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STRIDES - A STUDENTS' JOURNAL OF SHRI RAM COLLEGE OF COMMERCE

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ABOUT THE JOURNAL

It is a double blind reviewed bi-annual Journal launched exclusively to encourage students to pursue research on the contemporary topics and issues in the area of commerce, economics, management, governance, polices etc. The journal provides an opportunity to the students and faculty of Shri Ram College of Commerce to publish their academic research work.

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Principal's Message

It is with great pride that I reflect upon the remarkable journey of this Journal, which was inaugurated by Shri Prakash Javadekar, the Hon'ble Union Minister of Human Resource Development, Government of India in the year 2017. What began as a pioneering initiative to cultivate intellectual curiosity has blossomed into a distinguished platform, offering our undergraduate scholars an avenue to present their research under the astute mentorship of our esteemed faculty.

Research is not merely an academic pursuit—it sharpens the intellect and fosters critical thinking, enabling students to bridge the gap between theoretical knowledge and real-world application. This Journal stands as a testament to SRCC's commitment to fostering an academic environment where students can explore, refine, and present their scholarly insights on a diverse range of contemporary issues.

With the expert guidance of faculty, students contribute research papers across an array of interdisciplinary themes, including economics, society, governance, finance, business, environment, and sustainability. To uphold the highest academic standards, each submission undergoes a rigorous review process. In just five short years, this Journal has made significant strides, expanding its scope while maintaining the utmost quality in scholarship.

The latest edition, Volume 7, Issue 1, presents an impressive collection of research on cutting-edge topics, including "Yajnomics," "From 'Dragon' to the Land of 'Ascending Dragon,'" "The Power of Emotional Branding: A Cultural Perspective," "The Impact of the Israel-Palestine Conflict on India: An Economic Perspective," "Upgrading The Konkan Fishing Industry with AI and Technology and Its Economic Impacts" and "Moksha Sadhya Aur Sadhan."

My sincere congratulations to Mr. Saurabh Gupta, Editor of Strides, and to the brilliant students whose research papers are featured in this edition. I encourage more students to seize this opportunity and contribute their work to future volumes as they embark on the enriching journey of research and discovery.

My best wishes to the students of Shri Ram College of Commerce in all their future research endeavours!

Prof. Simrit Kaur

Principal

Founding Editor

Shri Ram College of Commerce is well known for its academic excellence and dedicated approach towards dissemination of knowledge in the academic world. The college appreciates the role of research in education and is committed to developing an inclination towards research in both faculty and students. In this pursuit, the college has taken the initiative to launch a new Journal named 'Strides - A Students' Journal of Shri Ram College of Commerce' to encourage students to pursue research under the guidance of the faculty of Shri Ram College of Commerce.

It is a bi-annual Journal launched exclusively to publish academic research papers and articles by the students on contemporary topics and issues in the area of commerce, economics, management, governance, policies etc.

In order to maintain the high standards of publication, COPE (Committee On Publication Ethics) has been constituted. The COPE shall be the apex authority to take all the decisions related to the publication of research papers and articles in Strides. The decision of COPE shall be final and binding.

To maintain the high academic standards, academic ethics and academic integrity, a rigorous process of double blind review of research papers is followed along with screening of plagiarism of each manuscript received by the COPE for publication. The research work published in Strides is original and not published or presented at any other public forum.

The foundation issue of the Journal "Strides - A Students' Journal of Shri Ram College of Commerce, Volume 1, Issue 1, 2016-17" was successfully released on 91st Annual Day of SRCC held on 13th April, 2017 by Shri Prakash Javadekar, Honb'le Union Minister of Human Resource Development, Government of India.

The successive Issues of 'Strides - A Students' Journal of Shri Ram College of Commerce' shall be bi-annually released.

I congratulate all the students whose research papers are published in this Issue of Strides and express my sincere thanks to their mentors and referees.

Dr. Santosh Kumari

Founding Editor

Editor's Message

Greetings!

It is with great enthusiasm that I welcome you to the latest edition of *Strides*, the student-led journal of Shri Ram College of Commerce. Our journal serves as a platform where young minds can express, explore, and engage with diverse ideas in the fields of commerce, economics, and allied disciplines.

At *Strides*, we believe that knowledge is not just a static repository of information but a dynamic process of inquiry, critique, and reflection. This edition is a testament to that philosophy. Each article, essay, and research paper presented here reflects the passion, curiosity, and intellectual rigor of our contributors. Whether it is an analysis of emerging trends in global markets or a deep dive into the intricacies of consumer behavior, every piece adds to the rich tapestry of insights that define our journal.

In a world that is rapidly changing and increasingly interconnected, we are witnessing shifts that will shape the future of commerce and economics. Through *Strides*, we aim to capture these transformations, offering perspectives that are both forward-looking and grounded in thorough research. Our contributors, under the guidance of the faculty and the editorial team, have gone the extra mile to ensure that this edition is not only informative but also thought-provoking.

I would like to extend my heartfelt gratitude to everyone involved in bringing this edition to life — the editorial board for their unwavering commitment, the faculty advisors for their invaluable guidance, and most importantly, our student authors for their inspiring contributions. Your dedication to academic excellence and critical thinking makes *Strides* a journal of true merit.

As you turn the pages of this edition, I hope you find inspiration, new ideas, and a deeper appreciation for the subjects we all hold dear. Together, let us continue to push the boundaries of knowledge and take bold strides into the future.

Happy reading!

Saurabh Gupta

Editor

STRIDES-A STUDENTS' JOURNAL OF SHRI RAM COLLEGE OF COMMERCE

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RESEARCH PAPERS

Yajnomics

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Abstract

This research paper carefully investigates the interactions between economics and the sacred Yajna ritual in Bharatiya society. With a focus on the Yajna practice in particular, the study uses a multidisciplinary approach to analyse the intricate reciprocal interplay between cultural traditions and economic activities.

In order to provide a clear knowledge of how economics and the centuries-old Yajna practice interact, this study, which is underpinned by a rigorous mixed methodology, skillfully integrates quantitative economic analysis with qualitative inquiry. Quantitative analysis can unearth empirical findings that illuminate the economic facets of this cultural practice by dissecting data to detect economic consequences within the context of Yajna.

By focusing on the cultural specifics that give Yajna its economic relevance, the

qualitative component of the inquiry supports the quantitative component. The study draws on in-depth discussions with persons who have a deep spiritual awareness and knowledge to collect personal viewpoints on the complicated relationships between Yajna and economic behaviour. These qualitative findings encourage a deeper comprehension of the factors and motivations affecting economic decisions within the Yajna framework by providing a humanistic lens through which economic events can be evaluated.

The study acts as an interesting assessment of how economics and the centuries-old Yajna tradition interact favorably. The study sheds new light on the vital role of Yajna within the economic framework of Bharatiya culture by adopting a comprehensive approach that mixes quantitative analysis with qualitative observations to uncover the connection between cultural practices and economic reality. It also uncovers the role of Yajna in contemporary times in various disciplines of study. It also assists further research in depth field of cultural and temple economy. This initiative thus contributes to the understanding of the blending of tradition and economics, improves the academic discussion of cultural economics, and establishes the framework for further investigation into this fascinating blending.

Keywords – Yajna, Yajnomics, Ashwamedha, Yajmaan, Dakshina, Cultual and Temple economy, Keynesian Economics, GDP, Indian Knowledge System

Introduction

The ancient Bharatiya(Indian) texts showcase the heritage and culture of Bharat(India). They contain various hymns, epics, rituals, etc. Some are as old as the late Harappa period, such as the Rigveda, while others are as recent as the Mughal era, like the Ramcharitmanas. All these texts contribute greatly to our rich history. However, they are not limited to just that; they provide insight into various historical, political, social, economic, and scientific aspects. We simply need to examine them more closely. By connecting various theories, aspects, epics, and hymns to modern theories, we can see how closely they intersect with these modern concepts.

This research paper will deeply analyze the role of economics in Yajna – a rich ancient practice of sacrifice and attempt to connect some economic concepts with it. This paper refers the interconnection between Yajna and economics as Yajnomics. Yajnomics is a part of the cultural and

temple economy, which is currently trending, with the current union government supporting it in various ways. This paper also explores the social benefits of performing Yajna and examines what empirical studies reveal about Yajnomics.

What is Yajna?

Yajna (Sanskrit: यज्ञ) or Yagya (most common name) is a tradition of offering items such as ghee, milk, rice, millet etc. in the holy fire called Agni (God of fire or cosmic fire of universe). In Sanskrit Yajna came from the root word yaj – to worship. It is a ritual and tradition which was prescribed in the oldest and ancient Bharatiya text known as Vedas. The details of yajna and hymns of sacrificing (yajna) are mostly given in Yajurveda. The offering made to Agni because Agni will perform as a medium between the celestial gods and the human consciousness. According to the Atharvaveda (9.15.14), अयं यज्ञो विश्वस्य भुवनस्य नावभः - Yajna is the basis of the creation of this world. But the yajna has an even broader definition which is not only limited to the holy fire. In the Bhagwat Geeta, Lord Krishna talks about 4 kinds of yajna – Dravya Yajna (sacrifice of giving material possessions in charity), Tapo Yajna (Sacrifice in the form of penance and mediation), Jnana Yajna (sacrifice in form of knowledge), Yoga Yajna (Sacrifice in the form of yoga). Sometimes, Yajna also refers to the God. In Bhagwat Geeta, Krishna denoted himself as Agni and yajna. Vedas and other ancient Bharatiya scriptures talk about more than 1000 yajnas. But for the study purpose, this research paper confined the meaning of yajna as the holy sacrifice or offering to the fire. Yajna, Yagya, Yagna, Yag, Holy fire, sacrifice, hawan will be used as interchangeable terms for the Yajna.

From the point of historical evidences, yajna was also one of the important practices done by the human civilizations even before 5000 BCE. Many fire altars have been found in Harappan Civilization sites such as Lothal and Kalibangan. Fire altars and evidence of fire worship have been found in foreign lands such as Egypt, Mesopotamia etc. This sacrifice practice was not only prevalent in Bharatiya subcontinent culture (Bharat Varsh) but also in other countries cultures such as Africa, North America etc. But the difference is here that this ritual is widely practised in Bharat till now.

Objectives

- To understand the perspective of Yajna within the Indian

knowledge system (IKS).

- To understand the Yajna from an economic standpoint.
- To know a part of the temple economy from the economic perspective of Yajna.
- To explore the contemporary relevance of Yajna in various fields of economics.

Flow of this research paper

This research paper is primarily divided into three sections. The first section provides an overview of Yajna. The second section offers a qualitative analysis of this study using various spiritual and ithihaasic texts, telephonic interviews, academic and research papers. This section utilizes the relevance and concept of Yajna in the past era, as depicted in various spiritual and ithihaasic texts, to establish a foundation for analysing and drawing its relevance in contemporary times. Additionally, this section examines the economic consequences of Yajna in various fields such as tourism, employment, income generation, etc. The third section presents, calculates, and analyses the major quantitative aspects of this study in the field of the Indian economy empirically.

Literature Review

Various literatures have been utilized in the construction of this research paper. Below are the literature reviews conducted for the literature mostly utilized throughout this paper.

The concept of Yajna first emerged in the oldest Bharatiya text known as the Vedas. This paper utilized the Yajurveda (n.d) and other Vedas to understand the concept of Yajna. These Vedas consist of various hymns associated with the performance of Yajna and the Celestial Gods, namely Indra, Agni, and Soma. These sacred scriptures depict Yajna as the most sacred sacrifice performed to attain spiritual gains from the Celestial Gods and God (Brahma). However, they primarily view Yajna as a spiritual and ritualistic practice, lacking an economic interpretation of Yajna.

To explore the concept of Yajna in the later Vedic period, various itihasic texts such as the Bhagavad Gita (n.d), Valmiki Ramayana (n.d), and Mahabharata (n.d), which were written during the late Vedic period, have been employed. These texts indicate that the practice of Yajna was prominent during that time and suggest that in the late Vedic periods,

Yajna was not only for self-spiritual gains but also served other purposes such as social welfare, politics, economics, psychology, etc. However, a limitation with these texts is that while they touch upon various social sciences including economics, they do not provide in-depth and clear explanations of the economic aspects of Yajna. They offer only glimpses of the interconnection between economics and Yajna.

To understand the link between these texts with various aspects of social sciences and sciences in a better way, Sanskrtise verses have been taken with the translations and commentaries by the various scholars Mukundananda, S. (n.d), Prabhupada A.C.B.S (1983), IIT Kanpur, temple priests, Sanskrit scholars etc. The suggestions, translations and commentaries all help in decoding the concept of Yajna more magnificently. These whole works of literature create the base for the understanding of Yajna and reveal the value of Yajna in ancient times with a multi-dimensional discipines.

In order to understand the concept of Yajnomics , it is very necessary to understand the concept of temple and cultural economy. The explanation by Barthwal (2024) have been best fitted in this paper. According to him, the temple economy served as a distinctive system that intertwined religious, social, and economic aspects, playing a pivotal role in shaping the socio-economic framework of ancient Bharatiya civilization. But his explanation talks about economic aspects of the Yajna lesser than the other economic activities of temple.

To address the question of why the government is intervening in the field of temple and cultural economy in contemporary times, various web links such as Dikshit, R. (2022, December 14) and Tnn. (2023, July 30) have been used. They highlight the surprising fact that government investment in this field is a tactic to improve the country's economy. While they answer the objective question, they do not provide in-depth and clear explanations of the economic aspects of Yajna due to government intervention. To mitigate this limitation and support the main objective of this paper, telephonic interviews were conducted with various government officials. Additionally, data provided by the Ministry of Tourism supports the arguments made by the above authors regarding government intervention in this arena. The collective argument put forth by these sources helps to underscore the relevance of Yajna in the economic field of Bharat.

To understand the impact of Yajna on the nature and environment, the

research works of various scientist, environmentalist and various scholars such as Chauhan et al. (2007) , Kumar Devender. (2019), Rastogi, R., Chaturvedi, D. K., Rastogi, M., Chauhan, S., Aggarwal, V., Agrawal, U., & Singh, R. (n.d.) have been employed. They prove the multiple natural and environmental benefits due to Yajna. They prove the multiple benefits gained from the performance of Yajna which not only cleans the negative aura around us but also helps in reducing AQI, making the people more disease free etc. But they didn't clearly integrate their results with concept of economics but they help this paper to support the argument regarding positive externalities from the performance of Yajna.

(कुमार et al., 2018) give the evidences to unveil the effect of Yajna on tourism and employment. According to him, performance of yajna helps to increase in tourism and employment. But his paper needs more deep analysis to understand the direct impact of Yajna on tourism and employment.

Along with these major literatures, other sources have also been utilized. Telephonic interviews were conducted with various scientists, scholars, and priests to understand Yajna not only as a spiritual ritual but also to comprehend it within the discipline of economics. This approach aimed to mitigate the limitations of the aforementioned literatures, aligning with the objectives of this paper.

Methodology

In this study, a rigorous mixed-methods approach integrating qualitative and document analytic techniques was applied to explore the numerous elements of Yajnomics. By maximizing the benefits of in-person interviews, sacred texts, and online sources, this methodological approach enables an exploration of economics in the performance of Yajna.

Additionally, a key aspect of this study's methodology is the textual analysis of verses drawn from famous texts like the Vedas and the Bhagavad Gita. This qualitative content analysis technique delves deeply into the intricate structure of these ancient writings to elucidate metaphors, philosophical ideas, and hidden meanings pertinent to Yajna. This textual analysis not only broadens our understanding of Yajna and economics, but it also gives the interpretations that will come next a historical and cultural backdrop.

The method also receives a quantitative and contemporary layer with the incorporation of information from a variety of trustworthy websites. A significant amount of information can be acquired by doing a systematic review of many web sources, including statistics, academic papers, and empirical research that speak to the contribution of Yajna to our economy. The analysis and synthesis of this data adds more context and an empirical element to the investigation.

The mixture of quantitative and qualitative components includes telephonic interviews with temple priests who were particularly chosen for this study due to their expertise and in-depth knowledge of Yajna. These interviews offer a wealth of knowledge on Yajna, illuminating perspectives, experiences, and cultural peculiarities that have an impact on the larger context under study. And telephonic interviews with the government officials who are appointed on various projects of temple construction.

This methodology's ethical foundations include gaining informed consent from interview subjects and following correct attribution rules when citing religious texts and online sources. This extensive process results in a holistic and nuanced understanding of Yajnomics by

synthesising and analysing these various sources. The ensuing understandings serve as the foundation for the conversation and interpretation that follow, helping us to better understand the complex dynamics surrounding Yajnomics.

Yajna – Cause of increase in national income and output

In the realm of Yajna, as outlined in the Yajurveda, offerings play a pivotal role. The sacrificial fire, representing a sacred and ceremonial practice in Hinduism, requires various items such as ghee, milk, buttermilk, cereals, and materials like new woods and fabrics like cotton. These offerings are integral to the ritual, symbolizing devotion and reverence.

Drawing a parallel to macroeconomics, particularly the concept of Aggregate Demand (AD), one can perceive an interesting connection. From the economics point, Aggregate Demand is broadly defined as the sum of consumption (C), investment (I), government spending (G), and net exports (NX). An increase in consumption leads to a subsequent rise in Aggregate Demand, resulting in an expansion of national income and overall economic output. For the yajna, new items such as ghee, buttermilk, woods etc. are demanded for the consumption purpose of

yajna, which increases the aggregate demand, which further expand the income of a nation. The further empirical evidences to prove the same is mentioned at the end of this paper with heading – Contribution of Yajna in Real economy- a numerical approach.

So, Yajna is the cause of the increase in employment, output and income of an economy. Yajna was the essential duty of an individual or group in the ancient period. Consumption which is an important component of Aggregate Demand is increased when the yajna is performed. There is the consumption of vast no. of goods and services which was sacrificed in the holy fire. Due to this increase in consumption and demand, it is beneficial for an economy to increase its income.

Government intervention in the Yajnomics

There were various yajnas which was conducted by the king for different purposes such as welfare for the state, capturing of a territory etc.

Vālmīki Rámáyaṇa, n.d ,ch.Bala Kanda, vv.14.1-2

अथ संवत्सरे पूर्णे तस्मिन्प्राप्ते तुरङ्गमे।

सरय्वाश्चोत्तरे तीरे राज्ञो यज्ञोऽभ्यवतत।।

ऋश्यशृङ्गं पुरस्कृत्य कमत चक्रुर्द्वतजर्तभाः।

अश्वमेधे महायज्ञे राज्ञोऽस्य सुमहात्मनः ।।

Valmiki Ramayanam. (2020) translated this as - After completion of one year when the sacrificial horse (ashwa) had returned, the sacrifice (yajna) by the king Dasratha(Father of Lord Rama) commenced on the northern bank of river Sarayu. The best of Brahmins led by Rsyasringa performed the rituals of Ashwamedha organized by the king of Ayodhya – the excellent king.

Ashwamedha Yajna was the sacrifice performed by the Chakarvati Kings(Universal King or King of Kings or World King) to prove their imperial sovereignty. The horse was released free and made to wander freely across the territory. If any rival king or rival wants to challenge the king's authority then s/he will capture the sacred horse and fight with the warrior (which was with the horse) or the king (rare case). If no enemy managed to kill the warrior or king, then

the horse would come back to the capital. Then a grand celebration will be made with yajna as per procedure laid down in Vedic text.

Priests from various parts of Bharat were interviewed regarding the

Ashvamedha yajna. According to him, the whole yajna samagari (material needed for yajna) will cost around Rs.5,00,000 and not only this the Priest who initiated the yajna was gifted with the gold and valuable items. The subjects also get a gift from the king.

Vālmīki Rámáyaṇa, n.d ,ch.Bala Kanda, vv.14.43

क्रतुं समाप्य तु तदा न्यायतः पुरुर्ऋतभः ।

ऋस्मिग्भ्यो र्द्ह ददौ राजा तां धरां कुलवधतनः।।

Valmiki Ramayanam. (2020) translated this as - the king Dasratha best among all men and upholder of his dynasty, having concluded the sacrifice according to law, offered the entire earth as a gift to priests who performed this yajna.

In Ancient Bharatiya culture texts and traditions, a concept of Dakshina arises. Dakshina is a payment or fee (either in the form of money or goods or service) made to the priest or knowledgeable person for their service like doing Puja or providing knowledge to the fellows. The concept of Dakshina is mentioned in the various texts including the Shiva Purana. This Purana is centred around the glory of the lord of destruction – Lord Shiva. The Shiv Purana mentions - A knowledgeable devotee shall offer a fee for sacrifice (known as Dakshina) with the 3 mantras (Hymns) beginning with "Hiraṇya-garbha" etc. and shall perform ablution (Abhisheka) with the mantra "Devasya tva. Here, it's an instruction to offer the fee of payment for rituals like sacrifice or holy sacrifice with mantras (Shastri J.L, 1999, ch.20, v.1.31). Fee is important so that spiritual person (who performs sacrifice for their Yajmaan) can sustain their life with the path of spirituality. This transaction has been made between the Yajmaan (the person who commissioned the sacrifice) and the purohit or spiritual person (who performs the sacrifice for their Yajmaan

Vālmīki Rámáyaṇa, n.d ,ch.Bala Kanda, vv.14.46-48

मर्द्रणरत्नं सुवर्णं वा गावो यवा समुद्यतम्।

तत्प्रयच्छ नरश्रेष्ठ धरण्या न प्रयोजनम्।।

एवमुक्तो नरपर्द्तर्ब्ातह्मर्णैवेदपारगैः।।

गवां शतसहस्रार्द्र्ण दश तेभ्यो ददौ नृपः।

शतकोटीस्सुवर्णतस्य रजतस्य चतुगुतर्णम् ।।

Valmiki Ramayanam. (2020) translated this as - Brahmins urged the

King them gems (or valuable items) or gold or cows, they have no use of Earth. Lord of all men (persons) of the entire earth, the king (Dashrath) having been thus addressed by knowledgeable persons or brahmins who were well versed in the Vedas, gave them ten hundred thousand (10,000) cows, a hundred crore (100 Crore) of gold coins and four times as much in silver coins.

The King Dashrath or king of Ayodhya or father or Lord Ram commissioned a major yajna called Ashwamedha Yajna, at first King Dashrath gifted the entire earth to the Brahmins or knowledgeable persons as Dakshina but they refused to take it because they are not capable to rule the earth. Instead of earth, they demanded for other valuable items such as cows, silver coins and gold coins as a part of Dakshina. So, the kind king Dashrath gave the all-valuable items which was demanded by them.

