2006-07	77	7956	21045	-2.67	-6.26	0.00
2007-08	75	8092	21184	-2.60	1.71	0.66
2008-09	75	8044	21199	0.00	-0.59	0.07
2009-10	79	7763	21240	5.33	-3.49	0.19
2010-11	81	8117	21343	2.53	4.56	0.48
2011-12	77	8154	21402	-4.94	0.46	0.28
2012-13	100	8810	21394	29.87	8.05	-0.04
2013-14	79	8313	21268	-21.00	-5.64	-0.59
2014-15	79	8605	21199	0.00	3.51	-0.32
2015-16	79	8804	21094	0.00	2.31	-0.50
2016-17	81	8484	21217	2.53	-3.63	0.58
2017-18	81	8535	21181	0.00	0.60	-0.17
2018-19	81	8613	21150	0.00	0.91	-0.15
2019-20	78	8823	20151	-3.70	2.44	-4.72

Source: Indiastat, National Federation of State Cooperative Banks Ltd.

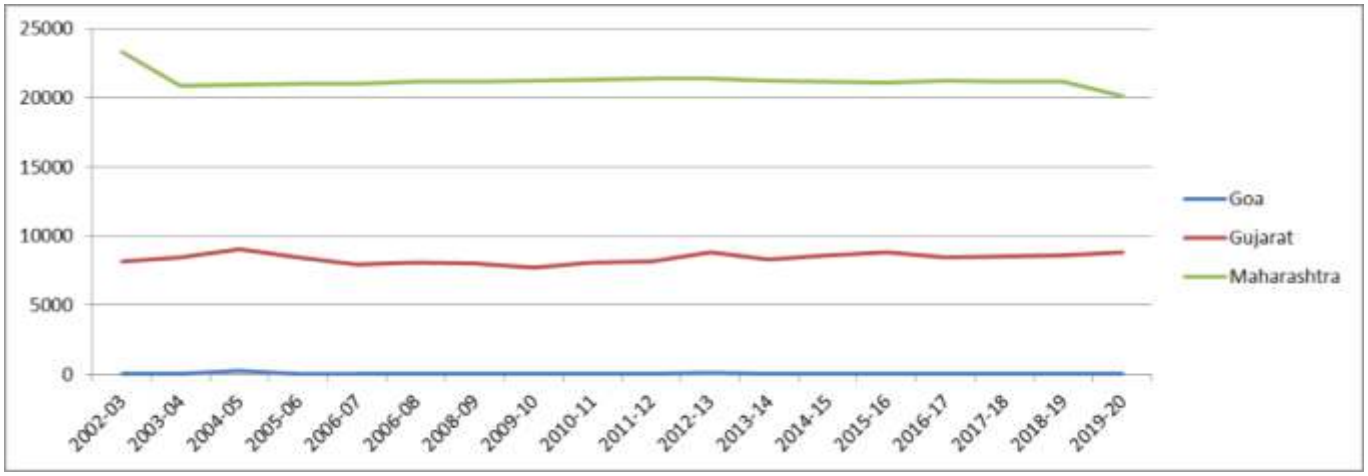

Table 3: State -wise Growth rate of membership in PACS in Western Zone

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	4.36	323.57	6.51
2004-05	282.78	-76.77	0.91
2005-06	-73.68	4.83	1.21
2006-07	-4.88	-6.83	0.00
2007-08	11.09	2.46	1.36
2008-09	-26.69	9.21	24.24
2009-10	28.72	5.03	1.41
2010-11	3.35	-1.68	1.35
2011-12	0.60	-1.29	2.72
2012-13	-7.07	5.74	5.02
2013-14	7.11	1.56	0.03
2014-15	-12.10	1.69	-6.80
2015-16	23.53	-0.02	3.46
2016-17	4.94	-7.79	5.70
2017-18	-0.39	-3.97	-3.43
2018-19	-26.16	0.17	0.24
2019-20	12.55	1.37	27.11

Source: Indiastat, National Federation of State Cooperative Banks Ltd.

Table 4: State -wise Growth rate of Paid-up Capital of PACS in Western Zone

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	-8.12	8.26	10.92
2004-05	464.66	32.73	4.17
2005-06	-84.14	-10.9	7.28
2006-07	9.42	1.86	0
2007-08	22.13	12.54	10.03
2008-09	-1.34	-4.87	15.87
2009-10	8.36	-0.69	-4.29
2010-11	3.92	10.37	1.09
2011-12	-38.86	10.67	8.97
2012-13	21.06	8.73	9.9
2013-14	17.48	29.46	-3.27
2014-15	-23.57	39.55	21.2
2015-16	99.09	-25.05	-11.51
2016-17	-9.82	3.53	14.26
2017-18	4.37	3.69	0.12
2018-19	59.12	5.47	2.14
2019-20	-8.81	-1.48	21.89

Source: Indiastat, National Federation of State Cooperative Bank LTD.

Table 5: State -wise Growth rate of total reserves of PACS in Western Zone

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	7.92	7.74	-15.56
2004-05	314.69	18.24	11.06
2005-06	-82.80	-50.70	10.41
2006-07	89.71	142.66	0.00
2007-08	-21.71	45.88	36.08
2008-09	128.71	-1.09	18.98
2009-10	4.63	-26.84	-8.58
2010-11	3.25	36.28	18.26
2011-12	-21.36	-9.34	12.55
2012-13	-7.08	13.46	14.87
2013-14	109.20	21.39	-0.60
2014-15	8.52	20.91	10.19
2015-16	22.95	6.79	-13.58
2016-17	-39.75	1.13	9.40
2017-18	10.03	9.94	35.03
2018-19	545.05	13.89	4.27
2019-20	1.36	0.06	8.11

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	24.95	11.39	-90.71
2004-05	51.35	23.33	16.97
2005-06	-24.26	16.75	4.94
2006-07	-7.97	5.48	0.00
2007-08	73.96	31.99	-9.20
2008-09	-10.85	1.53	4.05
2009-10	6.28	-4.35	-22.10
2010-11	2.54	389.00	9.22
2011-12	-6.18	-0.67	29.88
2012-13	15.80	28.22	30.89
2013-14	15.03	3.86	0.01
2014-15	-34.82	-50.98	0.69
2015-16	16.26	2.33	-6.99
2016-17	76.00	2.69	1.62
2017-18	0.10	-2.05	19.09
2018-19	46.18	9.43	26.08
2019-20	16.71	5.81	-13.46

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	-12.44	-6.80	17.13
2004-05	1323.35	20.97	9.65
2005-06	-85.36	26.17	11.03
2006-07	-49.86	-4.55	0.00
2007-08	-3.35	6.14	16.71
2008-09	-9.44	-4.47	18.68
2009-10	2.34	8.47	-13.48
2010-11	3.12	-6.02	2.95
2011-12	72.27	38.60	4.95
2012-13	-68.59	24.11	-0.18
2013-14	1046.66	14.44	-0.83
2014-15	6.82	24.09	21.42
2015-16	-82.54	3.51	-8.17
2016-17	33.62	15.25	0.05
2017-18	-3.51	5.64	-2.61
2018-19	-57.43	0.82	11.41
2019-20	110.60	23.95	13.28

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	-13.78	-0.28	-2.92
2004-05	312.81	8.92	7.60
2005-06	-63.30	32.86	12.11
2006-07	-13.97	-7.33	0.00
2007-08	0.13	11.73	22.56
2008-09	23.11	34.66	11.92
2009-10	4.70	-22.23	-7.83
2010-11	1.32	46.48	7.49
2011-12	64.36	12.86	30.13
2012-13	-39.26	11.12	-20.02
2013-14	24.51	14.03	5.15
2014-15	-2.71	-2.41	0.00
2014-15	-2.71	-2.41	0.00
2015-16	-0.17	-0.07	15.34
2016-17	-2.18	14.33	9.57
2017-18	2.36	2.01	0.75
2018-19	81.39	1.46	6.52
2019-20	20.39	12.24	0.94

Year	Goa	Gujarat	Maharashtra
2002-03	76955	2023600	3911277
2003-04	88039	2965900	4522581
2004-05	99811	3270600	4492660
2005-06	132317	4232000	5276384
2006-07	128746	5004300	6722886
2007-08	141050	5789700	8068446
2008-09	149120	5904900	7583257
2009-10	165778	6727600	8857753
2010-11	187062	10320048	12933622
2011-12	227418	12105758	13406827
2012-13	255180	11393015	14246930
2013-14	285116	15626637	17022854
2014-15	285857	11657931	16655868
2015-16	370442	10413800	18361200
2016-17	444484	10603700	24087400
2017-18	693521	13290951	2352782
2018-19	718530	14921560	2579628
2019-20	748282	16302402	2818555

Year	Goa	Gujarat	Maharashtra
2002-03	N/A	N/A	N/A
2003-04	-	4.55	-72.50
2004-05	-89.87	-1.82	-7.91
2005-06	-50.00	0.24	27.11
2006-07	50.00	3.86	0.00
2007-08	-50.00	0.46	-17.94
2008-09	33.33	7.16	-2.70
2009-10	-14.25	-0.65	-5.29
2010-11	1.17	-11.87	7.90
2011-12	27.09	-3.04	19.37
2012-13	15.65	4.56	-3.32
2013-14	961.57	4.61	0.03
2014-15	-17.58	-5.14	-86.68
2015-16	-95.05	0.97	-10.40
2016-17	-72.85	-18.53	-0.93
2017-18	0.00	-0.10	2.81
2018-19	-100.00	5.67	-15.03
2019-20	-	-1.47	-0.80

