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ENVISAGE

Students' Research Journal

Editorial

Envisage is an inter-disciplinary students' research journal. The research papers written by the students have been reviewed by the Research and Development Cell and edited under the guidance of faculty mentors. It is an initiative to give the students an opportunity to develop critical thinking skills and writing skills needed to succeed in academia. This journal is intended to provide a forum for students to explore their knowledge of current affairs and express their views on subjects relating to economics, trade, business, international affairs, new developments and social sciences.

The objectives of this research journal are as follows:

- To enhance students' knowledge and promote their interest in future career research.
- To provide a medium to explore their knowledge related to current affairs and express their views.
- To develop analytical and critical skills and enhance their academic exposure.
- To enrich the education through experiencing the research publication process.

The current issue contains research papers presented in national level Research Paper Presentation Competition (Research Fair), conducted by the college every year. It also contains the research papers from the other research competitions such as Epsilon (for Economics), DLLE and Aavishkar Research Convention of University of Mumbai. Besides these competitions many students also conduct case studies and various projects under the guidance of faculties on different topics.

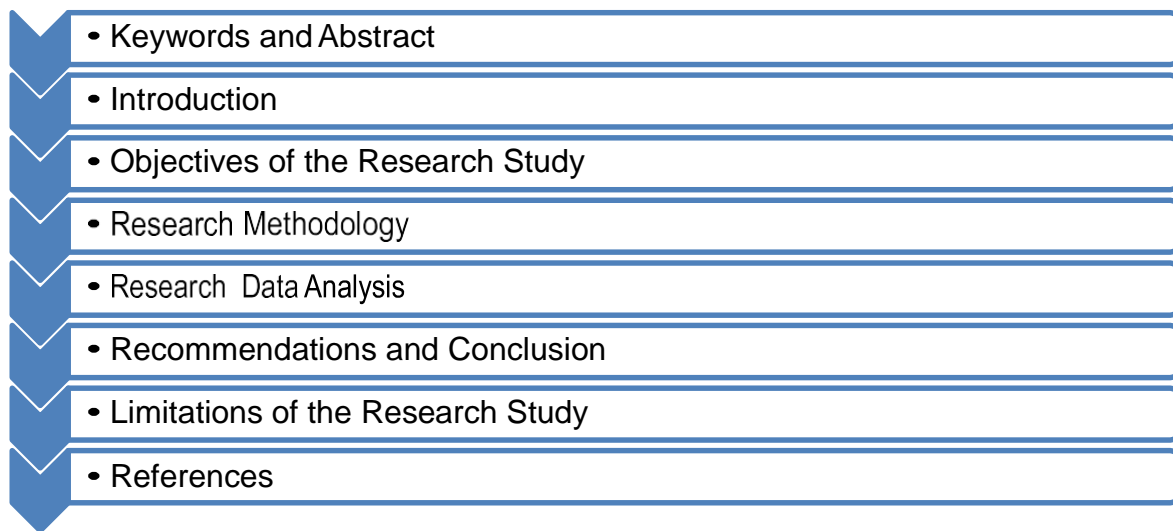
Envisage also allows students to participate in the editing, review, and publication processes. We anticipate that Envisage will provide an interesting venue for young students to participate in research efforts in a variety of themes that foster the growth of students.

GUIDELINES FOR RESEARCHERS

“Envisage” strives to open the doors of research for young students and academicians. It presents to you papers from varied fields in a structured and organised manner.

Manuscript:

The manuscript has the following flow:



Research

It includes research articles that focus on the analysis of economic, social, business and other related issues which impact the economy as well as society.

References

Throughout the text, references and sources of knowledge used by the authors must be cited. Citing references is essential, as high-quality research is built upon established knowledge and empirical (observed) evidence.

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ENVISAGE
Students' Research Journal

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AYUSHMAN BHARAT DIGITAL MISSION: DIGITAL HEALTH INFRASTRUCTURE FOR AN INCLUSIVE INDIA

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*This research paper won the First prize at Epsilon Research Paper Competition 2024-25: An Intercollegiate Economics Research Paper Presentation Competition held by the Economics Association of SVKM's Narsee Monjee College of Commerce and Economics on 24th January, 2025.

Abstract:

The Ayushman Bharat Digital Mission (ABDM) aims to revolutionise healthcare in India by creating a unified digital health infrastructure that enhances accessibility and affordability, particularly for underprivileged communities. Launched in 2021, ABDM integrates with the existing digital health infrastructure to provide a seamless exchange of information. Despite its potential, the study reveals low awareness, limited digital literacy, and minimal adoption, with only 10% of surveyed participants possessing ABHA accounts and none utilising them. Addressing these barriers through targeted campaigns and infrastructure improvements is essential to reduce healthcare disparities and achieve inclusive, sustainable health services.

I. Introduction

Universal Health Coverage (UHC), advocated by the World Health Organization, emphasises the requirement for affordable health services for all, devoid of financial hardships. This has taken India to a critical juncture in healthcare, leading to a pivotal transformation in services through the initiation of the Ayushman Bharat Digital Mission in September of 2021.

This mission uses a Unified Health Interface (UHI), to create a system that enables smooth communication among stakeholders across various platforms such as the ABDM Personal Health Records (PHR) and facilitate the exchange of health data with the patient's consent (National Health Authority, 2021). Furthermore, it marks the nation's first attempt to leverage technology in delivering affordable, efficient and essential health services to the common man, similar to the National Health Service (NHS) in the United Kingdom, My Health Record (MHR) in Australia, etc.

This study seeks to assess the role of ABDM in integrating technology into government welfare schemes and its impact on the accessibility and affordability of healthcare for disadvantaged groups in society.

II. Scope of Research

The study focuses on evaluating the role of Ayushman Bharat Digital Mission (ABDM) in reducing the disparity in healthcare access between the privileged and underprivileged sections of India, and study its impact on the urban and rural populations of India. The study further aims to find out the specific policy challenges leading to the effective implementation of the scheme.

III. Objectives

- A. To assess the role of digital health services in decreasing the disparity in healthcare access between the privileged and underprivileged sections of society.
- B. To determine the advantages and potential shortfalls regarding the implementation of the digital health policy and its future outcomes.

V. METHODOLOGY

A. Quantitative aspect

This research paper uses the DiD model to analyse the survey data collected from a treated group (underprivileged class) and a control group (privileged class). The underprivileged class consists of participants having a monthly household income of less than

₹25,000 and/or residing in a rural area. The privileged class consists of participants having a monthly household income of above ₹1,00,000 (average income of the top 10% income group) Nitin Kumar Bharti et al. (2024). and/or residing predominantly in urban areas.

Surveys to the control group will be distributed via google forms through gmail, and various social media services. The treated group will be surveyed partly in-person and partly on a telephone call due to lack of digital literacy. The survey assesses various aspects of healthcare access by both groups.

The rationale behind using the DiD model is that the research paper aims to understand specifically the impact of a policy, thereby using a before-and-after model which measures the variables of healthcare access before and after the implementation of ABDM will give us appropriate outcomes.

The DiD estimate will be calculated as = (Post-intervention difference for the treated group) - (Post-intervention difference for the control group)

Mathematically, the DiD estimate = [(Treated group after ABDM) - (Treated group before ABDM)] - [(Control group after ABDM) - (Control group before ABDM)]

The healthcare access variables will be measured for each group and their differences will be calculated above to get the DiD estimate. A positive DiD estimate indicates that the healthcare access for the treated group has improved as compared to the control group due to the policy i.e. the inequality of healthcare access has reduced. A negative DiD estimate indicates the contrary i.e. the inequality of healthcare access between the two has been exacerbated due to the policy, which may be a cause of concern.

The variables which will measure the healthcare access are:

- 1)Frequency of healthcare visits,
- 2)Out-of-pocket health expenditure,
- 3)Convenience of accessing healthcare services,
- 4)Satisfaction with healthcare services.

The quantitative aspect also includes individual analysis and regression analysis to get a comprehensive understanding of the relations between the variables under consideration.

B. Qualitative aspect

The study includes interviewing medical professionals and government experts from the field of healthcare to gain deeper insights into specific policy challenges and opportunities where it can be improved.

VI. Analysis

The Difference-in-Differences (DiD) estimates for healthcare outcomes were calculated by categorizing 110 participants into a Treated group and Control group. Treated group: 55 participants; Control group: 45 participants. The variables for which the DiD estimate will be calculated are: 1) Frequency of healthcare visits, 2) Out-of-pocket health expenditure, 3) Convenience of accessing healthcare services, 4) Satisfaction with healthcare services.

For all the variables, we assign numerical values to the categories as follows (in ascending order): Only in case of emergencies: 1, 1-2 times a year: 2, 3-4 times a year: 3, More than 4 times a year: 4. In each case, we calculate the mean pre-intervention and post-intervention values for each variable as follows (we assume that the values for the control group remain constant as the responses could not be gauged due to absence of policy usage):

I) Frequency of Healthcare Visits

DiD Estimate: [(Treated group after ABDM) - (Treated group before ABDM)] - [(Control group after ABDM) -

(Control group before ABDM)] = [(1)-(1)] - [(1)-(1)] = 0.

The DiD estimate for the variables 'Frequency of Healthcare visits' is Zero.

II) Out-of-pocket-Health-Expenditure. . DiD estimate: [(2.25)-(3.36)] - [(4)-(4)] = -1.11. The DiD estimate for the following is -1.11.

III) Convenience of accessing healthcare services.

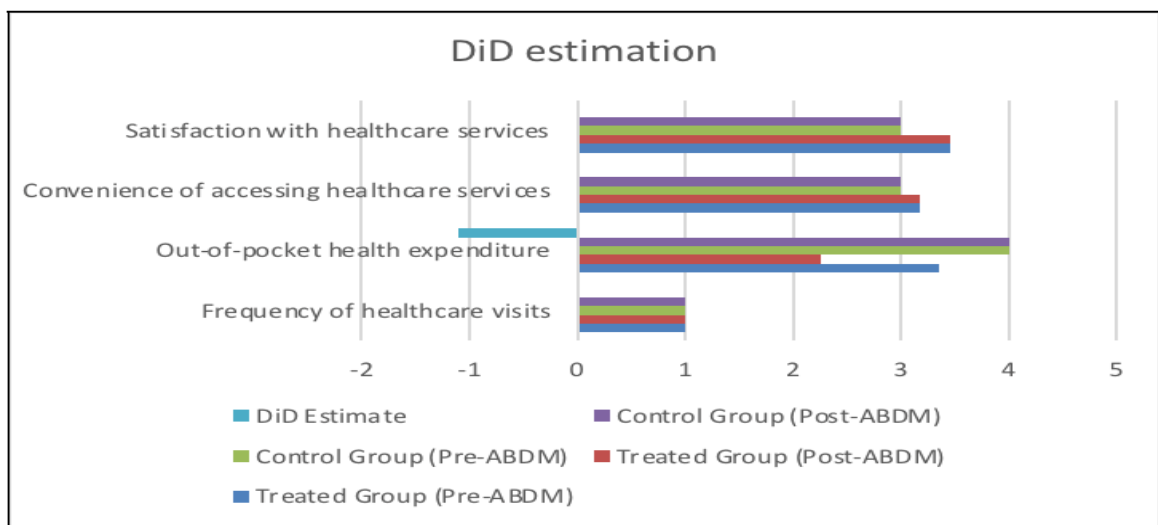
DiD estimate: $[(3.18)-(3.18)] - [(3)-(3)] = 0$. The DiD estimate for the variable ‘Convenience of accessing healthcare services’ is zero.

IV) Satisfaction with Healthcare services.

DiD estimate: $[(3.45)-(3.45)] - [(3)-(3)] = 0$. The DiD estimate for the variable ‘Satisfaction with healthcare services’ is zero.

Table 1 - DiD Estimation

The table with the above values and its graphical representation is as follows. Variable	Treated Group (Pre-ABDM)	Treated Group (Post-ABDM)	Control Group (Pre-ABDM)	Control Group (Post-ABDM)	DiD estimate
Frequency of health care visits	1	1	1	1	0
Out-of-pocket-Health-Expenditure	3.36	2.25	4	4	-1.11
Convenience of accessing health care services	3.18	3.18	3	3	0
Satisfaction with health care services	3.45	3.45	3	3	0



Source: Authors' construction

Figure 1: DiD Results

Observe that there is no change in the variables, this can be wholly attributed to the absence of policy usage by the respondents. We classify the respondents as 1) Having knowledge about the ABDM, 2) Having an ABHA account, 3) Utilising its services.

While 40% of the respondents had knowledge about the ABDM, only 10% of the total actually had an ABHA account. Notably, none of the participants had actually used its services, (0% respondents), or had the technical know-how about the same.

There is, however, a negative DiD estimate observed for the variable ‘Out-of-pocket-health-expenditure’, which means that there is a decline in OOPHE due to the policy intervention. This can be due to the presence of confounding variables such as other healthcare policies, change in the income level of the participants, change in healthcare prices etc, including its spillover effects such as increased awareness due to the scheme.

This seems to paint a picture where the government may

Source: Authors’ construction has advertised the scheme in the media, but couldn’t effectively educate the public upon its applicability and its usage. Due to these factors, an individual analysis of the dependent variables is necessary, with the demographic data as follows:

The survey revealed that 52.7% of the population earns less than Rs. 25,000/- on a monthly basis. The average medical expenditure per case in a rural hospital in Maharashtra was Rs. 11,261/- (*Health Care Financing Indicators | National Health Systems Resource Centre, n.d.*).

Considering the rate of inflation over the last decade, the average expenditure in Maharashtra amounts to Rs. 17,605 (per RBI rate of inflation). Thus, medical bills in rural hospitals cover close to 70% of average monthly salary, leading to ignorance of health, decline in standard of living, higher morbidity rates and growing lack of trust in the prevailing healthcare system. 20% of the total survey takers are aware of the ideals of the ABDM and ABHA, while only 9 people actually acted upon their knowledge of the scheme and proceeded to create one for themselves. While majority of the survey takers and ABHA beneficiaries lie between the lowest economic strata, the data divulges the lack of awareness and information amongst the population that can derive maximum benefit from a scheme such as the ABDM. Several account holders revealed that even though they created their Ayushman Bharat Health Account, the benefit they gained from the account is unknown.

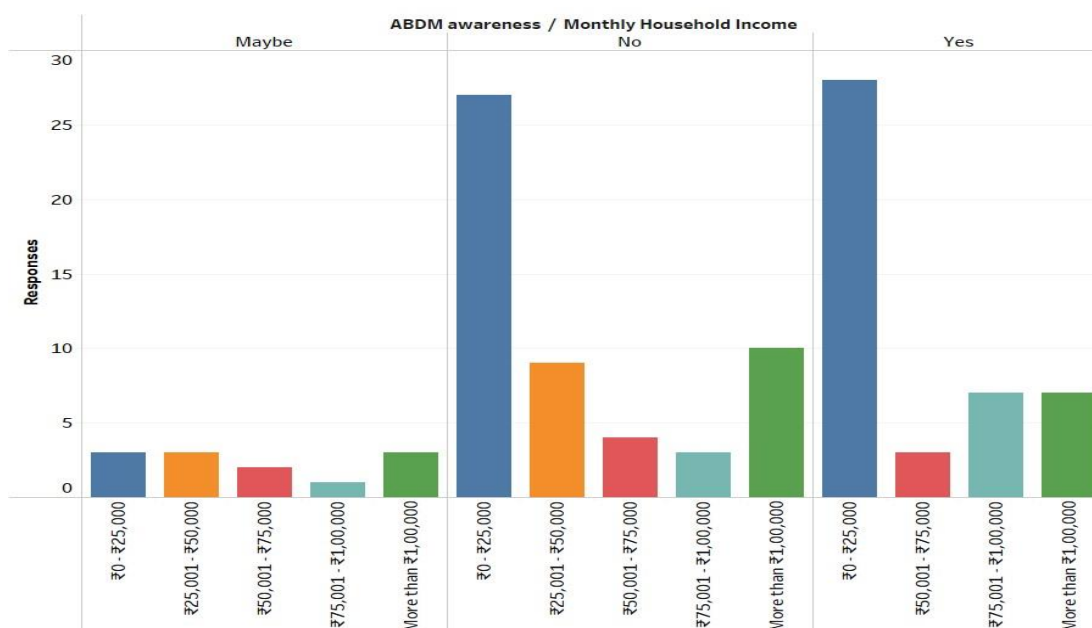


Figure 4 - Analysing Monthly Incomes and ABHA Awareness

Source - Authors' Construction

According to a 2021 consensus by the Press Information Bureau, the nodal agency of the Government of India for the distribution of government oriented data, around 65% of India's total population lives in rural areas. While Ayushman Bharat Health Accounts were introduced keeping in mind the financial situation of rural households, the same is not being reflected in the amount of rural ABHA beneficiaries. Of the 43 people surveyed living in rural areas, only 51% of the survey takers are aware of the ABDM, while only 11% (5 people), actually have ABHA. This statistic provides a shockingly low turnout for a scheme that aimed to promote accessibility, integrity, and reduce the disparity in healthcare services between rural and urban India.

Table 2 Cross tabulation of Urban-Rural differences on awareness

Residence	Responses - ABDM Awareness			Total
	Yes	No	Maybe	
Rural	19	21	3	43
Urban	26	32	9	67
Grand Total				110

Source: Authors' construction

Residence	Responses - Account holders		Total
	Yes	No	
Rural	5	38	43
Urban	6	61	67
Table 3 - Cross tabulation of Urban-Rural differences on ABDM accounts Grand Total			110

Source: Authors' Construction

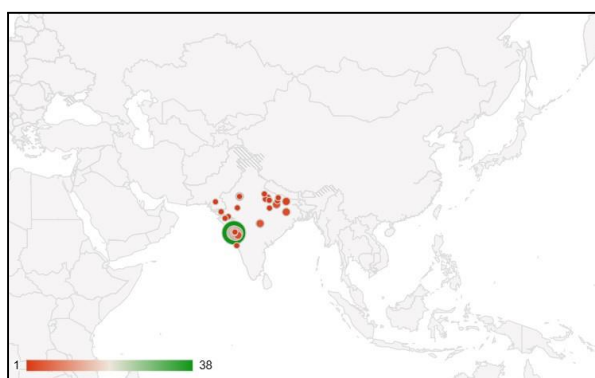


Figure 5 - Survey demographic across India

Source - Authors' Construction

Table 4 - Cross tabulation of Income groups and beneficiaries

Monthly Household Income	ABHA Beneficiaries	
	Yes	No
₹0 - ₹25000	9	49
₹25001 - ₹50000	1	11
₹50001 - ₹75000	0	9
₹75001 - ₹100000	1	10
₹100000+	0	20
Total	11	99

Source: Authors' construction

The survey, although aimed towards gauging responses in Mumbai city, provided a country-wide demographic with its immigrant-rich population. While Immigrants from Uttar Pradesh and Rajasthan are better informed about the facilities of ABHA, with 60% and 50% affirmative feedback respectively. Bihar and Jharkhand also delivered a positive response.

Meanwhile, surveys in areas close to Mumbai, like Karjat, gave us better insight into the healthcare systems in rural Maharashtra. While the majority of surveyed people in the area were aware of the ABDM, being immigrants, they did not realize that the ABHA can be used throughout Indian territory, conflating it with the AB-PMJAY scheme and thus missing out on the benefits of either scheme. Northern India ranks higher on ABHA beneficiaries for several reasons. Bihar and Jharkhand consist of nearly 40% of the total population that is below the poverty line (Justice, n.d.). By using schemes such as ABDM, it ensures cheaper and faster healthcare options. Health departments in Uttar Pradesh have institutionalized the ABDM by setting ABDM state offices.