This was not only yajna which was done by the state but many yajna were performed by the state which cost heavily in lacs and crores. So, according to macroeconomics, government spending helps in increasing the income and output of an economy. The increase in government spending will increase autonomous consumption which further increases the aggregate demand. An increase in Aggregate demand will increase the level of output and income in an economy. Government spending is a more efficient method to get a positive increase in output and income than imposing taxes and making transfer payments. Government expenditure not only increases the national income but also puts the government expenditure multiplier effect. During the time of recession, the state should increase their spending to pull the economy from this crisis. Like, Keynes emphasised in his 'General Theory of Employment, interest and Money' that government intervention is necessary in time of recession or depression which was against the classical economists who emphasized free market forces. State intervention for getting a good economy was necessary in the ancient or Vedic age of Bharat, and even now! So, Government spending is yet another important component of Aggregate Demand. The large no. and size of yajnas were commissioned by the state in the ancient period. Like, in the case of big-size Yajna like Ashwamedha Yajna, a large no. of people is employed for the production of goods and services. A good amount is paid to the labours. The grand celebration was initiated in a state which not only increases employment and output but also increases the income of an individual and a state. It also fulfils the duty of

a state to think about the welfare of its citizens. From the view of investment, many temples and land were granted for the construction of temples. Temples were the main centre of the economy in the ancient period. Some scholars called this economy a temple economy. Yajna is majorly done in temples even now. Both private and government investors invested in the temple. Even the production of various items was done specifically for the yajnas. Even, now in many villages and in many Bharatiya customs, the first harvest is sacrificed only in the Holy fire- Yajna.

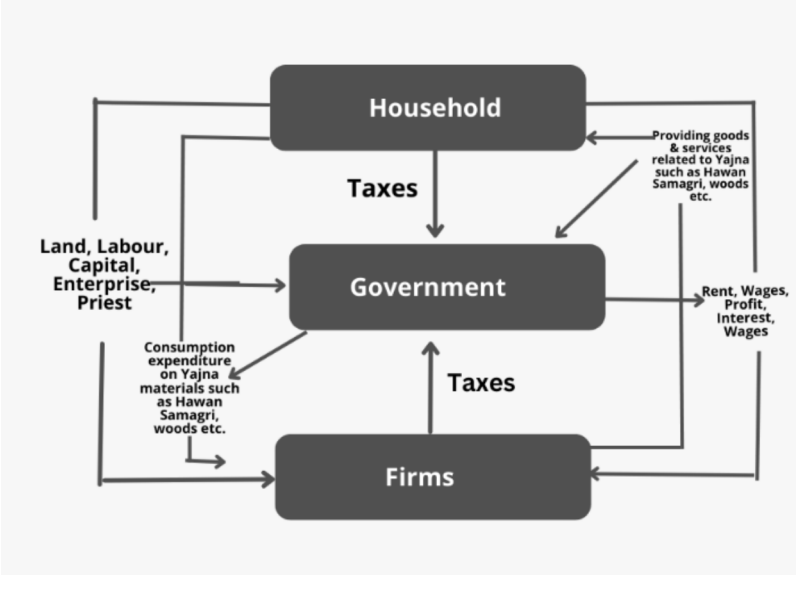
In the recent times, the current union government focusing on promoting cultural and temple economy. In the end of 2021, union government had made and inaugurated the Kashi Vishwanath Corridor, Varanasi. They have invested ₹ 900 crore for the construction of the corridor. Now, the recent trends showed that there is increase in tourism in Varanasi in very high rate. Tnn (2023) revealed that increase in tourism in Varanasi is 8 times the increase in tourism in Goa in 2022. Ministry of Tourism revealed that more than 60 per cent of tourist were the spiritual tourist. When spiritual tourist or Devotees went to the temple, they perform some spritiual practices and rituals such as yajna. For these practices and rituals, these devotees expend on various materials and do the donations. Expenditure of the government and the devotees became someone income, which he/she will spend again on further items. This give rise to multiplier effect and boost the economy. Dikshit (2022) wrote that more than more than 60 kg of gold, 1500 kg of copper, 10 kg of silver and over ₹ 100 as the donations and Dakshina was collected till July 2022. Government expects that invested ₹ 900 crore will be recovered by the temple by 2024. Many vendors sell the spiritual items or materials for the spiritual practices such as yajna around the temples. They got the employment and they earn very well in terms of money. Tnn (2023) found that more than 32.6 per cent of employment increased by the construction of this corridor, and some government officials who were interviewed about the corridor revealed that 67.4 per cent are the vendors who sell the ritual items. In Bharat there are thousands of temples, some of temples are very rich. Investing in temples and cultural economy not only fulfills the spiritual goal but also helps in getting good returns from less investment and a handsome economy.

Circular flow of Income due to Yagna– 3 sector model

According to Yajurveda, for the performance of holy sacrifice (or different types of holy fire sacrifice), there is the need of some goods and services like wood, fabric, cereals, millet, wheat, paddy, ghee, buttermilk, flowers, fruits, animals etc. according to the requirement of different yajnas as described in Yajurveda (such as Kanda-2) like for the cattle, son, prosperity etc. These things need some factors of service for the producing these goods and services and in return the factors of service will get the factors of payment. Now, we are assuming if any yajna done by the king or the authority over state will be counted under the government sector. For simplicity, we are taking 3 sector model here. Agriculture, animal rearing, dairy, weavers, (group or industry) etc will be considered as the firms.

Figure 1

Diagramatic Representation of Circular Flow of Income due to Yajna



Factor of productions such as land, labour, capital, enterprise and priest. For producing goods like grains, fabric crops, woods such as sandal, mango, banana etc. And providing various services like decoration, constructing Mandap (A place where Yajna is performed) etc., land and labour were required by both firms and government. The Yajna was performed by Brahmins or priests on behalf of an individual or a group (also called Yajmaan). Some capital and enterprise were needed by different sectors to discharge goods and services. In return as the factor payments, the owners of the land get the rent, Wages & salaries are given to the labour ,the household gets interest for their capital , profit for their enterprise and priest will get

their fee as Dakshina from government and the firm.

These payments were spent in the form of consumption expenditure by the household to buy different goods and services for the Yajna and the firm provides these goods and services. The government sector gets its income by imposing taxes on households and the production sector and also imposes some indirect taxes and various goods and services needed for the Yajna and later on, the government buys the various goods and services from the firm to initiate Yajna (generally in large scale). The factors of payment and expenditure done by the government to households and firms are the government spending for the Yajna. This circular flow of income generated from the Yajna will be continued.

Impact of Yajna on Employment

According to scriptures, conducting a Yajna requires various materials such as a Yajna Kund (Fire Altar), firewood, ghee, dairy products, grains, hawana samagris, fruits, flowers, deity representations, water, incense sticks, and clothing. The process of Yajna entails a series of activities that generate employment opportunities. For example, the construction of the Yajna Kund necessitates materials like bricks and mortar, with laborers employed for its preparation. The cultivation of various agro, horticultural, and medicinal plants required for the ceremony engages farmers, forest dwellers, and workers in related industries. Dairy items essential for offerings provide employment to dairy workers and benefit dairy farms. Priests who officiate the Yajna also find employment through their services. Firms producing Puja Samagri, such as incense sticks, camphor etc. contribute to job creation. Additionally, the transportation sector benefits from the need to transport these goods, generating further employment. The production of clothing specifically for Yajna rituals also offers employment opportunities. Moreover, special Yajnas conducted during festivals or occasions like marriages create employment for cooks, decorators, staff in party halls ec. Thus, Yajna ceremonies have a multifaceted impact on employment, involving various sectors of the economy and providing livelihoods for a diverse range of workers.

Impact of Yajna on Tourism

Tourism has emerged as a crucial global industry, continuously advancing day and night, offering individuals a means to escape their everyday worries. Spiritual tourism offers travelers a rejuvenating

journey coupled with a positive outlook on life. Spiritual tourism be defined as a form of tourism where individuals seek spiritual experiences, personal growth, or a deeper connection with themselves and higher power, often by visiting locations associated with religious or spiritual significance. Those seeking spiritual enrichment prioritize environments conducive to Yajna rituals to derive spiritual benefits away from their usual surroundings. Numerous scholars have examined the potential, significance, and impact of Yajnas on spiritual tourism.

Yajna ceremonies attract both domestic and international tourists seeking to experience the rich spiritual and cultural heritage associated with these rituals. Tourists are drawn to witness the elaborate preparations, intricate rituals, and vibrant atmosphere surrounding Yajna ceremonies, offering them a unique glimpse into ancient traditions and spiritual practices. Tourists often visit pilgrimage sites and sacred locations where Yajna ceremonies are conducted, contributing to the preservation and promotion of religious heritage. Yajna ceremonies have a ripple effect on tourism infrastructure and services in the surrounding areas. The influx of tourists attending these ceremonies creates demand for accommodation, dining, transportation, and other tourist amenities. Local businesses benefit from increased patronage, leading to the development of tourism-related infrastructure and the growth of various economic sectors in these regions.

Moreover, Yajna ceremonies often coincide with festivals and special occasions, further enhancing their appeal to tourists. These events attract larger crowds and offer additional cultural activities, such as music, dance, and traditional performances, enriching the overall tourism experience. Tourists may plan their visits around these festivals, extending their stay and exploring other attractions in the region, thereby boosting local economies and supporting sustainable tourism development.

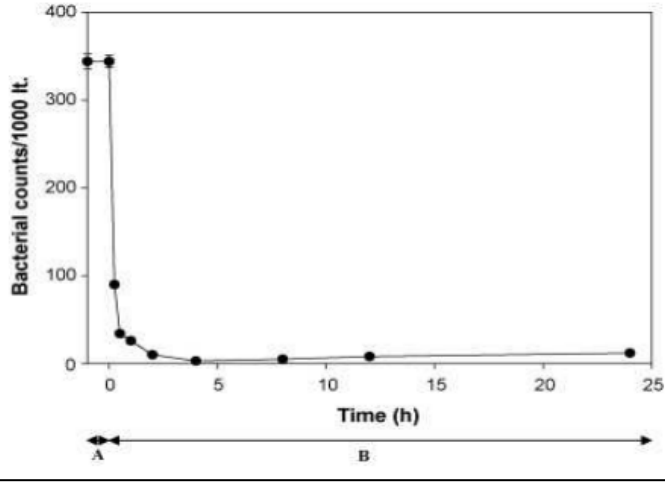
Externalities from Yajna?

Externalities are the economic concept which refers to the benefits or harms of an activity caused by a firm or an individual for which they are not paid or penalized. Externalities are divided into two major parts - positive externalities (when social benefits is greater than) and negative externalities (when social cost is greater than social benefits). The performance of a Yajna or Havan or Agnihotri Yajna or Medicinal fire also causes some externalities to the general public. Some scholars have

argued that the performance of Havan causes pollution and hence provides negative externalities. But various Neo-scholars have made strong reasons that show the performance of Yajna causes positive externalities to the people and environment. Chauhan et al. (2007) made the scientific research about the same. For the yajna, there is the need for Mango wood plus various havan samagri or yajna samagri (materials for the havan or yajna). So, they have found the impact of this on various disease-causing bacteria (pathogenic bacteria) such as Corynebacterium urealyticum, Curtobacterium flaccumfaciens, Enterobacter aerogenes (Klebsiella mobilis), Kocuria rosea, Pseudomonas syringae pv. persicae, Staphylococcus lentus, and Xanthomonas campestris pv. Tardicrescens etc. They demonstrated an experiment in a room filled with various pathogenic bacteria and found that the mere burning of 1 kg of Mango wood caused no reduction in bacterial count. But when 1/2 Kg of hawan or yajna samagri is added into it, the bacterial count is reduced by 94 per cent within 60 minutes that is 1 hour. At the end of 24 hours or 1 day, the bacterial count was 96 per cent lower. The impact of this experiment was long lasted for 30 days in the open room, the bacterial rate was much lower than normal. But there is a disclaimer in this experiment that nowadays the hawan samagri which is available in the market is more adulterated which means it contains chemicals. But in this experiment only natural Dhawan damages had been used, to get maximum benefit from this.

Figure 2.

Effect of the yajna or havan by burning mango woods (A) and havan sámagri (B), on the survival of aerial bacterial population (●). Source: Chauhan et al. (2007)



This is not only a single positive externality from the economic activity of yajna. When yajna is performed, a person gets some positive aura and finds the positive energy around him/her. In terms of spirituality, they are getting spiritual benefits from the performance of the Vedic practice of Yajna. Participating in Yajna ceremonies and witnessing the collective efforts of the community can have positive psychological effects, promoting a sense of purpose,

belonging, and emotional well-being among participants. So, in the matter of externalities, this enlightening activity provides numerous positive externalities.

From the perspective of pollution, in recent years, scientists such as Kumar Devender (2019) , Rastogi et al. (n.d.) and other scientists have done their researches on the impact of yajna on the pollution. They found that if the Yajna done in such a manner that are given in scriptures and use only organic material of Yajna then they can help to reduce the AQI level and can help in reducing the harmful impurities founded in the air. Similarly, many other studies are in queue to reveal the Vedic Knowledge of Bharatiyas.

Quantitative analysis

The aim of this quantitative analysis is to determine the impact of performing yajna on the Indian economy.

Sampling

Considering the aim of investigating the effect of Yajna on the Indian economy, stratified sampling was employed. The method involved dividing different regions of Bharat - North, East, West, South, and Central - into strata. Subsequently, samples were randomly selected from each stratum in proportions reflecting those strata's proportions in the population. 20 samples were collected throughout Bharat and classified into different strata. Samples were gathered through telephonic interviews with priests from various temples across Bharat. The priests were asked a series of questions (provided in the Annexure - A) which tells about the expenditure on the Yajna, to which they were expected to provide truthful answers.

Measurement Procedure

The priests explained that each Hindu temple performs at least one yajna daily; the difference lies in the scale, with some yajnas being small-

scale and others large-scale. Our study divides yajna expenditure into three major parts: one-time expenditure in a year, such as the construction of yajna kund and utensils; expenditure on consumable materials, such as hawan samagri, ghee, and milk; and Dakshina the fee or payment to the priest for commissioning the yajna for his/her Yajman.

For the study's purposes, the expenditure on a simple Agnihotra yajna is calculated. Since expenditure on consumable materials and Dakshina are reoccurring in nature, they are broadly defined as Reoccurring expenditure, while one-time expenditure is categorized as Fixed expenditure. Reocurring expenditure not only includes expenditure on Dakshina and consumable materials but also other expenses such as electricity, lodging, and transportation.

MS Excel 2021, has been used to calculate various statistical parameters such as mean, standard deviation, Margin of errors, confidence interval etc. Since, the sample size is less than 40, therefore, t-distribution has been used here with the sample mean ($\bar{X}$) and Margin Error (M.E) with confidence level α per cent = 99 per cent to estimate the expenditure on yajna

Due to limited availability of previous data regarding the number of temples in Bharat, the records from 2021-22 have been utilized. As per the data provided by "Temples in Bharat (2022)" and "Temples of Bharat" (n.d.), there were approximately 648,907 Hindu temples in Bharat during the 2021-22 period. Therefore, the nominal GDP of that year has been considered for analysis.

Assumptions

- The priests informed that each temple conducts at least one yajna daily. For simplicity, this paper assumes that every temple conducts a yajna daily.
- For the study's purpose, the expenditure on a simple Agnihotra yajna has been calculated.

Measurement & Findings

According to the assumptions and the model set up for the research purpose, the Mean ($\bar{X}$), Margin of Error (M.E), Lower Limit ($\bar{X}$-M.E), and Upper Limit ($\bar{X}$+M.E) have been calculated to understand the one-time expenditure, expenditure on consumption materials, and Dakshina for a yajna in a day.

Table 1

Calculating the Mean ($\bar{X}$), Margin Error (M.E) , X+M.E, X-M.E for one time expenditure, expenditure on consumption material, Daskhina for a yajna.

		$\bar{X}$	M.E	$\bar{X}$ - M.E	$\bar{X}$ + M.E
Fixed Expenditure	**One-time expenditure**	₹ 2,725.00	₹ 366.95	₹ 2,358.05	₹ 3,091.95
Reoccurring Expenditure	**Expenditure on Consumption material**	₹ 3,790.00	₹ 896.14	₹ 2,893.86	₹ 4,686.14
	Dakshina	₹ 476.00	₹ 180.12	₹ 295.88	₹ 656.12

For calculating the expenditure for a year, the values of expenditure on consumption material and Dakshina multiplied by 365 and 6,48,907 respectively. Since these expenditures are recurring, the study computed them for all temples in Bharat over 365 days. Similarly, one-time expenditure was multiplied by 6,48,907, as it is a fixed expenditure, and the study calculated the expenditure for all temples in Bharat one time only.

Table 2

Calculating the Mean (X), Margin Error (M.E) , X+M.E, X-M.E for one time expenditure, expenditure on consumption material, Daskhina for year 2021-22.

		$\bar{X}$ - M.E	$\bar{X}$ + M.E	($\bar{X}$ - M.E) x 365 x 6,48,907	($\bar{X}$ + M.E) x 365 x 6,48,907
Reoccurring expenditure	**Expenditure on exhausting material**	₹ 2,893.86	₹ 4,686.14	₹6,85,41,37,97,760.77	₹ 11,09,91,71,99,139.23
	Dakshina	₹ 295.88	₹ 656.12	₹70,07,85,38,649.32	₹ 1,55,40,36,65,710.68
		$\bar{X}$ - M.E	$\bar{X}$ + M.E	($\bar{X}$-M.E) x 6,48,907	($\bar{X}$+M.E) x 6,48,907
Fixed Expenditure	**One-time expenditure**	₹ 2,358.05	₹ 3,091.95	₹1,53,01,54,285.64	₹ 2,00,63,94,314.36
Total Expenditure on yajna in a year		-	-	₹7,57,02,24,90,695.74	₹12,67,32,72,59,164.26

Table 2 reveals that the expenditure on yajna in a year in Bharat will lie within the interval of (₹7,57,02,24,90,695.74 , ₹12,67,32,72,59,164.26)[1]. According to the Press Bureau of Bharat, Bharat's nominal GDP in 2021-22 was Rs. 235.97 lakh crore.

[1] The provided information acknowledges that the estimated expenditure amount may differ from the actual amount, but it offers an approximate idea of the costs associated with performing a yajna. For simplicity, it is assumed that specific items are used in the Agnihotra yajna. However, some materials may be substituted based on their availability and the requirements of the yajna as per scriptures. Additionally, the expenditure on Dakshina may vary depending on the financial capacity of the Yajman.It is noted that some temples may conduct low-cost yajnas, resulting in lower expenditure, while larger temples may conduct high-cost yajnas, leading to higher expenditure. Furthermore, while some temples conduct only one yajna, particularly significant temples in South Bharat may conduct more than one yajna per day. Additionally, households may also perform daily yajnas or conduct them on special occasions such as during Navratri, childbirth, or marriage ceremonies.Moreover, institutions like Gurukuls and community religious organizations such as Shantikunj in Haridwar managed by Akhil Vishwa Gayatri Pariwar, Patanjali Yogpeeth, etc., may conduct multiple yajnas in a day. It is acknowledged that the cost of yajna may vary across different regions due to differences in price levels of the same commodities.For simplicity, it is assumed that all other factors remain fixed in this analysis.

To calculate the share of expenditure on yajna in the nominal GDP, the following equation has been used:

Share of expenditure on yajna in nominal GDP =

$$\frac{\text{(Total expenditure on yajna in a year) x 100}}{\text{(Nominal GDP)}}$$

This equation helps determine the proportion of the expenditure on yajna relative to the overall nominal GDP of Bharat, expressed as a percentage. Therefore, total share of expenditure on yajna in Bharat in nominal GDP in Bharat lie under the interval (0.32 per cent, 0.54 per cent)[2].

Analysis

The calculations yielded a surprising result and interpretation. Merely conducting the activity of Yajna contributes significantly to the economy. Many services and businesses rely on the Yajna, indicating that ancient Bharatiya practices are not only for spiritual gain but also for economic benefit. While this estimated value provides a rough idea of the Yajna's contribution, the actual value likely constitutes a much larger share of the economy. According to the estimation by Bhattarai, K., Prasuna, A., Kumar, S. S., & Kasturi (2022), the Marginal Propensity to Consume (MPC) in Bharat is around 0.498. From the data from PIB, RBI and Union budget, the tax rate (t) and marginal propensity to import (MPM) estimated as 0.08 and 0.23 respectively.

To get the multiplier effect of this, following formula have been used

$$\frac{1}{1\text{-MPC}(1\text{-t}) + \text{MPM}}$$

This yields a multiplier of 1.45, meaning that expenditure on the Yajna generates a multiplier effect on nominal GDP ranging from ₹ 10,95,10,68,30,944.48 to ₹ ₹ 18,33,31,24,25,470.23. This also highlights the surprising fact that if a portion of the cultural and temple economy contributes significantly to GDP, then the entire cultural and temple economy will likely have a substantial share in GDP.

Limitations and future scope

Despite careful consideration of the research objectives and the model

[2] Since expenditure on yajna can vary due to various reasons as stated in point 1, their share in nominal GDP can also vary.

developed in accordance with them, this paper encounters some limitations. However, it also provides glimpses of the future scope that can be associated with it.

Due to the limited time and travel constraints, the sample size consisted of people from 20 cities in Bharat, more samples can be collected covering most of the regions of Bharat to get more clearer picture of the analysis. Due to the same reason, the study could not be conducted through physical interviews with priests and government officials. It can be conducted in physical mode which would have led to gaining more information about Yajna and covering a large sample size

This study is majorly conducted from the perspective of economics while incorporating various other disciplines of philosophy, social science and science. More other discipline-specific research can be done in this field. Such as further scientific studies, which reveal the positive externalities of Yajnas, can be conducted in the near future with appropriate measuring tools under the guidance of mentors in this field. Nowadays, the University Grants Commission and Ministry of Education emphasize greatly on Indian Knowledge System (IKS). The concept of Yajnomics is part of IKS, and more in-depth studies can be done in other disciplines to explore further the relevance of Yajna in contemporary times.

Recent studies show that due to the efforts of various personalities such as Srila Prabhupada, Swami Vivekananda, Satguru Jaggi, etc., and organizations such as ISKCON, Art of Living, Chinmaya Mission, etc., there is a great influence of Vedic culture from Bharat in the Western world. More research can be done on the impact of Yajna on the Western world, or future researchers can refer to this as the soft power of Bharat on the rest of the world.

Conclusion

Ancient Bharatiya culture and traditions are not only beneficial for spiritual gains but also for economic gains, The concept of Yajna which was developed by our ancestors and sages is a way towards prosperity in both spiritual and materialistic senses. Yajna not only connect the souls but also the different business. There has always been a concept of give and take from ancient times which is an essential part of economic activities. Yajna is one of the factors that contribute to the national income of a state. Most of the people of our country only see the rituals in a narrow way and see them as a mundane thing but they have forgotten the reason and series of economic activities connected with it. Various

economic activities such as tourism and employment enhanced due to the performance of the Yajna.The scientific researches of Yajna reveal the various positive externalities gained from the performance of Yajna. The present-time government promotes the rich Bharatiya culture and invest in temple economy which not only attracts the foreign and residents' attention but also moves towards a positive economy. A small investment in the field of Yajnomics give the multiplier effect in the real economy in Bharat. This also highlights the surprising fact that if a portion of the cultural and temple economy contributes significantly to Indian economy, then the entire cultural and temple economy will likely have a substantial share in Indian economy. These facts give the indication towards the understanding of Yajna from an economic standpoint and the

contemporary relevance of Yajna in various fields of economics.As we explore further into this rich tapestry of information, we gain a plethora of insights that may help us create a more tranquil and prosperous economic environment. This research is not ended here with the conclusion but waiting for the new thinkers and researches to see in-depth and multidimensional field of Yajna under the rich information of IKS.