Gujarat (Growth rate)		Goa (Growth rate)		Maharashtra (Growth rate)	
X-PACS	**Y=GSDP**	**X-PACS**	**Y=GSDP**	**X-PACS**	**Y=GSDP**
3.767123288	46.56552678	-3.448275862	14.40322266	-10.59982862	15.62926891
7.213578501	10.27344145	203.5714286	13.37134679	0.565513275	-0.661591246
-6.69525066	29.395218	-70.58823529	32.56755267	0.290697674	17.44454288
-6.256627784	18.24905482	2.666666667	-2.698821769	0	27.41464609
1.709401709	15.69450273	-2.597402597	9.556801765	0.660489427	20.01461872
-0.593178448	1.989740401	0	5.721375399	0.070808157	-6.01341324
-3.493286922	13.93249674	5.333333333	11.1708691	0.193405349	16.80670983
4.560092748	53.39865628	2.53164557	12.83885678	0.484934087	46.01470599
0.455833436	17.30331099	-4.938271605	21.57359592	0.276437239	3.658719885
8.045131224	-5.88763628	29.87012987	12.20747698	-0.037379684	6.266232868
-5.641316686	37.15980362	-21	11.73132691	-0.588950173	19.48436611
3.512570672	-25.3970576	0	0.259894218	-0.32443107	-2.155842963
2.312608948	-10.67197087	0	29.58996981	-0.495306382	10.23862581
-3.634711495	1.823541839	2.53164557	19.98747442	0.5831042	31.18641483
0.601131542	25.34257853	0	56.02833848	-0.16967526	-90.23231233
0.913884007	12.26856528	0	3.606091236	-0.146357585	9.641607255
2.438174852	9.254005613	-3.703703704	4.140676103	-4.723404255	9.262071896

State	p-value	Interpretation of p-value	Accept/ Reject Null Hypothesis
Goa	0.620269291	higher than 0.05, not statistically significant	Accept null hypothesis
Gujarat	0.229818932	higher than 0.05, not statistically significant	Accept null hypothesis
Maharashtra	0.784440222	higher than 0.05, not statistically significant	Accept null hypothesis

Regression Statistics			
Multiple R		***Slope***	***R square***
Goa	0.134189612048446	-0.035218662286107	0.0180068519817125
Gujarat	0.318134612	-1.33189902238566	0.101209632
Maharashtra	0.0743184227812096	1.723810716	0.00552322796468662

Consequences of Space Colonization

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ABSTRACT

Empowering the business improvement of the room is vital to the future colonization of the room furthermore, the key to a reasonable space investigation program. Without business improvement continuing in the strides of investigation it is challenging to legitimize and keep up with a public interest in the endeavours. NASA's investigation program has experienced the absence of a decent business *monetary* methodology for quite a long time. Just little advances in business space have pushed ahead, and simply up to Earth circle with the business satellite industry. A method for moving past this stage is to start the foundation of human business exercises in space in association with the human investigation program.

In 2007 and 2008, the creators investigated situations to make space investigation and business space improvement more possible as a feature of their alumni work in the *Space Design Program* at the Sasakawa International Center for Space Architecture at the College of Houston, Houston, Texas. Through this exploration, it became clear that the issues confronting future colonization are a lot bigger than the innovation being created or the global missions that our space organizations are chasing after. These issues incorporate an absence of business showcases that the industry can without much of a stretch move into, space a strategy that tends to investigate however not business concerns, an absence of long-haul technique, planning and contracting strategies from space office acquirements, and key lawful issues with current space settlements that show up counter-useful to business tries.

In light of previous involvement in the International Space Station (ISS) almost certainly, current designs for human missions to the moon and Mars will develop into global endeavours. Yet, that by itself won't be to the point of guaranteeing extremely durable human colonization of space. What's more, a more noteworthy job for the business area should be characterized by laying out a foothold that will make long-lasting stations in space monetarily suitable.

In any case, what is the business job, and how might it be framed and become monetarily reasonable? NASA as of now has objectives laid out expressing the business advancement need. NASA Strategic Goal 5 states: "Support the quest for fitting partnerships with the arising business space area." The issue is that the business area isn't arising sufficiently quick, and can't arise without a market to move into, particularly considering that NASA is on a consistent beginning up, shut down, or take a different path mission with powerless long-haul methodologies.

Keywords: **Human Civilization, O'Neill Cylinders, Sustainable Environment, Protection against Grandiose Beams, Earth-Forming, Computer Vision, Deep learning, Automated Space Habitat**

What is space colonization?

Space colonization (additionally called space settlement or extra-terrestrial colonization) is the theoretical extremely **durable settlement** and abuse of normal assets at divine items other than Earth. As such it is a type of human presence in space, past human spaceflight, and working space stations.

Numerous contentions have been made for and against space colonization. The two most normal for colonization are endurance of human development and the biosphere in case of a planetary-scale debacle

(regular or human-made), and the accessibility of extra assets in space that could empower the extension of human culture. The most widely recognized issues with colonization incorporate worries that the commodification of the universe might probably upgrade the interests of the generally strong, including major financial and military foundations; colossal open-door cost when contrasted with using similar assets here on Earth; intensification of previous inconvenient cycles like conflicts, monetary imbalance, and natural degradation.

Until now, no space province has been set up. A space province would start a trend that would bring up various socio-policy-cantered issues. The simple development of the required framework presents an overwhelming arrangement of innovative and financial difficulties. Space states are for the most part imagined as hierarchical and material constructions that need to accommodate essentially all (or every one of them) requirements of bigger quantities of people, in a climate out in space that is extremely threatening to human existence and blocked off for upkeep and supply from Earth. It would include advancements, for example, controlled natural life-emotionally supportive networks, that still can't seem to be created in any significant manner. It would likewise need to manage the at this point obscure issue of how people would act and flourish in such places long haul. Due to the current expense of sending anything from the Earth's outer layer into space (around $1400 per kg, or $640 per pound, to the low Earth circle by Falcon Heavy), a space settlement would presently be a greatly costly undertaking.

Figure 1: The imagination of what a space colony would look like

OBJECTIVES:

- The main objective of this paper is to study space colonization possibility by overcoming its challenges in it.
- It also discusses about how AI can be implemented to do this efficiently.

IMPACT OF SPACE COLONIZATION:

- It can protect humans from worldwide pandemics, one of the several reasons including both **natural and man-made catastrophes**.
- It can prevent the human race from mass extinction.
- Through space colonization, humans can use the resources of other planets or maybe other satellites.

HISTORY:

Early ideas for future colonizers like **Francis Drake and Christoph Columbus** to arrive at the Moon and individuals, therefore, living there were made by John Wilkins in A Discourse Concerning a New Planet in the principal half of the seventeenth century.

The main realized work on space colonization was The Brick Moon, a work of fiction distributed in 1869 by **Edward Everett Hale**, about an occupied counterfeit satellite. In 1897 **Kurd Lasswitz** additionally expounded on space settlements.

The Russian advanced science pioneer **Konstantin Tsiolkovsky** anticipated components of the space local area in his book Beyond Planet Earth expounded in 1900. Tsiolkovsky had his space voyagers building nurseries and bringing manifests in space. Tsiolkovsky accepted that going into space would assist with idealizing individuals, prompting interminability and peace.

During the 1920s John **Desmond Bernal, Hermann Oberth, Guido von Pirquet,** and **Herman Noor** dung further fostered the thought. **Wernher von Braun** contributed his thoughts in a 1952 Colliers article. During the 1950s and 1960s, **Dandridge M. Cole** distributed his thoughts.

One more original book regarding the matter was

the book **The High Frontier: Human Colonies in Space** by **Gerard K. O'Neill** in 1977 which was followed that very year by Colonies in Space by T. A. Heppenheimer.

Marianne **J. Dyson** thought of Home on the Moon; Living on a Space Frontier in 2003; **Peter Eckart** composed Lunar Base Handbook in 2006 and afterward, Harrison Schmitt's Return to the Moon was written in 2007.

Why space colonization is important?

When the elite region of sci-fi stories and movies, the subject of room colonization has quickly drawn a few stages nearer to turning into a reality because of significant advances in rocket drive and plan, astronautics and astronomy, mechanical technology, and medication. The earnestness to layout humankind as a multi-planet animal group has been re-approved by the rise of an overall pandemic, one of a few reasons including both normal and man-made fiascoes long upheld in the supportive of colonization manner of speaking.

O'Neil cylinder:

The dramatist Cylinder, or island 3, may be an area settlement configuration projected by Gerard K. O'Neil. He notional that the settlement would be created utilising materials from the moon. The materials would be sent off into the area utilising a mass driver.

The living areas themselves are unit chamber formed and area unit typically underlying matches allis 5 miles (8kms) in breadth, are 20 miles (32kms) long and might house several millions super sturdy occupants. Each chamber is partitioned off into six equivalent region strips that summarize its facet. 3 strips area unit "land" and the alternative 3 area unit windows. The 2 chambers area unit counter-turning and area unit associated at every finish by a pole through a direction framework.

Artificial gravity:

The states turn to give counterfeit gravity on the inward surface. Since every chamber has such a huge sweep, the state turns just 40 times each hour. At this low speed, nobody would encounter movement affliction. An individual could recognize spin ward and anti-spin ward bearings by turning their head, and any dropped items would seem, by all accounts, to be redirected by a couple of centimetres. The **focal pivot** of the chamber would be a **zero-gravity district**.

You can encounter this when you are on a carousel. You feel a power following up on you when you are at the finish, though you don't feel it when you are at the middle point.

Atmosphere:

Every lebensraum would have an oversized portion of the vapourish tension of Earth's. 2 hundredths would be gas, and half-hour would be a chemical element. This half-pressure air saves gas and diminishes the strength and thickness expected for the natural surroundings dividers. The chamber shell and also the air within protecting grandiose beams.

Sunlight:

Enormous mirrors are pivoted to the rear of every window. The off-the-wall edge focuses on the sun so the mirrors reflect daylight into the living space. The light **reflected** from the mirrors would be energized, which could befuddle honey bees. During the day, the Sun would seem to move as the mirrors move. The mirrors would open to re-enact night as the window will see void space. This likewise allows hotness to transmit into space. The windows wouldn't be made of single sheets, yet rather would be made of many little areas to forestall disastrous harm, thus the **aluminium or steel window** casings could take the greater part of the anxieties of the pneumatic force of the territory.

Assuming that a **shooting star** broke one of the sheets, some air would be lost however it wouldn't be a crisis since the territory is so huge.

Different plans would get rid of the perplexing course of action of mirrors and glass. Instead of that a 'sun-globe,' controlled by sun-based cells on the outside of the chamber, would go through the focal pivot giving light in a similar recurrence as the sun. This sun-globe would diminish and relight to reproduce nightfall, evening time, morning, and day.

By eliminating the glass in the construction, the inside surface region would be twofold and be persistent.