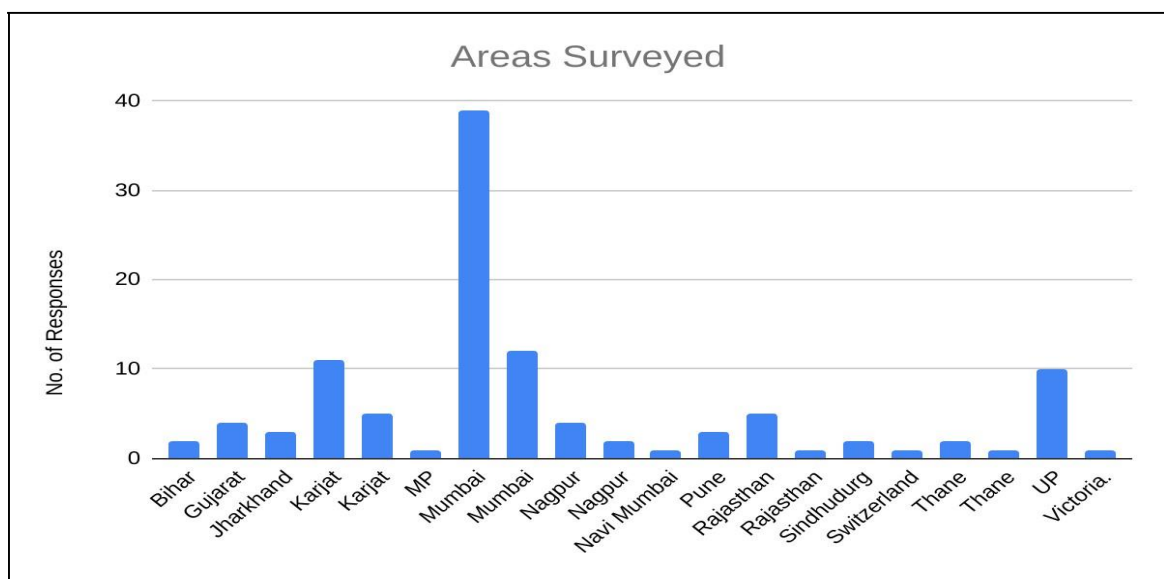


Figure 6 Survey demographic across India

Source: Authors' construction

The survey indicates that only 10% of the total feedback holds an ABHA, and none have actively used the services offered to account holders. Over 70% of those surveyed admitted that they have either never heard, or are unaware of the services that ABDM and ABHA offers. Several people expressed lack of faith in digital platforms and lack of access to internet services. In addition, 40% of the survey set were unaware of how an Ayushman Bharat Health Account works. Hence, the use of ABHA within the city is negligible. Every response in this question emphasizes on the fact that there is no awareness regarding the medical resources that ABHA offers.

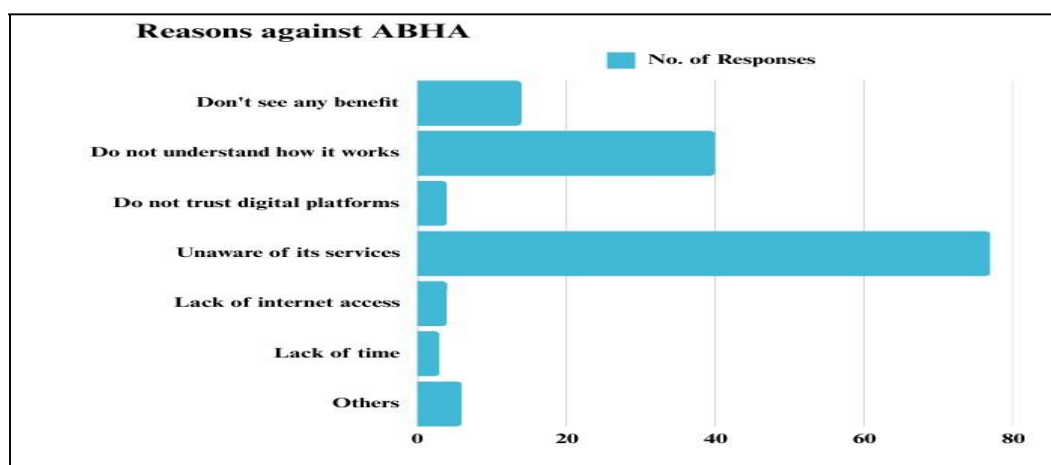


Figure 7 - Reasons for lack of ABHA

Source - Authors' Construction

We conducted a linear regression analysis using the survey data in order to get a deeper understanding between income and ABHA beneficiaries. However, the data was not compatible to perform a regression. The data for “Monthly Household Income” was classified into numerical categories, in the following order -

- 1 : 0 - ₹25,000
- 2 : ₹25,001 - ₹50,000
- 3 : ₹50,001 - ₹75,000
- 4 : ₹75,001 - ₹1,00,000
- 5 : More than ₹1,00,000

Similarly, to perform a regression analysis, the responses for the close-ended question “Do you have an Ayushman Bharat Account”, which was to be answered in a “yes” or “no”, were converted into binary values in the following way - Yes = 1 ; No = 0.

Using Microsoft Excel, we performed the regression analysis, and arrived at the following result -

Table 5: Regression Summary Statistics

Statistic	Value
Multiple R	0.195249
R square	0.038122
Adjusted R square	0.029215
Standard error	0.296937
Observations	110
F statistic	4.28
F significance	0.04

Term	Coefficients	t Stat	p-val
<i>Intercept</i>	<i>0.1842</i> <i>(0.0496)</i>	<i>3.71</i>	<i>0.0003</i>
<i>Income</i>	<i>-0.0366</i> <i>(0.0177)</i>	<i>-2.06</i>	<i>0.04</i>

Source: Authors' construction Note: Brackets indicate standard error of the coefficients

Based on the above results, it can be observed that the slope is -0.036. The slope is indicative of the magnitude of the relationship between the variables. Thus, a negative slope implies that the monthly household income has an inverse relationship with the creation of an ABHA account. However, the negative value is close to zero indicating a negligible slope. Furthermore, the p-value at 0.0409 indicates that the relationship between the given dependent and independent variable is statistically significant at 5% in the context of this research. The R^2 value verifies that income explains only 3.81% variation in the account data. The rather weak relationship is an indication that there is not much awareness amongst economically backward classes and rural areas. This has led to a response that is spread out over all economic classes, but slightly increasing in lower sections.

An interview with an anonymous government health professional revealed that the city of Mumbai follows a different medical system altogether, as compared to those throughout the rest of India. Healthcare centres in India are divided into Primary, Secondary and Tertiary Healthcare centres.

However, in Mumbai, another form of medical service surfaces in the healthcare system, the hospitals run by the Brihanmumbai Municipal Corporation. These hospitals do not come under the authority of the government. Therefore, they are not subject to the use of the ABDM.

In addition, a systemic malfunction in the database in tertiary healthcare centers across Maharashtra has led to the use of conventional book records since 2022. Thus, the use of ABHA in hospitals across Mumbai and Maharashtra requires a rewiring of the existing framework in the medical system that the region follows, as well as tests to prove that the application is digitally compatible with the softwares.

IX. Conclusion

The Ayushman Bharat Digital Mission has the ability to transform healthcare in India by seamlessly integrating with the existing medical protocols. It can bridge the gap between the privileged and the underprivileged sections of the population through provision of affordable and accessible services. Despite its potential, the study highlights the various barriers that impede its direct impact on the people, namely low digital literacy, underutilization of ABHA accounts and minimal awareness. These barriers are made prominent through the survey conducted in the research underlying key medical research metrics.

Furthermore, ongoing evaluation of the ABDM's implementation will be crucial in identifying areas for improvement and ensuring that the benefits of digital health services reach all segments of society.

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GIG ECONOMY: STORY OF INDIA'S CHANGING LABOR MARKET [Understanding the Dynamics, Challenges, and Future of Gig Work in India]

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*This research paper won the Second prize at Epsilon Research Paper Competition 2024-25: An Intercollegiate Economics Research Paper Presentation Competition held by the Economics Association of SVKM's Narsee Monjee College of Commerce and Economics on 24th January, 2025.

Abstract:

The gig economy is rapidly reshaping India's labor market, offering flexible, short-term employment opportunities across various sectors. This research examines the rise of gig work in India, analyzing its impact on employment, economic growth, and the dynamics of the labor market through the IS-LM-BP (Investment-Saving, Liquidity Preference-Money Supply, balance of payment) framework. The paper explores key factors such as youth participation, skill development, government policies, and challenges like income instability and lack of job security. Using a combination of primary and secondary data, the study finds that the gig economy has significant potential to reduce unemployment and optimize labor force utilization. However, mismatches between employer preferences and worker expectations, alongside policy gaps, leads to challenges. The paper recommends a balanced approach between fiscal and monetary policies to foster sustainable growth and stability in the gig economy, while addressing the challenges faced by gig workers

Key words: Gig Economy, Labor Market, Economic Growth, Unemployment, Freelance Work, Job Market, IS-LM-BP Model, Employment Trends, Flexible Work.

What is the gig economy?

The gig economy, also called sharing economy or access economy, is activity where people earn income providing on-demand work, services or goods. Often, it's through a digital platform like an app or website. [1]

A 2020 study conducted by the Michael and Susan Foundation and Boston Consulting Group (BCG) estimates the gig economy jobs at 8 million in India. This could increase to about 90 million jobs in the non-farm sector in about 8 to 10 years, with USD 250 billion transactions at 1.25% of India's GDP[2]

As per the worldometer[3] the population of India on 9th March 2025 is 1,459,787,921(1.46 billion). Around 17.78% of the world population is covered by India. By observing these numbers, we get to know that India has a large number of labour forces. In economic terms the India is labour intensive country (As per the Heckscher Ohlin theory)[4].

There are 3 question arise on the basis of this information

1. Why does India have a large amount of BOP deficit?
2. Does India have the ability to overcome the BOP deficit?
3. Does proper investment in the gig economy help India to overcome these problems?

This research paper aims to examine all these problems and also try to find out practical and efficient solutions for these problems.

Hypothesis:

Investing in and supporting the gig economy in India will lead to increased economic growth, more optimal utilization of the labor force, and a reduction in unemployment rates as well as reduce BOP deficit.

Scope of research

This research focuses on the major problem of India that is unemployment and tries to understand how the government can reduce this problem with the help of the gig economy and gig workers.

Because of the gig economy, unorganised Economic activities also rise to control this problem. What can the government do? Also try to find out solution for this. By applying Mundell Fleming Model [IS-LM-BP Model][^{5,6}] model help to understand what kind of policies government should implement for boost the domestic economy and international economy.

Additionally, the study tries to recognise the challenges faced by gig workers, including unstable income, lack of benefits and less social security. By providing a detailed analysis, this research answers how gig work influences the Indian economy and society.

Objective of Research:

- Knowing how efficient investments in the gig economy can contribute to India's economic growth and reduce unemployment rates.
- Being aware of the potential of the gig economy to overcome the problem of underutilize labour force
- To highlight how government policies and rules and regulations can contribute to well structured, optimally functioning gig economy with reduction in unorganised sectors/ unorganised workers

Methodology:

To examine the role of the gig economy in India's changing labor market, a combination of primary and secondary research methods was used:

- Primary Data Analysis:[⁷]The sample of 100 individuals were collected to identify what kind of jobs are mostly preferred by the students who currently passed out their higher education, graduation and post-graduation. Also try to understand the thinking gap between the employee and employer
- Secondary Data Analysis: Data and information were sourced from online platforms, government reports, and also use economic models such as the IS-LM-BP model.

Data interpretation:

Secondary Data:

India's government has initiated discussions on regulating gig work to protect the rights of workers. As per the Code on Social Security (2020), gig and platform workers are entitled to benefits such as life insurance, accidental coverage, and pension schemes. However, the implementation of these policies remains limited, requiring a more structured approach to enhance their effectiveness.^[8]

Globally, India stands out as one of the fastest-growing markets for gig work. Comparisons with countries like the United States and China reveal similar patterns, with India's gig economy uniquely shaped by its large labour-intensive workforce and increasing digital penetration. However, unlike developed countries, gig work in India is primarily driven by economic necessity rather than choice ^[9]

As per latest budget the great initiative taken by government of India that is the gig workers has to self-register themselves on e-shram portal, the one who registered and issued identity Card they will be eligible for getting the benefits of healthcare coverage under “Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana”. This will help to record the number of gig workers and also reduce number of unauthorised workers ^[10]

As per the report of the Ministry of Labor and Employment, the unemployment rate was decreasing year by year. In 21-22 unemployment rate was 4.1% where as in 22-23 unemployment rate was 3.2%^[11]

Primary Data:

The target population of this research work is students who recently qualified their higher education, graduation or post-graduation. To understand what kind of job today's generation prefers and according to them what are the conditions that are required to get their dream job.

Analysing the results it clarifies that 15% of individuals prefer gig job whereas majority individuals preferring business or part time jobs. Gig job in terms of job preference comes at least position. This Trend happens because of 56% individuals thinks, there is income instability in the gig economy and 36% of people thinks there is a lack of benefits due to this contribution in gig economy has the least position.

However, in the context of working hours, how many hours an individual want to work, then a survey shows that 46% of individuals want to work for 3 to 5 hours and 41% of individuals want to work for 5 to 10 hours. It clearly shows that the majority of individuals don't want to follow this traditional work culture.

Even in terms of skills 60% of individuals think 2-4 skills were enough to get that dream job where 21% of people think that 5 to 10 skills an individual should have to achieve their dream job. It clearly shows that an individual having only one particular skill is not enough for competing in the present job market.

It is observed that 21% of individual's preference permanent jobs. Let's find out if permanent jobs have positive effects or negative effects on productivity. Majority that is 68% of individuals think that permanent jobs have a positive effect on productivity because they think the permanent job provides job security and income stability whereas 32% of individuals think that there is a negative impact of permanent jobs on productivity. Because due to permanent jobs, employees stick to particular work which stops them to learn new skills, even if they lose interest from that Particular work which will directly reduce their productivity, that's why in Long term it is not too effective.

At last it's observed that training and skill development programmes play a major role to provide employment and sustain the job role 58% of individuals agree with. It clearly shows that companies or government should focus on training and skill development programs while investing in better education system providing skill development courses at cheap price or free of cost to their employees will result into long term sustainable growth for the economy

Examining the Impact of the Gig Economy Through the IS-LM-BP Framework (Mundell Fleming model)

Impact on the Real Sector (IS Curve)

(T = Tax, Y = Income, MD = Money demand, MS = Money Supply, i = Interest rate, C = Consumption, P = Producers, E = Employment, M = Imports, X= Exports, FDI = Foreign direct investment)

If the government introduces **expansionary fiscal policy**, T will **reduce**. Due to reduction in T consumers have more money to spend it means their **Y increases**. Due to **increase in Y**, MD also **increases**. to maintain MD=MS RBI **increase i** . Due to high interest rate **FDI inflows will increase**. This leads to **appreciation of currency** in the international market. As the value of the rupee increased, Indian goods became expensive in foreign markets. Due to this **X Will decline**, on the other side as Y increases **M also increases** both of these leads to **leftward shift In BP and IS Curve** respectively. This leads to a situation where **fiscal policy still increases Y and I but its effectiveness is diminished**. As a result, **expansionary fiscal policy is less effective**

If government impose **contractionary fiscal policy** which **increase T**, **increase in tax** lead to **reduction in Y**. As income reduce **MD also decline**, to maintain MD=MS RBI **reduce interest rate**, due to reduction in i, **FDI will decrease and outflow will occur**. As a result, the currency value **depreciates**. It means that Indian goods became cheaper in the international market which leads to an **increase in X**, on the other side Y reduces which means **M also reduces**. Due to fall in M and rise in X the **current account will improve** as a result **BP and IS curve shift rightward** respectively. **This leads to a situation where fiscal policy decreases**. I buy Y is increasing. As a result, **contractionary fiscal policy is more effective**.

Impact on the Money Market (LM Curve)

(i = Interest rate, I = Investments, C = Consumption, P = Production, E = Employment, Y = Income, MS = Money Supply, MD = Money Demand, M = Imports, X= Exports, FDI = Foreign direct investment))

If RIB implement **expansionary monetary policy** due to this **MS increase**. As **MS increases i decrease**. Due to decline in **i FDI will start to decline** and **outflow** will occur. As a result, Currency value **depreciates**, X becomes cheaper and M becomes expensive. Due to this the **X Will increase and M will decrease**, it shows **improvement in Current account**. As a result, **BP and IS curve shift rightward**. Which shows **i decrease but the Y increase** it means that **expansionary monetary policy is completely effective**

If RIB implements **contractionary monetary policy** due to this **MS decrease**. As **MS decreases I increase**. As a result, **FDI increase inflows occur**. This leads to **appreciation of currency**, it means M becomes cheaper and X becomes expensive. Hence **X Will decline and M will increase**. It shows a **leftward shift in BP and IS curve**. This leads to a situation where **monetary policy still increases Y and I but its effectiveness is diminished**. As a result, **contractionary monetary policy is less effective**

Policy Recommendations:

- Contractionary Fiscal Policy:
- Expansionary Monetary Policy:

The interrelation between fiscal and monetary policies is crucial for getting the benefits of the gig economy while maintaining macroeconomic stability. By maintaining the balance, the government can ensure that the government policies and gig economy supports employment, income, and investment, increasing sustainable economic growth without creating inflationary pressures.

Findings:

The 2 questions raised at the beginning will be answered on the basis of primary and secondary data.

If analysed by Bop of India it clearly shows that there is a BOP deficit. BOP deficit most of the time occurs due to deficit in capital account. Deficit in capital account shows that a country's imports are larger than exports. India imports too much capital goods but as a labour intensive country we should focus on the production of goods which is labour

intensive. There are artistic goods, such as handmade jewellery, clothes which have authentic Indian embroidery, all these things have High demand in the international market, focusing and empowering this work culture not only utilise the labour force but also contribute to sustain India's culture and heritage. Proper investment and security structure helps more people to join the gig economy which not only increases the GDP of the country but also contributes to the development of the country. Where women, students can also earn surplus income without sacrificing their family or studies.

Conclusion:

According to our analysis, it is safe to say that India has a large amount of labour force which enables them to produce labour intensive products. However, India imports a large number of capital goods and exports raw material or agricultural goods which have low value. This leads to a BOP deficit^[12]. To reduce this government can empower Gig workers to work in the field of artistic Good, handmade jewellery or clothes which has authentic Indian embroidery, all these works are labour intensive also all of these highly demanded in the international market. It clearly shows that India has an advantage to produce these goods, which will not only reduce the problem of unemployment but also increase our exports, help to preserve India's art, reduce BOP deficit and boost Economic growth with sustainable development. However, government initiative in terms of skills development programs, affordable education, encouragement of entrepreneurship is also required to achieve and sustain long term economic development. The combination of government policies required to maintain Economic stability in the country the market mechanism fails to maintain balance between the policies it will result in economic shock. All the questions raised in the beginning of the research were answered now, hence the hypothesis which was taken will be accepted. As government spending in the form of investment for boosting gig economy will leads to economic growth, reduce unemployment and reduce BOP deficit

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GLOBAL DEBT CRISIS: ANALYSIS BETWEEN DEVELOPING AND DEVELOPED NATIONS

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Abstract

Public debt levels have risen globally, fuelled by post-pandemic recovery expenditures, geopolitical tensions, and volatile commodity prices. Developed countries can sustain high levels of debt because they have robust financial systems, but developing countries are not so fortunate. Higher interest rates, volatile revenues, and foreign capital dependence tend to compel governments to make tough choices.

This research considers debt sustainability from an analytical perspective, applying measures such as interest payments as a percentage of revenue and debt-to-GDP. The research emphasizes the critical importance of more equitable financial policies and structural adjustments to avoid economic instability in susceptible countries.

Introduction:

Governments everywhere borrow to finance infrastructure, social welfare programs, and bailouts. Borrowing in itself is not bad, but the capacity to repay and service debt differs widely between countries. Rich nations tend to have access to low-cost credit and stable sources

of revenue, while poor nations are offered high-interest loans and economic uncertainty, so debt becomes a much more onerous burden.

This study examines why emerging economies experience difficulties in debt sustainability, examining actual cases where servicing debt came at the expense of necessary public service provisions. Examples include Sri Lanka's 2022 economic crisis and Argentina's persistent debt default issues, demonstrating difficulties in servicing finances in uncertain economic times. Through the comparison of major financial indicators, this research is expected to contribute to an understanding of the underlying disparities in the global financial system and why current debt management strategies tend to fail developing countries.