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ANNEXURE – A

QUESTIONS INTERVIEWED FROM THE PRIESTS

Date:

Time:

Place:

Region:

During the study of this paper, the following questions were asked to the priest, and they provided descriptive answers

1. What is Yajna?
2. Can you explain the significance of Yajna in Hindu tradition?
3. Why is Yajna performed?
4. Can you elaborate on the rituals and procedures involved in performing Yajna?
5. What are the different kinds of Yajna, and what are their costs?
6. How many Yajnas are performed during a day?
7. What is Agnihotra Yajna?
8. Which items are needed for the Agnihotra Yajna?
9. How much do all the items cost?
10. How much is the fixed expenditure on the Yajna cost?
11. How much Dakshina do you take for the performance of Yajna on behalf of your Yajmaan?
12. How can the teachings and principles of Yajna be applied in various aspects of life today?

From 'Dragon' to the land of 'Ascending Dragon'

Can India be Atma-nirbhar by replacing China with Vietnam in its supply chain?

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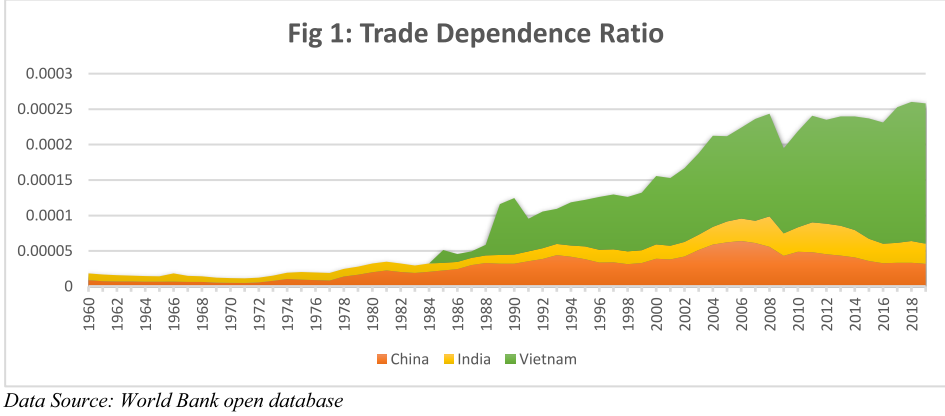
Abstract

The policy of Atma-nirbhar Bharat talks about making India a self-sufficient and self-generating economy. This self-reliance sentiment was bolstered by anti-China protests due to the Galwan valley standoff. In this context, many Indian nationalists have vouched for the boycott of "Made in China" products. This has polarised the whole idea of Atma nirbhar Bharat as solely restricting the imports from China due to which the idea of substituting it with Vietnam has been hailed as a viable solution. This thus gives us enough impetus to empirically analyze the bilateral trade between India - China and India - Vietnam. In this context, this paper uses the tools of regression and comparative analytics to analyze the efficacy of substituting Chinese imports with those from Vietnam from a short-term and long-term perspective. Additionally, this study reinstates the belief that India has to be selective and strategic while taking steps to discourage imports especially in the categories of electronics

and chemicals, in favor of locally produced goods given the importance of open trade for India's per capita income growth.

Introduction:

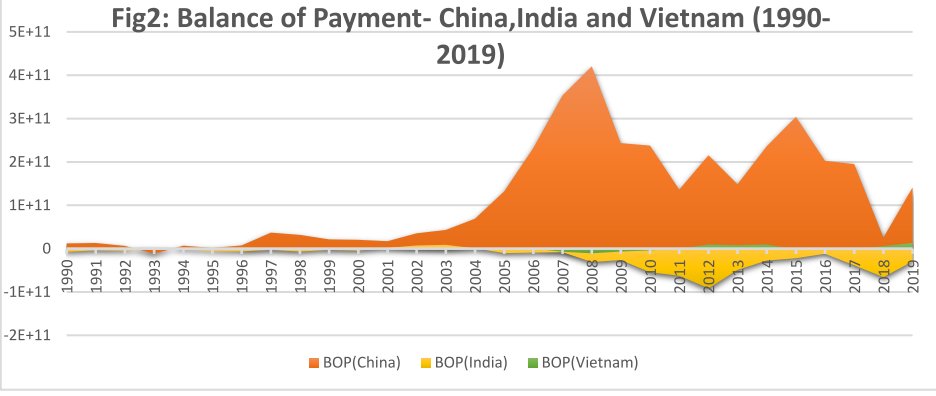
India, China, and Vietnam initiated economic reforms around the same time and all have had a fair degree of success in making their respective economies more broad-based and integrated into the world economy. The following graph indicates the 'Trade Dependence Ratio' or trade to GDP ratio for these three nations. This openness index measures the importance of international trade in overall economy of a country.



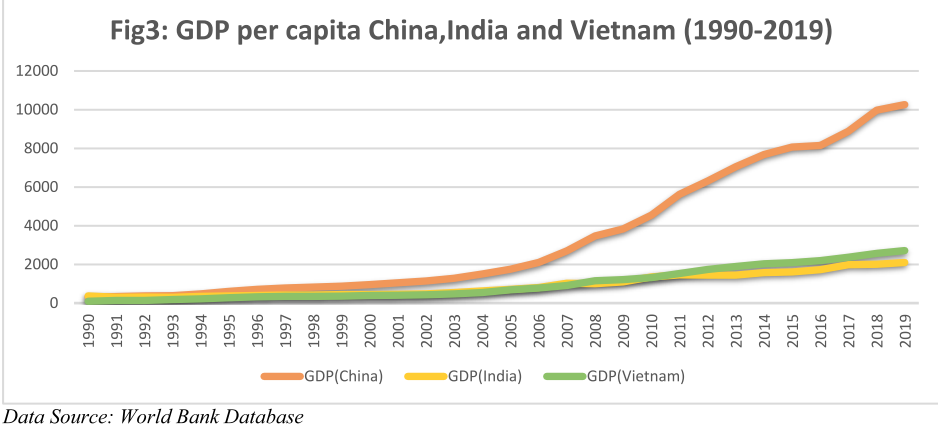
Data Source: World Bank open database

From 1960 to 2008, there are continued instances of higher inclusiveness of trade in Gross Domestic Products and relatively lower susceptibility to external shocks and volatility, ceteris paribus. The year 2009-10 has been identified as the year of structural break which is an implication of the global financial crisis. The global economy was in a slowdown mode due to which the contribution of international trade in the GDP for each nation has fallen by a great amount. In the recent years, a majority of income for Vietnam comes from international trade whereas Indian and Chinese net exports contribute relatively less than consumption and investment to the national output.

To understand the welfare effects of greater market integration with the world economy, per capita income is juxtaposed with the Balance of trade for each nation:



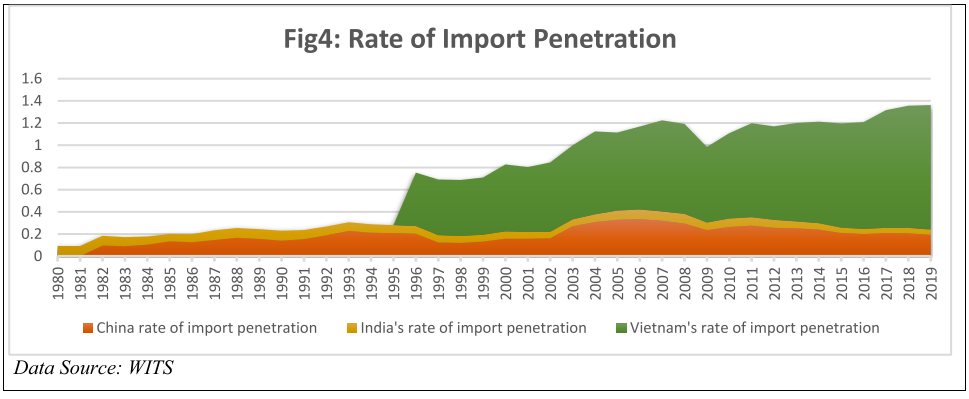
Data Source: World Bank open database



Data Source: World Bank Database

The graphs highlight that all three countries per head income have continuously risen throughout the years, but Chinese growth has been exponential. Balance of trade acts as an indicator of the extent of both domestic and global demand being fulfilled by domestic industries. Chinese BOP showcases a W-shaped trend, which reached its maximum in 2007-08 and minimum in 2018-19. On the one hand, where China and Vietnam have witnessed a surplus on international trade, India has imported more than what it exports, and this trend was further accentuated after 2008. A clear picture emerges here. The country that has built its manufacturing capacity to sustain the domestic demands and satisfy global needs is the country that has seen an exponential rise in income per head. The country that depends on foreign goods and services in the country with the lowest per capita GDP. Hence, it can be alleged that self-reliance through lower imports and greater exports will bring economic welfare for a nation.

The rate of import penetration can also measure such an advent of self-sufficiency. It is the ratio of import to domestic demand (GDP – net exports). The greater the extent, the lower the competitiveness of domestic suppliers.



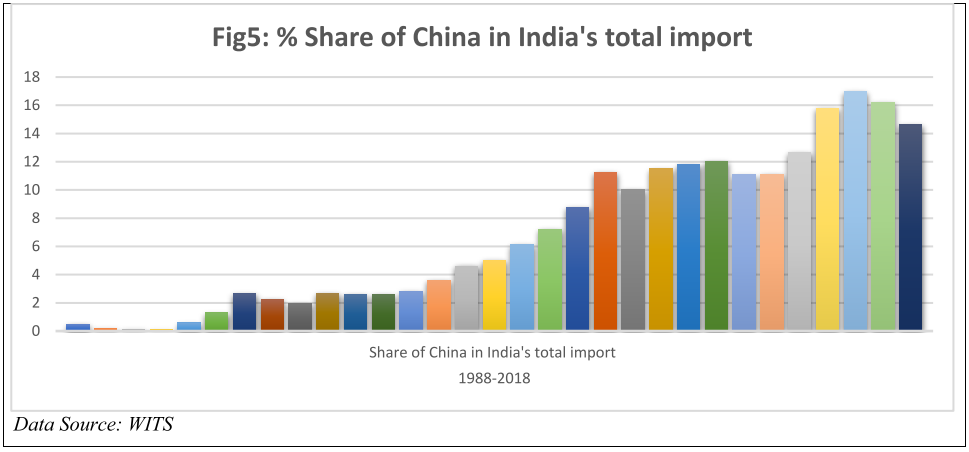
Data Source: WITS

The above-stacked area chart highlights that China is the most self-sufficient, whereas Vietnam satisfies most of its domestic demand from imports. India is also endeavoring towards self-sufficiency as China is.

This idea of self-sustenance has recently found new vigor in India. The coronavirus pandemic has proved to be a catalyst in rejuvenating the spirit of self-reliance and self-sufficiency in India. In this context, the Indian prime minister Mr. Narendra Modi launched Atma-nirbhar Bharat's scheme on 12 May 2020 amidst the lockdown to make India a self-dependent and self-generating economy.

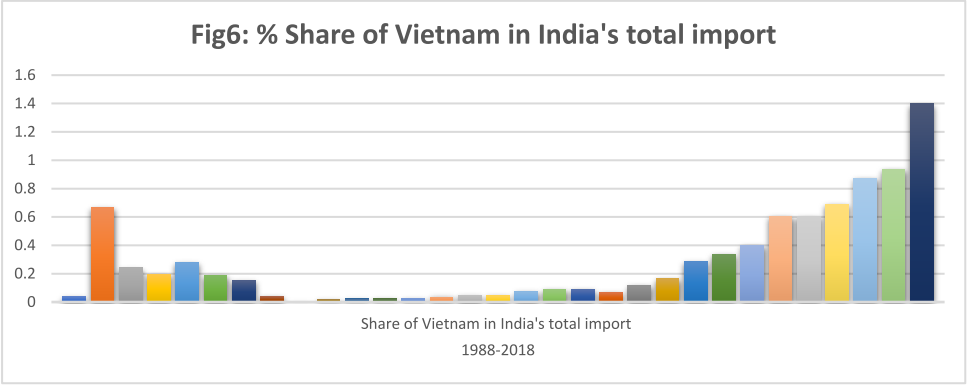
"When the world is in crisis, we must pledge - a pledge which is bigger than the crisis itself. We must strive to make the 21st century India's century. And the path to do that is self-reliance," PM Narendra Modi said.

During COVID-19, global sentiments have accelerated against China. Galway issue further strained the 'Hindi Chini bhai bhai' relationship. Since India is heavily dependent on China for its imports, one of the natural perceptions of this was banning the Chinese imports or reducing them in the short run. Of late, the national sentiment has polarized the whole idea of Atma-nirbhar Bharat as solely restricting imports from China. Taking a step back, we need to analyze our dependence on China more rationally:



Data Source: WITS

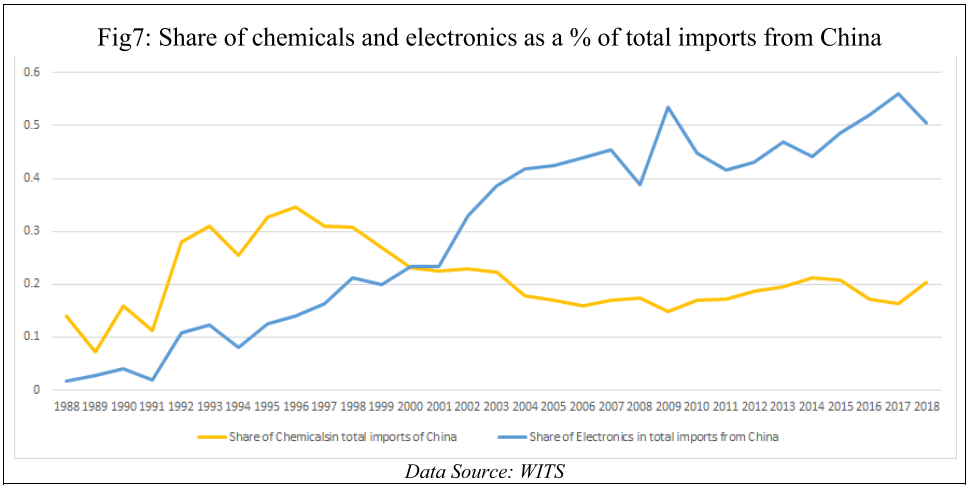
From less than 1% in 1990 to more than 14% in 2018, the bar diagram shows that China has gradually increased its share in the total imports of India to become the second largest trading partner after the USA (The Economics Times 2020). On the contrary, India accounts for only 2.1% (Bureau 2018) of Chinese trade. Using simple maths, such a boycott will clearly hurt India more in the terms of both livelihoods and lives. Therefore, it's worthwhile to access the feasibility of such a 'wallet response' which comes in the form of boycott of 'Made in China' products. Undoubtedly, in the short term, this move appears to be highly optimistic. But in the long run, the same can become a reality if India either finds alternatives to China or develop domestic supply chains by increasing production, or both in conjunction. When we talk about diversifying imports, Vietnam seems to be one of the potential destinations. Low labour cost is one of the attractions for investment in Vietnam which is almost 50% lower than China (Statista 2020). Vietnam's biggest specialisations are in production of electronics, textiles and furniture. However, Vietnam seems to lack the required expertise, competence, and capital-intensive machinery to take China's position as of now.



Data Source: WITS

India is now seeing Vietnam as a prospective import destination which is clearly highlighted by the bar diagram above. The exponential growth in import of Vietnam's goods and services is bound to be witnessed in future also. When compared with China, the dependence of India on Vietnam's commodities has been rising drastically whereas the same for Chinese products has become stagnant in the past 5 years. If this trend continues, India and Vietnam can witness greater economic integration in the coming 10 years.

Dissecting the trade relations between India and China, it can be inferred from the graph below that electronics and chemicals form a major chunk of total imports from China. We import more than 50% of electronics and 20% of chemicals from China as of 2018. Before 2000s, India majorly imported chemicals from China but post 2000 trends signify an increasing dependence of Chinese electronics to satisfy domestic demand for the same and muted import of Chemicals.



Data Source: WITS

Thus, when we talk about substituting Chinese imports, the limelight falls on the above two industries. Before jumping to conclusions, it's worthwhile to understand the performance of Indian electronics and chemical industries in relation with China and Vietnam.

Indian Chemical Industry India's chemical industry ranks sixth (Gupta 2020) in the world in chemicals sales, contributing 3% (CII 2015) to the global chemical value chain. A consistent value creator, the industry has always remained an attractive hub of opportunities for investors and global businesses. The table below ranks the top region in terms of chemical manufacturing. No doubt, the relative market size of India is smaller than most of the other regions, but it's CAGR is significantly higher.

Region	CAGR	Market Size 2010 ($ Billions)	Market Size 2020 ($ Billions)
Europe	2.2	176	218
North America	2.8	176	231
Latin America	4.4	26	40
Middle east and Asia	4.6	13	20
Greater China	7.0	113	221
India	17.0	22	100
Southeast Asia	5.1	41	68
Japan	1.3	78	89

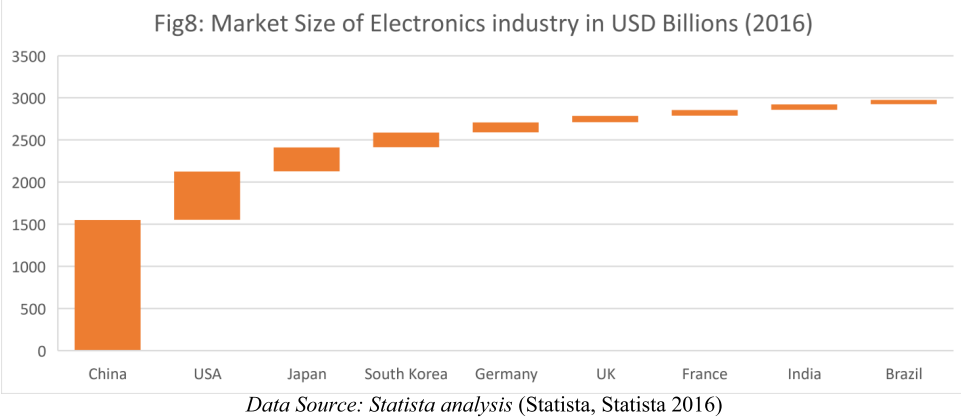
Source: McKinsey analysis (McKinsey n.d.)

A diversified manufacturing base has been a major growth driver of this industry. With a highly trained and scientific human resource base, it produces world-class products. The India government, at the same time has realized the role of the chemical industry in economic growth and hence introduced a supportive set of policies for the industry. FDI is 100% (Times 2019) permissible in the industry and manufacture of the most of chemical products is delicensed. Thus, India provides a conducive environment for the growth of the chemical industry. Fortunately, events across the globe may also lead to a boost in the industry. During the COVID-19 pandemic, though some of the biggest health and economic challenges in decades came to the forefront, it has opened a myriad of opportunities for this sector. Plastics being part of the overall chemical industry, played a vital role in manufacturing ventilators, COVID-19 test kits, personal protective equipment (PPE), packaging material and so on. Such fortuitous moments

have been bolstered by geo-political tensions between China and the rest of the world. Stricter environmental norms, tighter financing and consolidation in China may lead the countries importing from China to shift their supply-chain base. This seems like a budding opportunity for India.

Indian Electronics Industry

Over the years, rising digital penetration at the last mile in India has resulted in greater domestic demand for electronics. The country has struggled with ramping up the production on the same scale due to which it has to increase its dependence on imports for other nations, China being the front runner. The following graph shows the global standing of Indian industry relative to other nations:

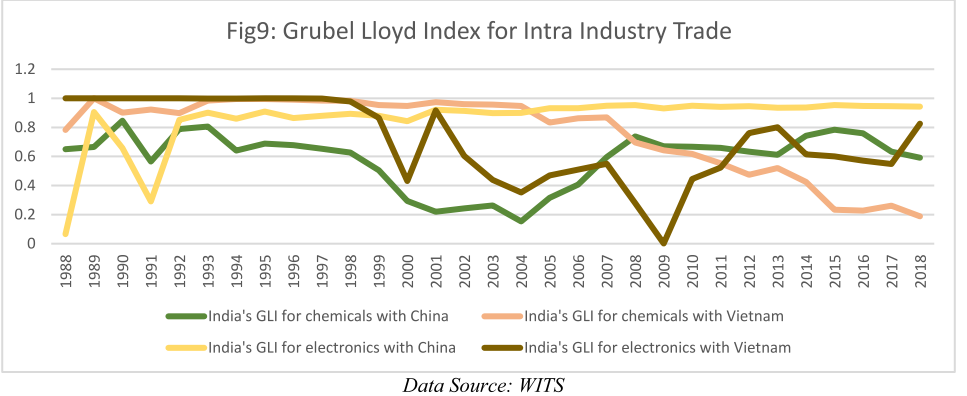


Data Source: Statista analysis (Statista, Statista 2016)

As of 2020, India's electrical industry was valued at $70 billion (Gurnaney 2020) and accounts for 3.3% of the global electronics market (Srinivasa 2020). Continuing along the same path, the industry is expected to grow at around 30% (Statista, Statista 2020) for the next five years. This growth can be attributed to initiatives such as Make in India and availability of internet at reduced costs.

The economic scenario is leading the countries to shift the supply-chain from China. This opens up a hub of opportunities for the Indian electronics industry. To achieve and facilitate this growth, the industry needs remedy from high taxation, dearth of finance and power resources.

On visualizing the intra industry trade of India for these two industries with respect of China and Vietnam using the Grubel Lloyd Index the following picture emerges:



Data Source: WITS

$$GL_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i} \quad ; 0 \leq GL_i \leq 1$$

When GL=1, the country is consideration imports as much it exports to a given region. When GL=0, there is no intra industry trade and either the country in consideration is importing or exporting to a given region. First, let us consider China. For electronics, this index has been close to 1 over the year which imply that India imports from and exports to China, though the magnitude of imports is undoubtedly greater than exports. When it comes to chemicals, only in the past decade the value of GL= 0.8 which again signifies a high incidence of two-way flow of goods and services. Secondly, let's consider Vietnam. India majorly exports chemicals from Vietnam but engages in both imports and exports for electronics.

LITERATURE REVIEW

In the paper 'Vietnam-India Economic Ties: Challenges and Opportunities since 2007', Ngo Xuan Binh attempts to analyse the strategic partnership of India and Vietnam since 2007. Over the years, both the countries have developed strategic economic ties, however issues such as similar export-import structure, geographical distance, cultural difference, transportation difficulties make the task at hand more complicated (Binh 2016).