Attitude control:

The environment and its mirrors should be focused on the sun. To constantly turn the state **360 degrees** for every circle without utilizing rockets that dispose of response mass, the sets of living spaces should initially be moved by working the chambers as force wheels. If one living space's turn is somewhat off, the two chambers will pivot about one another. When the plane framed by the two tomahawks of turn is opposite (in the roll hub) to the circle, then the sets of chambers can be yawed to focus on the sun by applying power between the two sunward courses: away from one another will make the two chambers gyroscopically process, and the framework will yaw in one heading, towards one another will cause yaw in the other bearing. The counter-pivoting environments make **no net gyroscopic** difference; thus, this slight precession can go on for the living space's circle, keeping it focused on the sun.

Terraforming:

Terraforming or terraformation (in a true sense, "Earth-forming") is the theoretical course of on purpose sterilization of the air, temperature, surface earth science, or biology of a planet, moon, or different body to be just like the climate of Earth to create it liveable by Earth-like life.

The idea of terraforming is created from each sci-fi and real science. Carl Sagan, a stargazer, projected the planetary planning of Venus in 1961, which is viewed as maybe the earliest record of the idea. The term was authored by Jack Williamson in a very sci-fi transient tale ("Collision Orbit") distributed in 1942 in Astounding fantasy, despite the very fact that terraforming in thought society may originate before this work.

Regardless of whether or not the climate of a planet might be changed by choice, the chance of building an associate degree-free planetary climate that emulates Earth on another planet still cannot appear to be checked. Whereas Mercury, Venus, Earth, Mars, and the Moon are focused on resembling the topic, Mars is usually viewed because of the most probable risk for terraforming. A lot of reviews have been finished regarding the possibility of warming the earth and modifying its climate and the National Aeronautics and Space Administration has even expedited banters concerning the matter. A couple of expected ways for the terraforming of Mars could be within humankind's innovative capacities, however as of currently, the money assets expected to try and do therefore square measure a protracted ways past that which any administration or society can dispense thereto.

AI implementation in space colonization:

AI can be implemented in the **O'Neil** cylinder to ensure the correct scheduling of events and to maintain them.AI Technologies such as **Computer Vision**, can be used to supervise the presence of all individuals by using face recognition technology. Deep learning can be used to avoid the collision of cylinders with objects such as planets, natural and artificial satellites and asteroids, etc. Many techniques of AI can be used in various parts of the O'Neil cylinder to ensure every single small process is going on correctly. Thus, making it an automated habitat cylinder for human survival without the need for human intervention. The techniques of AI used here are:

- Computer Vision
- Deep Learning
- Natural Language Processing
- Brain-Computer Interface
- Artificial Neural Networks

The above-mentioned technologies can be used to make the O'Neil Cylinder behave like a self-driving car. They can also be used in asteroid mining or planetary mining in extracting the materials required to build the cylinder or spacecraft in space.

Financial Impact:

Having the opportunity to Mars is undeniably more than multiple times more costly than getting to the desert, yet the creator was going for impact instead of demanding accuracy. Mars is a frozen, airless desert, and the vast majority of the Solar framework is much more dreadful. Who sane could need to proceed to live there? In addition, with the expenses per kilogram of getting anyplace in space higher than most valuable metals on Earth, there's nearly nothing

if any financial impetus to go whatsoever. For sure, it was assessed that the expense of returning the couple of hundred kilograms of Moon rock to Earth was around $50,000/gram. Regardless of whether the Moon was shrouded in unadulterated Platinum powder, it wouldn't sound good to dig it for Earth-based purposes at that expense.

Others have previously managed the hard-science numbers, and I won't tire you with those. In any case, assuming that is your thing, the most inside and out and relevant conversation on the theme I've had the option to find so far was set off in August 2007 by hard-science fiction creator Charles Stross with a post on his blog about the disincentives around space colonization. Perusing it is worth your time, both for the first-estimate right depiction of the expenses and the motivators, or rather a deficiency in that department, of space colonization in the underlying blog entry, yet in addition due to the 825, for the most part, contradicting remarks his underlying post-produced, with Stross getting back to answer to his faultfinders just multiple times.

Figure 2: Mars dome one from Babylon 5

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Conclusion:

The outcome of this paper is to implement AI in space colonization so that the process can be executed efficiently without much supervision from humans.

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Evaluation of the Greenfield Investments as a Source of Sustainable Finance - Correlation between the Return on Investment (Margin%), Environmental Abstain and Levered Growth- Inferences, Synchronization through Capital Asset Pricing & Hostile Takeovers

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ABSTRACT

"Economic Sustainability is an irrational factorial when compared to the environment hazard both in terms of static investiture and the yield on nurturing the call" Degradation has happened all over the world with the Empirical Investigation on how the consensus has pre-defined to be a memorandum of environment-friendly cult both when trying to deploy accrual services helping the industry re-merge from the anti-pollution constraints or the symptomatic assumption of capital intrusion to arrange the sophisticated distribution when it comes to the bond and surveillance rates to have been inversely related to each other"

The index scoring being mapped in for identifying the rates / magnitude for environmental descent per unit of fuel tanked in for proportionating guaranteed returns on the investments. The existing data framework consisting of the interdependence on the homogenous variables and the secluded cycle of investments – divided into crossover margins, rate of evolution for fund appraisals, cost of capital, acquisition rates, market value added for the investments, existent heterogeneous inductive parameters including Fisher's projection on Opportunity costs, existing differences in the over-run costs, no- trail measures to create a stratum to understand and access the risk – aversion of wealthy investors, trending demand / occlusion to focus on the strategic evaluation (depending upon the coefficient of correlation and the environment hazards sustained above a tolerance limit valuation). Thus, the Imbibing culmination of a positively regress downturn payments to settle low-realized accruals is again the shifting the world to a financial inclusion having binary constraints easy for a concentrated mechanics to float the risk quotient. Both are synchronous to each other

Keywords: **Investiture, Environmental Imprint, Economic Confluence, Cooperatives**

A. Introduction & Framework Analysis

The clear distinction surviving the benefits being stated is the unravelling conjecture to hold the cause-oriented premises of greenfield investiture, environmental performance to adjourn the acceptable rates of de-graded returns, institutional finance along with over-projected derailing and meniscus to return the payments, economic growth in between the panel secretion of data mapping between 1995 and 2017. The data clogging as mentioned before is done to segregate the same fact pertaining to take wealthy positions in the market along with the adjustable intrusions. All policy constraints that have happened in the near past are a duration statement of the aforesaid integrations to churn the rates of deferred employability. They may have constellations to bag in any payroll cost that might have allowed/ surrendered the secondary intermediary to have strategize the need of the fusion through inflation, qualifying prospects to have had a mixed bag opportunity matrix to divide the demographics of economic scaled playfield.

The basic conjecture to evolve the literature review and the methodology is again a quadrant mix of several factors. The most progressive auto- defined model for understanding how well the environment sustained scripture and the foreign divestments pay at par when the investments are secluded towards hotspots bringing inclusivity, green evolution through under-assessment of dialogues, impending direct assessment , situational analysis for the growth proximity taking grounds for any location avenues (to help identify the platform assessment locus and demand for usage of that self-serving bias both for the government and generational hypothesis) A recently developed prima-facie by the new financial constraints upon the market to understand the means of a sophisticated call margin and evaluate what can

be the cell- inducted mark-to-margin inferential. This may be a plan to evaluate the alternative hypothesis for the international pragmatic environmental degradation on non- mutated monologue. Ecological evidencing based the parametric invasion being done for the nth case can be a test to determine what patterns do these additional count of procured material syndicate cost, along with some variability in the cross-cycle demand uplift and the versatility of the option premium plan.

Then, to along with Alliaz and Decos (2019) have secluded the non-unit test required to configure the auto-integrated transgression on the explicit variables determining the exchange rates, cover-diluted funds (Appropriation Margins), Deducted source on revenue (Legal Conjecture- Shift on the seal-contrusion), same evidential navigation is available for the cross- rooting in terms of estimated correlational synopsis of the inter-sectional data clumping. Andlier and Kapsen (2018) along with Maple and Jeos (2020) have underlined using the Pearson – No Cost show (Shadow costing) to understand the relation between different set of directional variables and understand the assimilation of the most concurred initiation between the target variable and the stagnated effect on loop – constraint. There may be some unit prices of different invariants that may help understand the systematic risk evolved with both the acceptance and the roll-out impertinent collision. This is due to insurgency in the environment helping us introduce some coveted costs to tarnish the baseline effect of creation, recurrent deposits (% incurred plus flow of positive encashment of transfused funds along with higher pay-outs for those policy overview trances wherein the investment call-to – trigger the best simulated retrusion is set along with the encapsulation of fragmented reordering of output costs. This may be in accordance to any such investigation being implanted upon why are the greenfield investments a direct source if environment sustained mechanism and fostered containment zones to rupture soon when the environment is altogether a grounded framework under synoptic green-cover. The brownfield investment happening initially has been reducing these footprints by a more convacture and the implantation has been affecting the zones wherein corporate restructuring has not been figured -out and the contrusions to divide the segment and then calculate the cost required to be a solicited independent contractual obligation to rule out every possibility of harsh testimony of over-rated pollution engines, drivers using extra-vagine vehicular stoppage policy , increase in the number of folds to initiate an agreement to file as a sacred proposer for the oviance of the policy (Melke and Arthur (2020)) clearly indicate this as a para- nomal equitable distribution of imperative data points and can be reduced via initiated modelling of those target variables like economic surplus, mandated interest on income, expense order nuances, employee orientation Stochier plot, relational distribution through five mass integrations- change in the eccentricity of underlying stock, value of the stock after nth cycle has passed ordering, number of electro- incurrent messages to decipher navigation census , iterative gestures, pre-ordered samples. The earned valuation comes in defining the economies of scale (pre-consignment), econometric implantation of the review modelled, stigma to create lag- levelling of the historical evidence, final assumptions and derailed constraints as a performance gap.