Scope:

Instead of providing a general overview of public debt, this study addresses the particular ways in which debt sustainability varies across affluent and poor countries. The main topics discussed are:

- Comparing debt indicators like the cost of borrowing, debt repayment ratio, and export revenues to determine financial vulnerabilities.
- Learning about fiscal priorities, specifically how developing country governments have to curtail important expenditure (such as education and healthcare) to service debt.
- Analyzing financial structures, understanding why richer economies can carry more debt without serious repercussions while other, poorer countries suffer under the same circumstances.
- Monitoring trends between 2010 and 2023, taking into consideration significant financial occurrences such as the COVID-19 pandemic, the volatility of oil prices, and changes in global lending trends.
- The research does not presume a uniform explanation but seeks to explore how various economic conditions influence a nation's capacity to cope with debt.

Objectives of the Research

- To examine the variation in debt sustainability between developed and emerging economies.

- To analyze the economic and social implications of unsustainable debt levels in emerging economies.
- To determine the contribution of international financial institutions towards shaping national debt policy.
- To evaluate the effect of increased global debt on general financial stability and economic growth.
- To analyze whether conventional economic metrics (e.g., debt-to-GDP ratio) are an accurate representation of a country's financial health.

Methodology Used

Analytical Approach:

This research analyses systemic disparities in global debt sustainability through a multi-metric framework. The following metrics were examined:

1. Interest payments as a percentage of revenue.
2. Public health expenditure as a percentage of revenue
3. Present value of debt as a percentage of exports.
4. Public debt as a percentage of GDP.
5. Outstanding public debt in absolute figures.
6. Average borrowing costs.

Data Analysis:

- All measurements were examined by using data collected from the IMF, World Bank, UNCTAD, and Trading Economics.
- Focus was given on revenue-based and export-based indicators to emphasize fiscal stress and issues of debt sustainability.
- Figures and graphs were devised to represent patterns and differences among developed and developing countries.

Methodological Considerations:

- Currency-based metrics were given the highest priority so that actual fiscal stress could be represented, given that GDP-based metrics tend to hide differences.

- External debt indicators centered on the dependence of developing countries on exports to service debt, emphasizing their susceptibility to external shocks.
- Limitations of each indicator were recognized to present a balanced view.

Data Interpretation and Analysis

1. Interest Payments as a Percentage of Revenue

Developing countries spend a much higher percentage of their revenues on debt servicing than developed countries.

Developed Countries: Between 2010 and 2023, interest payments consumed an average of 3–4% of government revenue.

Developing Countries: The proportion gradually rose from 7% in 2010 to 10% in 2023.

This measure strongly confirms the hypothesis that developing economies experience higher fiscal pressure, as a larger proportion of scarce revenue goes towards debt servicing, leaving fewer resources for essential development areas.

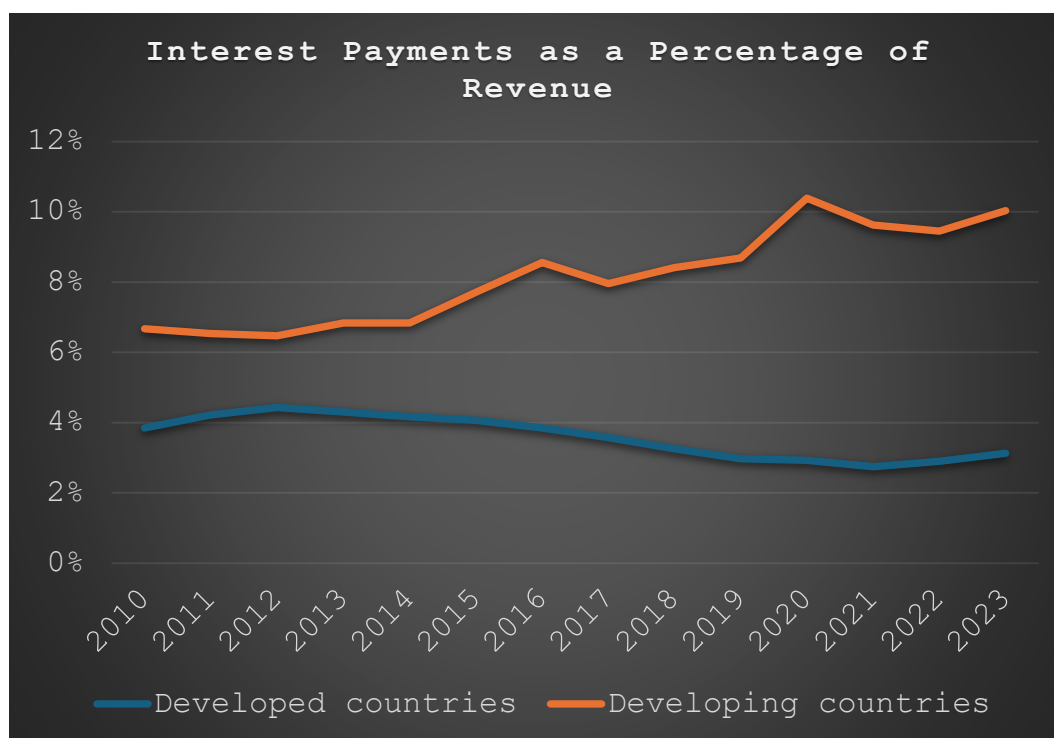


Figure 1 : Line chart showing Interest Payments as a Percentage of Revenue

2. Public Health Expenditure as a Percentage of Revenue

The unequal burden of revenue for developing countries has far-reaching impacts on their capacities to invest in key sectors. One of the most evident expressions of this is the stark contrast in the public health spending as a proportion of GDP. The governments of developing economy are compelled to engage in a trade off between servicing the debt and social welfare expenditure.

Developed Nations: Expenditure 6–7% of GDP on health.

Developing Countries: Only 2–3% of GDP are spent on health.

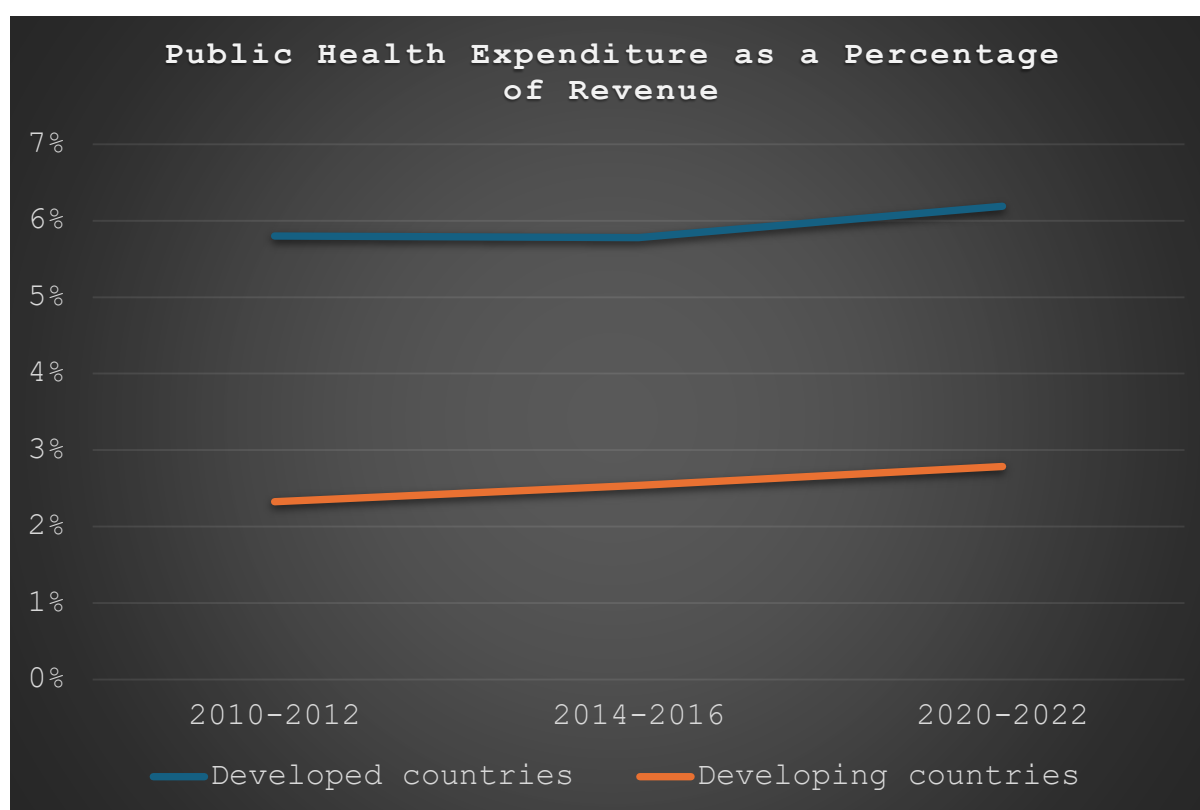


Figure 2 : Line chart showing Public Health Expenditure as a Percentage of Revenue

3. Present Value of Debt as a Percentage of Exports

Apart from revenue-related trade-offs, the use of external debt also adds a degree of risk exposure for developing countries. This becomes clear when viewing the present value of debt compared to export proceeds, an essential indicator of the sustainability of external debt. Developing Countries: Debt levels range from 100–130% of exports, which indicates how much they depend on fluctuating foreign exchange revenues to cover debts.

Developed Nations: Debt levels are relatively low at 60–65%.

This indicator shows how susceptible developing economies are to external shocks and therefore how difficult it is for them to be debt-sustainable.

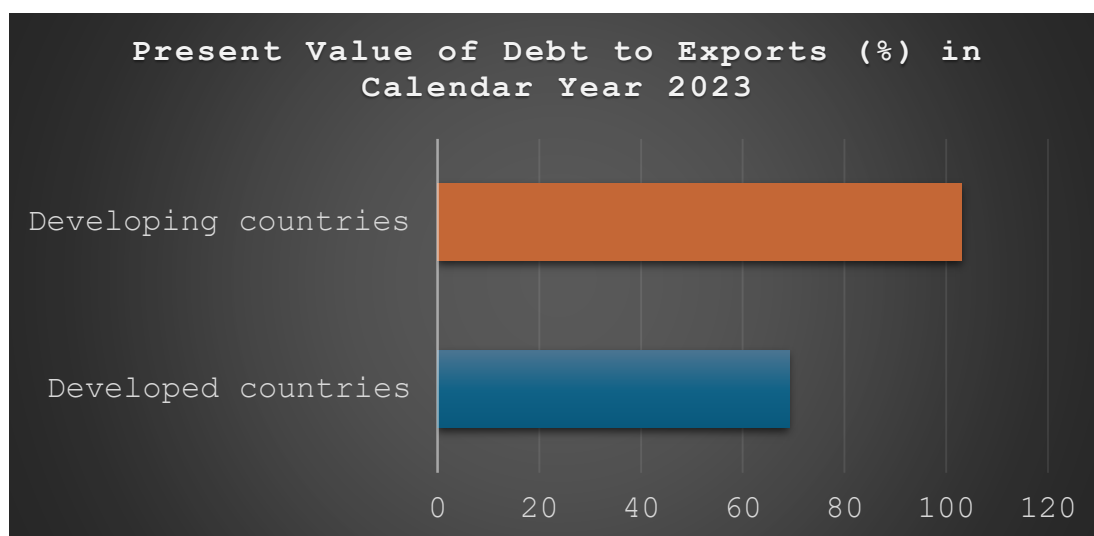


Figure 3 : Bar chart showing Present Value of Debt to Exports (%) in Calendar Year 2023

4. Public Debt as a Percentage of GDP

While the earlier figures point to fiscal strains and exposures from abroad, public debt in terms of percentage of GDP helps understand the total magnitude of debt compared to output. Yet this figure shows an opposite trend deserving of cautious reading.

Developed Countries: Debt-to-GDP rates varied between 59% in 2010 and 67% in 2023

Developing Countries: Rates rose from 41% in 2010 to 61% in 2023. Advanced economies are aided by well-established financial systems, greater fiscal cushions, and cheaper borrowing, allowing them to carry higher levels of debt without similar strain. Developing countries have more difficulty absorbing even modest debt levels because of systemic financial disparities.

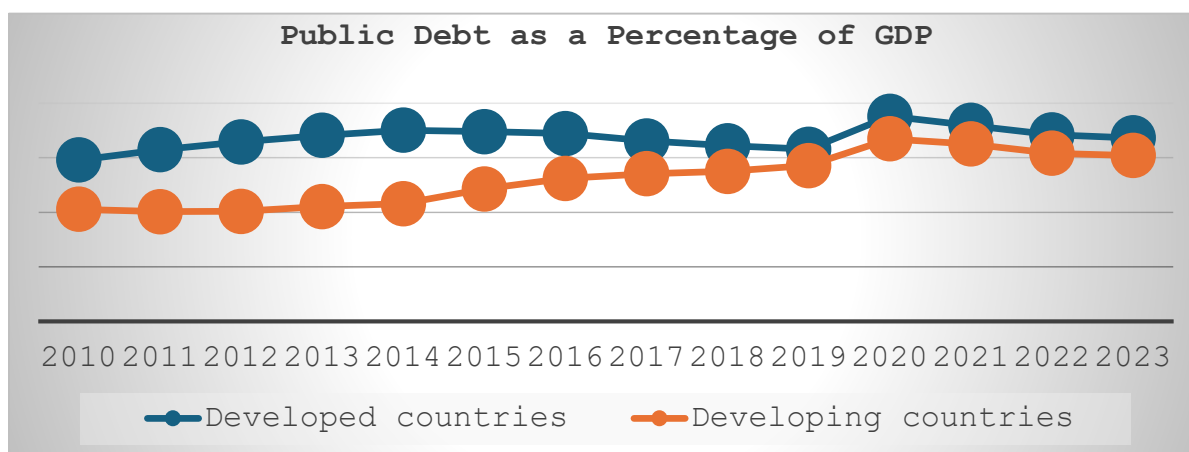


Figure 4 : Line chart showing Public Debt as a Percentage of GDP

5. Outstanding Public Debt in Absolute Figures

Although public debt as a percentage of GDP shows higher debt levels in developed economies, analysing absolute debt figures offers a different perspective on the scale of global borrowing. However, this metric must be viewed cautiously, as it does not account for the cost of debt servicing. Further, the metric also doesn't consider the fact that countries like Afghanistan and Syria have virtually zero external borrowing due to them being highly instable in terms of geopolitics. Absolute levels of debt also depend significantly on the size of an economy. Bigger economies, mainly developed economies, will be more indebted. This indicator does not account for the cost of the finances or the sacrifice involved in repaying this debt. For small developing economies, even lower absolute debt can become a major concern, especially when combined with high costs of borrowing and unstable export revenues.

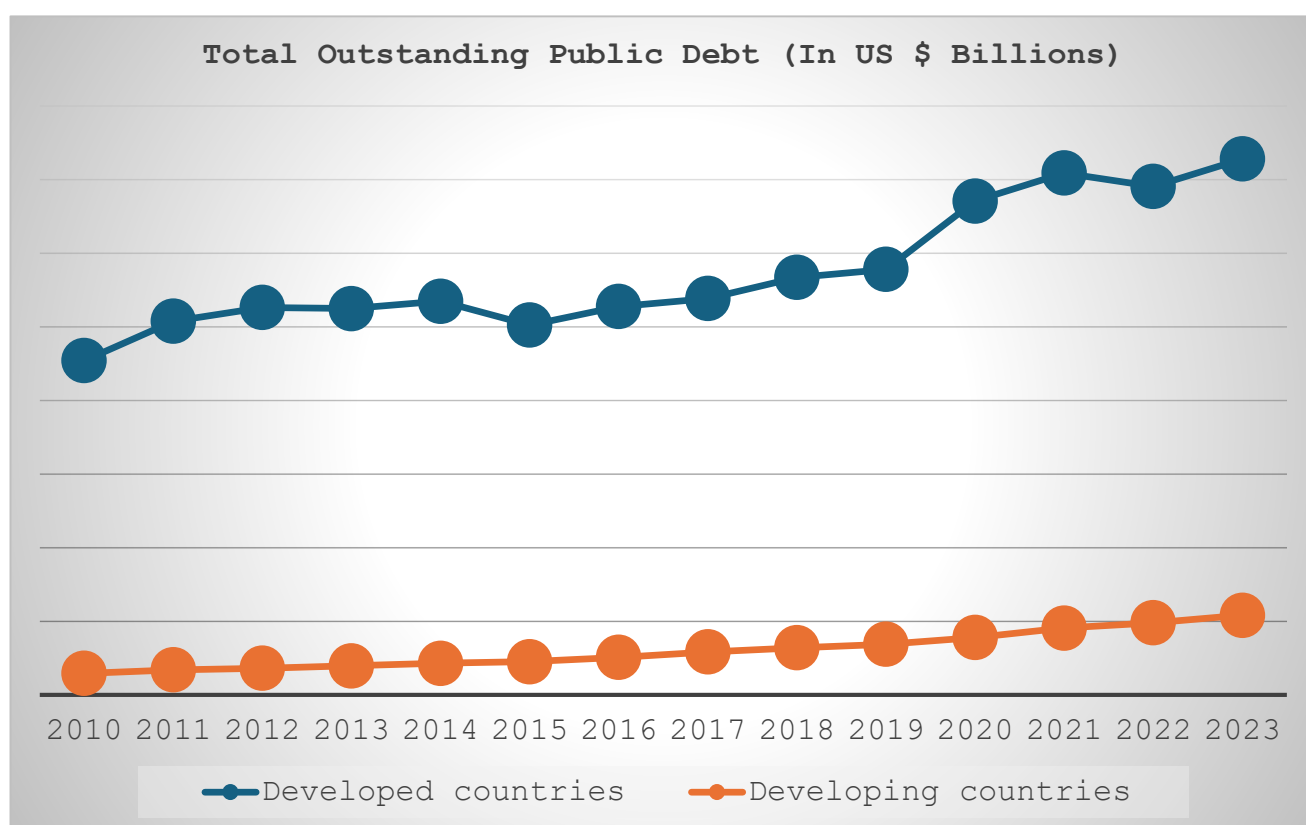


Figure 5 : Line chart showing Total Outstanding Public Debt (In US \$ Billions)

6. Average Borrowing Costs

Although the indicators in No. 4 and No. 5 reveal that developed economies have higher public debt both absolutely as well as in % of GDP, they in fact incur much less cost of borrowing. The next graph from the UN Trade Development Report illustrates that developed countries like Germany and the USA enjoy considerably lower borrowing costs because of better credit ratings and sound financial systems, while developing countries face higher borrowing costs, which increases their debt servicing expenditure and curbs fiscal flexibility. Therefore, developed countries are able to absorb such huge debts as a % of GDP and absolutely too.