A report "Chinese Blessing for the Chemical Industry" by CRISIL studies the trends of the chemical industry in China. In the decade 2009-2018, the industry witnessed a growth rate of 8-10%. This was a result of huge investments, research and development spread, easy access to low-cost capital and labour, relaxed environmental norms, and government subsidies. However, over the next couple of years, the projected growth

rate of the industry settles at around 6.25%. Change in global trade dynamics, stricter environmental regulations and rising cost of labours are the major factors. This provides a golden opportunity for the Indian chemical industry to make its mark. However, in order to completely absorb such benefits, it becomes imperative for India to accelerate its investments in R&D, development of downstream speciality chemical and fiscal incentives (CRISIL n.d.).

A paper by NITI Aayog, "Make in India Strategy for Electronic Products", weighs the two alternatives India has: export orientation strategy versus import substitution. The per capita income only doubled across a span of forty years when India practiced import substitution. The growth since 1991 has enlarged the domestic electronics market in India, while at the same time, the global market remains relatively smaller. Thus, if we aim at the world markets, the scope for expansion is humungous. With China's share in the global trade of electronics declining, this is a one-time opportunity for India to capture the global market (Aayog 2016).

Dipika Sahu in her paper "Impact of Bilateral Trade between India and China on Economic Growth of India" concluded that imports from China contributed around 11.5% to the Indian GDP while total exports to China during this period of consideration contributed about 14% to the GDP (Sahu, Impact of bilateral trade between India and China on economic growth of India 2018).

A paper by Dr. Smita Dubey and Dr Harish K Dubey aims to study the preparedness of textile, automobile and pharmaceutical sectors to achieve self-reliance, problems on the way to Atma-nirbhar Bharat and possible remedies. It concludes that Atma-nirbhar Bharat is a long-term concept which needs proper implementation of laws and proper allocation of funds (Dubey 2020).

HYPOTHESIS

Due to high import dependence on China in the categories of chemicals and electronics, it will be difficult for India to resists its vulnerability in the short run. The call for self-reliance and targeting Vietnam as a potential alternative to China, can work in the longer run provided India boosts its manufacturing base.

RESEARCH METHODOLOGY AND RESULTS

The study is divided into two timeframes: short to medium term (2-3 years) and long term (10 years). The former case is dealt using

regression analysis and the latter is analyzed using comparative data. (All the data points are sourced from the World Bank Open Database and World Integrated Trade Solution)

A. Double log regression model

A double log regression model has been set up to study the impact of imports of electronics and chemicals from China and Vietnam on the per capita income of India. It is a time series analysis for a period of 30 years (1988-2018). The following econometric equation is devised:

$$logY_i = A_1 + A_2\, logX_{2i} + A_3 logX_{3i} + A_4 logX_{4i} + A_5 logX_{5i} + v_i$$

Variables (USD thousands)	Regression notation*
Indian GDP per capita	$logY_1$
Import of Electronics from China	$logX_2$
Import of Electronics from Vietnam	$logX_3$
Import of Chemicals from China	$logX_4$
Import of Chemicals from Vietnam	$logX_5$

*Log has been taken to adjust the skewness in the variables to ensure normality is satisfied which has been discussed in the appendix in detail.

Ordinary linear estimators have been used for the purpose of regression. In order the verify the 'best, linear, unbiased and efficient (BLUE)' property of these estimators, the model is tested for heteroscedasticity, endogeneity, autocorrelation and multicollinearity in the appendix.

STATA has been used for the purpose of regression. The results are as follows:

Fig10: Regression results

```
. reg lgdppc limelch limelv limchc limchv, robust

Linear regression                               Number of obs     =         25
                                                F(4, 20)          =     345.98
                                                Prob > F          =     0.0000
                                                R-squared         =     0.9851
                                                Root MSE          =     .08311

------------------------------------------------------------------------------
             |               Robust
      lgdppc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    limelch |  -.1156983   .0341851    -3.38   0.003    -.1870071   -.0443895
     limelv |  -.0004475   .0228166    -0.02   0.985     -.048042    .047147
     limchc |   .4163139   .0436626     9.53   0.000     .3252354    .5073925
     limchv |   .0682529   .0456591     1.49   0.151    -.0269903    .1634961
      _cons |   1.763664   .2964983     5.95   0.000      1.14518    2.382149
------------------------------------------------------------------------------
```

- The F-test is used to test the null hypothesis (H_0): no independent

variable fits the data. Since the p-value is less than the critical f value, the null hypothesis can be rejected. We can say that all the variables are jointly significant.

- The t-test shows check for the null hypothesis: individual coefficients are insignificant. Given a 5% level of significance, the null hypothesis can be rejected if critical t-value is greater than the p-value. This means that all the independent variables do affect the dependent variable in this model.

- The R_2 value denotes how much proportion of variation in GDP per capita growth, can be explained by the growth rate of independent variable. 98.51% can be explained in this model, which means that per head income growth is being affected by growth in import of electronics and chemicals by 98.51%.

- A_5= 0.068: Here the p-value is highly unacceptable given the 5% LOS. This implies that import of chemicals from Vietnam has no impact on GDP per capita of India. One probable reason could be the abysmally low dependence on Vietnam for chemicals.

- A_4= 0.416: The coefficient is highly significant and so it means that when chemical imports increase by 1% from China, the per head income raises by 0.41%.

- A_3= 0: The import of electronics from Vietnam is insignificant in impacting GDP per capita due to high p-value and non-rejection of the null hypothesis.

- A_2= -1.116: The elasticity of per head income with respect to electronics import from China is -1.116. This highlights the fact that when such imports rise by 1%, GDP per capita reduced by .116%. This could indicator that the paradigm set under Atma nirbhar bharat might be sound and rational.

-A_1=1.176: When all the independent variables are taken as 1, the average value of per capita GDP will be USD 3.241.

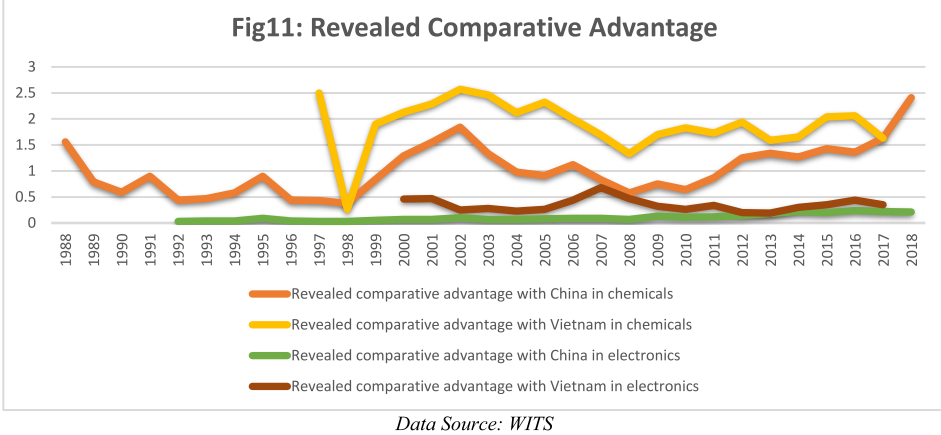
B. Comparative analysis

Having corroborated that restricting Chinese imports is not a viable strategy in the short run, it is worthwhile to revisit this policy in a longer time frame. A period of 10 years: 2020-30 has been considered here.

Years	Total import of Chemicals	% of chemicals imported from China	% of chemicals imported from Vietnam	Total import of Electronics	% of electronics imported from China	% of electronics imported from Vietnam
2008	3E+07	16.06364	0.149307637	6E+07	18.95582	0.059097
2009	3E+07	16.79263	0.224617312	6E+07	28.11598	0.279362
2010	3E+07	20.65787	0.274538586	6E+07	29.00781	0.667052
2011	4E+07	22.78415	0.297425756	8E+07	30.00263	0.870502
2012	4E+07	22.90048	0.345686518	8E+07	29.5201	1.113719
2013	4E+07	22.98011	0.384586652	8E+07	31.87096	2.225545
2014	5E+07	25.99065	0.470216972	7E+07	34.38765	1.722952
2015	5E+07	27.63891	0.619989773	8E+07	37.23201	1.603207
2016	4E+07	24.53196	0.706304756	8E+07	38.29511	1.502165
2017	5E+07	24.22365	0.665079499	1E+08	41.26324	1.665131
2018	7E+07	25.66598	0.675984899	1E+08	33.90456	3.361423

The table gives an overview of the total imports of electronics and chemicals and the respective share of China and Vietnam in these commodities for the past 10 years. Undoubtedly, China captures a majority of share in the import of both the commodities. As of 2018, India imported approximately 26% of its chemicals and 34% of electronics from China whereas the respective share of Vietnam is 0.7% and 3.4%.

To further dissect the relative long term advantage India enjoys between the electronics and chemicals industry, the tool of revealed comparative advantage has been used:



Data Source: WITS

This concept is based on the Ricardian comparative advantage concept which indicates whether a country has the trade potential in a particular product or not. A value of less than one means than the country has a revealed comparative disadvantage. Here, India has this potential for chemicals but not for electronics clearly.

In this backdrop, the only way to reduce India's dependency on Chinese products in the long run is by increasing its own domestic manufacturing

base and satisfying the rest of the demand by diversifying imports, one of the potential destinations being Vietnam. With continued government support, it is worthwhile to see whether India can take over China as a manufacturing hub in the segments of electronics and chemicals. The following tables show the forecasted production capacity of these two industries and the expected domestic demand which will be met by Indian domestic manufacturing base:

CHEMICALS

Year	Production (Billion KG)	Best case scenario-Production	Consumption (Billion KG)	Production CAGR	Best case scenario-Production CAGR	Consumption CAGR	Shortfall (Billion KG)	Best Case Scenario Shortfall (Billion KG)
2014	0.96	0.96	4.2	0.07837	0.17	0.027066087	3.24	3.24
2015	0.96	0.96	4.2				3.24	3.24
2016	0.98	0.98	4.5				3.52	3.52
2017	1	1	4.6				3.6	3.6
2018	1.1	1.1	4.8				3.7	3.7
2019	1.4	1.4	4.9296				3.5296	3.5296
2020	1.509718	1.61	5.0626992				3.5529812	3.4526992
2021	1.6280346	1.8837	5.199392078				3.571357479	3.315692078
2022	1.75562367 1	2.203929	5.339775665				3.584151993	3.135846665
2023	1.89321189 8	2.57859693	5.483949607				3.590737709	2.905352677
2024	2.04158291 5	3.016958408	5.632016247				3.590433332	2.615057839
2025	2.20158176 8	3.529841337	5.784080686				3.582498918	2.254239348
2026	2.37411973 1	4.129914365	5.940250864				3.566131133	1.810336499
2027	2.56017949 4	4.831999807	6.100637637				3.540458143	1.26863783
2028	2.76082076 1	5.653439774	6.265354854				3.504534092	0.61191508
2029	2.97718628 4	6.614524536	6.434519435				3.45733315	-0.180005101
2030	3.21050837 3	7.738993707	6.608251459				3.397743086	-1.130742247

A period of 6 years has been considered for calculating CAGR = 7.8%. The second column shows the forecasted production capacity if the industry continues to produce at the same rate. In the best-case scenario[1], it can be

[1] This rate has been computed by the government analysis:

expected to grow at a rate of 17% (Florian Budde 2020). The consumption is taken to increase at a rate of 2.8%. The last column implies that by 2030 in the long run, by revamping its production capacity, India can satisfy its domestic demand without depending on China and also aim to be a net exporter of these products.

ELECTRONICS

Year	Production (USD Billion)	Best case scenario - Production (USD Billion)	Consumption (USD Billion)	Production CAGR	Best case scenario - Production CAGR	Consumption CAGR	Shortfall (USD Billion)	Best Case Scenario Shortfall (USD Billion)	Import Vietnam (USD Billions)
2008	21	21		0.138414	0.3	0.21446			0.00038
2009	21.2	21.2							0.00163
2010	23.4	23.4							0.00425
2011	28.3	28.3	69.6				41.3	41.3	0.00668
2012	29.9	29.9	80				50.1	50.1	0.00881
2013	32.7	32.7	100				67.3	67.3	0.0169
2014	40.8	40.8	135				94.2	94.2	0.0129
2015	50	50	160				110	110	0.01289
2016	52.5	52.5	200				147.5	147.5	0.01236
2017	62.2	62.2	250				187.8	187.8	0.01626
2018	69.6	69.6	320				250.4	250.4	0.04521
2019	99.5	99.5	400				300.5	300.5	0.06978
2020	113.272193	129.35	485.7844				372.512	356.434	0.10771
2021	128.9506503	168.155	589.9662082				461.016	421.811	0.16626
2022	146.7992256	218.6015	716.4909512				569.692	497.889	0.25662
2023	167.1182937	284.18195	870.1503171				703.032	585.968	0.39609
2024	190.2498052	369.436535	1056.763624				866.514	687.327	0.61137
2025	216.5830417	480.2674955	1283.398208				1066.82	803.131	0.94366
2026	246.5611668	624.3477442	1558.637071				1312.08	934.289	1.45655
2027	280.6886842	811.6520674	1892.903936				1612.22	1081.25	2.24819
2028	319.5399277	1055.147688	2298.858007				1979.32	1243.71	3.47011
2029	363.7687272	1371.691994	2791.873394				2428.1	1420.18	5.35614
2030	414.1194118	1783.199592	3390.621354				2976.5	1607.42	8.26726

If the Indian electronics industry were to grow at the rate of past i.e., 13.8% and consumption at the rate of 21.4%, the shortfall will be immense. Provided we consider the best-case scenario of CAGR of 30%, the domestic industry will be able to satisfy more than half of the demand through self-reliance. The last column calculated the imports from Vietnam till 2030

considering the same CAGR in the previous 11 years. Clearly, even if we diversify imports from Vietnam, our domestic demand will not be met through it. Hence, this calls for not only accelerating the domestic manufacturing and moving from China to Vietnam, but also importing from countries like Taiwan, Malaysia and Singapore.

CONCLUSION

The regression analysis shows that import of electronics and chemicals from China significantly impact the per capita GDP of India whereas the same from Vietnam does not. In the short run, if India were to boycott ''Made in China'' products then it will end up hurting its own prospects of higher per head income. The charts depicting the past trends also bolster such contention due to the high trade integration between the two nations. But the feasibility of such a policy can be thought for the longer run. For the chemicals sector, if India were to produce at a CAGR of 17% for the next 10 years then the country will be highly self-reliance and self-sufficient in meeting its domestic demand and can end up as a major net exporter of chemicals. When we consider electronics, two divergent picture emerges. The regression analysis shows that increasing the Chinese imports is reducing the Indian per capita GDP by .11%. But on the same hand, even if it manufactures at a CAGR of 30% and diversify the imports by depending on Vietnam, the domestic demand will still be left unsatiated. This symbolizes a paradox. In one-way, Chinese imports is negatively impacting per head income in India but alternatively it has penetrated so much in the Indian market that it will be difficult for the Indian electronic industry to bear the shock of boycotting Chinese products. Due to such intensified market integration between China and India, some economists believe that instead of completely and immediately boycotting the dragon, the government may rather focus on structural reforms: diversifying imports, boosting FDI, and should aim to strategically disengage from China. In order to attract MNCs, the government can work on enhancing the ease of business, competitive industrial growth, innovation, and ease of access to capital to encourage the budding start-ups.

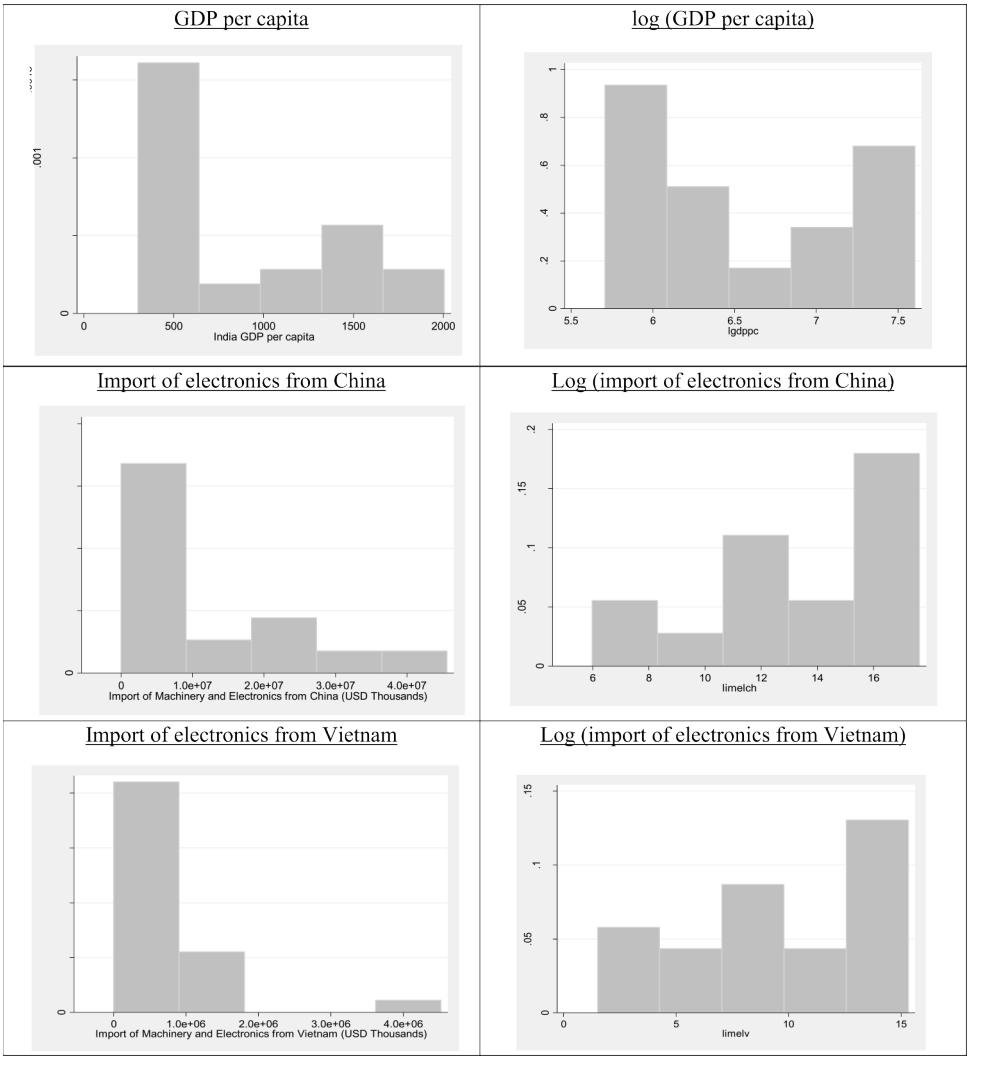
LIMITATIONS OF THE STUDY

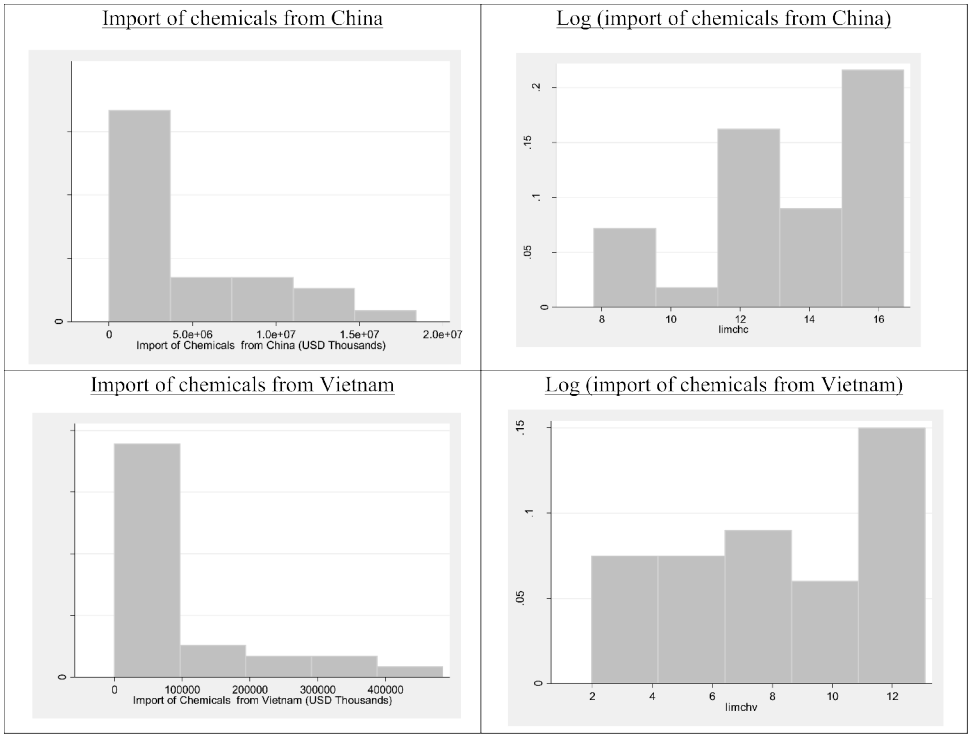
- 30 years are considered: 1988-2018, But due to unavailability of data for 5 years, the regression has been run on 25 years only.
- The regression model suffers from endogeneity, multicollinearity and non-normality of error terms.

APPENDIX

1. Skewness of the variables in the double log regression model and log transformation:

Variables	Imports of chemicals from China	Imports of chemicals from Vietnam	Import of electronics from China	Import of electronics from Vietnam	Indian per capita GDP
Skewness	1.099895	2.623952	1.099963	2.623952	.7361335
Log skewness	-.6712472	-.4996232	-.7318895	-.1691425	.3176243





2. Testing for heteroscedasticity

This problem of unequal variance of the error term or heteroscedasticity may arise due to omission of relevant variable, the addition of irrelevant variable, etc. The OLS estimators are no more efficient since they don't have minimum variance and so there exists another linear estimator that utilizes the data better. The original regression results without checking for heteroscedasticity appeared like:

Fig12: Heteroscedastic results

```
. reg lgdppc limelch limelv limchc limchv
```

Source	SS	df	MS		
Model	9.15149179	4	2.28787295	Number of obs	= 25
Residual	.138150072	20	.006907504	F(4, 20)	= 331.22
				Prob > F	= 0.0000
Total	9.28964186	24	.387068411	R-squared	= 0.9851
				Adj R-squared	= 0.9822
				Root MSE	= .08311

lgdppc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
limelch	-.1156983	.0564179	-2.05	0.054	-.233384	.0019873
limelv	-.0004475	.0235646	-0.02	0.985	-.0496024	.0487074
limchc	.4163139	.0717171	5.80	0.000	.2667147	.5659132
limchv	.0682529	.0572325	1.19	0.247	-.0511321	.1876378
_cons	1.763664	.5283812	3.34	0.003	.6614805	2.865848

Testing for heteroscedasticity using the Breusch – Pagan test for detecting whether the coefficients have joint significance of the error term or not:

H0: variance is constant

Fig13: Results of Breusch Pagan Test

```
. hettest, rhs fstat

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: limelch limelv limchc limchv

         F(4 , 20)     =      0.83
         Prob > F      =    0.5190
```

Since the p value is smaller than the critical f-value, the null hypothesis can be rejected. This means that variance is not constant and so exists the problem of heteroscedasticity. To correct this issue, Robust standard errors have been used. On correction, all the p-values, F and t statistic are now reliable.