B. Objective of the research review

A switch to financial inclusion has definitely changed the curvature of selling high/ volatile pragmatic investments. The environmental needs and Consumer Outlook has changed and is inclusive of the transgressive steps and the demand over-riding the stratum of cost evangelists, split-overs, value aged costing and the methodology to underline carpet techniques reducing the investment proportionated to the realization of a lost coal mine. Coupling of saturated interest rates have been deliverable via the greater accountability protocols at the discretion of the management avenues surviving the environmental performance standards, substitutes hampering the environmental hegemony of super fluence through greenfield costing, novel forward instruments, graduated assessment of foreign direct investment (net promoter margin to have increased in the same ratio), rate of imbalances both in terms of general volume differences, evolution through periodical deficit in the market, pooling of the funds, frequently changing apprehensions about the economical survey being instigated by the litigation of churned costs, diluted benefits, imperfect installation of supply constraints as cited (Adouli and Harmni 2018; Jiang Lu Al. 2019; Naveen, Alwar and Tovar 2019; Publice Romas and DeJaesus 2018; Saptok and Brassic 2019;

Shitle and Shahbtez Ltd, Musibu and Hassin 2020)

C. Research Methodology and Data Analysis :

Coming to the most factual agreement that may happen is according to Mortay and Senul (2019), about how to select the best prototype while aggregating the intervention, abbreviation due to economic penetration, best case scenario mapping and loggerheads with the derivable unit every ecology helping determining the underlying case on point about how to inter-link different schemas evolving a intruded registration. That analogy to help select case-to-case basis of any scheme to dis-integrate classification census, population accepting rates of sustainable measures; Jensky and Mortal (2017) , trailing through the last quarter analysis of stepping the scaled benefits, variance analysis , mapping through mere factual discourse intrusions, identifying the best case investment parameter and then model selection on the intervention. The retrenched factual agreement discusses about how an early schematic dot game helped the Asian contruders identify the opportunity. There were nth sample according to Magoy and Janeson; (2018), trying to decipher k elements in the market. After realizing the power of decoupling and sourcing some investitures out of the lane constraint, they were able to clearly magnify the risk -sourcing hedgers, maple leaf yield calls, driving counteracts through imperial containment services (legal beneficiaries, term linked onus , acquisition through management equations, derivation via corporate emaculation, restraints on the focal drive connect (integrated through-output), environment consensus blog (carbon is a stationed linked incentive for most of the fixed deposits , probabilistic into the marginal safety indication being adjudicated collaterals to the initial mark-to-market fragmentation.

Putting every disclosed credential into minimum lag consortium, helping an individualistic investor to analyze the mobility of wealth managers, analysts who derive the zones for wiping up the defined hostility of direct transfusion (An Ombudsman may derive a direct commission surcharge from per cent implantations happening for that hour of greenfield invasions, within the financial contagion (maybe a symptomatic following on any platform may help derive a unit volume of a corpus that is used as an annuity and then it is re-invested into types and incubating margins)- Dolt and Schweizer (2009) Divisional Income was a modus operandi for most of the stealth health infra-gons due to the low proximity of the current user and the mode to rely on the famished arbitrageurs along with the position evolvement of each investor. Let us assume if two units of carbon ionization would have uplifted the market momentum by 6 basis points, all 33 out of 100 hotspots would have portrayed brisk effervescence along with a radiant fusion. This is called linear transitivity and would have affected the corpus margin by a greater force. This is the annualized value of increase the productivity of the last mile incentive, rating it on a basis of the first order sequencing within the dots and in-front diversifications, surrendering the mid- value of the calculated topology of the mapped scaled revenues.

Research Hypothesis and Validation Criterion

Underlying Foreign Direct Investment for trending Greenfield & Environment Sociology Direct investiture is again a commensurate methodology for directing the foreign institutions in the , assets being co-mapped or transferred using the acquisition model of direct capital transfer or the exodus of the new hostile foreign re-issuance that is being linearized and put into account surplus. This has been either an innate exclusion or the capped fund being utilized for number of samples with a polarized call to margin approval and the stakeholders trying to yield in guaranteed returns being a part of the asset pricing model (Rate of Inverse Mortgaging wherein a clear distinction between the swap agreement for the risk mitigation and no-cost under-rated annuity has to be penetrated via signalled routing. This is the trailing of the last-mile unit of capital fusion and the minimum rate above which an investor can take a call and decide upon the market resilient over-riding exchange corpus called the outflow – backchain transfer through the savings schemes or the unit linked market schemes (capital flow – both internal and external basis the determination of the intrinsic valuation of the integrated weighted capital intrusion).

An affiliated cross-border refinancing has been initiated recently to annualize the exchange rates. The environment friendly initiative including the public provident fund with a provision of 56.54% of the Non-Asset Pricing Index, mere absolute difference between the inflows and net adjusted outflow does not

help calculate the % mark-up of the greenfield investment. The United Nations Council Apprehension Department serves as the locus of indifference for different primarily focused choice of whether an exhaustive specimen for choosing the territory shall be plummeted territorial expansion, strategic evaluation of a non-corpus validation scheme (Aditya Birla Asset Allocator Small Fund valuing both the underneath currency and a noble zone creation for a ready cause, dilution of care funding (for new acquisitions plus prima facie shareholdings of the minority stakeholders)- causal effect and binary implantation of financial constraints, modelling rebates, return on investments, leveraging the corpus.

FDI Margin Sum

2020-2022	63.636363650116300%	86.7768605766771%
Developing Nations	63.636363674183400% 63.636363740368000%	99.9159243372071% 99.7687919266582%
1999-2000	63.636363922375600%	99.3641777933090%
2001-2003	63.636364422896500%	98.2514888937800%
2004-2006	63.636365799329100%	95.1915941718836%
2007-2009	63.636369584518900%	86.7768818097180%
2010-2012	63.636379993793200%	86.7768818097180%
2013-2015	63.636408619315200%	101.7485144457350%
2017-2019	63.636487339633500%	104.9629795386530%
2020-2022	63.636703821512800%	114.9716549416020%
	63.637299154275700%	95.1929846853215%
Hispanian Nations	63.638936376810200%	86.7803677865593%
1999-2000	63.643439173188400% 63.655825149399800%	95.2206971243087% 87.3321377017628%
2001-2003	63.689911455556500%	86.8033979309997%
2004-2006	63.783837303709000%	94.3835400284257%
2007-2009	64.043567647959400%	90.9521875428963%
2010-2012	64.768856447688600%	90.2453880191588%
2013-2015	66.850828729281800%	90.822891391258 7%

Research Methodology, Variance Analysis and Inductive Reasoning

__Analysis of the cross- merger tabulation and inverse mortgaging, acquisition& Cycle Foreign Direct Investment has to be cross-mapped over different cyclic ties/ periodicals available for the rate of super-positioning of the return on promoters, indulging non stockholders (Priority lending in case of an environment supposition compliance check), both gauging high margins due to financial leverage exceeding the allocator basket of 54.50% to 76.98%. This means that 30% of the financial inclusion comes from the investment done as a part of greenfield capital expenditure, modelling shifts in the swap rate, exchange cap of 25.758%. The difference between the actual corollary of the minimum treynor ratio should have been a product multiple of the agreement value. This has been a basic assumption of the underlying caused based re-merger. This is the derived contract that may be used to understand the hypogenity of the sustained model. The difference between the induced hyper-inflation within the diluted prices, invariant yield (foreign direct consensus tallied within the maximum of the principal and the payback amount) - this is called the demand forecasting for a new range of capital exodus – initiating fresh issue either through purchase of additional shares, miniature rebates on the free- flow of cash provisioning, fragmenting the equity issue, debt resolved corpus, feasibility of unit market capital, latent fusion through amalgamation schedule for an immediate return on initiated investment . Let us take an example of 450 units of extra envisioned capital for transferring to a unit X and diluting 5% to a trust Y. (Hypothetical)

Inferences for the Data Gathered:

The foreign funding is a proportionate cover for each instalment being a super-repository for most of the scheduled margin/ scaled payments. The direct transmission rate in case of an old merger is incubated within the additional unit of capital trust being induced via the positioned stock variant, it is termed as the low-high-low sell cover. This is proportioned to be the lowest bid in the market with regards to understanding the operational leverage for a company/ guardian to inculcate any trust/ society to emaculate various trailing opportunities through desk servicing (conducting survey based on low appetite quotient for a homogenous set of variables while analyzing the same). This is appropriation through navigation of the maximum output/ probabilistic reactivity of the best premium / added margin to the repayment amount. This is called Decartes' law of conformity with regards to invariable decrease in the underlying asset / deducted source on costing, evaluation of an infinite scheme, biased stratum of design evaluation/ operating the tertiary variable to obtain the higher degree of correlation. This may be a positive correlation with regards to the maximum factors as a definite function to the limitless annuity pay-outs. Thus any section of financial constraint shall define those borderline investments that may be a liability in case of deferred payments. Let us take an example of Short-term cover with a fixed interest rate of 5.5%. Assuming some X instalments, we need to find out the risk assessment methodology to reflect about the origin. Assume every bid is a multiple of the previous cycle. Take Capital Cost to be 3.55% of this corpus. The return on added value capital is 2%. The Decartes' rule can thus be deduced, verified, approved and final spill over/ fraction of the final amount is calculated. Capping the principal targeted value, no-cost dividend and implied counterparty rate".

Thesis Equation on an Existent Recursive Model

When there is an indirect motion to solve a debt-ridden simulated asset, we try using the minimum verified capping of not more than 6.7% to understand the payback or limited constraint valuation. This is called the Gregor's value test mapping upon the implied set of unified interface integration. This may be due to different pricing manuals for distribution or the classified environmental stocks mainly from Adani Wilmer, mostly contain the yield on capitalized arbitraging. We try deliver at-most three deliverable penny variants against the large-cap heterogenous frameworks wherein the minimum interest rate is double of the surplus traced with the funds. This may be due to the infringement in the basic model that is being used to assimilate the volatile beneficiary ratio. The risk-to reward for the environment friendly stock, N25 (Supposedly it has a large cap seeding of 8%) is divided among the newly acquired stakeholders (Say X and X' may be the promoters and equity shareholders). The modelled value of the net- initial stochastic turnover is curated to be a quarter benefit - cost proportionate of diluted shareholdings). On a case to case basis, each investor will be requiring a portfolio mapped index (Net Guaranteed Support Wealth Scheme) – Scholas and Nikken (2019) , about

a minimalistic pragmatic institutional investor shall retrace the current fair value. Reviewing the profit zone, we try to understand the limitations of the stock within the netting zone to create. A pilot surveying above the masked investment. This is called demand forecasting for a limited constraint has been periodically fitted using a recursive model.