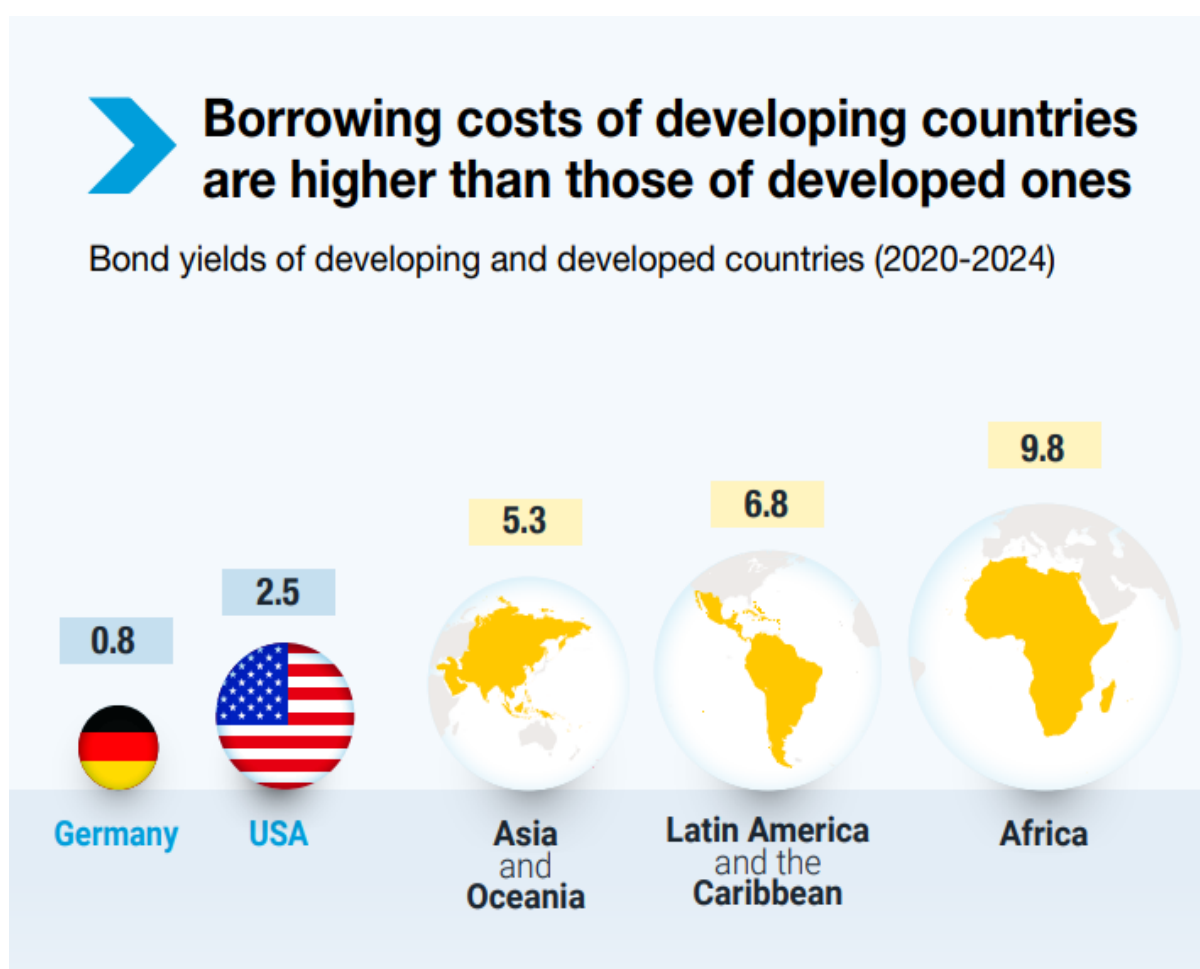


Figure 6 : A visual on borrowing costs of developed nations of USA and Germany vs developing regions of the world

Source: UNCTAD, A World of Debt (2024). A screen shot of a chart

Collectively, evidence suggests that underlying systemic imbalances in the global financial system is propelling developing world debt crisis. These inequalities not only do harm to a nation but pose threat to the overall international economic stability. Embracing debt in

emerging nations usually generates lesser investment in the health, education, and physical infrastructure, continuing to slow the growth and nourish inequality within regions.

Its visible that the majority of developing nations are not able to sustainably finance their debt increases the risk of defaults, finance contagion, and instability in world trade. Owing to the level of interdependence of the global economy, the crises do not only stay within specific zones but can, in theory, have widespread implications on the global market and financial systems.

Conclusion:

The debate highlights a deep mismatch of global debt sustainability, bringing about systemic imbalances with heightened impact on developing nations.

Key Findings:

Revenue-Based Disparities: Developing countries allocate 7–10% of their revenues for debt servicing, against 3–4% for developed countries, diverting the resources away from vital sectors such as health and education.

Exposure to Foreign Debt: Debt burden of average value 100–130% of exports poses higher risks of financial instability and external shocks to developing countries.

Enlarging Borrowing Costs Disparity: Greater borrowing costs for developing countries widen fiscal strains, constraining them from investing in growth-promoting policies or refinancing debt.

Broader Implications:

The evidence points to a global financial structure that increases inequality, opening the door to financial crises in vulnerable economies. These crises have the potential to not only harm individual countries but also the interdependent global economy, with contagion effects and market instability in world markets.

Call for Action:

These imbalances call for far-reaching reforms, including:

- Lowering the cost of borrowing for developing countries through concessional financing.
- Refinancing external debt in order to ease the fiscal burden.
- Expanding access to international financial resources for sustainable development.

By resolving these system issues, the international community can minimize the potential of future debt crises and create a more equitable and sustainable economic order.

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INNOVATE TO DOMINATE: SHAPING THE FUTURE WITH TECHNOLOGY

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Abstract:

*The high raise in demand for vehicle tracking systems has opened the need for advanced solutions to improve safety, productivity, etc. including logistics, transportation and overall security. The **Satellite Coordination System for Vehicle Tracking** focuses on satellite-based navigation and communication tech stack to provide 100% accurate tracking of vehicles over all areas specially in India. This system goes through the key factors of traditional tracking methods, like short coverage, signal blockages, etc. By utilizing its benefits for satellite technology, it ensures non-stop, 100% correct tracking without the use of location, making it an easy solution for overall problems in India.*

This solution of the problem is there to change transport service by giving helpful, affordable, and time saving vehicle tracking systems. The Satellite Coordination System can purely fleet work, enhance safety overall, etc. By handling the uneasiness of traditional tracking systems, it gives a more useful and effective chance to handle vehicle work, increase in the speed of operational enhancement for government. In the future transportation will continually upgrade, which represents an important plus point in easy coordination and handling of vehicle fleet. It's helpful a lot for the government and as well as for citizens. Developed Country like Japan used this useful vehicle tracking with GPS and QZSS called as Michibiki, mostly used in urban areas and all.

Keywords: FASTag, Satellite Coordination System, Vehicle Tracking, Toll Collection, Fleet Management, Real-time Monitoring, Logistics.

Introduction:

In a never-contracting world, time-saving vehicle tracking has been playing an important role for various industries. Traditional systems, usually reliable on outdated technologies, which further face challenges such as limiting the coverage, wrong data, mostly in remote areas. To solve these issues, the Satellite Coordination System for Vehicle Tracking shows an important solution, using satellite-based navigation for benefits of India.

This system gives uninterrupted camera and 100% accurate area data except of the various areas, encouraging various businesses and individuals to locate vehicles in every situation. Also, the system gives better performance, helps in safety, etc. impressive decision-making by giving overall coverage, less transmission interference, and increased reliable data.

The system shows a versatile way for uncountable fleets, overall equal security, and better increasing supply chain work. It gives real-time taps, route verification time-to-time, and improved answer management, helping to enhanced features and decreasing various expenses. As a result, it represents an important process in the changing era, giving an increased-efficiency for tools in the future transport needs of the changing world.

Scope:

Scope is the main part. User can access uncountable features through the tracking system for industries, which gives important benefits are as follows:

1. **Fleet Management:** The most important part of fleet management is the vehicle handling, where government can keep their eye on the important factors like velocity, speed, condition of their vehicles which helps in identifying the condition.
2. **Security and Safety:** It gives overall security from theft. Also, if one is kidnapped government can observe and track them by the system.

3. **Public Transportation:** Due to this effective system, many uncountable governments transport system can be run in more smooth manner.
4. **Global Coverage:** As we have saw the system where it is not limited to an area but giving various feature throughout the World. For many different types of vehicles.

Objective of the Research:

- **Relevance in India:** Understanding how can be integrate the system to our country and make it more effective and helpful for us.
- **Traffic Management:** It also gives the main part of the solution which is management of traffic big is big problem.
- **Regional Challenges:** There are many areas where one can get signal or various factors there it can be integrated.
- **Indian Businesses:** Examining how numerous satellite systems can differentiate fleet management, 100% correct route working, and decrease various fuel usage, giving plus point to Indian businesses.
- **Security and Theft Prevention:** By using this Police can detetct the Location of the Vehicle which was used for any other theft work.
- **Regulatory Environment:** Probing India's regulatory landscape and policies that impact the implementation and operation of satellite vehicle tracking systems.
- **Future Growth:** Exploring how satellite tracking can play a crucial function in the development of smart, connected transportation networks, contributing to the future of India's transportation infrastructure.

Methodology:

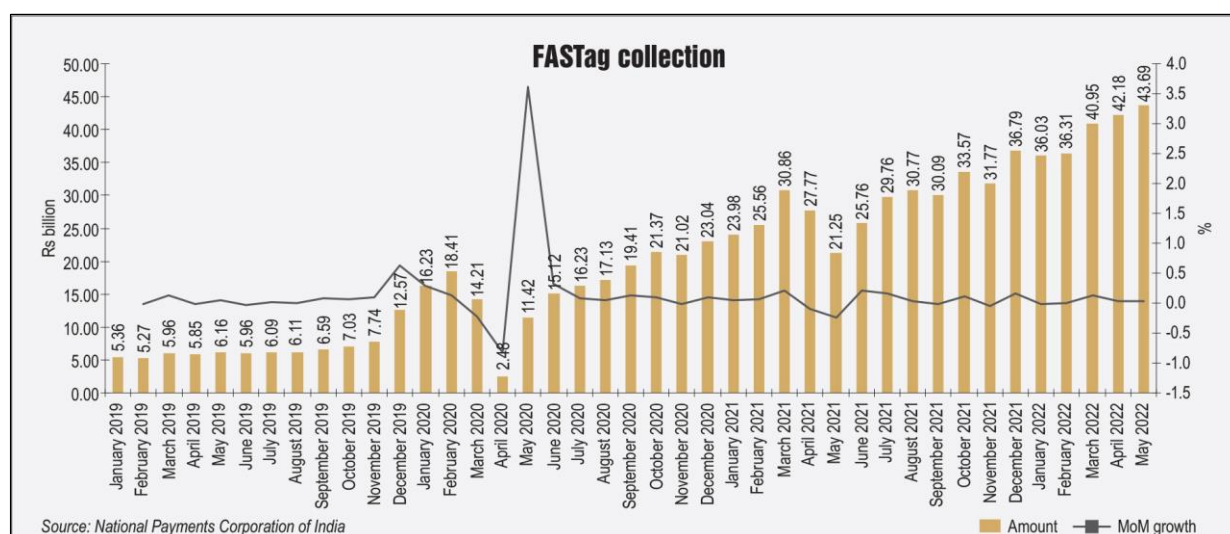
- **Research Approach:** A mixed methods approach would be used to compare FASTag lanes and satellite coordination systems, combining quantitative data on system performance (e.g., transaction rates, response times) with qualitative insights from user.
- **Data Collection:** Data was gathered through a mix of surveys targeting FASTag users and satellite system stakeholders to collect quantitative performance data, and interviews with toll operators, engineers, and policymakers for qualitative insights.
- **Framework for Comparison:** Comparison between solution is shown in (Fig. 1).

- **Analysis Methods:** Data was analyzed using statistical methods for performance metrics and thematic analysis for qualitative insights, allowing a comprehensive comparison of FASTag lanes and satellite coordination systems.

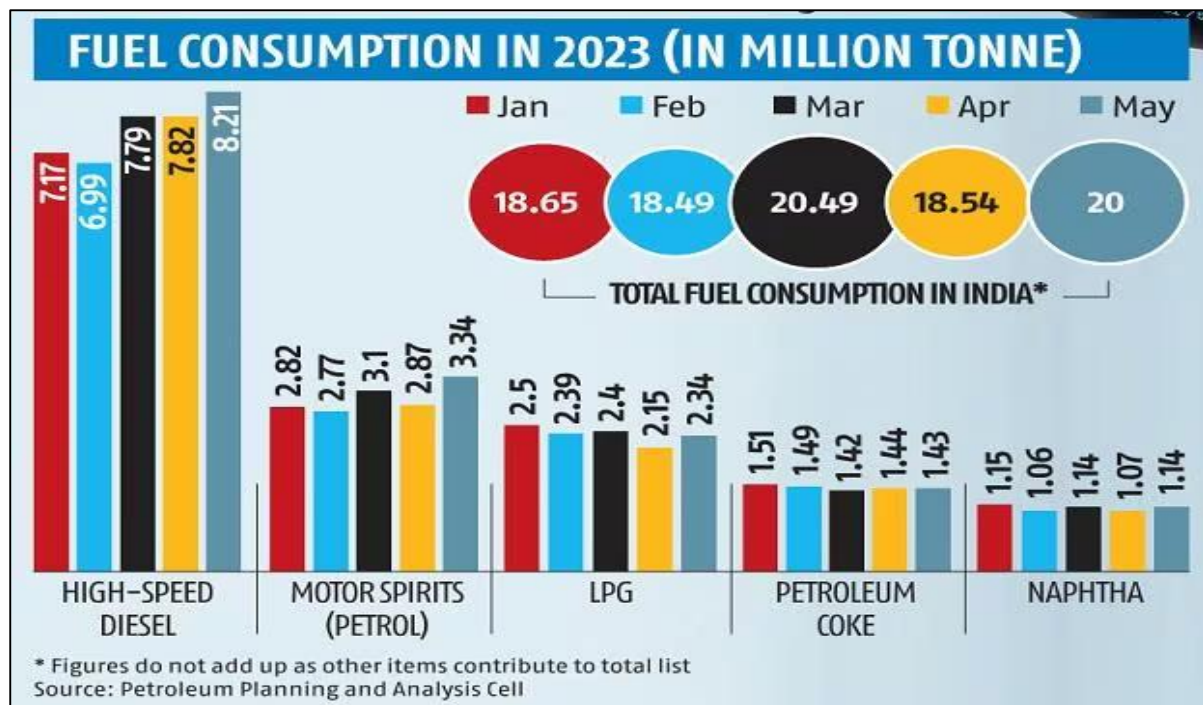
Data:

Criteria	FASTag Lanes	Satellite Coordination System for Vehicle Tracking
Technology	RFID-based technology for toll collection	Satellite-based GPS for real-time vehicle tracking
Purpose	Automates toll collection and reduces congestion	Provides real-time tracking, route optimization, and security
Coverage	Limited to toll plazas across national highways	Global coverage, works anywhere with satellite signal access
Data Accuracy	Limited to toll charges and toll booth information	Provides real-time, accurate vehicle location and movement data
Application	Used for toll collection and vehicle entry/exit at toll booths	Used for fleet management, vehicle security, and logistics
Cost	Low cost for consumers (small fee for tag)	Higher cost due to satellite infrastructure and tracking systems
Scalability	Limited to toll plazas and highways	Scalable for a wide range of applications, from small fleets to large logistics operations

(Fig. 1)



(Fig. 2)



(Fig. 3)

Working of the Technology:

The Satellite Coordination System Technology utilizes satellite-based communication, GPS, and geospatial tools to oversee and monitor vehicles in real time over long distances.

How Satellite Coordination Tracks Vehicles:

- **Satellite-based Communication:** Utilizes spacecraft-linked transmission to send data between automobiles and control hubs, enabling extensive-range interaction without relying on ground-based infrastructure.
- **GPS Integration:** Vehicles are outfitted with Global Positioning System devices that supply instantaneous location information, allowing for accurate monitoring of vehicle movements across vast regions.
- **Tools:** Using various cutting-edge cartography and rural assessment tools to assess, and give vehicle locations across areas.
- **Data Processing:** Unstopping management of data from various local traffic sensors to adjust toll rates.
- **Crowd Management:** It uses uncountable dynamic toll value, rerouting, etc., based on accurate traffic data.

- **Various Systems:** Integrating data from GPS, satellite, etc. To continuous monitor to deliver a important solution for vehicle finding.

Calculations:

Monthly Calculation for Delhi-Gurgaon Toll Plaza:

Parameter	Value
Fuel Consumption per Vehicle (Idle)	0.5 liters per hour
Fuel Consumption per Minute	0.00833 liters per minute
Waiting Time per Vehicle	10 minutes
Fuel Wastage per Vehicle	0.0833 liters
Vehicles Waiting per Minute	50 vehicles
Total Vehicles per Day	72,000 vehicles
Total Fuel Wastage per Day	5,997.6 liters
Fuel Cost (per liter)	₹100
Total Fuel Cost per Day	₹5,99,760

Annual Calculation for Delhi-Gurgaon Toll Plaza:

Parameter	Value/Explanation
Total Fuel Wasted per Day	5,997.6 liters
Fuel Cost per Liter	₹100
Total Fuel Wasted per Year	$5,997.6 \text{ liters} \times 365 \text{ days} = 2,189,424 \text{ liters}$
Total Fuel Cost per Year	$2,189,424 \text{ liters} \times ₹100 = ₹2,18,94,240$

- **Total Fuel Wasted per Year:** 2,189,424 liters
- **Total Fuel Cost per Year:** ₹2,18,94,240

Conclusion:

Orbital Coordination Framework which is the main part that offers a world changing solution for uncountable vehicle movement and tariff collection across the World to get an overview. By utilizing this system, Global Navigation Satellite System (GNSS) connectivity,

and data analysis, the structure can significantly lower fuel wastage caused by vehicle idling at the toll plaza which is the main issue to this solution.

In high-crowd toll plazas like Delhi-Gurgaon, where long waiting times cause lots of fuel wastage on the road, thus using a satellite-based framework which can greatly improve work productivity throughout the toll plaza and reduce expenses on each factor. By opening the option for faster fee processing. Even country like Japan has used and using this remarkable technology for betterment of their country and economy.

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ATTAINMENT OF SDGs IN URBAN SLUMS

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Abstract:

Slums in India are a home to millions of people. These slums are often overlooked by the glitzy façade and are a home to thousands of marginalized individuals and families who live in overcrowded and informal settlements. The research aims to study and analyse the slums of Juhu, Mumbai, laying emphasis on living conditions of the urban slum dwellers and the extent of attainment of Sustainable Development Goals (SDGs) in these slums. It seeks to identify the root problem areas and provide suggestions for government intervention. A case study-based methodology was employed, which involved face-to-face interviews with a questionnaire assessing living standards, health, education, economic standards and government intervention in these slums. The key findings included the existence of deep gender and economic disparity in the slums. While many residents lack access to healthcare, sanitation, usage firewood as the main source of cooking. Majority of the population is engaged in informal jobs. Poor air quality, lack of ventilation and open dumping of household waste, lead to several preventable diseases. In addition, masses consider their surroundings to be unsafe. It was also noted that women are less educated than men, resulting in poor mental health and them lacking equal economic opportunities. The research highlights the importance of addressing gender disparity, improving sanitation, waste management and education. Creation of job opportunities and enhancing the local security is also to be kept in mind. The study underscores the urgency of implementing stricter policies and programmes to ensure sustainable development in the urban slums of Juhu, as the current situation is far from meeting the SDGs.

Keywords: Sustainable development goals, slum dwellers, slums of Juhu



Figure 1. aerial of the Juhu slums

Introduction:

The Juhu slums in Mumbai, India, are inhabited by more than 7,000 families who reside in overcrowded conditions with poor access to basic facilities. Situated in one of the city's most affluent neighbourhoods, these informal settlements highlight the stark contrast between wealth and poverty that exists within the urban landscape of Mumbai. The slums of Juhu, as with other slums within the city, are marked by tight living conditions, poor sanitation, and no infrastructure, yet are an important part of the city's makeup, with their residents frequently working in surrounding sectors of commerce, tourism, and entertainment. Despite facing challenges, the community has shown resilience, with individuals and families relying on each other for support and survival while struggling to make a living in the heart of Mumbai's thriving metropolitan hub.

Scope of the research

- Identification of the problem area
- Base for policy making
- Deeper understanding of where we are lacking

Aim of the study:

- To study the living conditions of the urban slum dwellers in Juhu

- See the extent of attainment of SDGs in these slums
- Provide suggestions for government intervention

Review of literature:

Kalpana Kosalram

Kalpana studies the causes of slum development to be industrialisation, migration, inadequate amenities, poverty, overcrowding. In addition, she identifies that people migrate in huge numbers to urban areas in search of employment, industrial growth, low wages, and the absence of effective land reforms as major heads of slum formation. In addition, she draws our attention on the people living below the poverty line, earning less than \$0.38 (Rs.32) per day, making them vulnerable to poor living conditions. She suggested the need for effective policy reforms, job creation and improvement in social services.

Mr. Mundhe Nitin

Nitin studied the level, trend, and pattern of urbanization and growth of slums, and examined the association between urbanization and proliferation of slums. Urban development has significantly increased urban population, both naturally and by migration, putting heavy pressure on public services such as housing, sanitation, transport, water, energy, health, education and others. Some states/UTs have a high urban percentage, but a low slum growth rate has been registered, i.e., Chandigarh followed by Pondicherry, Goa and Mizoram due to slum up-gradation schemes and good governance program. In comparison, some states have low urban population growth, but a high percentage of the slum population is emerging. Mountainous regions have seen a high slum growth rate relative to their urban growth rate.