3. Testing for multicollinearity

It undermines the statistical significance of the given independent variables and takes away the statistical power of the analysis, can cause the coefficients to switch signs, among others. To detect it, Variance Inflation Factors have been used which tells the extent to which the variance of coefficients is inflated upwards.

Fig14: Variance Inflation factors

```
. vif
```

Variable	VIF	1/VIF
limchv	96.10	0.010406
limelch	59.78	0.016729
limchc	48.93	0.020439
limelv	35.83	0.027913
Mean VIF	60.16	

It is believed that values of VIF that exceed 10 are often regarded as indicating multicollinearity, but in weaker models values above 2.5 may be a cause for concern. In this model, since for every variable, VIF exceeds the threshold value of 10, there exists series issue of multicollinearity.

4. Testing for autocorrelation

Serial correlation or autocorrelation occurs when the error terms in the model are related. When autocorrelation is present, the OLS procedure still produces unbiased estimates but increases the variances hence the OLS estimators ceases to be BLUE. Using the Durbin Watson test:

Fig15: Durbin Watson test results

```
. estat dwatson

Number of gaps in sample:  1

Durbin-Watson d-statistic(  5,     25) =  1.491031
```

Rule of thumb is that when the statistic =2 there is no autocorrelation and when = 0, there are high incidence of autocorrelation. Since the dwatson statistic here= 1.5 which is close to 2, autocorrelation is not necessarily an issue in our model.

5. Testing for endogeneity

This refers to a situation where explanatory variables are correlated with error terms or, Cov (Xi,u) ≠ 0.

This means that there is something that is related to GDP per capita which is also related to imports but this something is not there in our model and hence poses a threat to the reliability of the OLS estimators. Let this something be 'Export of chemicals to Vietnam'.

H0: Import of chemicals from China is exogenous

Fig16: Instrumental Variables

```
. ivregress 2sls lgdppc limelch limelv limchv (limchc=exportofchemicalstovietnam)

Instrumental variables (2SLS) regression          Number of obs   =         25
                                                  Wald chi2(4)    =    1350.60
                                                  Prob > chi2     =     0.0000
                                                  R-squared       =     0.9817
                                                  Root MSE        =     .08242

------------------------------------------------------------------------------
     lgdppc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
     limchc |    .569871   .0929206     6.13   0.000     .3877499    .7519921
    limelch |   -.185341   .0621748    -2.98   0.003    -.3072013   -.0634807
     limelv |   .0156484   .0241942     0.65   0.518    -.0317713    .0630681
     limchv |   .0138273   .0605838     0.23   0.819    -.1049148    .1325693
      _cons |   .9303842   .6163285     1.51   0.131    -.2775974    2.138366
------------------------------------------------------------------------------
Instrumented:  limchc
Instruments:   limelch limelv limchv exportofchemicalstovietnam

. estat endog

  Tests of endogeneity
  Ho: variables are exogenous

  Durbin (score) chi2(1)          =  8.10453  (p = 0.0044)
  Wu-Hausman F(1,19)              =  9.11405  (p = 0.0071)
```

Using the 'ivregress' command in Stata, we get the Wu-Hausman F statistic = 9.114 and p value = 0.07% which is highly significant. Hence, we can reject the null hypothesis. This means import of chemicals from China is endogenous and it is correlated with the error term. The problem of endogeneity produces biased OLS estimators hence they cease to be BLUE (best linear, unbiased estimator). Undoubtedly, this model needs to be tested for other instrumental variables.

6. Testing for normality of errors

This means while taking the average, positives tend to cancel negatives of the error terms and hence mean=0. The central limit theorem ensures that errors follow such distribution for large observations. The t-test and F- test are not applicable unless the error term is normal distributed. Using the *Jarque-Bera normality* test on the residuals:

H0: errors are normal

Fig17: Jarque Bera test results

```
. jb uhat
Jarque-Bera normality test:  12.75 Chi(2)   .0017
Jarque-Bera test for Ho: normality:
```

Here p- value is less than the critical chi-squared value and so we have to reject the null hypothesis. This means that are error term is not normally distributed.

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The Power of Emotional Branding: A Cultural Perspective

Can India be Atma-nirbhar by replacing China with Vietnam in its supply chain?

Abstract

This research explores the field of emotional branding, with a particular emphasis on how it appears in India's diverse cultural landscape. By carefully analysing cultural nuances and viewpoints, this study aims to answer how it works in a specific cultural setting. This study seeks to understand the complex dynamics of emotional branding and how it affects customer behaviour and perceptions by contrasting and comparing the Indian and Western perspectives.

Keywords

Emotional branding, emotions, consumer behaviour, marketing, Indian & Western culture, family values, cultural awareness, cultural nuances

Introduction

Emotions direct our choices, deeds, and inspirations because they appeal to this underlying component of human nature. Ensuring clients are satisfied and their requirements are met is the core of

Mentor
Mohd. Hassan
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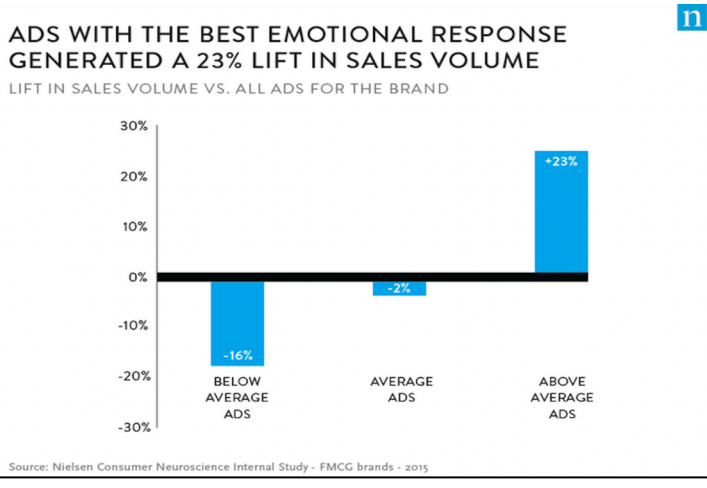
marketing. However, meeting people's expectations is no longer sufficient when they grow. These days, feelings are more significant, particularly for people who feel successful and satisfied. Emotions are akin to a global language that all creatures, even animals, can comprehend. Emotional branding is a powerful tool that companies all around the world can use. It is fundamentally about establishing a strong emotional connection with customers and motivating them to act.

The term "emotional branding" was first used in 2001 by Marc Gobé in his book "Emotional Branding: The New Paradigm for Connecting Brands to People." He aimed to investigate the possibility of a more profound, emotional connection between businesses and customers. Gobé asserts that emotional branding entails more than only raising brand awareness. The goal is to build a deep emotional connection between the brand and the customer from the commercials they see to the actual goods they utilise. A link is created when a brand stimulates particular feelings in its audience.

Emotional branding aims to appeal to customers' needs, desires, and feelings. It's similar to making a personal connection and affecting their perception of a business or product. When businesses create content that appeals to people's emotions, this happens. When it does, however, it's like magic – it triggers in the customers a deep emotional response that increases their desire for that particular brand or item. Making lasting relationships is the goal of emotional branding, not just selling products.

For marketers, emotional branding is like having a hidden weapon that can increase revenue and customer engagement like never before. When marketers create emotional ads, more than a third of them report seeing significant financial gains; 31% of advertisers support this by reporting substantial earnings from these types of advertising.But there's still more!



What did Nielsen research discover after carefully examining 100 advertisements from 25 distinct brands? The advertisements that evoked strong emotions and pulled at people's heartstrings managed to boost sales by an astounding 23%! (as shown in the above graph) That's no easy task. That emotional bond with clients might mean the difference between barely scraping by and going above and beyond in today's cutthroat industry. Not to be confused with a flimsy marketing gimmick, emotional branding is the real deal, analogous to a secret ingredient that transforms an ordinary campaign into an income-generating machine.

Discussion

The market leader in chocolates in India is CADBURY, a well-known brand that has gained the confidence of a sizable consumer base. Together, all of the brand's products account for over 70% of the market. With just chocolates sold under the brand name Cadbury Dairy Milk, they hold a 30% market share.

Every Indian remembers this famous line from the Cadbury advertising campaign: “Kuch acha hojayea, Kuch meetha hojayea” (Something good happens, let's have something sweet). It masterfully connects happy times and celebrations with Cadbury, elevating the brand to the status of happiness.

India boasts a colourful cultural environment with a plethora of festivals such as Diwali, Holi, Eid, Raksha Bandhan, and many more. Advertisers have a unique opportunity to build emotional and intimate connections with customers during these festivities. By linking their products to these celebrations, companies like Cadbury arouse sentiments of joy, cosiness, and indulgence, further solidifying their place in people's hearts and minds throughout the nation.

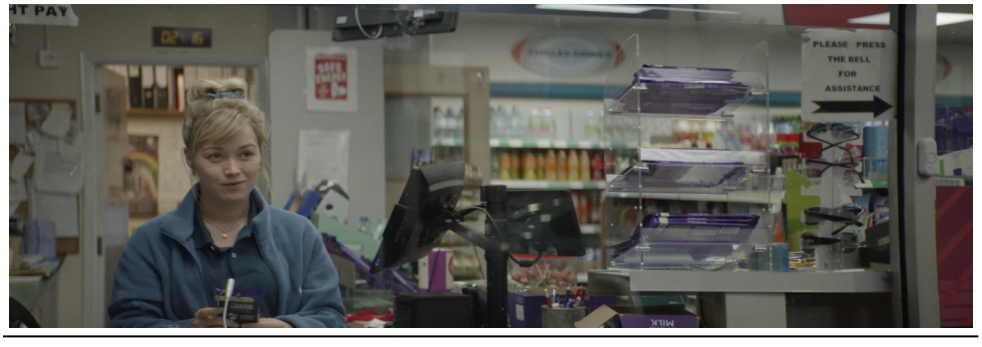
The strategic adjustment in Cadbury's advertising efforts to emphasise "Acchai" (goodness) is based on emotional branding. In order to establish a stronger emotional bond with a larger audience, Cadbury

plans to match its brand with social messaging and encourage optimism. By promoting social causes that are significant to Indian viewers, this strategy seeks to induce pleasant feelings and associations with the business in addition to providing sweet treats. By making these efforts, Cadbury hopes to strengthen its bonds with customers by focusing on shared values and feelings. This will help the company's emotional branding strategy connect deeper with its intended market.

Indian Culture:

One of the best examples of emotional branding in advertising is how Cadbury depicts family situations, like siblings eating chocolate on Raksha Bandhan. By presenting these moments, Cadbury draws attention to the strong emotional bonds that Indians share with their families. The focus on love, affection, and unity is in line with cultural ideals of fidelity and dependability, evoking sentimentality and cosiness that deepens the emotional connection between the company and its target market. Cadbury's emotional branding approach, which aims to establish meaningful connections with customers based on shared experiences and values, is in line with these advertisements, which inspire good emotions connected with family gatherings and festivals.

Western Culture:



In the above image, the Cadbury UK commercial, a parent gives his daughter a Cadbury chocolate bar as a surprise while she's staying up late at her workstation. The commercial emphasises how small acts of kindness, like surprising a family with a chocolate bar, can bring about happy memories. The emphasis on familial love and care reinforces this emotional connection, striking a chord with viewers on an emotional level.

Additionally, Cadbury's advertising in the West frequently highlight the sensual delight of savouring their chocolates, enhancing the emotional appeal using cues that are both visual and audible. Rich or serene settings combined with pictures of chocolate melting and calming music produce a multimodal experience that amplifies the brand's emotional impact. Cadbury's emotional branding approach combines concepts of warmth and familial affection with sensory enjoyment in an effort to invoke good feelings and establish enduring relationships with its target audience.

Comparative Analysis:

Strong emotions are the goal of Cadbury commercials in both the West and India, although they approach this goal differently depending on the culture. The advertisements in the West highlight the value of familial love and the pleasure of sharing Cadbury chocolates. They want customers to experience the warmth that comes from spending a memorable time with their loved ones. On the other hand, Cadbury advertisements in India capture the spirit of Indian customs and festivals. Their goal is to portray the pleasant, warm emotions of happiness and community that come with celebrations and other important events. In the end, the goal of both kinds of advertisements is to connect with viewers on a deep level by appealing to their experiences and cultural beliefs.

Conclusion

To sum it, this study explores the concept of emotional branding and how it manifests itself in the rich cultural diversity of India. The study compares and contrasts Indian and Western perspectives to analyse cultural quirks and points of view in order to understand the dynamics of emotional branding and how it affects consumer behaviour and perceptions. Regardless of cultural differences, emotional branding as demonstrated by Cadbury emerges as a potent tool for connecting with customers. Indian advertisements draw on local customs and festivities to invoke sentiments of happiness and cosiness, while UK advertisements highlight the love of family and the sensual pleasure of

consuming Cadbury chocolates. The success of both strategies in connecting with their target markets highlights how crucial cultural relevance is to emotional branding tactics. All things considered, emotional branding acts as a global language that bridges gaps and creates deep bonds between companies and customers everywhere.

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Impact of Israel-Palestine war on India:

Economic Perspective

Abstract

On 7th of October 2023, Hamas launched a surprise attack on southern Israel from the Gaza strip and the next day Israel declared itself in a state of war. This research paper aims to analyse and interpret the economic repercussions of the war on India and its economy. Among different arenas which may be affected by the war, the ones chosen for the purpose of this analysis are inflation, defence, stock market and trade balance. Furthermore, it is an attempt to understand the reasons behind all the changes that were encountered after the inception of the infamous Israel-Hamas war.

Introduction:

India has a timeline of strategic and diplomatic relations with Israel and both the countries share some of the major trade ties. To unlock shared economic advantages, countries are pursuing a growing number of joint ventures, formalized through reciprocal

agreements. It's a matter of fact that India and Israel don't have that major extent of dependence on each other for the products but still they share a lot of important trade relations. Upon Israel's declaration of a state of war on October 8th following an attack by Hamas, economists and analysts began speculating about the market's future trajectory, potential economic impacts, changes in relationships, and the long-term implications of prolonged conflict. To understand each of these questions and knowing about the credibility and reliability of these speculations, one needs to look at the data for the concerned sectors. This paper intends to fulfil its purpose by conducting a comprehensive analysis of the speculations regarding the impact of the war on Indian economy and whether empirical evidence supports the speculations.

India's Dependency on Israel:

Ever since India became an open economy in 1991, it has been forming diplomatic and strategic relations with the rest of the world. The main aim behind international unification is to promote international peace and security. Indian foreign policy includes aspects of national security and economic growth which are the prime reasons for forming strategic and military relationships with the major powers of the world.

India's ties to Middle East and North Africa region are underpinned by a broad range of political, economic, and strategic interests. One of the major countries with Indian ties is Israel. Bilateral trade with Israel has expanded dramatically since the establishment of diplomatic relations in 1992, growing from $200 million in 1992 to $10.1 billion in FY 2022-23, excluding defence trade.

There are three major categories of trade in which India and Israel share strategic ties, namely defence, merchandise and services, and cross-border investment. We shall analyse each of the above-mentioned category below.

Investment

Indian companies have made significant investments in Israel from time to time. Cumulative ODI (Outward Direct Investment) from India between April 2000 and November 2023 was USD 384 million. The Indian companies are marking their presence in Israel though mergers and acquisitions and by opening branch offices. Some of the major players in this space are TCS, State Bank of India, Sun Pharma, Infosys, Tech Mahindra and Wipro Infrastructure Engineering. These companies

have established their presence by executing operations or making acquisitions/ investments in Israel.

Major Indian companies are also showing interest in Israel's innovation ecosystem. Notable investments are being made in Israel's startups directly or indirectly through venture capital firms or academic institutions. For instance, in March 2022, Ola Electric invested USD 5 million in an Israel's battery technology company StoreDot specializing in extremely fast charging technology, as part of its plans to manufacture advanced chemistry cell/energy systems in India.

There has also been movement of capital from Israel towards India. From April 2000 to September 2023, India has USD 286.15 million in FDI from Israel, mainly in the sectors of high-tech domain, agriculture, and water. These investments are varied in nature, ranging from manufacturing plants to R&D centres, joint ventures, and technology partnerships with Make in India.

Defence

India and Israel share a significant bilateral defence relationship which is underscored by substantial exports of defence equipment from Israel to India. According to SIPRI Arms Transfer Database, Israel's defence exports to India from 2012 to 2022 amounted to $2.9 billion. India has been Israel's principal customer of defence goods, accounting for 37% of Israel's total defence exports between 2018-22, which makes about 9-10% of India's total defence imports (this value is estimated by analysts since no concrete data was available). Israel supplies critical and innovative force multipliers like unmanned aerial vehicles, assorted missile, guidance and avionics systems, precision guided munitions, diverse sensors and surveillance and targeting radars, amongst other equipment.

India and Israel also share a strong cooperation in defence which is evident from the "Vision of Defence Cooperation" formed in 2022, which laid out a 10-year roadmap with a commitment to focus on areas such as emerging technologies and defence co-production.

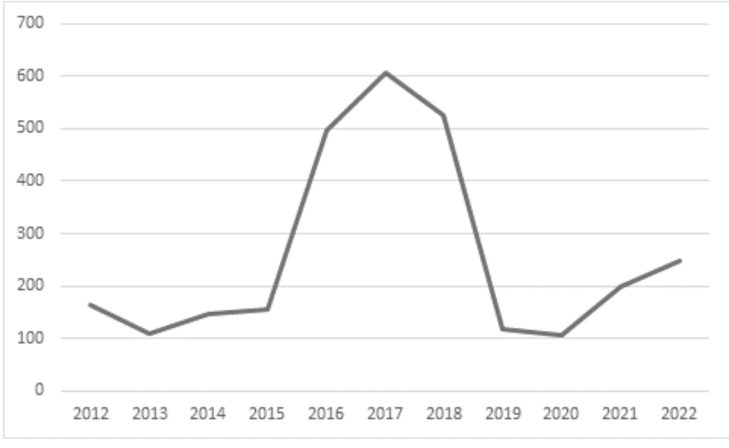


Figure 1: Israel's Arms Exports to India by Value (in millions of US dollars)

Source: SIPRI Arms Transfer Database

Merchandise

Apart from the trade in defence sector, India and Israel share trade ties for merchandise and service sectors too, which amounted to USD 12 billion in 2022-23. India's merchandise exports and imports from Israel during 2022-23 were USD 8.4 billion and USD 2.3 billion respectively, leading to a merchandise trade surplus of USD 6.1 billion.

The bilateral trade between India and Israel involves substantial exchanges of goods. India exports various commodities to Israel, including pearls and precious stones, automotive diesel, chemical and mineral products, machinery and electrical equipment, plastics, textile and apparel products, base metals and transport equipment, and agricultural products. Conversely, Israel exports commodities to India, such as pearls and precious stones, chemical and mineral/fertilizer products, machinery and electrical equipment, petroleum oils, defence equipment, machinery, and transport equipment.

Israel Palestine Conflict History

The Israel-Palestine Conflict is one of the world's largest-continuing military and political conflicts. The history of the conflict traces its origin back to the late 19th and 20th century with the arrival of Jewish immigrants and settlers in Palestine which marked the advent of Zionist movement (a nationalist movement that advocates for a Jewish homeland in the Biblical land of Israel.). This movement was supported by an imperial power in 1917 Balfour Declaration issued by Britain, which promised to support the creation of a "Jewish Homeland in

Palestine". The idea was obviously resented by the Arabs and the tensions grew into open sectarian conflict between Jews and Arabs.

The 1947 United Nations Partition Plan for Palestine (Resolution 181) triggered the 1948 Palestine war, which lead to expulsion and flight of most Palestinian Arabs and the establishment of Israel on most of the Mandate's territory, and the control of Gaza Strip (a small piece of land on the Mediterranean Sea that borders Egypt to the south). and the West Bank by Egypt and Jordan, respectively.

Over the following years, tensions rose in the region, particularly between Israel and Egypt, Jordan, and Syria. Following the 1956 Suez Crisis and Israel's invasion of the Sinai Peninsula, Egypt, Jordan, and Syria signed the mutual defence pacts in anticipation of a possible mobilization of Israel's troops.

In July 1967, following a series of manoeuvres by Egyptian President Abdel Gamal Nasser, Israel pre-emptively attacked Egyptian and Syrian air forces, starting the 6-day war. After the war, Israel gained territorial control over the Sinai Peninsula and Gaza Strip from Egypt; the West bank and East Jerusalem from Jordan; and the Golan Heights from Syria.

Six years later, in the infamous Yom Kippur War or what is commonly referred to as the October War, Egypt and Syria launched a surprise two-front attack on Israel to regain their lost territory. However, the conflict could not result in significant gains for Egypt, Israel, or Syria. Then, in 1979, after a series of cease-fires and peace negotiations, representatives from Egypt and Israel signed the Camp David Accords, a peace treaty that ended the thirty-year conflict between Egypt and Israel.

The Camp David Accords improved relations between Israel and its neighbours, the question of Palestinian self-determination and self-governance remained unsolved. Then in 1987, the First Intifada happened, wherein hundreds of thousands of Palestinians rose up against the Israel's Government. There came the 1993 Oslo I Accords, which mediated the conflict, setting up a framework for the Palestinians to govern themselves in the West Bank and Gaza, and enabled mutual recognition between the newly established Palestinian Authority and Israel's government.

Upon the launch of Second Intifada by the Palestinians, in 2000, the Israel's government approved the construction of a barrier wall around the West bank in 2002, despite opposition from the International Court of Justice and the International Criminal Court.

The Rise of Hamas

In 2006, Palestinian Authority's Parliamentary elections, HAMAS came into the picture. Hamas is an Islamist militant resistance movement and one of the two major political parties in the Palestinian territories. Hamas managed to win the elections, deposing the longtime majority party Fatah. This incident gave Hamas the control of Gaza Strip. However, the United States and European Union considered Hamas a terrorist organization since the late 1990s (presence of Hamas in Palestine and then elections). In 2014, after a series of violent attacks and failed peace talks, Fatah entered in a unity government with Hamas.

Following years witnessed a series of clashes between Israel and Hamas which claimed a lot of innocent lives. These circumstances led to a strained political atmosphere which resulted in disharmony between Fatah and Hamas, with Fatah party controlling the West Bank and Hams ruling the Gaza Strip.

Present Scenario:

On 7th of October 2023, Hamas launched a land, sea, and air assault on Israel from the Gaza Strip. The October 7 attack resulted in more than 1200 deaths, primarily Israel's citizens, making it the deadliest day for Israel since its independence. More than 240 people were also taken hostage during the attack.