This may be due to an odd discriminant analysis to understand a secluded study for environmental changes, sustained econometric variance (create a landmark for utilizing all the funds triggered as a metric to understand, assimilate and parametrize the market census) and then make call upon whether such an initiated public offering (IPO's performance) shall deliver the Yth% of consolidated fund value. This difference in limited constraints is due to inflated parameters of the deduced capital, higher buffer costs, Brayer's cost integration, additional fragmentation and invariable decrease in the marginalized revenues for non-parameterized indexation, revised annuity on truncated inflation, per capita broadcasted premium on return on induced capital, viewership frequency of campaigns, reverse ordering is planned in an initial model to help understand navigation census and drive the resonant framework. This maybe 10-12% of the return on debt – (Using the asset pricing and Gorden's capital census, we try mapping in both the variability and underlying crater of the long-term fund proposal, there are n, n-3 initiating protocols for the firm to have a glance for the stratum of benefit, with the findings of the lag in the tarnished intrusion, finding the stake best suitable for a converted differential option. The unit pricing of any such model shall be different from the unidentified manipulated Gregorian fiscal deficit.

Cost Benefit Analysis & Composite Factor Variant (Use Case- Symphony)

"There has been an instance of sudden payment elapse and now an environment friendly fuel has to eject some fund to help make the corpus available to the primary investors. They have pooled in 9.255% of the switched funds. This fund appropriation is 1.455% of the surrender value as the best opportunity index. The last quarter, the company had utilized the derailments due to some elapse in the hour of added value reserve and the return on equity is increased by 5.275% (Averaged to x % of weighted order relative pricing). Under the market conditions, what can be the rate of returns for a product to adjudicate electricity corners? Using the Principle of Conjoint Valuation, evaluate the funds to be distributed. The first and last figures are assumed to be constants. Use a linear regression model and evaluate the probability of such an integration with the S1 variable"- Arthur and Mayer's Fierteg – The Environmental Cadalist

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A Managerial Perspective on Sustainable Supply Chain Management Practices and Performance in the Indian Dairy Industry of Maharashtra and NCR

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ABSTRACT

Need and Significance: The dairy business in India has made a substantial contribution to the rural economy of the country. It has been considered as a tool for achieving socioeconomic improvement. To meet the increasing demand of the consumers, companies are increasingly interested in supply chain management as a development area. A plethora of studies since the 1990s, both successful and unsuccessful, show how companies have invested heavily to optimize their supply chains to boost customer satisfaction and internal productivity. The winning network of individual enterprises is made up of supply chains that add the most value to customers at the lowest cost. In fact, companies can no longer compete if they operate in isolation from their suppliers, consumers, and other supply chain partners. As a result, the most pressing issue is optimizing the dairy industry's supply chain to meet future domestic demand while remaining competitive in global markets. The purpose of this study was to discover the true facts and, as a result, examine the methods for improving those processes to generate a win-win scenario for all players in the dairy supply chain.

Research Question & Objectives: Based on the literature review, the research question of the study is to understand-How can the Indian dairy industry's supply chain management (SCM) procedures be monitored and structured to improve performance and gain a competitive edge? The research objectives pertaining to the problem includes: 1) To get an understanding of the SCM methods used by supply chain participants in the Indian dairy business, such as producers, processors, distributors, and retailers. 2) To critically evaluate the impact of accepted SCM practices on the performance of the organization. 3) To have a better understanding of how youngsters are reacting to market dynamics leading to customer satisfaction. 4) What are the factors and challenges for the successful implementation of Sustainable Food Supply Chain Management? 5) To propose a clear direction for enhancing the performance of the Indian dairy industry by implementing SCM methods.

Methodology: The study involves exploratory research to understand the Indian dairy supply chain management. A descriptive research design has been adopted to answers the who (dairy companies operating in India), what (SCM practices are adopted), and what are the changing mindset of the consumers. The primary data has been collected from the Indian states- Maharashtra and NCR region. The five groups that have been identified as respondents include: two Dairy plants (registered milk processing unit), four Milk Cooperatives (collection centers), two Retailers (marketing and Distributors), one union employee and 545 customers (milk & milk products). Judgmental Sampling technique is used to select the various milk processing units, milk cooperatives, retailers, onion employee and data was collected through structured questionnaire. Simple Random sampling technique is used to reach out customers and data was collected through questionnaire on five points Likert-type scale. The data collected is analyzed using the 'Statistical Package for Social Sciences SPSS (Statistical Package for Social Sciences) version 25.0 subject to different analyzing techniques. Cronbach's Alpha value was used to conduct Reliability test. Other statistical tools used are mean and Factor analysis

Key Findings: The findings of the study show that all the dairy companies are aware of dairy supply chain management (DSCM) practices. The maximum of the companies has implemented or planned to implement whereas the small companies lacked implementation practices. All the respondents agree to DSCM practices will help the organization in improvement of performance, marketing orientation, and achieving competitive advantage. Use of ICT (Information and Communication Technology) and ERP (Enterprise Resource Planning) helps in supplier relationships. Factors that lead to customer satisfaction include customer services, customer

problem solving capability, value for money, product quality and Product & service reliability.

Implications of the study: This study would be beneficial for operating managers, Sales and marketing officers, procurement managers and other departments to understand the mindset of the consumers to fulfill their demand. It will also help the milk producers to sell decent quality products.

Keywords: **Supply Chain Management, Indian Dairy Industry, Customer Satisfaction, Sustainability**

I. Introduction

India is the world's greatest milk producer, accounting for 23% of worldwide milk production. As a result, the dairy business in India has made a considerable contribution to the economy of the country. Dairy activities in India are an important aspect of the rural Indian economy because they are the primary source of employment and revenue. Therefore, it's been seen as an instrument for accomplishing socioeconomic progress. India's population is enormous, and per capita milk consumption is approximately 394gms per day (in 2019). In India, the dairy industry's products are largely consumed domestically, with most of them being marketed as fluid. To meet rising consumer demand, India is rapidly investing in and emphasizing supply chain management as a development area.

Milk production in India is approximately 209.96 MMT, with an expected increase to approximately 255 MMT, indicating the potential growth of dairy management in India. Currently, the dairy business in India is largely unstructured; according to several studies, India has a 20% organized market and an 80% unorganized market. There is a lack of technology adoption or innovation in the unorganized milk market, resulting in higher wastage, variable quality, low customer satisfaction, and so on. Successful dairy companies are currently investing extensively in supply chain optimization to improve customer satisfaction and internal productivity.

Customers get the most value for the least amount of money. As a result, optimizing the supply chain to fulfill future domestic demand is critical for firms to preserve their competitiveness in the global market. Similarly, the Indian government has launched numerous development initiatives to enhance the dairy industry, and private engagement is growing in the Indian dairy sector.

Implementing an effective supply chain across the business (including inbound, manufacturing, and export) will be the most crucial area of development for the Indian dairy industry to meet both home and international demand. As a result, the most important challenge for the dairy business is streamlining its supply chain to meet future domestic demand while remaining competitive in global markets. The goal of this research is to uncover the truth and, as a result, look at solutions for enhancing those procedures to create a win-win situation for all parties involved in the dairy supply chain.

Ii. Related Literature Review

2.1 Indian Dairy Industry Scenario-

India is a developing country & day by day the consumption pattern, healthy lifestyle & eating habits of consumers changing due to numerous causes like growth in income level, Covid-19 epidemic, promotion of healthy & nutritional food culture etc. As a result, the food industry is attempting to enhance its supply chain. Interdependent supply chain linkages will ensure each stakeholder a market for their products, eliminate the risk of unpredictability, and keep them financially stable within such a supply chain. However, to maximize profit from the business while also ensuring a long-term supply chain, the company must optimize the chain by eliminating/merging unnecessary/less important linkages to increase the product's value at the lowest possible cost.

Studies by Goyal (1994), Srivastava & Patel (1994),

Roy (1997), Kulkarni (1997), Bhalla (2001), Rangasamy & Dhaka (2007), Burki and Jhan (2008), GyanPrakash (2011), Technopak (2010), and FAIDA & CII-McKinsey reports have highlighted the difficulties and the potential of the Indian agro-industry. Inefficiencies, deterioration of perishable food items, inferior food quality, malpractices in weights and measures, mismatch of demand and supply, feed/fodder shortages, costly raw materials, supply chain inefficiencies, increase in transportation and processing cost and so on are only a few of them.

Supply chain procedures are the most significant department in any company since they bring all the stakeholders together and connect them to provide the best services at the lowest possible cost while also ensuring customer satisfaction. According to many definitions, supply chain management encompasses various departments such as procurement, production, processing, and distribution, among others, and successful coordination between them will result in the organization's success. Previous literature (IBM, Chopra and Meindl 2007, Walters 2008, Yigrem et. Al. 2008, Burki and Jhan 2008, Subbhaiah et al.,2009, Karthikeyan and Teshome 2010, Wisner et al. 2012, Rebeca Sanchez-Flores 2020), has defined supply chain management (SCM) and its positive effect on productive efficiency of the small dairy farmers. These studies emphasize handling of the entire flow of goods and services, integration of trading partners, transport and storage of material, fulfilling customer requirement etc.

National and International studies have been reviewed to analyze the various predictor variables like Information and Communication Technology (ICT) (Hazen and Byrd 2010, Asabere et al 2012), Warehousing Management (Fatehpuria 2013, Aung at el 2012), Supplier relationship practices (Qrunfleh et al 2012, Boniface 2011), Supply chain manufacturing practices (Singh et al 2012, National Bureau of Agricultural Commodity and Food Standards 2005, Smith et al 1995), customer relationship management (Saarijarvi et al 2013, Wang and Feng 2012), Transportation management (Matapurkar and Sinha 2011,Garcia and Lunadei 2010), etc. These studies have been analyzed using a case-study, regression, multiple linear regression, factor analysis, Structural equation modeling etc.

2.2 Supply Chain of Indian Dairy Industry-
In India, for example, Amul cooperatives' supply chain eliminated the middlemen and engaged farmers/milk producers directly with processors, allowing them to enhance profit margins. Such a model aided in the creation of transparency among stakeholders, and the inclusion of all stakeholders' aids in the improvement of supply chain procedures by removing redundant supply chain links. This, in turn, leads to a long-term supply chain.