Amey Z Sheth

Sheth studied that development of slums was a result of displacement of people without any proper resettlement provision. She studied the conditions of the slums to be unhygienic, overcrowded, without any proper demarcation of the slum boundaries, underreporting of slum populations. There exists socio-economic instability, she suggested rehabilitation efforts, development of slum rehabilitation society to improve the living conditions. work to get implemented with the help of the slum rehabilitation society. In a nutshell, she emphasized comprehensive and organized intervention to address the causes and consequences (Mumbai).

Gap analysis:

While numerous studies have been conducted on slums around the world, including various slum areas in India and Mumbai, there is a noticeable gap in research specifically focusing on the Juhu slums. In spite of the slums being located in the most affluent areas, they have not been analysed through the lens of the United Nations' Sustainable Development Goals (SDGs). Existing research has often overlooked the unique challenges and opportunities present in Juhu's slums, focusing instead on more widely studied areas. This gives one an opportunity to explore the kind of living environment, provision for basic amenities and government actions with regard to goals set out for SDGs targets. The study aims to bridge the gap by examining how the slums align with, or diverge from, the targets set by SDGs



Figure 2: pictures captured while surveying

Methodology:

The methodology followed includes descriptive survey design method as it helps to identify the influencing characteristics in the target population with a focus on housing, education, and health, this study aims to assess how well local housing, living circumstances, and government initiatives aligned with the Sustainable Development Goals (SDGs) of the UN. Primary data has been collected by the method of physical interviews in the locality of Nehru Nagar, Juhu in the month of November 2024. A sample size of 70, 1% of the total population of 7,000 people were interviewed in the survey with each lasting for 5-7 minutes. Housing, living circumstances, health, education, and government efforts were evaluated using a 27-

question survey. The interviewer was also trained to translate the questions in the language such as Hindi and Marathi for better understanding of the subjects to curb projection bias.

Sample size: 70 (1% of 7,000)

Average interview duration: 5-7 minutes

Interviews conducted: Month of November 2024

Slum localities covered: Nehru Nagar, Juhu.

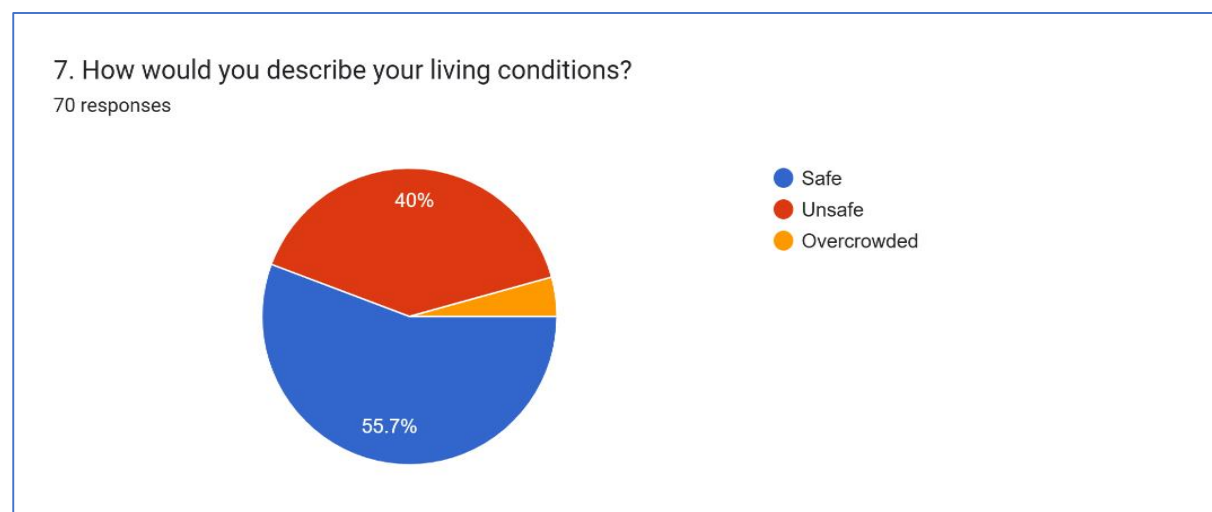


Figure 3: people of the slums

Observations and analysis:

Living conditions: The study reveals that the majority of people living in the slums of Juhu are in various types of housing. Among them, 60% are staying in temporary households, 38.6% in permanent housing, and 1.4% in their workplaces. Temporary households consist of less durable goods and are easily damaged by weather conditions, while permanent households consist of durable goods with solid foundations and legal rights to the land, giving them more security and stability. The size of the households is distributed in a broad range, as most of the households have between 3 and 5 members, which forms 60% of the total population. The other household sizes are 4.6%, 7.1%, 5.7%, etc. The variations in sizes reflect the heterogeneity of slum living because of family structure, space availability, and economic constraint. The living environment is generally taken to be secure for the slum dwellers because of their societal ties. The women in slums are easily exposed to violence, sexual attack, and exploitation because of

the prevalence of patriarchal attitudes, also restricting women in several economic activities, decision making, etc. The community connection is also low with 38.6% somewhat connected, 35.7% very connected, and 25.7% not connected. 74.3% of women lack equal opportunities in comparison to men, while 24.3% of women get equal opportunities. Such inequality occurs in education, health, job sectors, and even resource facilities. Out of the 70 people surveyed, 92.5% use gas as their medium of cooking, while 7.5% use firewood. Access to gas cylinders is yet to reach the masses fully. Hungry nights are common, with 34.3% of people often sleeping hungry during the night. Most households rarely or very rarely sleep hungry, with 12.9% never sleeping hungry at night. Electricity access is essential to the development process of any country, and there have been huge developments towards this. Most of the sample population thought they had electricity 24 hours a day. 97.1% reported to have access, but 1.4% said they did not, while 1.4% could not answer.



Health and education: The data collected showcases that 52.2% of residents use tap water, while 46.4% purchase water delivered at certain time of the day. Only 1.14% use community wells, which shows that access to water is varied and costly. More than half of the population has access to basic sanitation, but 15.7% do not have these facilities and 5.7% are not sure. Many use unhygienic community washrooms, which is a health hazard. In addition, 75.7% dispose their household waste through garbage collection vans, but 21.4% dump openly, which creates unsanitary conditions, serves as a breeding ground for mosquitos and are a home to several preventable diseases. 32.9% people rate their mental health as very good, while 4.3% consider it very bad. Men report better mental health than women, with 61.42% of men feeling better compared to 38.57% of women. Major issues faced by the slum dwellers are

overcrowding (21.7%), flooding (26.1%), and sanitation (17.4%). Other issues are that of community washrooms and accessibility to water. Furthermore, 58% of the population does not have access to healthcare services, indicating a major deficit in healthcare provision. 47.1% get food from local markets, while 39.7% get food on subsidy. Users of ration cards are mostly served with low-quality food, while 1.15% avail tiffin services. There has been no form of education regarding sustainability practices to the population. 40% of the population never received any education; 32.9% finished secondary school while only 4.3% have pursued higher education. 81.4% of the children go to school. Education is considered highly important even under difficult circumstances.

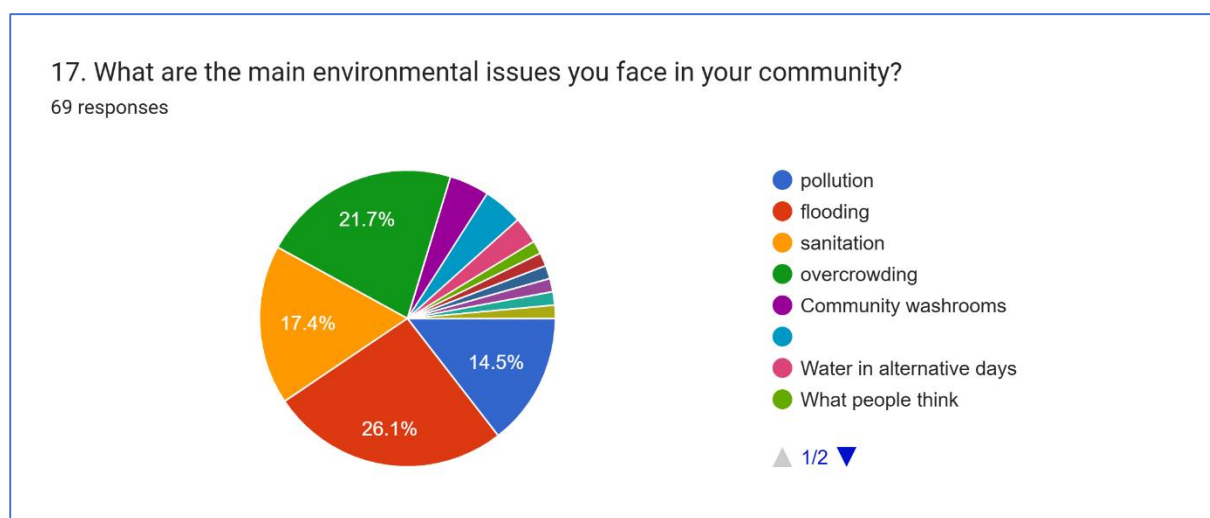


Figure 4: environmental issues faced by the people

Economic conditions: Mumbai's slums suffer from high living costs wherein majority of people earn less than ₹15,000 per month and could be characterized as below the poverty line. Most people are also generating incomes below ₹5,000, thereby characterized by extreme poverty. Only a small percentage of people earn more than ₹20,000, and thus the situation is that of limited financial condition. Major expenditures in slums of Juhu include food, housing, and utility expenses. 65.7% of these households spend so much on shelter, while 84.3% spend most on food. 68.6% of them spend much on utilities, such as water and electricity. Education, though necessary, is the least prioritized; 67.1% people (47 out of 70) allocate some funds to it, probably because of its importance, although the money allocated for it is not significant. Only 20% of these people save money for medical needs. These are financially. Most households have one income earner, which is a heavy burden on one person. Only 10% earn above ₹20,000.

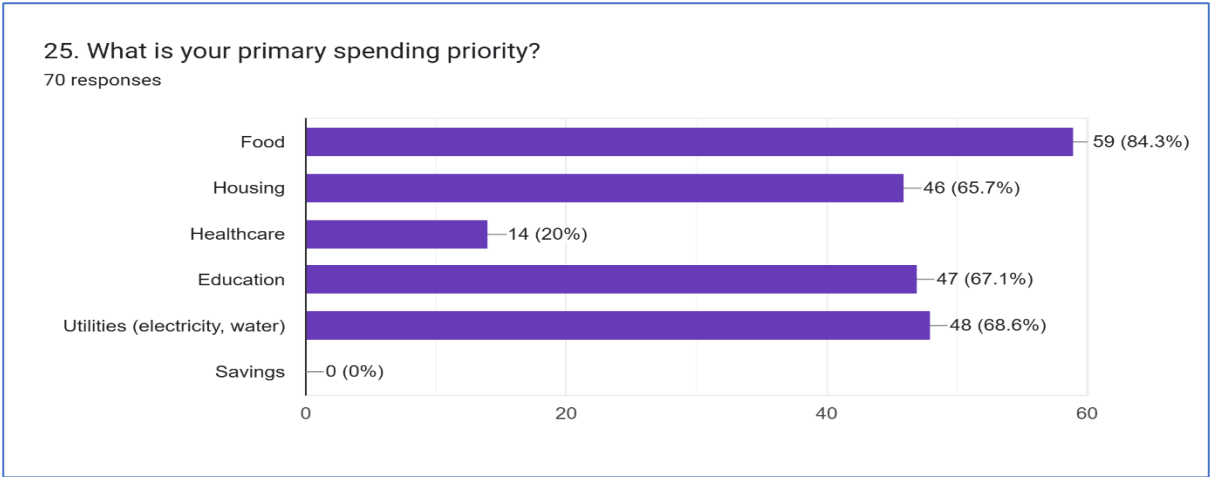


Figure 5: primary spending of the masses

Government: The air quality in Mumbai slums is predominantly poor, according to 34.3% of the people surveyed primarily due to high population density, poor sanitation, and a high use of polluting fuels. Chronic exposure to pollutants may lead to health issues through respiratory diseases or cardiovascular problems. The key causes of air pollution identified by residents are vehicle emissions (60%) from old, poorly maintained vehicles, and open waste burning (32.9%). Urbanization and construction in the surrounding area has increased pollution making the air dusty (2.9%), and overcrowding and poor ventilation aggravate the quality of air. 95.7% of respondents assert that there is no substantial initiative at the local level in the slums because of lack of resources, gaps in governmental efforts, and insecurity. There is low satisfaction of government efforts; only 4.3% consider the effort of the government in rural development. The air contaminants concentration in slums due to a high density of an urban environment increases and ventilation lacks.

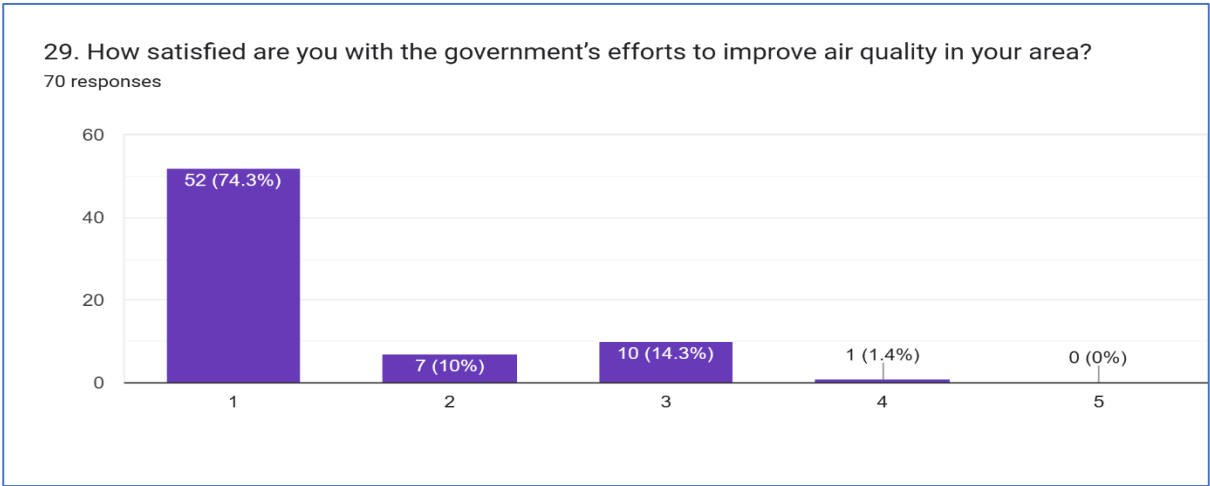


Figure 6: government's efforts to improve the air quality

Gender angle: Gender disparity in the Juhu slums is evident in education, mental health, and opportunities, creating a cycle of inequality that affects women's well-being and prospects. Only 38.6% of women are educated, compared to 61.4% of men. This educational gap limits women's economic mobility, independence, and empowerment, restricting their ability to make informed decisions about health, finances, and family life, exacerbating gender inequality. Mental health is said to be good by 61.4% of males, but by only 38.6% of females. Women are subject to various stressors like fewer opportunities for education and economic participation and vulnerability to violence, which all have negative impacts on mental health. Poor awareness and lack of resources also inhibit them from reaching out for treatment. Only 24.3% of women report equal opportunities compared to 75.7% of men. Limited education and mental health challenges hinder women's ability to access formal employment or participate in economic activities, leaving them dependent on male counterparts and reinforcing gender inequality.

The cycle of uneducated women, poor mental health, and lack of opportunities leads to gender inequality. Women who are not educated cannot access better opportunities, which in turn affects their mental health. Poor mental health reduces motivation, making it harder to pursue education or economic opportunities, further resulting in poverty and marginalization. Improving educational access, mental health support, and opportunities for women is a comprehensive approach to solving these issues.

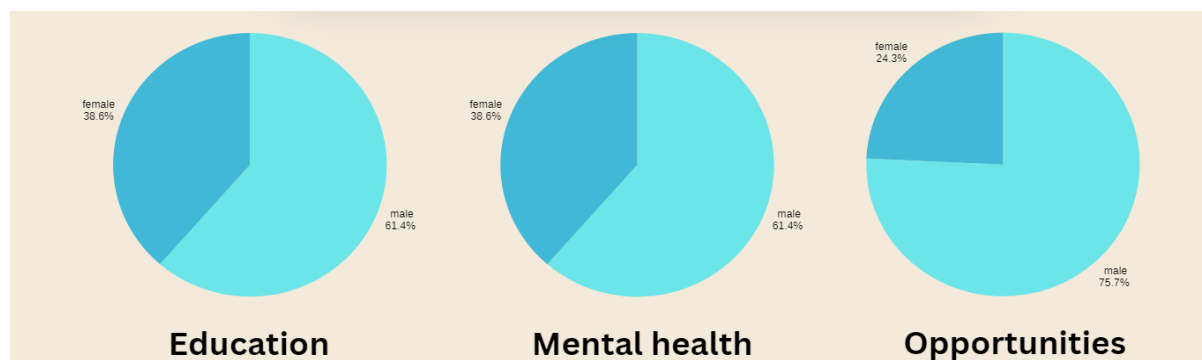


Figure 7: relation between education, mental health and opportunities

Recommendations:

The Juhu slums face a unique set of challenges that hinder the well-being and development of the slum dwellers. Mumbai being the financial capital of India, shows a stark

contrast where wealth coexists with poverty. Addressing these issues requires a multifaceted approach that focuses on improving living conditions and fostering sustainable growth. The following recommendations are proposed to tackle the key challenges faced by the masses. These interventions aim to bridge the gap between the slum's residents and the goals of sustainable urban development, thereby improving the quality of life.

1. Address gender disparity: To reduce disparities against women in slums of Juhu, it is extremely important to raise the status of women through literacy, economic involvement, and healthy conditions. Skills for women could involve unequal access to resources, no or limited space in decision making and greater vulnerability in terms of physical violence. Programs that increase the skills levels in women, encourage leadership, provide economic independence. Creating safe areas as well as the equal participation in decisions in a community will enhance the inclusive environment and where women may exist alongside their peers, the men.

2. Improvement in sanitation, reconstruction of drainage infrastructures, improvement of education as well as solid wastes disposal facilities: Sanitation infrastructures are key in preventing an outbreak in a slum environment like that at Juhu. The repair and upgrading of drainage facilities should be done in order to have proper waste disposal and prevent flooding during the rainy season. Meanwhile, the systems of waste management will be significantly improved by means of regular collection of wastes, recycling programs, and others. Moreover, quality education must be enhanced by building more schools, giving learning materials, and training the teachers. Ensuring education for children in the slums will be one of the important factors that can break the cycle of poverty.

3. Implementation of rehabilitation: Rehabilitation of Juhu slums is crucial to improve the quality of life for its residents. This includes physical infrastructure improvements such as better housing and essential services, but also social support systems for displaced families. The government and NGOs should collaborate to design and implement sustainable housing solutions that offer access to affordable, safe, and adequate housing. Rehabilitation efforts should include resettlement plans that allow people to stay within the community while ensuring their rights are protected.

4. Creation of job opportunities: Creating job opportunities is a fundamental aspect of improving the livelihoods of residents in Juhu slums. This can be through skill-building programs that equip the people with skills that are of marketable values in sectors like construction, technology, and hospitality. Local entrepreneurship can also be boosted by offering microfinance opportunities, mentorship, and resources for small businesses. Cooperating with the local industries and businesses can develop employment opportunities towards a more self-sufficient and economically vibrant community.

5. Improvement in Local Security: The slums at Juhu should first have their safety and security assured as this would enhance the stable condition in which people dwell. Such an area requires reduction in crimes, violence, and even domestic abuse. For community security to be achieved, there must be the use of community policing, establishment of neighbourhood watch groups, and installation of sufficient street lighting. In addition, creating awareness programs around legal rights and access to justice for vulnerable groups will empower the community and reduce incidents of exploitation or abuse.