The next day, Israel declared itself in a state of war for the first time since the Yom Kippur War in 1973. The war began with the Israel Defence Forces (IDF) conducting air strikes on the Gaza Strip, followed weeks later by the incursion of ground troops and armoured vehicles. After 8 October, both countries have witnessed violence attacks claiming lots of innocent civilian lives. As of February 18, 2024, the Israel–Hamas war has killed over 30,000 people, including 28,473 Palestinians and 1,410 Israel's. Around 70% of the dead are women and children, with about 10,000 of the dead being children under 18. The war has also caused massive destruction, with 45-56% of Gaza's buildings damaged, and over 1.8 million Palestinians displaced.

Speculations:

"War brings nothing but destruction; in a war between two countries there are no winners and two losers."

Whenever there is a state of war existing in the world economy, there is always a possibility of economic slowdown since all the nation's resources

are diverted towards fighting the war. Diverted towards the war. Also, the wars tend to disrupt trade routes and fluctuate energy prices. The situation worsens if the war is joined by the major powers and nations. During this period, economists play a crucial role by forecasting potential impacts. This helps in providing insight into what lies ahead.

At the outset of the Israel-Hamas War on October 7, the global economy was already grappling with the ramifications of the Russia-Ukraine conflict. Additionally, it had recently begun to recover from the Covid-19 pandemic. Against this backdrop, numerous economists speculated the potential implications of these events for global trade and India. In a report by CNBC, economists have warned that any possible escalation of the Israel-Hamas war will have a direct impact on energy prices, causing them to shoot along with disruption of trade routes. Israel's subsequent bombing of Gaza in a bid to eliminate Hamas has increased the risk of an extension of war to the wider Middle East region with countries like Iran and Egypt taking part in the war.

In this section, we have considered speculation made by the economists in four major areas where the impact of war can be seen more vividly which are inflation, defence industry, trade balance and stock market.

Inflation:

"As of today, the war is between the two countries. No other country has joined the war. However, the situation will change significantly if Iran, which is a major supporter of Hamas, joins the war. If that happens, it could lead to a spike in the crude oil prices which may lead to selling pressure in the market.", the authors of ICICI direct quoted. In case the oil trade is disrupted, and global oil supply will fall short, then the global inflation is bound to rise, and India would be no exception. Crude oil is an engine of the economy since it supports all the trade and transportation and in case transport costs see a hike, it leads to a rise in general price level in the economy which is the prime reason why governments often seek to maintain stability in oil prices.

Defence Industry:

Recent local media reports, quoting defence officials, stated that Israel's ongoing war in Gaza against Hamas was 'unlikely' to impact military hardware and spares supplies to India in the short term. However, they cautioned that an extended conflict could jeopardise deliveries.

"Any limited impact on Israel's equipment supplies can only be adversely

felt if it turns out to be a long-drawn war, much like the one between Russia and Ukraine" reported the Indian Express, quoting an unnamed official.

In case the war stretches out to a longer period, Israel may end up diverting its weapons and equipment stock towards fighting its own conflict.

Trade Balance:

In a report by Takshashila, they pointed out that the war can influence Indian exports indirectly by affecting the operational costs of Indian businesses in West Asia, and by impacting investment flows. Additionally, the conflict's broader regional implications could affect the Indian diaspora in the Middle East, potentially impacting remittances and energy supplies from the Gulf region, which are vital for India's economy.

Israel imports around USD 5.5-6 billion of refined petroleum products from India. In FY23, Israel's total imports from India stood at USD 8.4 billion. As per the Global Trade Research Initiative, Indian companies exporting to Israel may have to pay higher premiums and shipping costs, which can lead to reduction in their profitability. If the war escalates, the premium charges might increase every week.

India also imports products from Israel like machinery, pearls, and other precious stones, which amounted to USD 2.3 billion in FY23. The escalation of war can result in supply side problems, and this may also lead to rupee depreciation as quoted by the authors of ICICI Direct.

GTRI co-founder Ajay Srivastava said trade may be seriously impacted if operations at the three largest ports of Israel, Haifa, Ashdod, and Eilat are disrupted as these ports handle shipments of agriculture products, chemicals, electronics etc.

Stock Market:

The global head of equity strategy at Jefferies, Christopher Wood, said in a note to the investors that in his belief, markets will continue to try to ignore events in West Asia if no invasion in launched. This assurance could potentially trigger a relief trade in the markets, enabling investors to overlook the domestic implications of uncomfortably high bond yields for a period of time, he observed.

Another brokerage UBS also noted that geopolitical events have rarely caused a global recession or left a lasting mark on markets. Since the Israel-Hamas war comes at a time when geopolitical tensions are already elevated due to the ongoing war in Ukraine and the intense rivalry

between US and China, a slower growth is expected, and yields will be lower over the next 12 months.

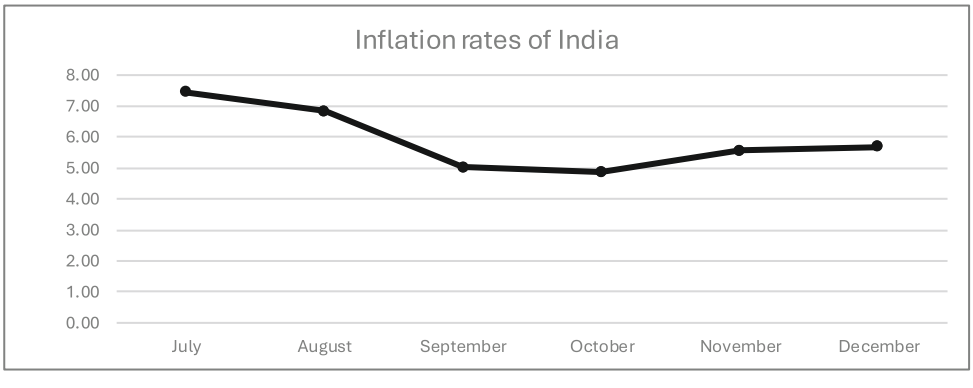
Analysis

In this section, the actual impact of the war, supported by data of the months July 23 – Dec 23, has been analysed and compared with the speculations in the previous section. Again, the areas that we will be considering are Defence, Inflation, Trade Balane and Stock market.

All these facts point out that the war hasn't yet affected Indian relationships with Israel in the sector of military and defence.

Inflation

As per the data published by the Ministry of Statistics and Programme Implementation (MoSPI), all India inflation rates based upon general, group and sub-group level CPI and CFPI have not shown major changes in the last six months of 2023. The data under consideration has been taken from July 23 – December 23 and it clearly shows that the Israel-Hamas war didn't have much of the impact on Indian inflation rates. Even before the war, from the month of July, Indian economy has transcended on a trajectory of decreasing inflation rates due to government policies alongside other reasons which do not fall under the purview of this research paper. The inflation rates took a downturn from 7.44% in July until 4.87% in the month of October and after October, it has risen to 5.69% at the end of December.



The graph above clearly depicts that despite the tensions in the Middle East region, Indian inflation has been following a downward trajectory which is a good sign for Indian economy. The reason behind this trend is that India doesn't get major imports from Israel and thus India's CPI remains undisturbed by the war going on in the middle east.

Defence Industry

For considering the impacts of war on the defence industry of India, we need to reiterate the items that India imports from Israel under this category. The major items that form part of Indian imports are diverse sensors, and surveillance and targeting radars. It's no doubt the fact that the war in any nation increases domestic demand for such equipment. Israel is no exception. As a matter-of-fact Israel's operations have indeed increased the need for ammunition and weaponry but not radars and sensors of the type it is exporting to India. Israel is making sure that the military exports to India are not impacted. In a report by Reuters, an Indian official said Israel had ensured a steady supply of weapons bought by New Delhi, which also include drone components.

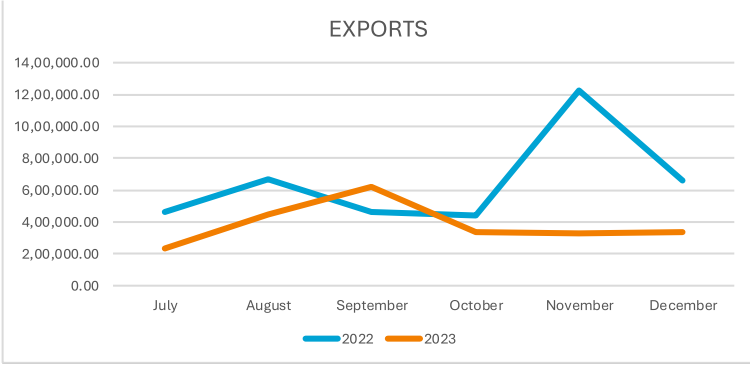
There is no evidence to the claim that Israel- Hamas war has slowed Indian Israel's military collaborations. In November 2023, Elbit Systems entered into an agreement to subscribe to a 44% stake in Adani Defence Systems subsidiary. In October, the brokerage house Nuvama published a report suggesting that the war may open more business opportunities for some Indian companies with Israel's joint ventures.

Trade Balance

Trade Balance is the difference between the value of a country's exports and imports over a period. This section is further divided into exports and imports to get a better image of the circumstance.

Exports

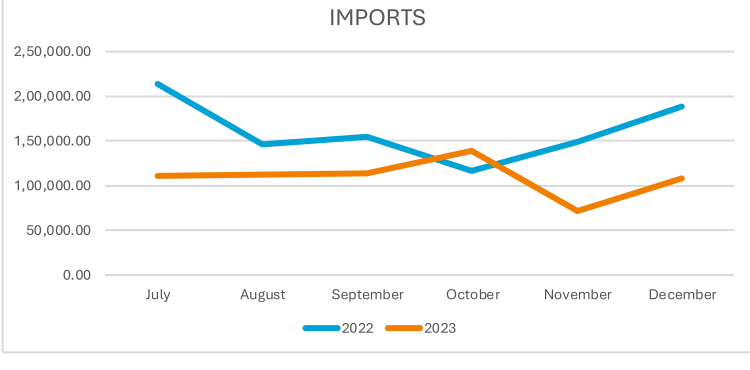
Indian exports to Israel have seen some major setbacks after the inception of Israel-Hamas war. In July, total exports to Israel stood at INR 2,33,576 lakhs which increased to INR 6,20,551 lakhs after two months i.e. in September, reporting an increase of 166%. Indian economy was doing well until the Israel-Hamas war broke out on 7th of October. In the month of October itself, the exports fell by 45%. In the following months, the exports maintained the October level and didn't see any major changes. Exports figures are at very low levels compared to the trade figures for the same months in the FY22. The month of November in 2023 even registered a 73% fall as compared to Fy22.



The graph clearly shows the extent of impact the war has laid down on Indian exports. The primary reason of such a tremendous fall in exports in due to the increase of the shipping premium by the insurance company in speculation of increasing danger at the ports and the disturbances the war will induce on the trade routes. Higher shipping premium reduces the profitability of the exporters and thus the exports decreased by half in October itself and showing no signs of recovery in the months following.

Imports

Now let us take a look at the data of imports from Israel. It can be clearly seen from the figures that imports weren't that disturbed by the ongoing Israel-Hamas war. From July 2023 onwards, the imports have stabilised themselves at around INR 1,11,000 lakhs. Minor ups and downs are seen in the time frame, but no major trend is witnessed. It was only in the month of November that the imports fell by almost half but in the next month, but it again reached the normal level, which is an indication that Israel is trying best not to have a negative impact of war on the exports to India.



The graph makes it clear that imports in the time frame are almost stable and have decreased compared to Fy22.

To conclude, the imports didn't see a major change, but exports fell by half. As a result, the trade balance is negatively impacted due to the war, but this situation can improve if the war doesn't get stretched out for too long.

Stock Market

Indian stocks did suffer in October owing to combination of factors which included the ongoing Israel-Palestine conflict among many other. However it's difficult to define the exact causation for the change, it can be attributed to a chain of events like shrinking of FPI due to surge of US bond yields. The Nifty 50 tumbled 2.84% in October, marking the largest monthly drop in CY23. From its all-time high of 20,222 points, the index traded down by 6.04% in the month of November. In October, 35 Nifty stocks finished in the negative territory, including companies like UPL, Divi's Laboratories, Tata Steel, Apollo, and others. These stocks experienced losses ranging from 4% to 12.3%. On the other hand, 15 stocks including Nestle, Coal India, Bajaj Auto among others, recorded gains within the range of 0.8% to 7.7%.

All these fluctuations in the markets were by and large attributed to the spike in US bond yields than the Israel- Palestine war as noted by the Chief Investment Strategist at Geojit Financial Services. So, it can be safely assumed that as of now the stock markets of India have not experienced the negative impacts of the war, but it should be kept in mind that the any serious event in the war or long stretching of the war causing a resource strain can surely lead to the impacts flowing down to the global markets including India.

Conclusion

After carefully reviewing data from government and trusted websites and analysing trends, it is clear that it is too soon to determine the exact impacts. The situation is complex, and we need more research and analysis to fully understand the effects of the war. This statement is made in the light that at the time of formulation of this research paper, only 5 months have passed by after the inception of war and the data figures concerning the export import information, the trade in defence equipment, the nature of Indian stock markets and the inflation in India, all points out that there have been minor disturbances in the variables in the time period concerned.

To see any major shift in the trends in the negative aspect, we would have to wait until the war is stretched out to a longer time causing diversion of

resources and disturbance in supply chains and trade routes.

Another major event that can be witnessed soon, which is not at all good for global economies, is joining of the war by some other countries of middle east like Egypt or Iran. In such a situation the oil supply is bound to be disturbed since middle east is the major source of crude oil for the world and any disruptions in the supply would lead to crisis in all the economies which depend on import of oil.

One major reason that can be seen as an explanation for not so negative impacts of the war is that Israel Palestine Conflict is not completely a new aspect, it has been stretching over centuries and over time there have been many such wars and peace treaties and all these circumstances have led to the global economies become a little less worried about the war in the short term and they are trying to maintain their current level of economic activities.

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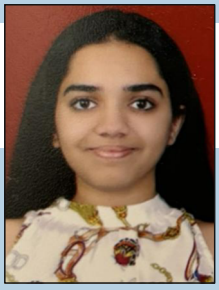
Upgrading The Konkan Fishing Industry with AI and Technology and Its Economic Impacts



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Abstract

India ranks 2nd in fish producing and aquaculture nations throughout the world succeeding China. It contributes 1.07% of India's total GDP. It provides employment to millions of people in the country and is one of the major contributors to foreign exchange of the country. It is one of the oldest occupations of the country and is predominantly practised in the southern coastal regions as well as states like Maharashtra, Goa, Gujarat, West Bengal and Odisha, along with the Indian Union Territories of Lakshadweep and Andaman and Nicobar Islands. The current state of fishing in India is mostly redundant as the methods of fishing used are manual and outdated. Besides, fishermen are facing issues like underemployment and low capita earnings and their economy is going through a lack of innovation as well as an unorganised aqua culture management system. Our research paper focuses mainly on the fishing industry of the

Konkan region and how the inclusion of different kinds of technology in the already existing methods of fishing along with other newly devised automation techniques at various levels can make the whole process easier, quicker and more productive and consequently give a boost to the whole fishing industry of the country.

Key Words:

Artificial intelligence, Technology, Konkan, Freshwater, Traditional, Fishermen.

Introduction:

There is ample evidence to prove that India has had a long history of practising traditional fishing in small ponds. Historical texts like Kautilya's Arthashastra and Manasollasa mention fish culture. Prehistoric fishing in India dates back to 40,000 years, and its practice has since then grown to play a significant role in the economy with gradual modifications and advances in the fishing processes. Some of the traditional methods of fishing which are still dominant in this industry are: Hand Picking; one of the oldest and the most manual methods of fishing where the physical acumen of the fishermen is needed in streams where the level of water is shallow.

Hammering; is a method used in streams which have high flowing water with a steep slope. The boulders and rocks obstructing the flow of water captures the fishes which perish or are damaged due to vigorous striking with a hammer (ghun) by the fishermen. These fishes thereafter float on water and are easily gathered by hands. Mosquito net; one of the most used methods of fishing which simply requires a mosquito net or a fine-mesh material. The external disturbance of water made by the fishermen drives the fish into the net during which it is lifted out of the water hence capturing enough fish. Other similar methods using the net as its capturing tool are Kandiyala and Fatiyala with its nets having different shapes and dimensions depending on the type of fish to be captured as well as the water area where it is to be used. Some other prominent indigenous techniques of fishing used are water diversion, temporary water blockage and pool fencing. In recent years, there has been an upgradation in the traditional processes with the introduction of contemporary harvesting systems like various kinds of fishing vessels and fishing gears like mechanised boats, trawlers, purse seiners, gill netters, dol netters which have a higher and faster fish capturing

capacity in areas beyond territorial waters. The involvement of automated and mechanised tools in fishing has owed to a significant growth of about 8% per year on average, however, a considerable chunk of the local fishermen still rely on the old methods of fishing without much inclusion of technological tools and machinery.

The Konkan Belt is one of the major fish producing regions of the country. It extends through the western coasts of Maharashtra, Goa and Karnataka and includes the districts of Sindhudurg Palghar, Thane, Mumbai, Mumbai suburban, Raigad, Ratnagiri, and Uttara Kannada. People residing in the coastal region of this belt derive their livelihood majorly from the fishing industry. It is not a single homogenous belt but is divided by coastlines of different states, pertaining to the diversity in dialects, food and culture. This region is covered by seasonal rivers as well as experiences heavy monsoonal rainfall sourcing from the Sahyadri hills. The fishermen in the Raigad and Ratnagiri prominently rely on the traditional methods of fishing i.e Dol and Trawlers (used by the richer sections). A major part of this community was observed to be poor with limited access to technological resources. The reliance on old techniques of fishing does not yield them sufficient fish produce, but they still manage to maintain a bare minimum sustenance for themselves. The men do most of the manual work like fishing, building and maintaining boats, weaving the nets etc whereas women do work like sorting out the fishes, getting the preparations done for market as well as looking after the loading unloading of fish and its transportation. It is noticed that a large community of fishermen are still poverty stricken, and the lack of capital as well as adoption of changes in the fishing culture has led this industry and this community to suffer from a lack of innovation as well as monetary incentives through profits. The problems stated above indicates the fact that there is a huge potential in this industry, and particularly among the fishermen who rely on the traditional methods of fishing, to inculcate certain technologically advanced tools and techniques that can assist in the processes like navigation, capturing of fishes, predicting changes in weather as well as availability of fishes and connecting with customers. If these proposals are implemented and brought into active use, it can increase the productivity as well as the quality of this industry, along with giving new hopes to farmers for gaining surplus and finding stability in this field.

Literature Review:

The Konkan fishing industry currently is dominated by the use of traditional methods of fishing amongst majority of fishermen, while facing many contemporary issues. According to recent data, the major fishing production is accounted for by mechanised trawlers. Problems like overfishing and climate change appear to be one of the main reasons for a notable drop in fish production in recent years (Maharashtra Department of Fisheries, 2021). Local fishing techniques like Rampan fishing have seen a resilient use in the industry (Maharashtra Fish Production Report, 2020-21). The fishing population in Konkan is quite varied, involving the Bhoi, Bhiwar, and Koli communities, each with distinct fishing methods and in socio-economic aspects, which are highlighted in the interviews conducted with fishermen. The research paper indicates that in order to solve these issues and enhance the sustainability of the industry, Artificial Intelligence and contemporary technological changes can be adopted and applied (Konkan Fisheries Sustainability Report, 2023).

There are numerous ways through which technological changes can improve the production and sustainability in the fishing sector, especially in the Konkan region. Gadgets like Fish Aggregating Gadgets (FADs) and sonar equipment can be instrumental in boosting the fish capture rates, along with the expertise of fishermen experience and skillset. Innovations like GPS-enabled cameras and on FADs, and geotagged photos, help with the management and distribution of resources as well as fasten rescue needs. The model of 'OFish' app can also prove to be very helpful in offering real-time information and improving tracking capabilities, which can enhance fishing efficiency and safety. The possibility of applying blockchain technology has also been explored in this paper, which can be used to optimise supply chain and provide a more transparent, as well as equitable trade.

Other proposals which integrate AI and technology include RAS technology and cage culture, which provide environmentally friendly substitutes, reducing human labour while maintaining disease control and water purity. The Maharashtra government itself is spurring initiatives to emphasise on the Konkan fishing sector. With the government's Neel Kranti Mission, it demonstrates a notable move in the direction of modernity and environmentally friendly methods in the fishing industry.

These recommendations have been given out keeping in mind their consistency with disparities in their socio-educational backgrounds. The suggested changes not only support economic expansion but also significantly fulfils the need of social empowerment of fishermen, by providing way more stability and independence. The future prospects of this industry will also be successful in encouraging young people to work in this dynamic sector.

Current Fishing Process:

In the Konkan belt; marine, freshwater, creek and brackish water fishing is practised. Marine and freshwater fishing forms the major contributor of the total fish produced. Fishing is carried out both for subsistence and trade. Trade is transacted at an international scale. There are fishermen who carry out the activity for trade locally, nationally and for the international markets (Shenoy, 2021). The Konkan coast has a huge aqua-diversity; it is home to numerous fishes and water bodies. Numerous fishes like Catla, Rohu, Muraenidae, Butterfly fish, Catfish, Bombay Duck, King Mackerel, Sardine, Pomfret, Barramundi etc are found in this region.

Plenty of these fishes are delectable sea cuisine and are popularly demanded throughout the globe. Fishermen use modern-day devices like mechanised trawlers, purse seiners, gill netters and dol netters etc and conventional equipments like boats, rapani, parsi net, rounded nets etc and traditional methods like; gleaning, net fishing, line fishing, use of arrows, harpoons and barriers, set and mobile traps, night fishing, fish poisoning, spearfishing etc.

The Rampan method of fishing is a traditional and popular method used by fishermen along the coast of Maharashtra. This method involves using a large, circular net with weights along the edges. The net is spread out in a circle and then slowly pulled together, capturing the fish inside. Fishermen work together to pull the net towards the shore, trapping the fish in the middle. It is a very rudimentary form of fishing.

Advanced mechanised equipment is not accessible to every fisherman. Those who predominantly practise fishery for subsistence, do so by traditional and conventional methods.

The fishing equipment and boats used primarily, can be broadly categorised into two types - mechanised and non-mechanised.

Table 1:

NUMBER OF MECHANISED AND NON-MECHANISED BOATS USED FOR DIFFERENT FISHING METHODS (Maharashtra)

Sr. No.	Fishing Methods	Mechanised boats	Non-mechanised Boats
1	2	3	4
1	Trawlnet fishery	218890	0
2	Bagnet Fishery	321348	7122
3	Gillnet Fishery	735459	18904
4	Purseseine	29556	0
5	Longlines	293	0
6	Rampan	0	632
7	Other boats	62327	50691
8	**Total Efforts**	**1367873**	**77349**
9	**Total Production In Tonnes**	**397110**	**1401**
10	Total no. of operating boats	12946	2272
11	Per boat No. of efforts	106	34
12	Per boat Production In Tonne	31	1
13	Per Unit efforts catch in Kg.	290	18

Source: Fish Production Report 2020-21: Department of Fisheries, Government of Maharashtra

The above table stands evidence to the fact the trawl net fishery is exclusively carried out through mechanised boats; followed by bagnet and gillnet fishing being dominated by mechanised boats too. Boats like Pureseseine and Longlines are also absolutely mechanised. However, Ramapans only exist in the non-mechanised form with some other boats. Mechanised boats and equipment, naturally, have greater contribution in the total fish catch over its non-mechanised counterparts.