Nestle, on the other hand, uses a milk district model for distribution, which includes: (a) an agreement with farmers to divert milk twice a day, (b) the installation of chilling centers, mostly at collection points, (c) transportation from collection centers to the district's factory, and (d) the implementation of quality-improvement programmes. Sustainable supply chain implementation is essential to govern the environment, economics, and social aspects of such a complex distribution network. Then and only then will such a network be long-term viable. The Company's efforts in India have facilitated direct and indirect employment and offers livelihood to about one million individuals including farmers, suppliers of packaging materials, services, and other commodities. In such a circumstance, the social side of the supply chain must be prioritized to benefit the people who work for the company.

2.3 Sustainable dairy industry-The dairy supply chain must enhance its sustainability to meet increasing customer demands to reduce food waste, pollution, and natural resource usage. Although intermodal transportation has been identified as a significant instrument for reducing CO2 emissions, several barriers remain in the way of the dairy supply chain adopting this approach (Cannas 2020). This emphasizes that having access to technology is insufficient to boost the dairy supply chain's sustainability; action must be performed at all stages of the supply chain.

Supply chain sustainability is a new emerging business goal that could be the dairy industry's key

goal in being truly sustainable (Luther 2021). A company's attempts to address the environmental and human impact of their products' journey are referred to as supply chain sustainability. From raw material procurement to production, storage, and delivery, as well as all transportation links in between. Its purpose is to keep environmental damage to a minimum. The supply chain is where the organization sees the most improvement. The activity of coordinating sourcing, production, inventory management, and transportation to all supply chain partners is known as supply chain management. The supply chain sustainability statistic components include demand, environmental impact, societal risk, data system, and advancement. Consumer products firms account for more than 90% of the supply chain. Environmental indicators are used by corporate members to inform supplier management and hold business partners accountable to supply chain sustainability goals. The biggest hurdle to sustainable supply chains is cost, as smaller businesses cannot afford the costs of establishing a sustainable supply chain.

The advantages of implementing a sustainable supply chain include determining areas for improvement within the supply chain, as well as ensuring that the company's branding is such that customers are prepared to pay more for superior services. Employee hiring and retention are generally influenced by a company's corporate culture and principles, with sustainability playing a vital part.

Current Supply chain of Indian dairy is bit complex due to various difficulties & lack of advancement in sector. Typical supply chain of dairy industries is shown below in figure 1

Figure 1: Supply Chain of Dairy industry
(Refer Annexure)

. Milk flows from the farmer to the customer via many modes of transportation, and its perishable quality makes transit more challenging. Time to deliver, milk temperature, humidity, total cost, distance, demand, forecasting, and packaging are all important concerns in any efficient supply chain. To create a sustainable supply chain, technological progresses as well as better optimized processes to move items swiftly are required.

2.4 Challenges in supply chain

Various issues in supply chain management exist based on various characteristics such as material handling, transportation, and quality supply, among others. When it comes to material handling, it's clear that milk handling at the farm level is critical, as there's a risk of contamination when milk is extracted from a cow. If the container is not clean, sour milk can develop in minutes. When cooperatives or dairy plant vans collect milk from farmers, an unnecessary milk transfer from one container to the milk van occurs, and the van driver is inactive at the time, lengthening the wait.

Because of its weight, milk is usually delivered by truck, and it should not be kept in one place for an extended amount of time due to the risk of spoilage and expiration. When transporting milk by truck, the weight limit is critical; if the truck is carrying less milk than its capacity, the fuel consumption and truck numbers are increased. Another significant supply chain interruption is the byproduct of the milk after processing. Milk by products can be used as animal feed, but from the standpoint of the industry, it is a revenue-generating commodity. As a result, additional transportation is required to carry by products from processing plants to other factories to produce other goods such as whey and other dairy products. Now a days, dairy industry is producing various value-added products with different varieties within them.

As a result, there will be additional packaging as well as a quick increase in the number of stocks keeping units (SKUs) for those products. SKU handling and storage, as well as specific packaging, all impede the process's long-term viability. Another major concern in the current dairy market is the lack of government support for the construction of cold chain infrastructure, as well as the lack of private sector involvement in the cold chain.

It is critical for the industry to address these issues and develop a long-term supply chain. Sustainable supply chains must consider not just the efficiency of the process for delivering milk, but also the

environment for a better and healthier future. The goal of such a modern supply chain implementation is to eliminate redundant supply chain linkages while increasing the value of milk products at the lowest possible cost. While implementing a supply chain, three basic elements must be considered: economic, environmental, and social factors. The economic element can refer to the benefits, profit, or return that various players in the supply chain receive because of their efforts.

Animals are a crucial aspect of the dairy business and must be treated ethically while producing milk, as is the usage of water for constantly cleaning various equipment, machines, and so on. Human capital is influenced by social variables, and several policies are in place to ensure that the supply chain runs smoothly. Continuous refrigeration, which has a direct environmental impact on CO2 emissions around the world, is another part of the supply chain that impedes sustainability.

III. Research Methodology

In today's competitive business environment of Indian dairy industry, SCM play an important role to improve the operational performance of the organization. It will aid in the reduction of overall system costs while also providing maximum value to its customers. The study involves exploratory research to understand the Indian dairy supply chain management. A descriptive research design is adopted to answer who (dairy companies operated in India), what (SCM practices are adopted), and what are the changing mindset of the consumers.

3.1 Research Objectives-

Based on the literature review, the research question of the study is to understand-How can the Indian dairy industry's supply chain management (SCM) procedures be monitored and structured to improve performance and gain a competitive edge? The research objectives pertaining to the problem include:

1) To get an understanding of the SCM methods used by supply chain participants in the Indian dairy business, such as producers, processors, distributors, and retailers

2) To critically evaluate the impact of accepted SCM practices on the performance of the organization

3) To have a better understanding of how youngsters are reacting to market dynamics, leading to customer satisfaction.

4) To propose a clear direction for enhancing the performance of the Indian dairy industry by implementing SCM methods.

3.2 Research Hypothesis-

The research hypothesis constructed to achieve the objectives of the study is given below:

H1: There are significant differences in how SCM practices are implemented among dairy supply chain members.

H2: Adoption of supply chain practices helps in improving customer satisfaction.

3.3 Data Collection, population and sample-

Secondary resources like national and international journals, reports, books have been used to investigate and comprehend the techniques of supply chain management in the Indian dairy industry.

The primary data has been collected from the Indian states- Maharashtra and NCR region. The five groups that have been identified as respondents include: two Dairy plants (registered milk processing unit), four Milk Cooperative (collection centers), two Retailer (marketing and Distributors), one union employee and 545 customers (milk & milk products).

Judgmental Sampling technique is used to select the various milk processing units, milk cooperatives, retailers and data was collected through structured questionnaire. Simple Random sampling technique is used to reach out customers and data was collected through questionnaire on five points Likert-type scale.

3.4. Questionnaire design-

The questionnaire was designed based on nine variables mentioned in previous studies (Rajeev 2014, Karthikeyan and Teshome 2010, Hazen and Byrd 2012, Qrunfleh et.al., 2012, Wang and Feng 2012, Kohli & Jaworski, 1990). These include customer relationship management, Supplier relationship practices, Information &

Communication Technology, supply chain manufacturing practices, inventory management system, transport management, warehouse management system, marketing orientation.

3.5 Pilot study-

The questionnaire was pre-tested by the researcher by distributing it to academics and dairy companies. Academicians were prominent professors from management institutes (dairy and milk cooperatives), while industry experts were managers from dairies in Maharashtra and the National Capital Region. Finally, the questionnaire was updated in accordance with the comments received, based on the results of the pre-testing.

3.6 Scaling-

Two types of scales (on a five-point Likert-type scale) were adopted: Adoption continuum and Agreement continuum. The adoption continuum scale for measuring the adoption level (on a five-point Likert-type scale) was mainly applied to access the responses of the four groups of respondents: dairy plant, milk cooperative, milk retailer, and union employee. The scale consisted of 1-Will think about it, 2-Willing to adopt, 3-Planing to adopt, 4-Partly adopted, 5-Fully adopted. Agreement continuum for measuring the agreement level of consumers or customers. It consisted of 1= Strongly Disagree, 2= Disagree, 3= Indifferent, 4= Agree, 5= Strongly Agree.

Apart from it, there are a few questions that are on a dichotomous scale.

3.7 Statistical tools-

The data collected is analyzed using the 'Statistical Package for Social Sciences SPSS version 25.0 subject to different analyzing techniques. Cronbach's Alpha value was used to conduct Reliability test. Other statistical tools used are mean and Factor analysis.

IV Data Findings & Analysis

The information gathered from the questionnaire replies was entered onto a computer using Microsoft Excel software. The data was then analyzed using the Statistical Package for Social Sciences (SPSS) version 25.0 application software package. Table 1 shows how the data generated from the surveys was exposed to various data analysis procedures.

Table 1: Types of Questions Asked and Data Analysis Methodologies Employed (Appendix)

The demographic profile of the seven respondents who agreed to fill the adoption continuum scale includes one respondent from dairy plant, four milk cooperatives, one milk retailer, and one union employee. Out of the seven respondents two belong to the government sector and five belong to the private sector. Location wise one belongs to NCR and the other six were from Maharashtra. Based on the year of establishment of the respective organization –one organization is 76 years old while others have an age of 52 ,49,41, 20 and 7 years.

4.1 Reliability Testing- Reliability values for the two types of questionnaires is as below in Table 2

Table2: Reliability Testing (Refer Annexure)

The values for the dairy plant, milk cooperatives, and milk retailer were found to be more than 0.6, which shows the scale has high reliability. Cronbach's alpha value for the customer questionnaire was calculated to be 0.800 which is more than 0.6 indication that the scale has high reliability.

4.2 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), Milk Cooperative (MC) and Milk Retailer (MR)- To check the difference in opinion of the response of dairy plant managers, milk cooperative workers, milk retailers and union employee representative by using Mean for the statements that were common between the three.