6. Development and implementation of strict programs and policies: To ensure the long-term sustainability of improvements in the Juhu slums, there is a need to develop and implement strict programs and policies that focus on urban planning, environmental protection, and community welfare. The government will implement comprehensive policies of sustainable development to ensure all local governance works towards the implementation of the UN SDGs. This policy includes the provision for guidelines in infrastructural development, resources management, and social welfare with periodic monitoring and implementation. Housing and sanitation, which have always posed public health challenges, will not be taken lightly because proper housing, sanitation, and public health systems are critical areas for the sustenance of a slum under any development condition.

Conclusion:

To sum up, the study finds residents in Juhu slums are highly challenged in terms of low income, disparity in gender, poor living conditions, and limited access to education and health care. The slum dwellers live below the line, with few opportunities in terms of finance and improper access to basic necessities that lead one to live in this vicious poverty cycle. Women

are also subjected to inequality in education, mental health, and opportunities, which are compounded by cultural norms and lack of resources, leaving them vulnerable to further exploitation.

Over time, basic provisions like electricity and water have increased. However, issues of overpopulation, unsanitary surroundings, and inappropriate health care have still not diminished. Education in schools is sparse, especially among women, causing further socio-economic inequality and thereby entrapping one into the circle of poverty. Moreover, issues with mental health arise, but particularly among women. The need is holistic and must take into account gender equality, improved education, mental health support, better sanitation, and healthcare. These local and governmental initiatives will make sure that every woman is empowered.

NOTE: A supporting document is attached with all the graphs and data collected

Bibliography:

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Poor Living Conditions for Those Who Live in Slums

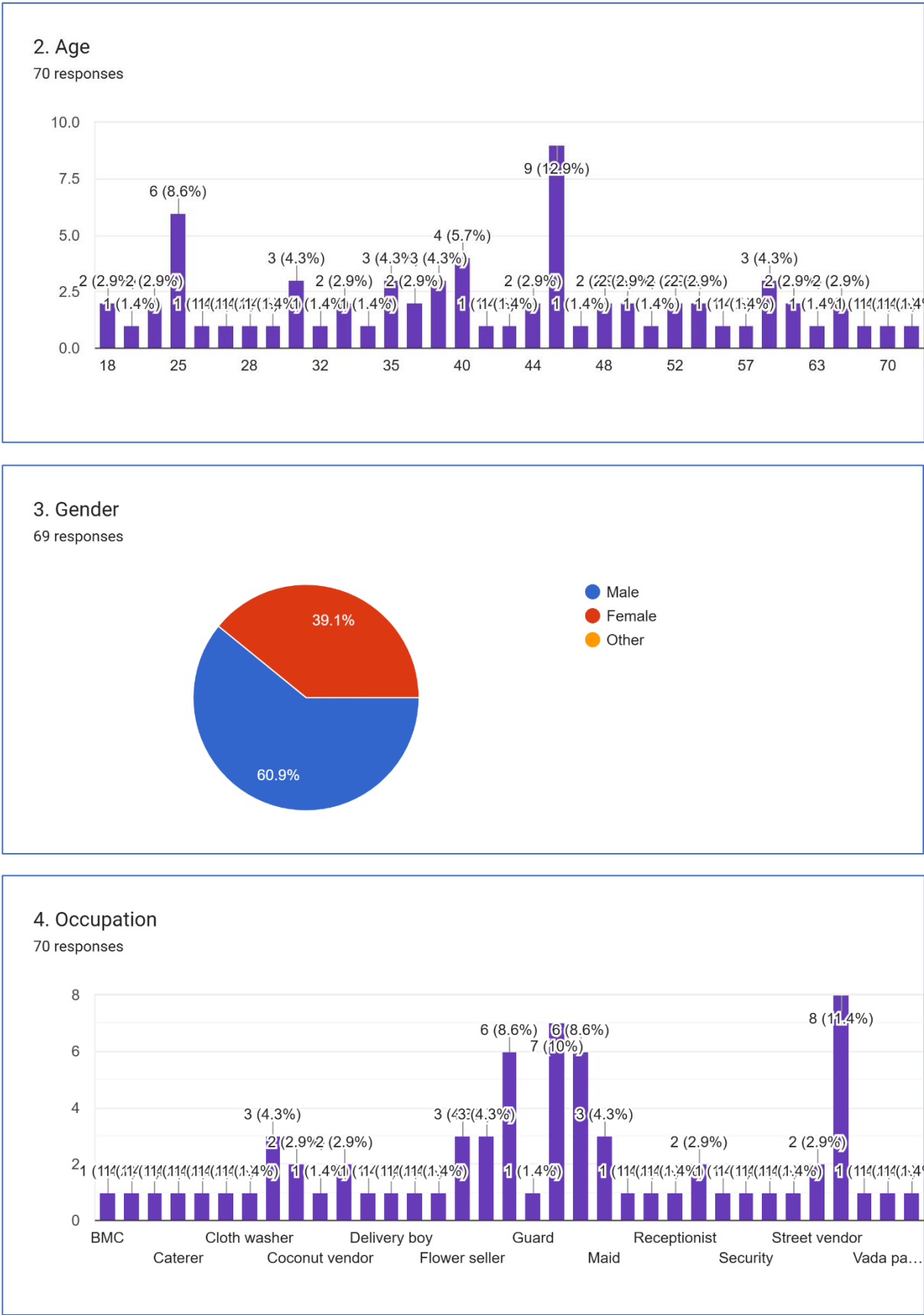
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Press Release: Press Information Bureau

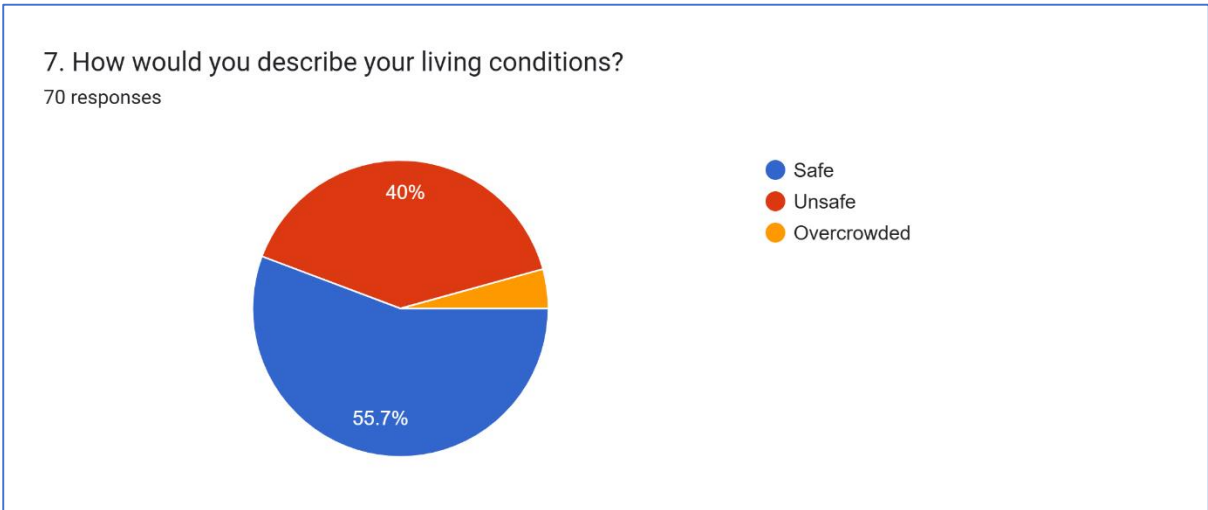
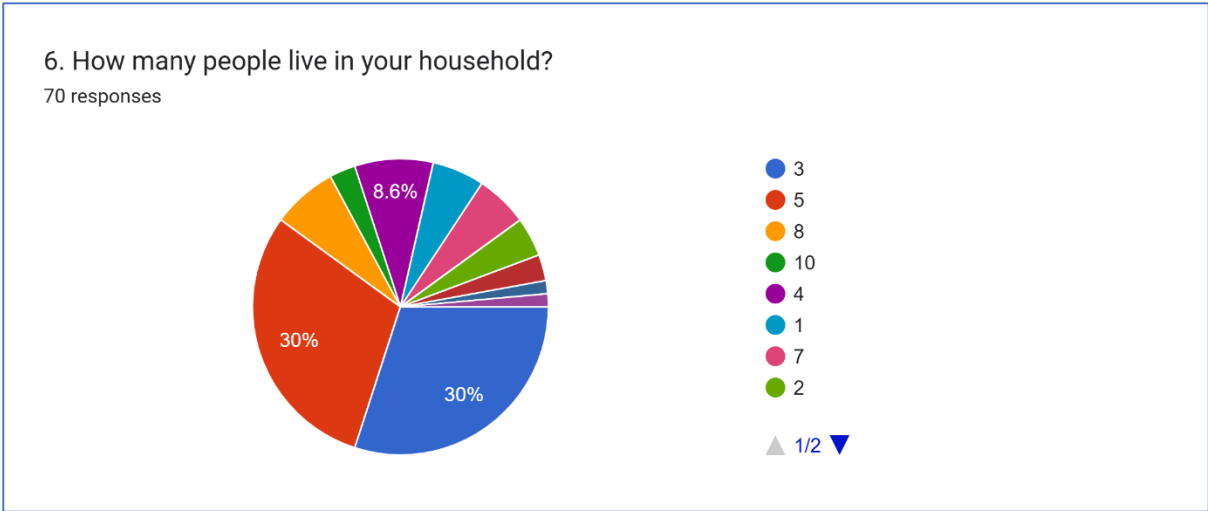
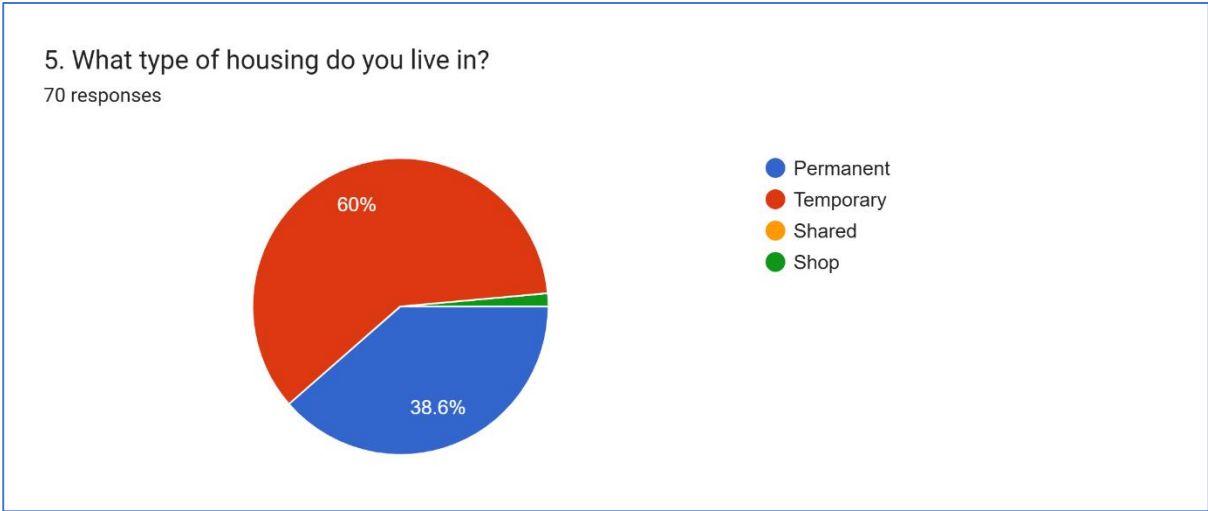
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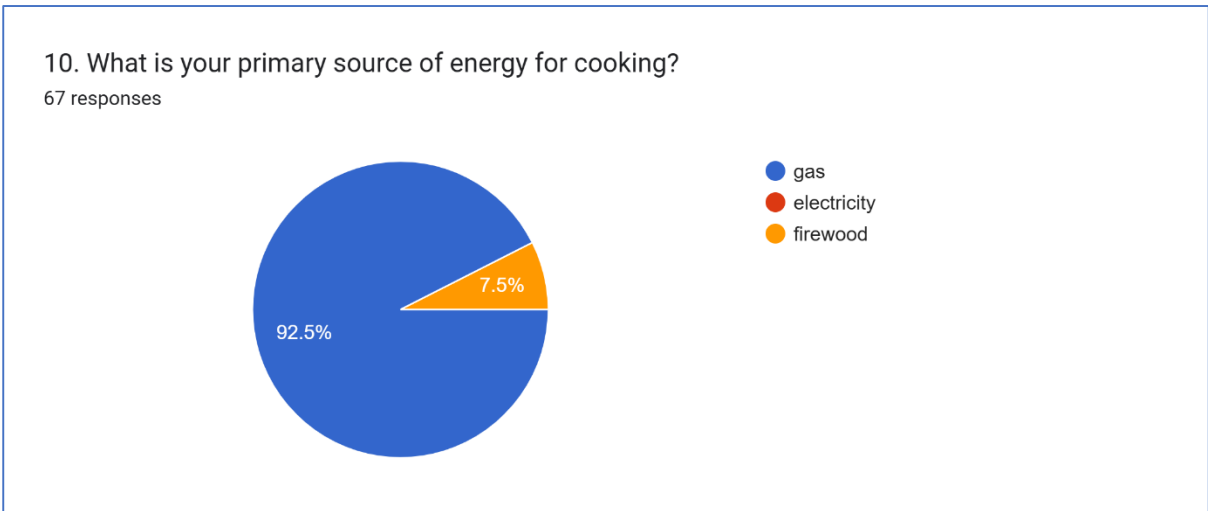
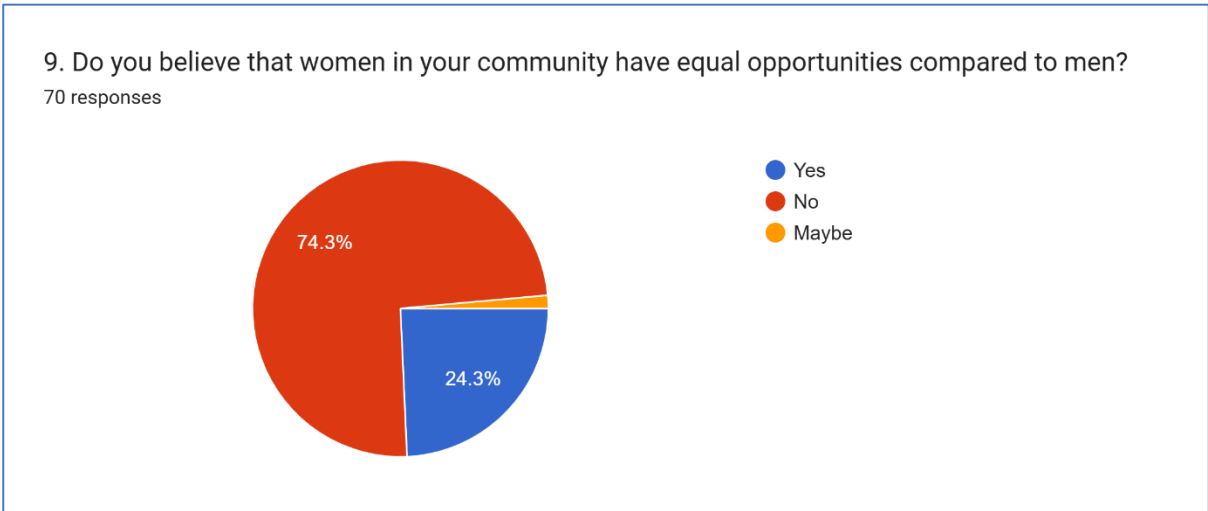
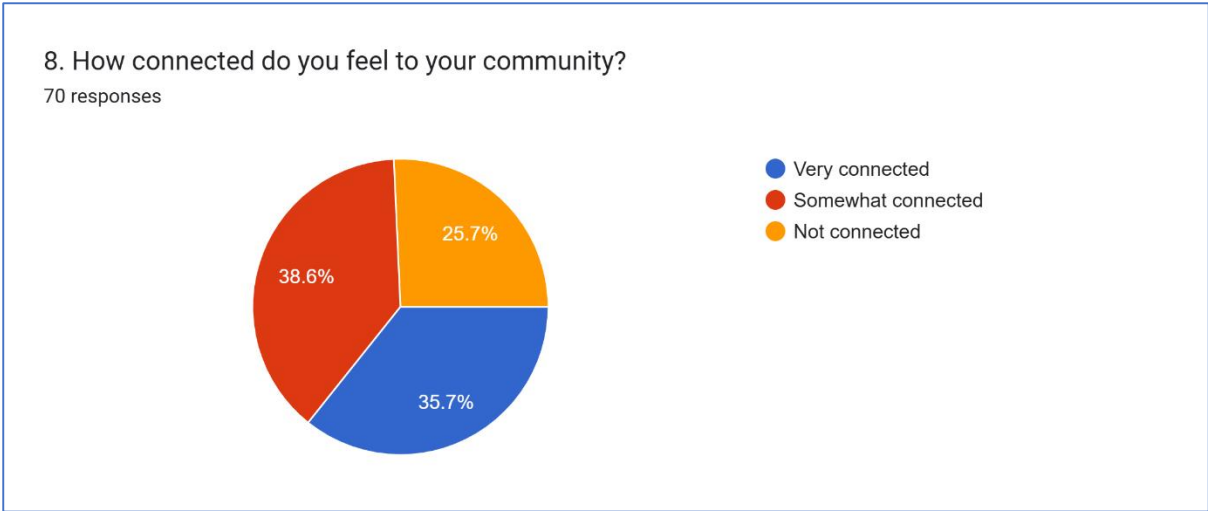
Graphs of the responses collected