Table 2:

NET-WISE NUMBER OF FISHES CAUGHT AND THEIR GROWTH RATE (Maharashtra)

Net	2015-16	2016-17	G.R.%	2017-18	G.R.%	2018-19	G.R.%	2019-20	G.R.%	2020-21	G.R.%
1	2	3	4	5	6	7	8	9	10	11	12
Trawlnet	178106	209857	17.83	189645	-9.63	191383	0.92	205832	7.55	174273	-15.33
Bagnet	159086	144683	-9.06	162117	12.05	166264	2.56	143115	-13.92	118036	-17.52
Gillnet	36494	46490	27.39	50360	8.32	46571	-7.52	41409	-11.08	44388	7.29
Longlines	116	137	18.10	122	-10.95	557	356.56	864	55.12	25	-97.11
Rampan	565	230	-59.29	143	-37.83	74	-48.25	166	124.32	307	84.94
Purseseine	58487	58238	-0.43	71280	22.39	60355	-15.33	46908	-22.28	55695	18.73
Others	1261	3112	146.79	1325	-57.42	2028	53.06	5299	161.29	5787	9.21
TOTAL	**434115**	**462747**	**6.60**	**474992**	**2.65**	**467232**	**-1.63**	**443593**	**-5.06**	**398511**	**-10.16**

Source: Fish Production Report 2020-21: Department of Fisheries, Government of Maharashtra

Growth Rate calculation for the above table:

$$G.R\% = \frac{N_t - N_{t-1}}{N_{t-1}} \times 100$$

G.R% = Growth Rate
N = No. of fishes caught
t = Time period

The above table shows the contribution of different methods of fishery in a period from 2015-21. The total production and growth rate of different methods of fishing are shown in the above table.

Trawlnet is the primary contributor to the total production from 2015-21. It shows a positive growth rate except for twice when it was negative 9.63% and -15.33% in 2017-18 and 2020-21 respectively. The growth rate of trawlnet shows positive trends in the other periods. Bagnet fishing only shows a positive growth rate in the period 2017-19. It shows a negative trend of growth in the other period. It forms the second largest contributor to the total catch. Gillnet shows a consistent positive trend from 2016-18, it shows negative growth from 2018-20, shooting its growth rate from -11.08% in 2019-20 to 7.29% in 2020-21. Rampan has shown a consistent negative growth from 2016-19. Its growth rate jumped to a high of 124.32% and declining positively to 84.94% in 2020-21.

The total fish production has been showing a negative growth trend with an increasing rate, consistently, from 2018-21. Fish production has come down from 434,115 in 2015-16 to 398,511 in 2020-21. This decline is majorly due to climatic change, erratic rainfalls, unwarranted cyclones, tsunamis and high tides. Other reasons for the decrease in fish count can be irresponsible behaviour on the part of fishermen and rampant fishing by major industries as well as the existence of the unregulated and illegal fishing sector.

Table 3:

ESTIMATED MARINE FISH PRODUCTION OF MECHANISED, NON-MECHANISED, AND RAMPAN BOATS IN KONKAN, MAHARASHTRA. (In Tonnes)

Sr No.	Types of Boat	2019-20	2020-21
1.	Mechanised	427,950	397,089
2.	Non-Mechanised	2,720	1,094
3.	Rampan	166	232
4.	Total Production	398,415	398,415

Data Source: Fish Production Report 2020-21: Department of Fisheries, Government of Maharashtra

The above table states that the mechanised boats and trawlers are the biggest contributors to the total production of fishes at 427,950 tonnes. This has a 99% share in the total fish production. The production by non-mechanised boats and equipment dropped considerably to 2,720, forming only 0.63% of the total production in 2019-20. Ramapan has almost a negligible share, approximately 0.37% in the total fish production. This is the lowest of the three types of boats mentioned in the above table.

The production by mechanised boats in 2020-21 reduced by 3.8% relative to 2019-20. The fish produced by mechanised boats in 2020-21 was estimated to be 397,089 tonnes, which is 30,861 tonnes lesser than the previous years. Non-mechanised boat production also dropped by 43% between the period from 2019-20 to 2020-21. Rampan showed an impressive growth of 17% from 2019-20 to 2020-21.

The above table stands evident to the fact that fish production has reduced considerably between 2019-20 to 2020-21. Both mechanised and non-mechanised boats have shown negative growth trends, while rampan has stood out with a positive growth and increasing its fish catch.

However, rampan has a negligible share in the total fish production. Mechanised boats are the largest contributor to the fish production, non-mechanised boats have a relatively meagre share in the total fish production.

In order to receive first-hand insights of the fishing industry of the Konkan region of Maharashtra and Karnataka, a telephonic interview of 25 fishermen pertaining to the different fishing regions as well as communities within Konkan – like Sindhudurgh region,Bhoi community, Bhiwar community, Koli community etc. The sample was chosen in such a way it was unbiased and representative of the regional variations as well as diverse community groups within the industry. A total of 25 fishermen were interviewed, through which, information about the fishing techniques, equipment used, socio-economic status, as well as overall profitability of their industry was produced. The interview method was used as there was a communication limit due to distance and lack of resources for travelling. The unit of sample is the number of fishermen interviewed.

In the region of Sindhudurg, fishing is carried out for both subsistence and commercial purposes. There is a large demand for marine fishes. These fishes form a major part of the exports. Freshwater fishes are both used for trade locally and in international markets. Such fishes are not

available amply but still demanded internationally. There are 4 major communities engaged in fishing. The *Bhoi* fishermen catch both marine and freshwater fishes.

The *Bhiwar* community has access to newer technologies and uses more advanced equipment and marine technology. The *Koli* community is the oldest fishermen community in existence, they have been practising fishing since time immemorial and are found in the entire Konkani belt. They are the community of the richer fishermen and use both advanced technology and indulge in exports. Major catches in this region are shrimp, lobster, oyster (*kalwa - raw oyster*).

In the Ratnagiri region too both marine and freshwater fishing is carried out. The use of *parsi nets* are prevalent in this region, mainly by industries. (The use of *parsi nets* is banned because these nets catch fishes of all sizes; from ½ inch to 10 ft. However, it is mandated to use nets according to the size of desirable fish, for example - use 4 inch nets to catch 6 inch fish.) In Chiplun, marine and freshwater fishing is carried out along with fish farming. 3 types of nets are used for this purpose, like *Kandal*, it is a traditional fishing method mainly used in small rivers and ponds; *Cast net* is a throwing net with a small weight at the bottom of the net and *Rapan*. People and communities who practise fishery as their primary occupation often sail out to sea on their vessels, boats, trawlers for days, even weeks to catch fish and often with a catch in bulk. This age old practice of fishing is now being posed with many hurdles such as decline in the fishermen community, environmental problems, climate change, illegal fishing etc. the newer generation of the traditional fishermen community is refraining from adopting fishing as a full time occupation due to erratic and unstable pattern of income and outdated technology in practice. Fishing is to be carried out only below the depth of 15-20 ft; however most of the industries turn a blind eye towards this and fish unwarrantedly. There are specified timings for fishing and the types of fishes to be caught; however many industries use trawlers overnight and poach sharks for liver oil. It is proposed in this paper that introduction of AI, newer technology and advanced equipment will not only have a considerable economic impact but can also help with the above stated problems.

Proposed changes in the methods being used:

Tools, Navigation and Security:

It has been established that there is great scope to improve the condition of

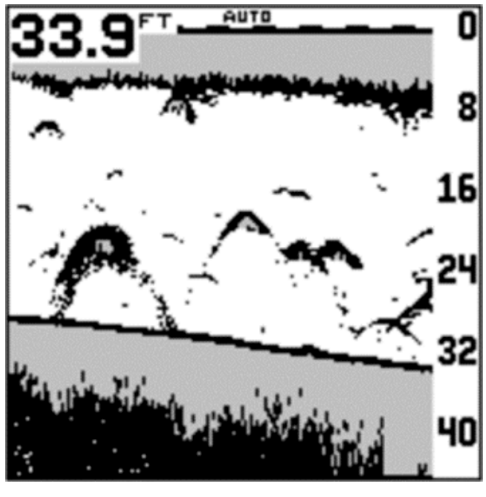
the fishing industry using technology; this is evident from the substantial fish catch from the mechanised boats relative to its non-mechanised counterparts. Apart from motorising the vessels, many other forms of technology can be handy to improve the overall production.

To start small, fishermen can use Fish Aggregating Devices (FAD); these are man-made floating objects that are suspended in the water body. Fishes find such floating objects fascinating and attractive and mark these places for mating activities, this attracts a large population of fishes both big and small increasing the fish catch. These devices are used for both recreational and commercial purposes. Hawaii in the USA, has 55 operational surface FADs which are being used for both recreational fishing and research.

Apart from the simple FADs stated above, smart FADs have a few more additional functions. Sonar devices installed in FADs can increase the fish catch substantially. The Echo Sounders / Fish Finders (sonar devices) radiate sonar waves, and following the same procedure as other devices using sonar waves, the sonar waves hit the fish and reflect back to its source, the time of the travel is calculated and thus the location of the object is located. This method can help locate lush schools, marine debris and the bottom of the water body. The sound waves reflected back bring information as accurate as the shape, size and composition of the object it hits. Such devices are used both for commercial as well as recreational fishing.

Image 1:

FISH FINDER DISPLAY OF SEAFLOOR SLOPING DOWN TO 33.9 FEET

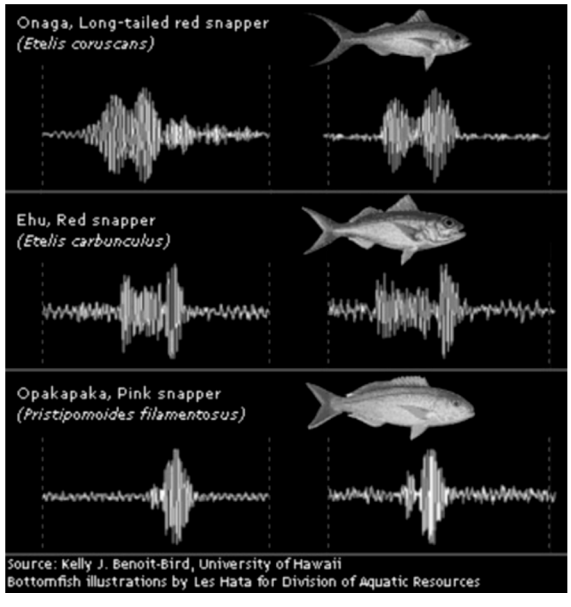


Source: Regional Fisheries. Livelihoods Programme for South and South-East Asia (Sept 2012)

Experienced fishermen can make consequential use of this technology; with their experience and some training, fishermen can use this to locate and identify particular species of fish (fishes with considerable market demand). According to the movement of a fish, a mark associated with that fish appears on the chart display. A fisherman must be familiar with the area of fishing, the fishes that swim there and swimming patterns of different schools of fishes to decode and identify the mark. For instance, short fat marks appear for slow swimming carp. Thus, experience and close watching of patterns sharpens a fisherman's skills of identifying a fish with the mark.

Image 2:

THE ECHO SIGNATURES OF 3 DIFFERENT SPECIES OF HAWAIIAN SNAPPER USING FAD



Source: Regional Fisheries. Livelihoods Programme for South and South-East Asia (Sept 2012)

To further improve the method, apart from marks, 'echo signatures' have been developed. Echo signatures have been designated for different species of fishes which helps to identify the fish. Every species has a unique shape of swim bladder and size. The differences in the shape of the swim bladder makes differences in the return of the echo signal. The above picture displays echo signatures for different fishes. These sonar devices can be installed both on the FADs and on the vessels that set out for fishing. These devices are one-time payment with no annual service charge, they are easy to install with minimal instruction and can be

installed on any boat, vessel irrespective of its size. This also reduces the reliance on overfished areas.

Using this device, fishermen in Sri Lanka have reduced fuel cost considerably and increased the catch considerably in Timor-Leste. In Timor-Leste FishFinders have also been used to gather bathymetric data such as depth and water temperature. It also revealed vessel movements and maps dangerous places such as shallows, rocks and areas of high current etc. The picture below shows the data recorded by the device.

Image 3:

BATHYMETRIC DATA RECORDED IN TIMOR-LESTE USING ECHO SOUNDERS

Source: Regional Fisheries. Livelihoods Programme for South and South-East Asia (Sept 2012)

The FADs can be made GPS (Global Positioning System) enabled with cameras installed on them. This way, the camera can click pictures and make the fishermen aware of the quantity and the species available, they can be made aware of the fish stock available in the region. Such cameras are easy-to-use and click excellent quality pictures. The GPS helps to send this location of the region to the fisherman accurately right down to the smallest degrees of longitude and latitude. This reduces the human effort and time of the fishermen of going out into the wide river or sea or ocean and looking for schools of fish.

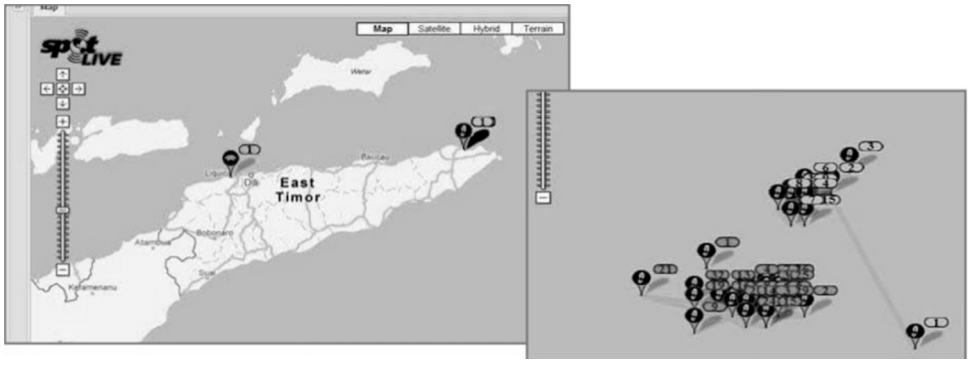
This method can be made more accurate with the help of geo-tagged photographs. Such photographs contain the exact location of the region

where the picture is clicked and can be located on Google Earth. The GPS data locates the exact location of fish caught and can be used to build up a data of fish catch locations. In Timor-Leste photographs of fish caught, its species and market price is written on a paper with its geo-tagged location; this helps to create a GPS location backes database for location fish schools. The geo-tagged photographs also aid in rescue operations and help find missing fishermen.

SPOT trackers is a hand-held tracking device which has been programmed in such a way that it automatically records its position every 15 minutes in real time via GPS. This device can prove instrumental on the Konkan belt to regulate and control illegal, unregulated and unreported (IUU) fishing activities. There is a provision of two buttons on the device. On pressing one of the two buttons an alert is sent to the coast authorities reporting IUU, whereas on pressing the other an alert is sent for emergencies. The device being GPS enabled, on pushing either of the two buttons, an alert with the location of the vessel is sent to the authorities. This device ensures security for the fishers, it helps to instil a sense of security among the family of the fisher about their safety and well-being as they too can monitor their location and most importantly it helps to forge a healthy relationship between the fisher and authority. This aids in reporting IUU in real time online on maps, this is safer as radio transmissions that may be heard by the illegal fisher are eliminated. This is becoming increasingly important as cases of illegal and rampant fishing are increasing. For instance, episodes of overnight use of trawlers, catching fish in the first 15-20 ft, poaching of sharks etc have been reported in the coastal belt.

Image 4:

LIVE LOCATION PINS ON FISHERMEN IN TIMOR-LESTE



Source: Regional Fisheries. Livelihoods Programme for South and South-East Asia (Sept 2012)

The above picture shows data from SPOT which can be tracked online close to real time. The given image shows how spot tracker devices, which are mostly being used in Timor-Leste giveupdates on the monitor about the locations of the fishermen.

Vehicle Monitoring System (VMS) helps to monitor vehicle position, course and speed. Every VMS unit is configured to produce positional reports containing information which includes vessels's current location, speed and course routinely for the purpose of domestic compliance, fisheries management and research. This system is widely used in Australia and monitored by the Australian Fisheries Management Authority (AFMA). Once the reports are received by the AFMA, they are immediately as plots on marine charts and these are subject to analysis. In the USA, The National Marine Fisheries Service (NMFS) have set required standards for a vessel to participate in the National Oceanic and Atmospheric Administration (NOAA) Vessel Monitoring System (VMS) program. All the participants are required to have a NMFS-approved Enhanced Mobile Transmitting Unit (EMTU) or Mobile Transmitting Unit (MTU) to comply with the Vessel Monitoring System requirements. However, the EMTU/MTU are relatively more expensive than the SPOT trackers. For the Konkan belt, this system can be tried to be integrated within the SPOT trackers. This will be both more feasible and affordable.

The Indian Space Research Organisation (ISRO) recently launched the first of its second-generation satellites for its navigation constellation. Besides the L5 and S frequency signals that the current satellites provide, this satellite will also send signals in a third frequency, L1. The L1 frequency is the most commonly used for GPS navigation and will increase the use of regional navigation systems in trackable devices. The installation of this satellite will significantly improve the existing GPS navigation system and make the location of tracking more precise.

Aquaculture:

Aquaculture is the process of cultivation of aquatic organisms under semi-natural or physically created and controlled environments. This method acts as a source of food as well as commercial products. These are usually practised for freshwater, saltwater or back water fish species, and the development in scientific techniques under this culture has resulted in the increase of fish population in open water areas as well as the coastal marines. It can be practised as offshore aquaculture wherein

the production of fish takes place in artificial facilities like fish tanks, ponds, raceways and aquaponics. It can also be practised in separated and sheltered waters near the shore of the water body in which there is a more natural environment for fish cultivation.

Aquaculture plays an important role in the fishing industry as it contributes to the increase in the fish population in the market, diversification of the fish species with the creation of high demanded traits along with the employment and creation of wealth among the local communities by providing them additional source of income. Using technology in aquaculture henceforth not only improves the aquaculture industry itself, but also supplements the fishing industry in manifold ways. This is why technological aquaculture applications in the Konkan fish industry can be one of the major contributors to its development. Some of these advancement proposals are listed down below. Cage culture; also known as the floating net culture, is a technique used to control fish production in an open water environment. It is the most basic method for fish production in aquaculture. This is practised majorly in lakes, rivers and coastal areas, indicating adaptability and applicability even in the Konkan region. Its usage is rapidly expanding and can provide opportunities even on a small scale (Vartak et al., 2018).

The cages used in it are made up of a supporting floating structure that keeps the net intact. The net fabric or wire is suspended from the frame and is strong to contain the fish and allow for the water circulation, which removes waste materials from the cage and allows for constant oxygen dissolvement. The materials used are made up of the cost effective Galvanised Iron (GI), a slightly expensive but long lasting High Density PolyEthylene (HDPE) and PVC pipes. The quality of water, depth, temperature, current pattern, water exchange and oxygen level play a vital role in determining the suitable sites for setting up the cages. The breeding of the fishes are done according to the availability of fish seeds, environmental conditions and the market value for that fish.

Some of these species include Seabass, Salmon, Carp etc. The fish food is commercially formed. The feeding process requires extensive monitoring and a scheduled feeding to avoid imbalance in nutrition levels. It also requires the maintenance of the temperature of water, oxygen levels, acidity as well as ammonia count in water. An observed environment like this helps to detect any early indication of disease in the fish through their change of behaviour during feeding stages and this

helps in maintaining the health and the quality of fish which are produced.

AI can be used for the extensive development of scientific instruments which can detect and measure nutrient, oxygen, acidity and ammonia content in water, along with its temperature, and draw inferences from the data to produce recommended use of external stimulators to procure favourable results (Lutz, 2024). Tools for the measurement of content in water already exist, but it can be further enhanced to study the existing data and bring out conclusions and suggest changes. This method of fishing culture has advantages like the proper utilisation of water resources, increase in the quantity produced, good maintenance of the quality of fish based on the market demand. This is a process which requires the presence of technical skill and expertise in areas ranging from cage building to feeding management. If the whole procedure is meticulously planned, monitored, surveyed and the workers are trained, then it can contribute immensely to the fish industry.

For cage cultures which are typically practised in indoor/outdoor tanks rather than in ponds and raceways require an extensively controlled environment. In such cases, the technology of Recirculatory Aquaculture System (RAS) can be used for the recycling and reusing of water used in the tanks. This is done using mechanical and biological filtration machines. The mechanical filter first removes all the solid matter, and the biological filter is used to remove ammonia content from water by using beneficial Nitrifying Bacteria. It then goes through an Ozone and UV treatment after which it is finally made reusable. A need for adding extra water to the tank rises when there is loss of water due to splash out, evaporation or removal of wastage. The filtered water is used to fill up around 10% of the total water volume in the tanks daily. This technology comes handy in reducing the long run costs of feeding and disease (bacterial/parasite) control, increasing the sustainability of tanks and efficiency of feeding management, as well as a resourceful use of water. This technology requires constant supply as well as back up electricity.

The initial costs of setting up the system is high, but the advantages cover up for it in the long run.

Table 4:

Economic Feasibility for 1-Year Production with RAS Technology (Maharashtra):

S. No.	Specifications	Amount (Lakhs)
1.	Capital Cost	6.00
2.	Operational Cost	1.50
3.	Total Project Cost	7.5
4.	Gross Income from 1st crop	3.78
5.	Gross income at the end of 1st crop after deducting the recurring cost for the 2nd crop	2.28
6.	Gross Income from 2nd crop	3.78
7.	Gross Income at the end of 2nd crop	6.06
8.	Depreciation cost @15% of capital cost	0.90
9.	Interest @ 12% of TPC	0.90
10.	Repayment @1/7th of TPC	1.07
11.	Recurring cost for next year	1.50
12.	Net profit = (7)- (8+9+10+11)	1.69

Data Source: National Fisheries Development Board, Department of Fisheries, Government of India.

The given table lists down the costs incurred as well as the revenue generated, finally computing the net profit made through production using RAS technology.

The National Fisheries Development Board of the Government of India has proposed the promotion of Backyard Recirculation Aquaculture System to make it more economical for the small and local fish farmers. The government also provides subsidies on the set up of these systems.