Table 3: Mean for Dairy plant (DP), Milk Cooperative (MC) and Milk retailers (Refer Annexure)

The above table 3 shows that the respondents agree for all the supply chain management practices to be important for the improvement of organizational performance. When they were asked about their adoption level- for the statement SRP3 the mean value of the responses is 3 which indicates respondents are planning to adopt the supply chain management

practices. The mean value for ICT 1, ICT 2, ICT 3 and IMS 1 is 4 which indicates that the respondents have partly adopted. In the statements SRP1, SRP2, and SRP4 the mean value is 5 which indicates that these practices have been fully adopted. The findings clearly suggest that DP is more likely to engage in the practices listed above, whilst MC and MR are less likely to do so.

4.3 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), and Milk Cooperative (MC) To check the difference in opinion of the response of dairy plant managers and milk cooperative workers by using Mean for the statements that were common between the two.

Table 4: Mean for Dairy Palnt (DP) and Milk Cooperatives (MC) (Refer Annexure)

The above table 4 shows mean values for the three SCM practices i.e. supply chain manufacturing practices, transportation management (TM) and supplier relationship practices (SRP) which were common and appeared in different supply chain members i.e. DP and MC questionnaire. The mean value for TM1 is 3 which indicates that the milk cooperatives are planning to adopt transport management practices related to truckload. Statements SCMP2, SCMP3, SCMP4, TM2, TM3, and SRP 6 have a mean value of 4 which indicates these practices are partly adopted. Whereas practices related to the personal cleanliness of the employees to maintain hygiene in the dairy manufacturing plan have been fully adopted. The above mentioned findings clearly suggest that DP is more likely to engage in the practices listed above, whereas MC is less likely to do so.

4.4 Assessment of agreement and adoption continuum which were common and appeared in Dairy Plant (DP), and Milk Retailers (MR). To check the difference in opinion of the response of dairy plant managers and milk retailers by using Mean and Independent t-test for the statements that were common between the two. The four SCM practices, namely customer relationship management (CRM) practices, information and communication technology (ICT) tools and techniques, supplier relationship practices (SRP), and inventory management system (IMS), which were common and appeared in different supply chain members i.e. DP and MR questionnaire, were subjected to a mean.

Table 5: Mean for Dairy Plant (DP) and Milk Retailers (MR) (Refer Annexure)

The above table 5 shows the overall findings revealed that while there are considerable variances in agreement for some practices, there are big differences in acceptance for CRM1, CRM3, CRM9, ICT4, and SRP5.

4.5 Assessment of agreement and adoption continuum which were common and appeared in Milk Cooperatives (MC) and Milk Retailers (MR). To check the difference in opinion of the response of milk cooperatives and milk retailers by using Mean and Independent t-test for the statements that were common between the two. SCM practices such as information and communication technology (ICT), supplier relationship practices (SRP), and inventory management practices (IMS) that were common and present in diverse supply chain members i.e. MC and MR questionnaires were subjected to a mean

Table 6: Mean for Milk Cooperatives (MC) and Milk retailers (MR) (Refer Annexure)

The overall findings demonstrated that there are considerable variations between procedures ICT5 and SRP7 in terms of agreement and adoption. The aforementioned findings clearly suggest that both MC and MR have a lower proclivity for the practises listed above.

H1: There are significant differences in how SCM practices are implemented among dairy supply chain members.

Thus we reject the null hypothesis as there is a significant difference in the SCM practices adopted by dairy supply chain members.

4.6 To identify the aspects that influence customer satisfaction in the Indian dairy sector

The customer questionnaire consisted of 45 questions, the first nineteen questions were dichotomous questions, which were asked to the

customers to know number of family members, monthly income, current milk brand consumption, frequency of purchase, daily consumption, factors influencing purchase of preferred brand, whether they used packaged milk and milk products, impact of covid on the consumption of daily milk etc.

The next 26 questions were on a five-point likert scale, and they were asked of customers to learn about many elements that they considered when purchasing milk and milk products. The questionnaire had five different variables, each of which contained statements related to the following constructs: A. Product quality B. Product & Service Reliability C. Customer Problem Solving Capability D. Value for money offers and E Customer Service. The scale has been adopted from Kumar Rajeev (2014).

The questionnaire was pre-tested in a pilot study before being distributed to respondents to check for errors in the wording of questions, lack of clarity, and other issues. The questionnaire was pre-tested by the authors who gave it to academics (dairy industry specialists), senior professors of Research Methodology and managers from dairy companies.

In the customer satisfaction survey 545 respondents participated from Maharashtra (70.9%) and North Central Region (29.1%). The total sample consisted of 68.4% males and 31.3% females. Maximum respondents (57.2%) belonged to the age group of 18-25 years, 29.4% belonged to 26-35 years, 7.4% belonged to 36-45 years, 3.5% belonged to 46-55 years and 2.6% were in the age group of 56 & above.

Forty-five percent of the respondents had 4 members in their family, 26.9 percent with 5 and above members, followed by 24 percent with 3 members, and 4.2 percent with two members. With respect to the educational qualification 64.8 percent of the respondents were graduates, followed by post-graduate 26.3 percent, 12^{th} grade were seven percent, Diploma were one percent, and below 10th class were just 0.9 percent.

The monthly income (in Rs.) was highest (50.6 percent) in the range of Rs 45,000 and above, followed by Rs. 30,000-45,000 (16.4 percent), Rs 15,000-30,000(14.5 percent), Rs 5,000-15,000(5.2 percent) and Below Rs 5,000 were 4.5 %.

The different brands currently in use by the consumers varies from Amul, Adarsh Milk, Buffalo Milk, Chitale, Country Delight, Gau Prakash, Gowardhan, Mother Dairy, Mahananda, Milky Moo, Nandini to Direct from the farm/village/local dairy, online stores, supermarket, own cows. While observing the frequency of buying milk, eighty percent of the consumers buy milk daily, 12.3 percent purchase thrice a week, and 7.6 percent purchase twice a week. In our sample, 36.4 percent of the respondent's average daily consumption of milk is one liter, followed by 22.6 percent with 1.5 liters, 20.9 percent respondents consume upto 500 ml and only 2.9 percent consume 3 litres and above. The most preferred packaging direct supply, gallons, glass bottle, metal containers, plastic bag/ pouch, tetra packs.

Daily expenditure on milk in Rs. per liter shows 41.7 percent respondents spend Rs 40-50, followed by 30.5 percent spending Rs.51-60, 12.9 percent spent Rs 71& above, 11 percent spent Rs 61-70 and only 3.9 percent spent only above Rs 71. Milk consumption increases during the festival season for 77.9 percent respondent, it remains same for 21.3 percent of the respondents and for 0.7 percent respondents it decreases. This increase in milk consumption during the festival season is used to prepare sweets, cur, buttermilk, ghee, paneeer, lassi, and ice cream.

Among the various factors that influence buying a preferred brand of milk in the highest order of choice are quality (102), easy availability (34), regular supply (24), price (22), nutrition values (19), brand value (15), Attractive packaging, Dealer Relationship (15). If the preferred brand is not available, then 54.6% respondents prefer to change brand but 10.5% respondents do not want to change and stay loyal to the brand. Apart from this 34.9% respondents were indecisive to change or not to change.

During the covid –pandemic for most of the respondent's 60.8%, the consumption of milk did not affect i.e., they could continue with the same level of milk consumption. For 28.3% of respondents- the consumption of milk had increased but for 10.9% respondents it decreased during the pandemic.

The agreement continuum of the customer questionnaire was subjected to factor analysis using principal component analysis and the Varimax rotation method, and items with factor loadings greater than 0.50 were clubbed into a single factor. Further, the sample adequacy score was 0.800, and Bartlett's Test of Sphericity was significant [Chi square) = 2617.793, df = 325, p = .000<0.05], showing that factor analysis was adequate.

Table 7: KMO and Barlett's Test (Refer Annexure)

Six factors emerged prominently covering 71.74% variance. The identified factors were analyzed for a common thread and accordingly the naming of the factors was performed. Table 8 shows the crux of analysis.

Table 8 - Total Variance Explained (Refer Annexure)

6 components extracted.
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Six prominent factors were extracted through the factor analysis which is being clearly reflected by scree plot of the analysis shown in graph 1.

Graph 1: Factor Analysis on Agreement Continuum of Customer Scree Plot (Refer Annexure)

Various elements of five extracted factors with the percentage of variance and factor loading value of each component are given in table 9.

Customer service has emerged as the most important criterion of dairy customers, according to the factor analysis results. Customer problem-solving ability and value-for-money offers have also become important factors to consider when buying dairy goods. Product Quality and Product & Service Reliability are considered crucial factors in the fiercely competitive field, which is why buyers prioritised them at the bottom of their choices. The following are more details on the various factors:

Customer service is the first factor to consider. This factor consists of ten activities that target service usability in predicting future customer value contribution. It includes the level of services supplied to customers in addition to the delivery of the desired goods, such as presenting a variety of product options, establishing a commitment to each client as an industry entity, conducting market analysis and interpretation, and providing after-sales assistance. The services factor accounted for 21.944 percent of the data variation.

Factor 2 is Capability to solve customer problems. This component includes the six problem-solving practices, which include identifying, analyzing, and solving problems. The ultimate purpose of problem-solving is to overcome obstacles and find the best solution to the problem. It can be further defined by sub-parameters such as honesty in problem-solving, customer compliance management, and returns and exchanges. The data has a variance of 21.233% due to problem solution.

Factor 3 is Offers that are good value for money. Value for money is a criteria that relates to the perceived degree of quality in relation to the price paid for a product or service. With 7.941% variance in data, it involves four practices: pricing of milk and milk products, competitive prices, price consistency, and expectations regarding milk and milk products.

Product Quality is the fourth factor to consider. This element includes four behaviours that address the product's ability to meet the end user's expectations and demands, such as consistent quality of milk and milk products, quality of milk and milk products, packaging of milk and milk products, and variety. Product quality is responsible for 7.390 percent of the data variance.

Reliability of products and services is the fifth factor to consider. This element has to do with the ability to deliver the promised service consistently and accurately, and it may be broken down into sub-parameters like prompt delivery, supply of the right products, and error-free transactions. The data variance is 6.819 percent due to product and service reliability.

H2 : Adoption of supply chain practices helps in improving customer satisfaction.