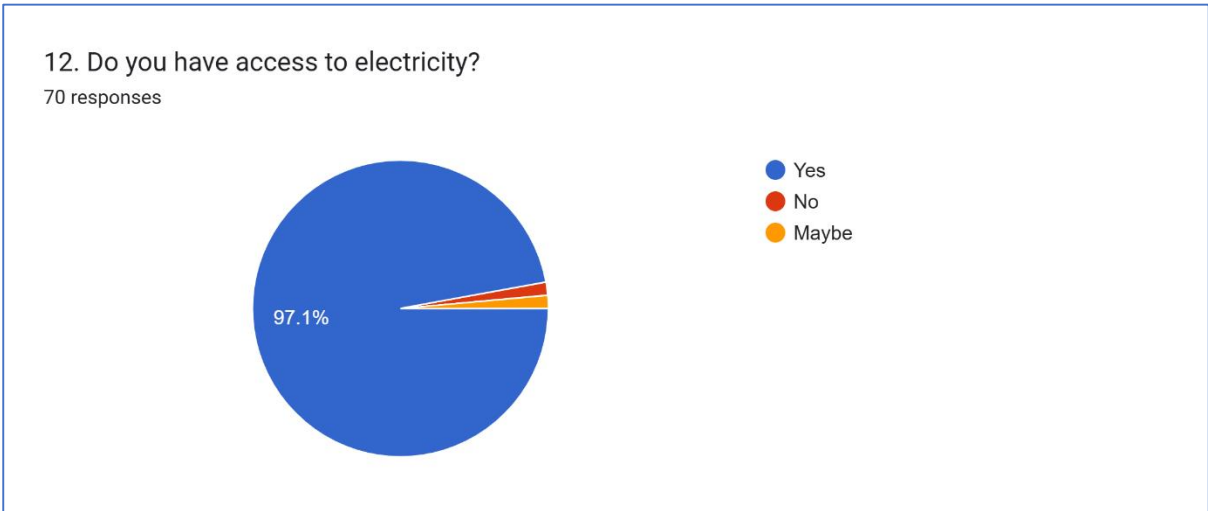
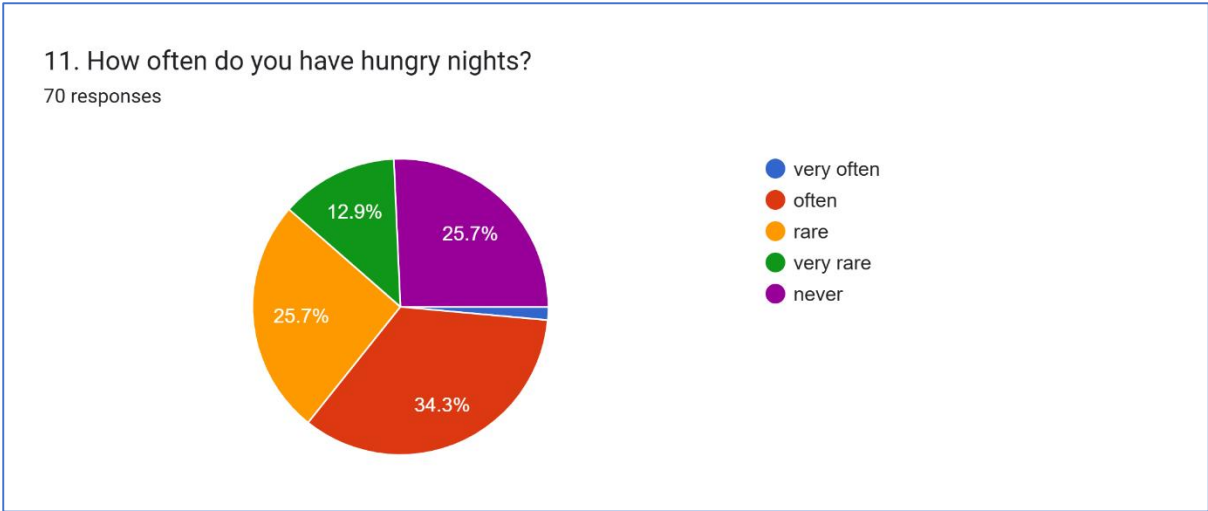
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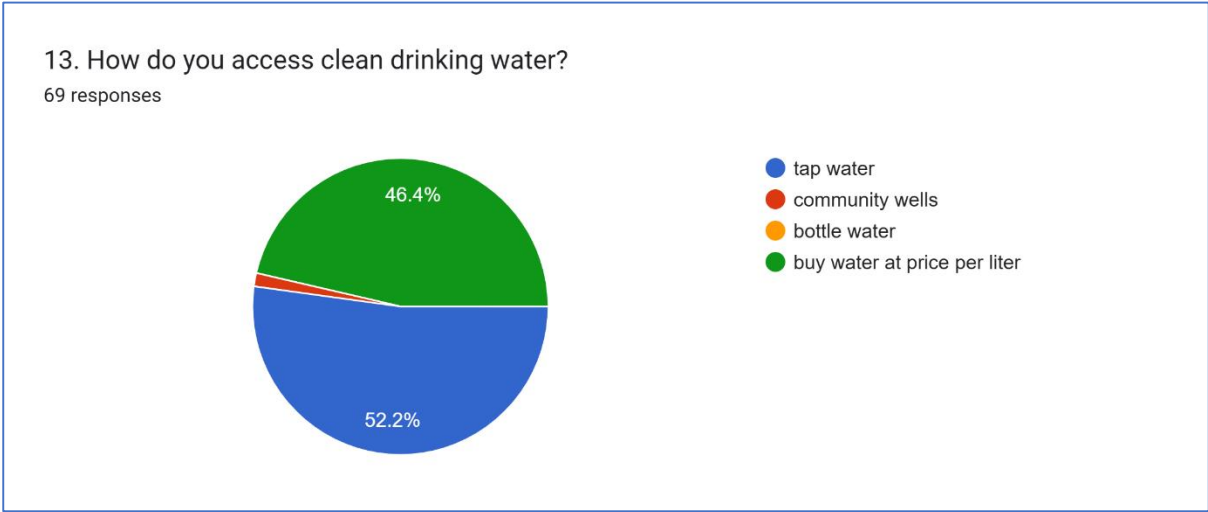
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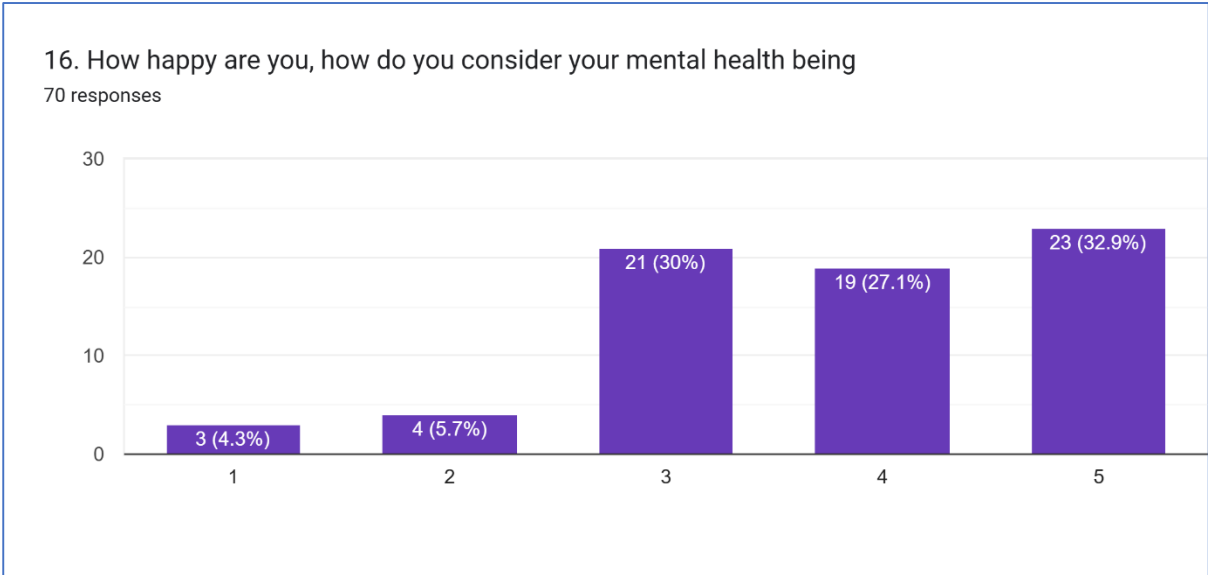
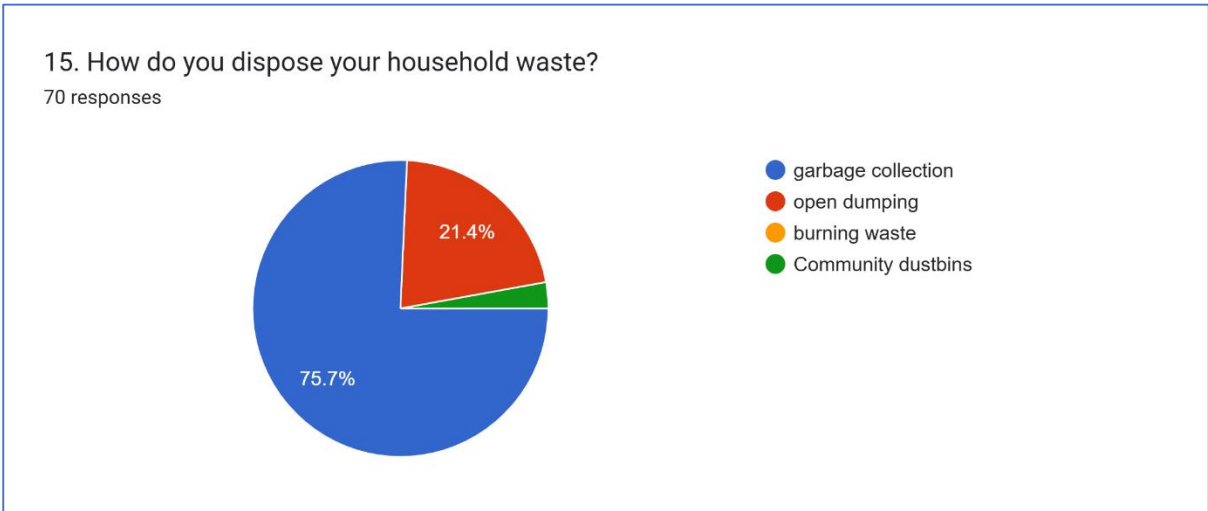
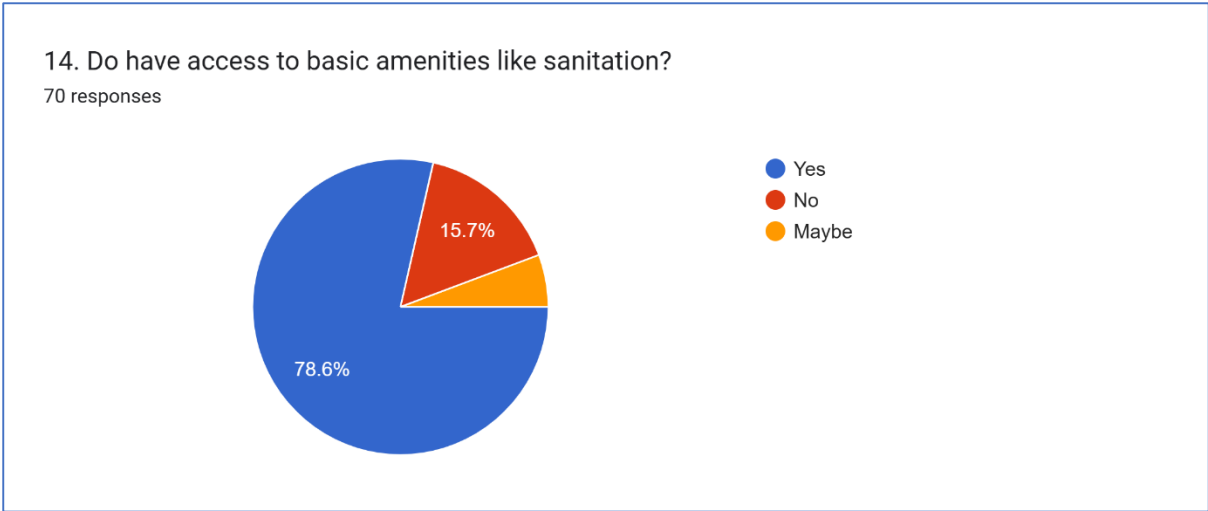


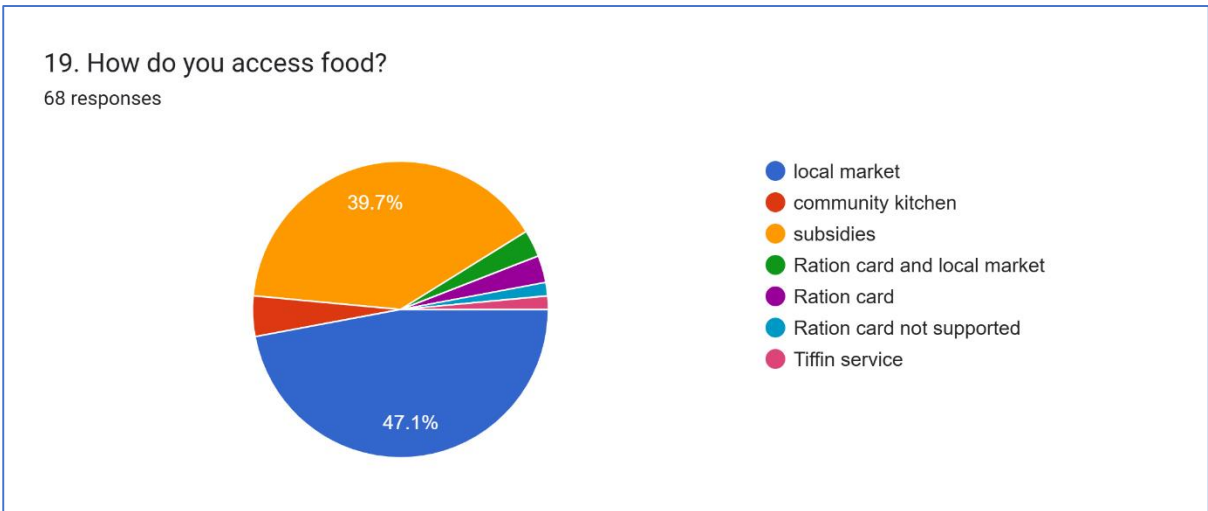
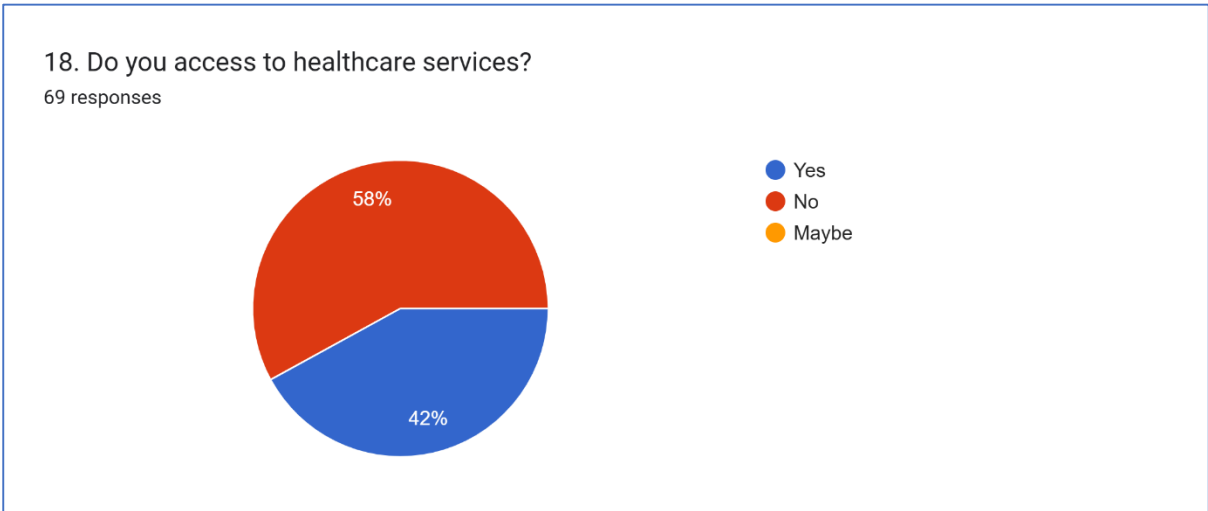
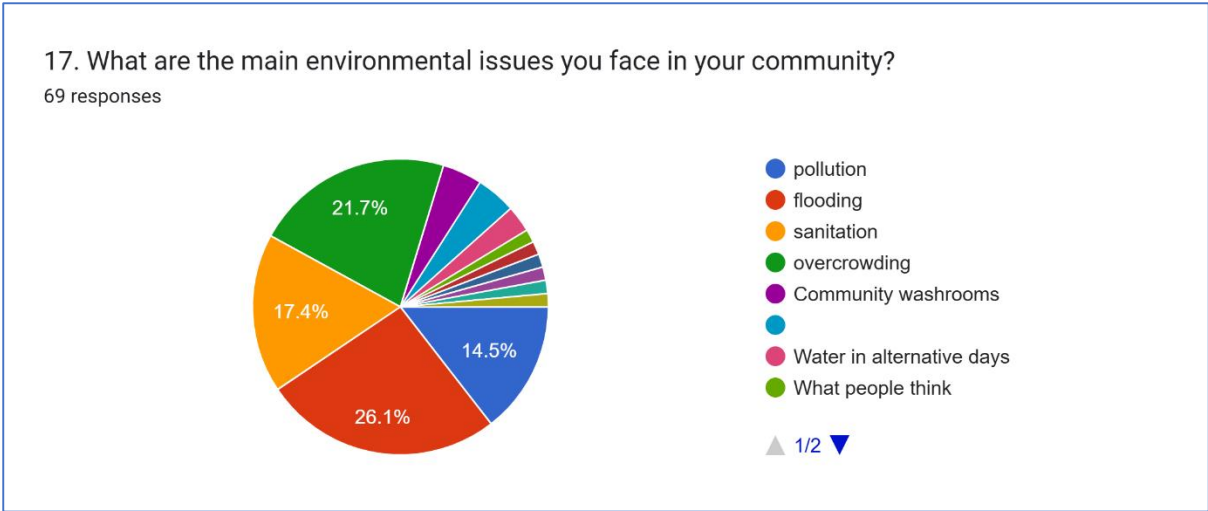


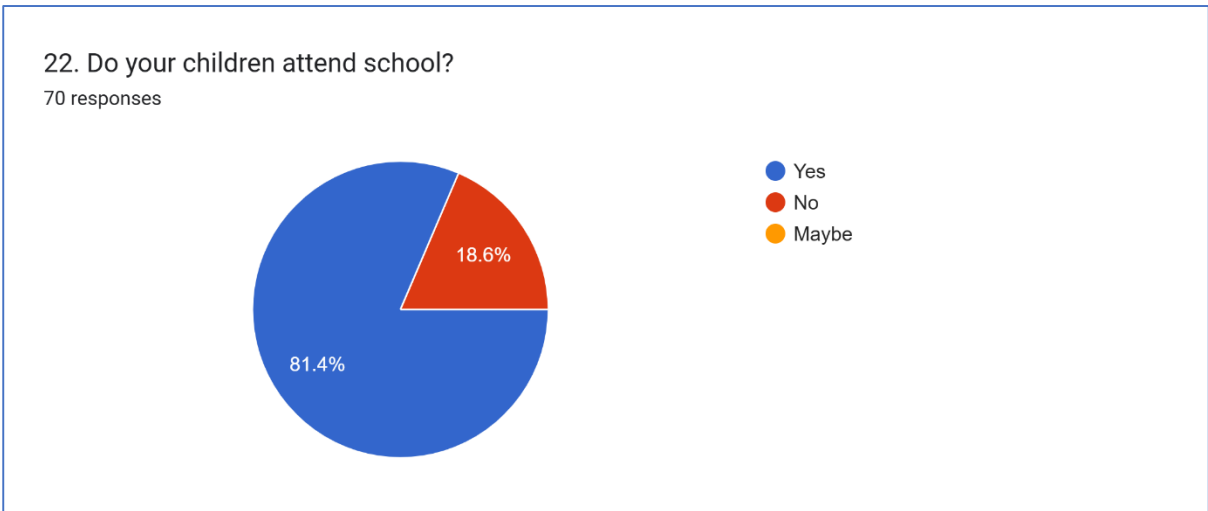
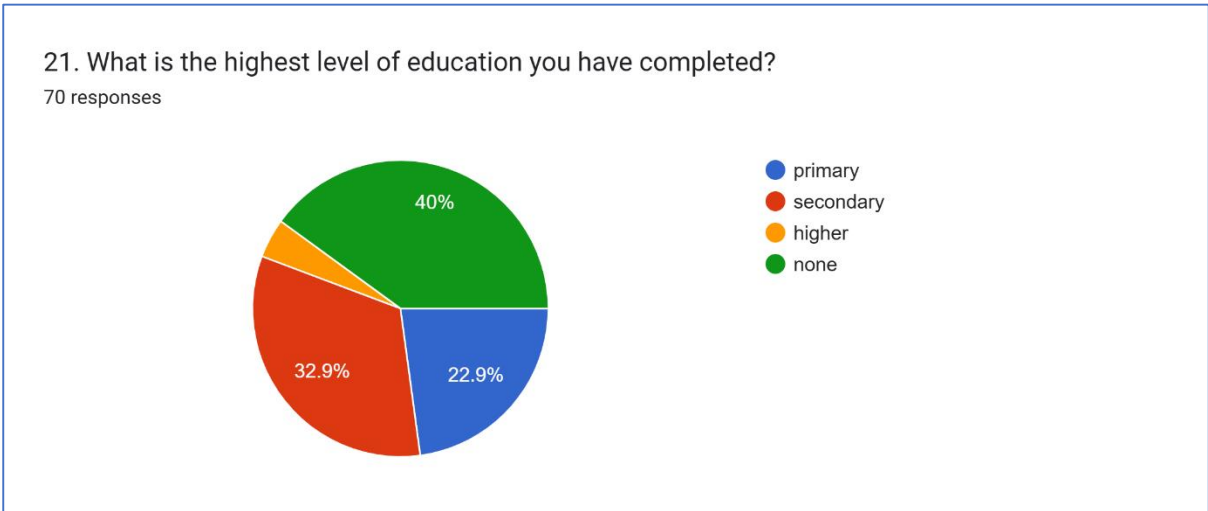
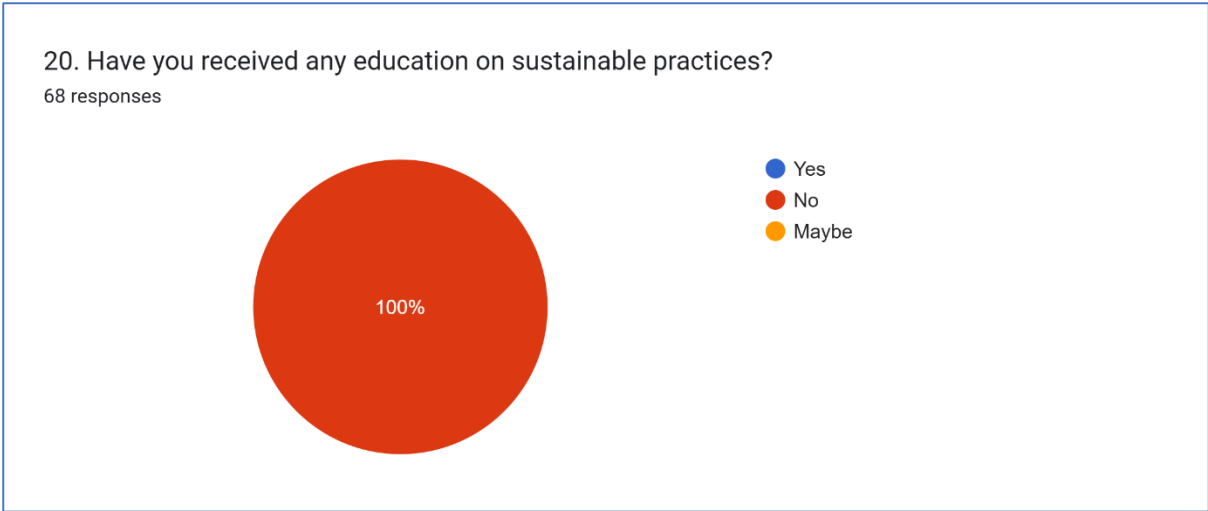