Crossbreeding; It is a method of hybridization between fish species (decided through genetic selection) which produces offspring having the desirable traits by the process of mating. Some of the traits in offspring demanded by the market are nutrition conversion efficiency, disease resistance, meat quality, tolerance to environmental conditions, and growth rate. This method needs to be carried out with care and caution. It is effective to consult with researchers, geneticists and other experts from this field to carry out the whole process successfully. This

process involves selection of the parent fish from different genetic lines or acquiring different genetic traits. According to the type of traits desired, the parent fish are chosen. These fish which are selected for cross breeding are fundamentally free from any genetic abnormalities or diseases, genetically diverse and are healthy. One of the drawbacks of this process is that the results are never certain. If the breeding yields unfavourable results, it can increase the likelihood of inbreeding depression. Otherwise, an offspring is born with hybrid vigour or heterosis. This means that the offspring has acquired complimentary, dominant and desirable traits from both the parents leading to improvement in the growth, survival, nutrition and overall performance. The parent fish traits are checked for their heritability. If a trait is highly heritable, then it has more chances to be passed onto the offspring during genetic selection. Traits with low heritability are achieved by multiple rounds of cross-breeding and additional selection stages (Chakraborty et al., 2020).

This method requires intensive scientific research and experiment for ensuring proper conduction of the breeding processes and avoiding potential negative genetic interactions and other unintended consequences. Hence, it's a time demanding work with the presence of the right expertise for maintaining appropriate genetic diversity. Efforts are also required to maintain the long term sustainability of the fish population. The fish production in the Konkan region can be diversified through cross-breeding methods, along with appropriate training, knowledge and skill parted to the fishermen as well as scientific support provided through government to make the fishermen self-sufficient in carrying out these processes.

AI Application:

Numer8 Analytics Pvt Ltd, a data science firm, has developed an app named 'OFish', after a deep analysis of the changes in the cyclical patterns of potential fishing zones in 2018. Its analysis also included the coastal vulnerability index for Kerala and Odisha post-2018 Kerala cyclone and Cyclone Fani in 2019. It developed the above mentioned after the detailed study of various patterns, trends, nature of the Kerala and Odisha coast and its requirements. The firm has built the app after closely monitoring and analysing 11 major climatic factors identified by International Collective in Support of Fishworkers (ICSF) as; Sea level, Sea surface temperature, Sea surface salinity, Wind patterns, Seasonality

and seasonal patterns, Rainfall, Natural disasters, Waves and currents, Tidal action, Mud flows and turbidity, Shoreline changes. These elements when added with rapidly growing pollution, IUU and unorganised fishing sector has led to a consistent decline in fishery (How Technology Is Helping Indian, Sri Lankan Fishermen Amid Climate Change Patterns, n.d.).

This app is a monumental development and has had major and direct economic impacts for the fishers of the said region. It has helped tackle the aforementioned problems and reduce their intensity significantly. It is a high precision app. It is the Google Maps for fishing. It has posed solutions for problems like wastage of time and efforts in finding fish, wastage of oil in the effort for finding fish and erratic and unpredictable weather conditions (How Technology Is Helping Indian, Sri Lankan Fishermen Amid Climate Change Patterns, n.d.).

Taking inspiration from the OFish app, this paper proposes an app which addresses the problems and fulfils the requirements specific to the fishers of the Konkan belt. The proposed app will contain numerous remarkable features like location of fish schools, weather updates and accurate predictions. The app will identify the lesser-known and lesser-crowded fishing zones for fishers while keeping the set government guidelines in mind. The app will be GPS enabled- this one feature alone will reap many benefits for fishers, their families, customers and coast authorities. The app being GPS enabled, it can track the movement of the fisher within the water body, it will be able to track the location of the device in which the app is installed, to the minutest detail. This way both the families of the fisher and the coast authorities can track the movement of the fisher, ensuring their security as well as acting as a monitoring device on violators. The app will provide precise weather updates like wind speed, direction, flow of the current, height of waves and other marine updates. A chatbot can be installed in various languages like Hindi, Marathi, Konkani and other local languages to help the fishers with any problems they might face. AI generated responses can be programmed within the app; if these responses fail to solve the trouble an executive from technical support will be connected with the fisher for assistance. The app 'OFish', is currently functional in the coastal region of Kerala and Maharashtra.

Supply Chain Optimization (Blockchain Technology):

The supply chain of the fishing industry consists of the small and large

fishermen, processors, agents, distributors, wholesalers, retailers and food service executives. These entities taking part in the chain are interconnected and can affect the whole process. The whole supply chain management of the fishing industry in India has various setbacks that has led to the productivity of this sector to remain stagnant. There exists a lack of developed infrastructure in areas of cold storage, freezing facilities and transportation which compromises the quality of product. There is the existence of multiple middlemen and other intermediary bodies in the chain, which makes it difficult for a fisherman to optimise their source of income and combat the inefficiencies and delays which come along with it (Gopal, 2021). Due to a limited access to the market information, and the market itself, fishermen find themselves at a loss (Yesvin-Wp, 2020).

After finding out the accuracy and the potential of blockchain technology, this paper proposes to implement this instrument on various levels of the whole fish supply chain management.

LEVEL 1: Blockchain technology is being used worldwide in the aquaculture industry to monitor and register the origin/source of fish, and the method with which it was caught. This ensures transparency of fishing in legal terms. It can be developed to even store information on the type of fishes caught and its features which will be useful in subsequent levels of the supply chain.

LEVEL 2: It will be able to trace and record transactions made throughout the supply chain. It is ensured by the usage of tags and unique barcodes, which would contain every information about the fish's journey in the chain. This will improve transparency to the stakeholders, fishermen as well as the consumers.

LEVEL 3: The information regarding storage practice, harvesting method, quality control, inventory management and logistics of the fish which will make it comprehensible for the stakeholders to assure the standard of the fish before doing business.

LEVEL 4: With our proposed app idea for the fishermen, it can be induce this blockchain technology which will make it easier for the consumers to directly track and connect with the fisherman selling fishes according to their demand. It will provide the consumers with all the appropriate information about the type of fish, its size, quality, source, storage, time spent since it was caught etc hence giving the quality assurance check. This will also ensure a fair price to the

consumers as well as the fishermen, and eliminate the existence of middlemen.

Blockchain technology is a very advanced piece of equipment which will make the whole fishing supply chain more traceable, transparent, comprehensive, manageable, efficient and sustainable. If it is implemented with meticulous monitoring of its efficiency for some period, it can act as a high-end, quick and automated way of optimising the supply chain making it more effective and judicious to its stakeholders.

Feasibility Check of the Proposed Changes:

This portion elaborates on the general feasibility check, focusing upon the extent of applicability of the proposed AI and technological changes on the fishing industry. Applicability has been assessed according to the socio-educational aspect of the fishermen population.

Table 5:

SOCIO-EDUCATIONAL PROFILE OF FISHERMEN IN COASTAL KONKAN REGION OF MAHARASHTRA

Variable	Category	Respondents (N=240)	
		Frequency	Percentage
Age (years)	Young (Up to 33)	79	32.92
	Middle (34 to 57)	126	52.50
	Old (58 and above)	35	14.58
	Average: 45 **Total**	**240**	**100.00**
Education (Std.)	Illiterate (No Education)	113	47.08
	Can read and write (Functionally Literate)	9	3.75
	Primary (Up to 4)	40	16.67
	Middle (5 to 7)	29	12.08
	High School (8 to 10)	24	10.00
	Intermediate(11 to 12)	16	6.67
	Graduation (College)	5	2.08
	Post- Graduation	4	1.67
	Total	**240**	**100.00**
Fishing Experience (Years	Low (Less than 5)	3	1.25
	Medium (6 to10)	52	21.67
	High (11 to 20)	93	38.75
	Very High (20 and above)	92	38.33
	Average: 16 **Total**	**240**	**100.00**
Training Attended	No Training	102	42.50
	Occasional	76	31.67
	Regular	62	25.83
	Total	**240**	**100.00**

Source - Socio-Economic Profile of Fishermen in Coastal Konkan Region of Maharashtra - Bhagyashree Patilkhede, V. G. Patil and J. R. Kadam, 2017

The above table shows that half of the total population engaged in fishing are between ages 34-57 years. Out of the other half approximately 34% are young. Hence, around 86% fishermen are younger members of the

community and more likely to have the potential and the spirit and the vigour to indulge with AI and newer technology (*Welcome to INSEEWORLD.COM ::*, n.d.).

Although the majority of the fishers (47.08%) are illiterate, the other half has at least received primary education and are capable of reading and writing. About 3.75% have received graduate and post-graduate level income (*Welcome to INSEEWORLD.COM ::*, n.d.).

Most of the fishermen have medium to very high experience with fishing. 38.33% of the fishermen have been in the occupation for over 20 years. Approximately 58% of the total fishermen have received professional training either on a regular or occasional basis (*Welcome to INSEEWORLD.COM ::*, n.d.).

Thus, it is safe to infer that with a suitable training program designed with keeping in mind the distinct requirements of fishermen with different levels of education, varied levels of experience and professional training and belonging to different age groups, they can be made accustomed to AI and technology. Programs pertaining to different devices, equipment and methods can be schemed that are altered to meet the requirements of the fishermen.

Conclusion:

With the Maharashtra Government focusing exquisitely on the Konkan fishing industry, through its *Neel Kranti Mission* or the Blue Revolution, work devoted to this area's fisheries, fishermen as well as nutrition security is in full swing. Many of the extensive initiatives are being taken in the fields of modernization of fisheries, inducement of technology, sustainable fish production, food and national security, employment as well as collective and inclusive development of the fishermen community.

Till now, diverse ways have been with which technology and AI can be implemented in the existing traditional methods of fishing practised by the majority of local fishermen of the Konkan region. Examples of places where the proposed technologies have been introduced and how the changes have been successfully supplementing the fishing industry of that area. Apart from

increasing the fish production, it has also improved security of fishermen and regulation of fisheries as a whole.

Along with the changes in existing methods some alternate, sustainable

and eco-friendly methods of fish cultivation have been proposed. The introduction of AI in techniques like cage culture and RAS technology will not only minimise the human effort, but also make accurate predictions and draw inferences on various aspects on the quality of water, health and nutrition of the fish and disease control.

Given the level of literacy, education and fishing experience of the fishermen in the konkan region, a feasibility check of the applicability of our proposed changes has been provided. It is concluded that, with a carefully curated training program according to the requirements of the fishermen, along with apt government and scientific assistance, the proposed changes can be elegantly implemented. With an appropriate time duration of the program, the fishermen would get accustomed to the new changes given their education level.

All of these modifications in the whole fishing process, besides improving the industry economically, also creates a monumental social impact on the fishermen. It will ensure a hope for stability in this field in terms of income, employment and growth prospects. It will make them more empowered, skilled, independent and capable of competing with their rich counterparts. Along with impacting the current generation of fishermen, it instils a sense of hope and entrepreneurial spirit in the youth to either continue practising their already existing fishing lineage or enter into this industry as one of the players.

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मोक्ष: साध्य और साधन

आप यदि किसी को बाहरी रूप से नुकसान नहीं पहुँचा सकते, क्योंकि वह ताकतवर है, तो उसे भीतरी रूप से आघात करते हैं। इससे वह धीरे – धीरे भीतरी और बाहरी दोनों रूप सेकमजोर हो जाता है। आज की मानव जाति के साथ भी कुछ ऐसा ही हो रहा है। कुछ गिने चुनें लोगों को यदि छोड़ दिया जाए, तो समस्त मानव जाति आज अंधकार की ओर बढ़ रही है। वह अपने आप को ही भूल रही है। सही गलत का भेद भी नहीं कर पा रही है।

मनुष्य समझ रहा है कि नई – नई तकनीक खोजकर वह विकसित होता जा रहा है, परन्तु वह यह नहीं समझ पा रहा है कि वह स्वयं के विकास नहीं, अपितु पतन की ओर अग्रसर हो रहा है। नई – नई तकनी कों से मानव जीवन तो आराम की ओर बढ़ रहा है जिस में काम के लिए शारीरिक बल का प्रयोग करना कम हो रहा है, लेकिन इससे मानव का कोई विकास नहीं हो रहा। हम इसे ऐसे समझ सकते हैं कि आज के समय में यदि हमारे

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पास मशीनी उपकरण न हों, तो हम सुविधापूर्ण ढंग से नहीं रह सकते, हम इन पर पूर्ण रूप से निर्भर हो रहे हैं। इसमें मनुष्य का विकास कहाँ हुआ? बल्कि हम मनुष्य तो अपन ेबल पर कुछ भी नहीं कर पा रहे हैं। वहीं हमारे पूर्वज अपने शरीर से काम करते थे, सभी में दया – धर्म होता था और अवसाद (डिप्रेशन) नाम की कोई बीमारी नहीं थी। तो क्या सच में मानव जाति का विकास हो रहा है?

मनुष्य का एकमात्र लक्ष्य है – स्वयं को पहचानना। 'अहम ब्रह्मास्मि' से सिद्ध होता है कि मनुष्य स्वयं ही ब्रह्म है। इससे आत्मा की परमात्मा से एक रूपता की बात भी सिद्ध होती है। परमात्मा का अर्थ है – 'परम आत्मा'। वह आत्मा जिसमें सभी आत्माओं का समावेश है या सभी आत्माएँ उसी परमात्मा का अंश हैं। यह आत्मा जब उस परमात्मा से मिलती है, तो उसे लक्ष्य प्राप्ति की अनुभूति होती है, जैसे बरसों बाद अपने किसी बिछड़े हुए के मिलने से होती है।

आज मनुष्य कोई भी कार्य करता है, तो उसे तुरंत उसका परिणाम चाहिए होता है और तुरंत परिणाम पाने के लिए मनुष्य गलत राह भी पकड़ लेता है। माता शबरी भी प्रभु श्रीराम के इंतजार में रोज फूल बिछाती और मीठे – मीठे बेर चख – चख कर लाती। उन्होंने वर्षों तक प्रभु की प्रतीक्षा की, तब श्री राम उनके पास आए। मनुष्य यह भी चाहता है कि उसे बिना कर्म किए ही फल मिल जाए। जबकि ऐसा नहीं हो सकता। बिना कर्म के कुछ नहीं मिलता, यदि हम स्वयं कुछ नहीं करेंगे, तो भगवान भी हमारे लिए कुछ नहीं करेंगे। यह तो हम सभी ने बचपन से सुना है कि भगवान भी उन्हीं का साथ देते हैं, जो स्वयं अपना साथ देते हैं। इस कथन को अंग्रेजी में भी इस प्रकार कहा गया है– "God helps those who help themselves-"

हम इसे भी ऐसे समझ सकते हैं कि जब लंका तक जाने के लिए राम सेतु बनाया गया तो वह ज्यादा चौड़ा नहीं था कि इतनी विशाल सेना वहाँ सेजा सके। राम जी ने जैसे ही अपने कदम सेतु पर रखे तो समुद्र के वन्य जीव – जन्तु पानी की सतह पर आकर उस सेतु से जुड़ते चले गए। उन्होंने उस सेतु को चौड़ा कर दिया, जिससे श्री रामजी की विशाल सेना उस पर से आसानी से गुजर पाई। इस पर जामवंतजी रामजी से पूछते हैं कि हे प्रभु, यदि आपके चरणों के जल को स्पर्श से ही इतने जीव – जंतुओं ने पुल बना दिया तो आपको वानर सेना से पत्थर डलवाने की क्या आवश्यकता थी। रामजी ने तब कहा कि बिना कर्म के प्रभु कृपा भी प्राप्त नहीं होती, हाँ पर यदि हम प्रयत्न करते हैं, तो उसके साथ प्रभु कृपा भी जुड़ जाती है और उस कृपा की कोई सीमा नहीं।

इससे कृपा का अर्थ भी स्पष्ट होता है – 'कृ' और 'पा', कि अपना कर्म करो, पुरुषार्थ

करो और उसके साथ फल पाओ। पुरुषार्थ के चार स्तंभ हैं – धर्म, अर्थ, काम और मोक्ष। ये चारों पुरुषार्थ एक दूसरे पर निर्भर हैं। धर्म द्वारा काम और अर्थ को नियंत्रित कर मोक्ष की प्राप्ति की जा सकती है। धर्म से व्यक्ति को सही – गलत का भेद होता है, उसका वि वेक जागृत होता है। गीता के अनुसार, गौर से समझो कि तुम्हें जो चाहिए, वह क्या है, और उसकी प्राप्ति में पूरा ज्ञान लगा दो, यही धर्म है। जैसे पानी का धर्म है– बहना, विद्यार्थी का धर्म है– विद्या अर्जित करना, सूर्य का धर्म है– प्रकाश प्रदान करना, मनुष्य का धर्म है– मानवता।

धर्म के अनुसार अपने कार्य करने के लिए हमें अर्थ की आवश्यकता होती है, जैसे जीवन यापन करने के लिए धन चाहिए होता है, जीवित रहने के लिए भोजन और जल चाहिए। यह अर्थ धर्म के अनुसार अर्जित कि या जाना चाहिए। यह नहीं कि हम आवश्यकता से अधिक धन अर्जित करते चले जाएँ और दूसरों को उससे वंचित रखें। धन धर्म के मार्ग पर चलकर कमाना चाहिए, न कि लूट या धोखे से। 'अर्थ' का उपयोग शरीर, मन, परिवार, समाज और राष्ट्र को पुष्ट करनेके लिए होना चाहिए। अर्थ इसलिए भी आवश्यक है क्योंकि भौतिक सुखों से मुक्ति के लिए भौतिक सुख जरूरी है, जैसे महात्मा बुद्ध ने सन्यांस उस वक्त धारण किया, जब वे भौतिक सुख देख चुके थे। भौतिक सुख का लालच भी नहीं होना चाहिए, जैसा कि ओशो ने कहा है "सुख का लालच ही नए दुख को जन्म देता है।

'काम' का अर्थ होता है मनुष्य की इच्छाएँ, वासनाएँ। मनुष्य जीवन में 'काम' की भी आवश्यकता होती है, किंतु इसकी भी एक सीमा निर्धारित की गई है। इस जीवन को चलाने हेतु तथा केवल समाज को एक अच्छा नेतृत्व दिलाने हेतु सांसारिक साधनों का सम्यक भोग ही 'काम' है। यह सम्यक् भोग केवल धर्म की रक्षा हेतु होना चाहिए, न कि वासनामय होकर जीने के लिए। मानव जीवन का एक मात्र उद्देश्य मोक्ष प्राप्ति है, लेकिन आवश्यकतानुसार धर्म पूर्वक अर्थ और काम का सहारा लेकर। मोक्ष सर्वोच्च पुरुषार्थ है। आत्मा जब परमात्मा में विलीन हो जाती है, तो वह मोक्ष कहलाता है। एक जैसी चीजें ही एक दूसरे में मिल सकती हैं। इसका अर्थ यह हुआ कि आत्मा और परमात्मा में ज्यादा भेद नहीं है। मनुष्य जब अपनी आत्मा को जान लेता है, तो वह स्वत : उस परम ब्रह्म को प्राप्त कर लेता है और वह स्वयं ब्रह्म हो जाता है।

मोक्ष भी कई प्रकार का है, जैसे समाधि, ब्रह्म स्वरूप होना, ब्रह्म में विलीन होना आदि , परन्तु पूर्ण मोक्ष है शनिर्वाणश। यह वह स्थिति है जिसमें आत्मा का भी कोई अस्तित्व नहीं रह जाता, वह शून्य में चली जाती है। मनुष्य जीवन का उद्देश्य इसी शून्य में

पहुँचना है। इस शून्य मेंना कुछ सही है ना कुछ गलत, ना कोई आत्मा है ना परमात्मा, ना कोई इच्छा ना कामना, है तो केवल शून्य और शून्य...।

यह शून्य बीच का स्थान होता है जहाँ कुछ नहीं होता सिवाय परम शांति के। इस स्थान में पहुँचने के लिए योग साधना का सहारा लिया जाता है। जब हम अनुलोम – विलोम करते हैं, तब स्वाँस को अंदर लेने और बाहर छोड़ने के बीच में स्वाँस को रोककर रखते हैं यही वह शून्य है, जिसके निरंतर अभ्यास से उस परम शून्य को प्राप्त किया जा सकता है। इसके लिए अपने अंदर झाँकने की आवश्यकता है, अपने कानों को बंद करके अपने भीतर ध्यान लगाना चाहिए और उस संन्... की आवाज को सनुना चाहिए जो कि अनहद नाद है।

अनेक ऋषि – मुनियों और महापुरुषों ने भी मानव को यही समझाने की कोशिश की है, फिर चाहे हम स्वामी विवेकानंद जी की बात करें या महात्मा बुद्ध की, मीरा बाई की बात करें या रामकृष्ण परमहंसजी की इन सभी ने उस परम सत्य को जाना, समझा और उसे प्राप्त किया।

आज विज्ञान भी अपनी खोजों से यह सही सिद्ध करता जा रहा है, जो करोड़ों वर्ष पहले हमारे ऋषि –मुनि हमें देकर चले गए। विज्ञान भी मानता है कि ब्रह्मांड में असीमित शक्तियाँ हैं, जो सब कुछ संचालित कर रही हैं और हम अभी तक उसे समझ नहीं पाए हैं। विज्ञान भगवान में विश्वास नहीं करता, परन्तु वह भी उस परम शक्ति को मानता है, जिसे हम भगवान, ईश्वर, अल्लाह आदि कहकर संबोधित करते हैं। वह सत्य तो एक ही है, जिसे हम अलग – अलग नामों से जानते हैं, जैसा कि स्वामी विवेकानंद जी ने कहा है "सत्य को हजार तरीकों से बताया जा सकता है, फिर भी हर एक सत्य ही होगा।

इन सब से हम इस बात पर पहुँच सकते हैं कि हमें स्वयं को जानना होगा, स्वयं में अच्छे परिवर्तन करने की कोशिश करनी होगी न कि दूसरों में। दूसरों में हम परिवर्तन कर भी नहीं सकते, जब तक उनका स्वयं का संकल्प न हो। महात्मा गौतम बुद्ध ने इस बात को समझाते हुए कहा है, "जीवन में हजारों लड़ाइयाँ जीतने से बेहतर स्वयं पर विजय प्राप्त करना है।

“इस जगत में समस्त जीवात्माओं का लक्ष्य मोक्ष प्राप्ति है। ये सभी जीवात्माएँ मोक्ष को अवश्य ही प्राप्त करेंगी परन्तु उसके समय की कोई सीमा नहीं है। धर्म, अर्थ और काम पुरुषार्थ हमें उस सर्वोच्च पुरुषार्थ श्मोक्षश या श्निर्वाणश तक पहुँचने में सहायता करते हैं। हम अब यह कह सकते है कि मोक्ष ही साध्य (लक्ष्य) है और उसे प्राप्त करने के

लिए हमें साधना और साधन दोनों की अवश्यकता है। साधना मन, शरीर और आत्मा के अभ्यास का नाम है, जबकि साधन वे मार्ग और उपाय हैं जिनका हम अनुसरण करते हैं। मोक्ष के लिए साधना हमें अपने आत्मा के आंतरिक खोज में ले जाती है, जबकि साधन हमें मोक्ष के रास्ते पर चलाता है। इन दोनों के संगम में, मनुष्य अपने अंतिम मोक्ष की प्राप्ति में सफल होता है।