Thus we reject the null hypothesis as there is a positive impact of adoption of supply chain practices on customer satisfaction.

I. CONCLUSION AND RECOMMENDATIONS

Since competition is no longer between firms, but among supply chains, effective supply chain management (SCM) has become a potentially significant technique of protecting competitive advantage and enhancing performance. Organizations came to recognise that improving efficiency within an organisation was insufficient; their entire supply chain needed to be competitive. Understanding and applying supply chain management (SCM) has become a must for being competitive in the global marketplace and increasing profitability.

SCM is a systemic, strategic coordination of traditional business activities and techniques across business functions inside a single organisation and between businesses within the supply chain in order to improve the long-term performance of the individual firms and the supply chain.

The Indian dairy industry has made a significant contribution to the country's rural economy. It has been regarded as a tool for bringing about socioeconomic change. India's dairy business has been changed by the 'white revolution.' It has enhanced milk supply while also providing a stable source of income and employment for millions of rural communities.

As a result, the research problem for this study was centred on the dairy industry's supply chain management procedures. In a nutshell, the research topic is to optimise the dairy sector supply chain in order to meet future domestic demands while remaining competitive in global markets. The current study attempted to discover the actual events and, as a result, examine the mechanisms for improving those processes in order to create a win-win situation for all stakeholders in the dairy supply chain.

Recommendations: Members of the dairy supply chain must concentrate on product quality, which refers to the product's capacity to meet the end user's expectations and needs. Product quality is primarily concerned with the physical characteristics of the product (taste, shelf life, etc.). It has three components: product freshness (meat, vegetables, milk and milk products, and fruits), product durability, and product variety. Members of the daily supply chain must concentrate on the level of service provided to customers in addition to the delivery of the product ordered. It entails having a diverse product range, committing to each customer as an industrial unit, and providing after-sales service. The dairy plant managers, milk cooperatives and milk retailers should also try to adopt all the supply chain practices related to ICT, supplier relationship practices, supply chain manufacturing practices, inventory management system, warehousing management system, transportation system, customer relationship management and overall organizational performance.

Thus, the study underlines the importance of management commitment, which ensures that SCM choices are widely accepted throughout the firm. The challenge may be solved by strategizing SCM decisions and implementing SCM practices to ensure cost minimization, efficient decision making, and flexible SCM methods to meet changing consumer expectations. It is believed that the study's findings will inspire decision-makers in the Indian dairy industry to employ supply chain strategies strategically when solving managerial difficulties.

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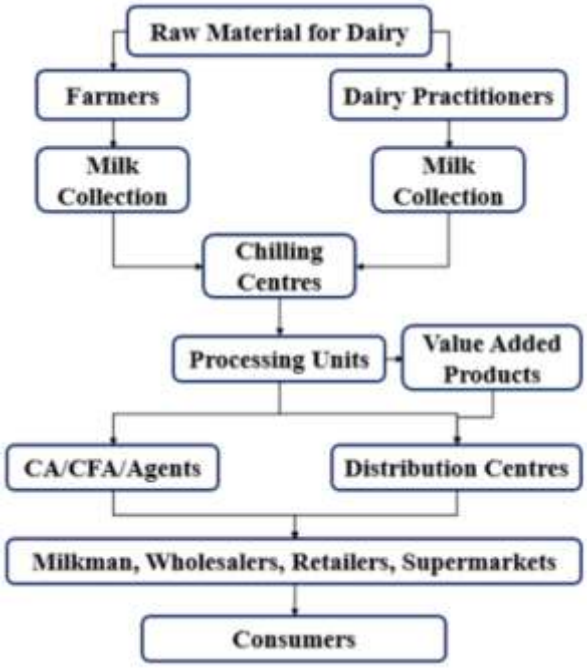
Annexure



Source: Industrializing Supply Chain, a new vroom for Dairy Industry

Table 1: Types of Questions Asked and Data Analysis Methodologies Employed

S. No.	Types of Questions	Data Analysis Technique	Remarks
1.	Dairy Plant (DP) and customer questionnaires have dichotomous questions.	Frequency of occurrence	To learn about the respondents' perspectives.
2.	Questions about adoption were widespread and occurred in the Dairy Plant (DP), Milk Cooperative (MC), Milk Retailers (MR) and union employee questionnaires.	Mean	To check the difference in opinion of the response of dairy plant managers, milk cooperative workers, milk retailers and union employees
3.	Customer questionnaires contained agreement continuum questions.	Factor analysis	To condense a large number of disparate activities into a smaller number of homogeneous factors.

Source - Tabulated by author

Table 2: Reliability Testing

Sr. No.	Questionnaire	Scale	Cronbach's Alpha value
1	Dairy Plant, milk cooperative, milk retailers Questionnaire	Adoption	0.926
2	Consumer Questionnaire	Agreement	.800

Table 3: Mean for Dairy Plant (DP), Milk Cooperative (MC) and Milk Retailers

Sr. No	Adoption Practices (Statement wise)	Mean
1	ICT1: Real-time information sharing facilitates the flow of material and money among supply chain partners	4
2	ICT2: Organization is having sufficient resources for implementation of ICT tools and techniques	4
3	ICT3: Supply chain partners (supplier and/or customers) are having adequate ICT infrastructure for ERP synchronization	4
4	SRP1: Organization considers quality as primary criterion in selecting suppliers	5
5	SRP2: Organization jointly solves problems with the suppliers on regular basis	5
6	SRP3: relies on a few dependable suppliers (key supplier)	3
7	SRP4: Organization has a supplier network that assures reliable delivery	5
8	IMS1: Organization reduces uncertainty by centralizing demand information	4

Table 4: Mean for Dairy Plant (DP), Milk Cooperative (MC)

Sr. No	Adoption Practices (Statement wise)	Mean
1	SCMP1: Organization focuses on the personal cleanliness of the employees in order to maintain hygiene in dairy manufacturing plant	5
2	SCMP2: Equipment, tools and devices used for raw milk testing are in compliance with the cleaning standards	4
3	SCMP3: Organization conducts workplace application of Hazard analysis and critical control points (HACCP)	4
4	SCMP4: Organization is having adequate system for milk testing and grading	4
5	TM1: Organization prefers less than truckload transportation over full truckload transportation (either for raw material or finished goods)	3
6	TM2: Tailored network	4
7	TM3: Organization uses the following techniques for tracing & tracking the vehicular movement i.e. smart card, radio frequency identification (RFID), Auto-id system, global positioning system (GPS)	4
8	SRP6: Organization includes its key suppliers in product planning and goal setting activities	4

Table 5: Mean for Dairy Plant (DP), Milk Retailers (MC)

Sr. No	Adoption Practices (Statement wise)	Mean
1	CRM1: Organization continuously determines future customer expectation	4
2	CRM2: The orientation of organization is on customer retention rather than on single transaction	5
3	CRM3: Organization delivers the milk and milk products on time	4
4	CRM4: Organization provides platform to receive complaints and feedback from customers	5
5	CRM5: Availability of product is an important criterion to satisfy customer	5
6	CRM6: Organization has convenient operating hour for supplying milk and milk products	5
7	CRM7: Organization emphasizes on quality and service levels preferably defined by customers	5
8	CRM8: Organization prefers convenience of customer in identification of milk retail locations	5
9	CRM9: Organization has amenable return policy	4
10	ICT4: Information technology (IT) system allows inventory management application to be linked to production planning	4
11	SRP5: Organization uses different strategies for different suppliers of product/service portfolio	4
12	IMS2: Collaborative management of inventories across SC ensures a high level of product availability	5

Table 6: Mean for Milk Cooperatives (MC) and Milk Retailers (MR)

Sr. No	Adoption Practices (Statement wise)	Mean
1	ICT5: Mode of Communication	4
2	SRP7: Proper input such as cattle feed, veterinary services, extension services etc. is provided to the milk producers	4
3	SRP8: Defective milk and milk products are taken back by milk dairy	5
4	IMS3: Proper supervision of supply storage and accessibility of milk and milk product items is taken care off in order to ensure an adequate & timely supply without excessive oversupply	5

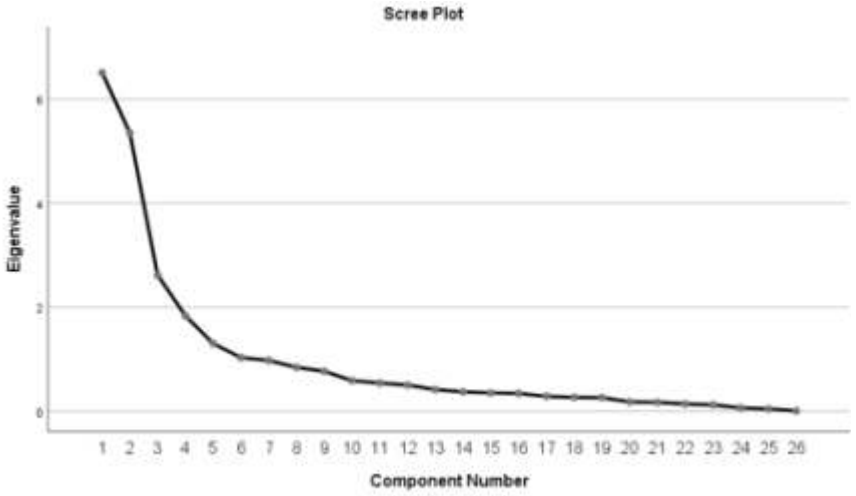
Table 7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.800
Bartlett's Test of Sphericity	Approx. Chi-Square	2617.793
	df	325
	Sig.	0.000

Table 8 - Total Variance Explained

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.508	25.03	25.03	6.508	25.03	25.03	5.084	19.553	19.553
2	5.35	20.577	45.607	5.35	20.577	45.607	4.335	16.673	36.226
3	2.618	10.07	55.677	2.618	10.07	55.677	2.955	11.365	47.591
4	1.838	7.07	62.747	1.838	7.07	62.747	2.686	10.33	57.921
5	1.305	5.018	67.765	1.305	5.018	67.765	2.055	7.905	65.826
6	1.035	3.98	71.745	1.035	3.98	71.745	1.539	5.918	71.745

Graph 1: Factor Analysis on Agreement Continuum of Customer Scree Plot



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