Health and education

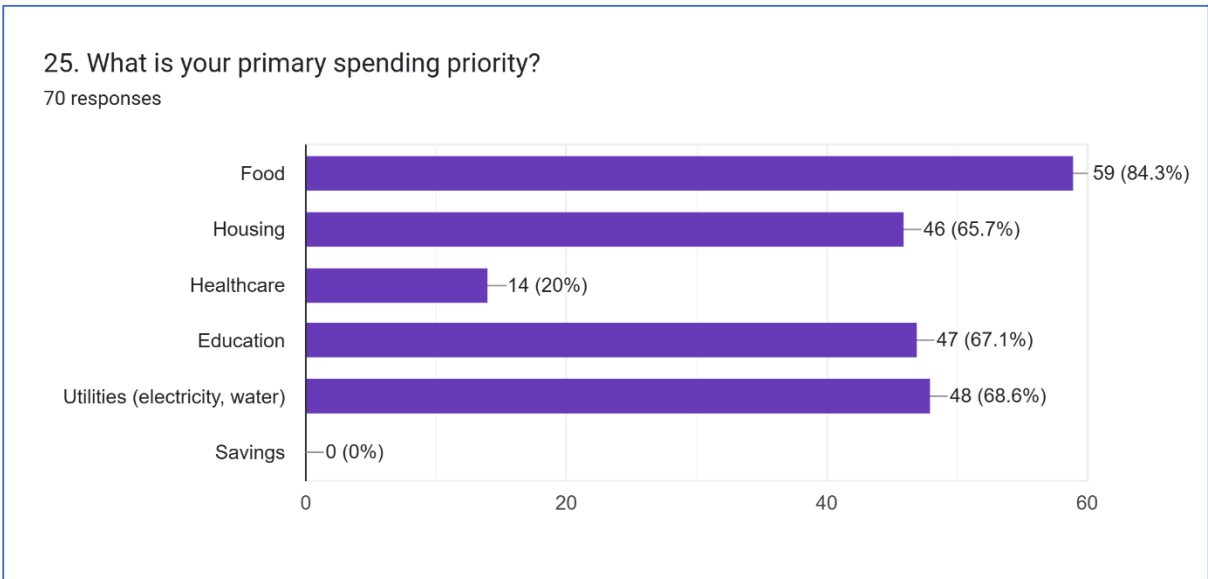
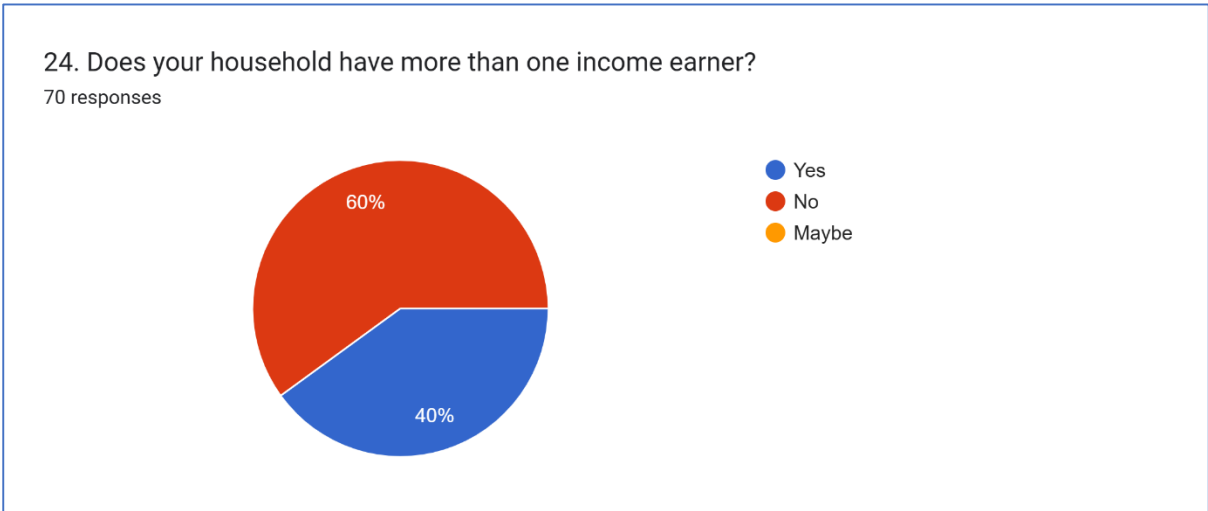
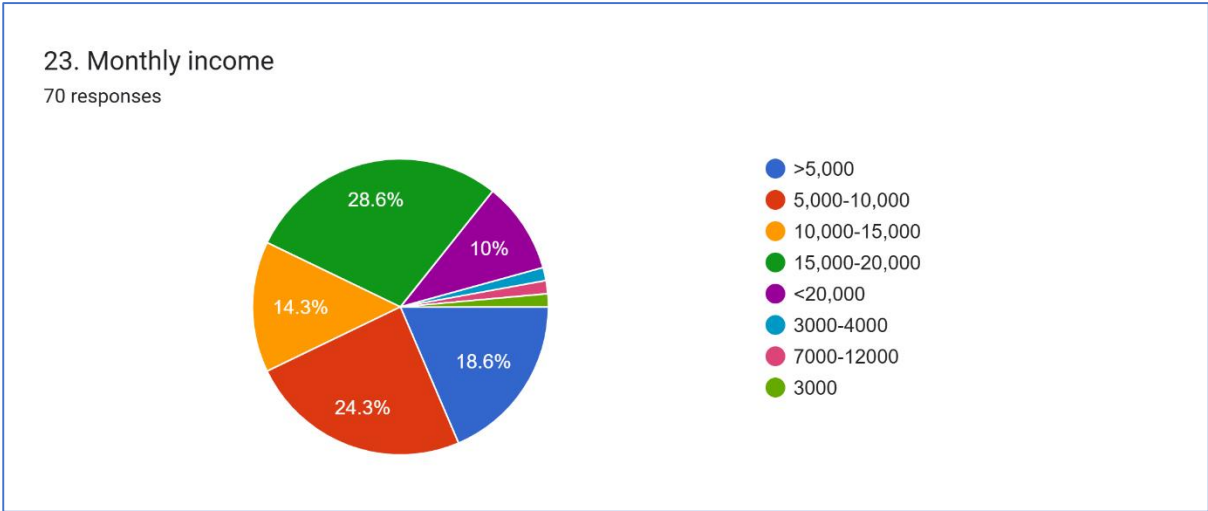




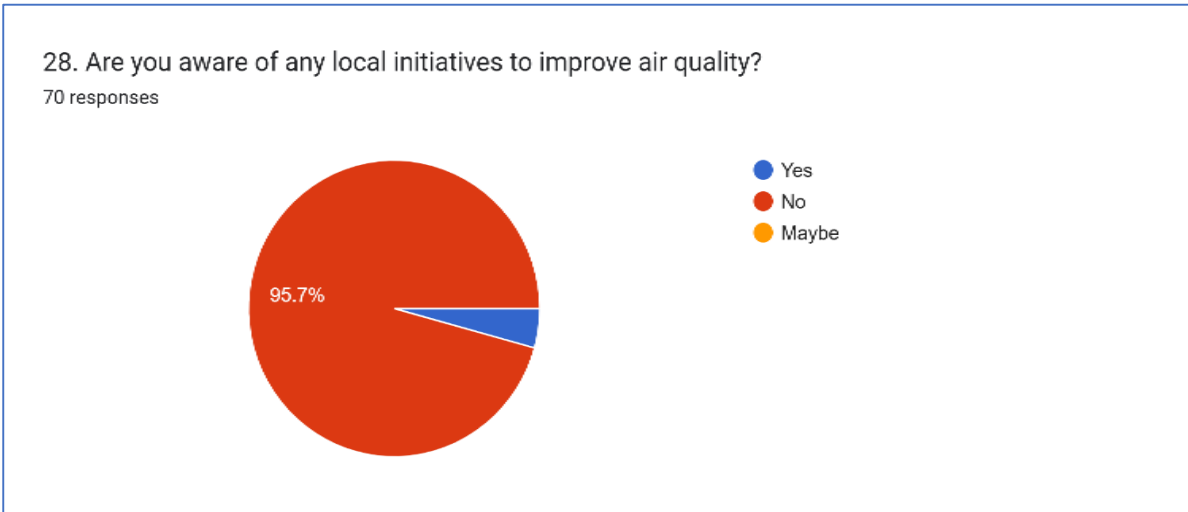
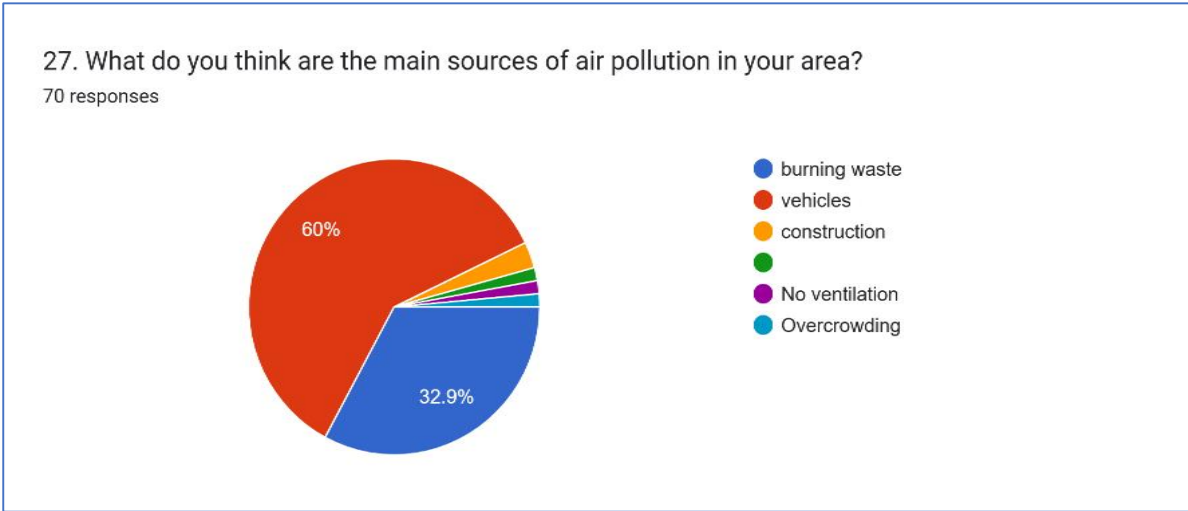
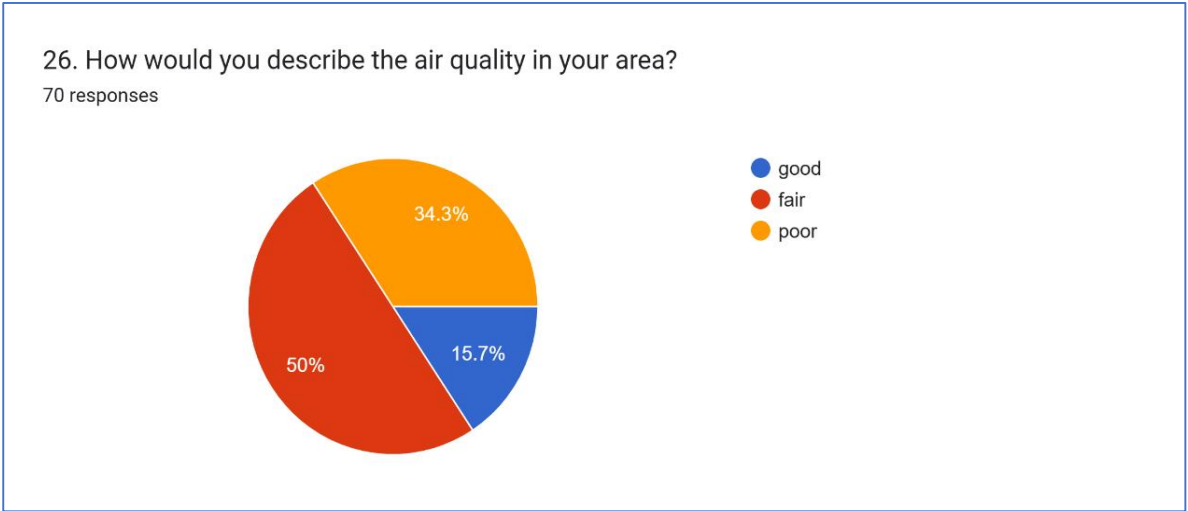


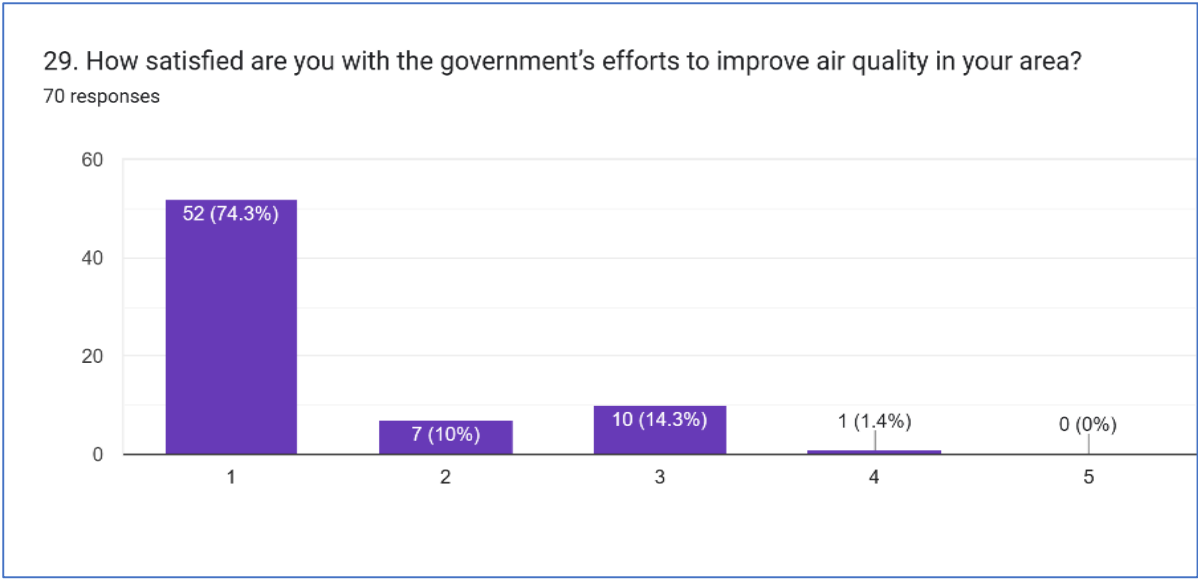


Economic conditions



Government





Responses in excel format

Sl. No.	Q. No.	Response	Gender	Age Group	Education Level	Occupation	Area	City	State	Country	Language	Response Text	Response Date	Response Time	Response Status	Response Type	Response Category	Response Subcategory	Response Tag	Response Label	Response ID	Response Count	Response Percentage
292929	29	How satisfied are you with the government's efforts to improve air quality in your area?	Male	25-34	High School	Unemployed	1	India	Uttar Pradesh	Uttar Pradesh	Hindi	52 (74.3%)	2025-04-01	10:00	Completed	Text	Response	Response	Response	Response	Response	52	74.3%
292930	29	How satisfied are you with the government's efforts to improve air quality in your area?	Female	35-44	High School	Unemployed	2	India	Uttar Pradesh	Uttar Pradesh	Hindi	7 (10%)	2025-04-01	10:01	Completed	Text	Response	Response	Response	Response	Response	7	10%
292931	29	How satisfied are you with the government's efforts to improve air quality in your area?	Male	45-54	High School	Unemployed	3	India	Uttar Pradesh	Uttar Pradesh	Hindi	10 (14.3%)	2025-04-01	10:02	Completed	Text	Response	Response	Response	Response	Response	10	14.3%
292932	29	How satisfied are you with the government's efforts to improve air quality in your area?	Female	55-64	High School	Unemployed	4	India	Uttar Pradesh	Uttar Pradesh	Hindi	1 (1.4%)	2025-04-01	10:03	Completed	Text	Response	Response	Response	Response	Response	1	1.4%
292933	29	How satisfied are you with the government's efforts to improve air quality in your area?	Male	65-74	High School	Unemployed	5	India	Uttar Pradesh	Uttar Pradesh	Hindi	0 (0%)	2025-04-01	10:04	Completed	Text	Response	Response	Response	Response	Response	0	0%

Acknowledgement: I would like to express my sincere gratitude to my friends and family for their endless support, encouragement and unwavering source of strength throughout. A special note of thanks goes to Professor Dr. Smrithi Nair for her invaluable guidance throughout this process. Her mentorship, wisdom, and constructive feedback have been essential in shaping this work, and I am incredibly grateful for her consistent support. Lastly, I would like to extend my sincere appreciation to my college for providing me with the opportunity to pursue this endeavor. The resources, environment, and academic support have been instrumental in my growth and success.

A STUDY ON AWARENESS LEVEL ON INDIAN CULTURE AND ART OF EATING WITH A GREEN MINDSET

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Abstract:

As there are 2 methods of food consumption - Traditional one is eating with hands which leads to zero wastage and modern one is through cutlery which several times leads to wastage. British Prime Minister Mr. Winston Churchill suggested to our President Dr S. Radhakrishnan to eat with a spoon for hygienic reasons. He answered, since nobody has used my hand to eat before, it is more hygienic than any spoon or fork you use. Many individuals use only 2-3 fingers. While eating with hands can have several benefits, it might not always be suitable for all types of food. For instance, a dessert like ice-cream can only be consumed with cutlery. With the rising trends of parties and events, eating with disposable cutlery is now popular due to its convenience. To reduce this, adopt the 3 B's cutlery approach and support zero-waste initiatives like edible cutlery made from flour, wheat, rice or corn so that it can be consumed as well or else it can be decomposed naturally, reducing the burden on landfill after use. For data analysis and presentation, Descriptive Statistics method is used to gain insights on the eating practices followed by individuals.

Keywords - Indian culture, eating with hands, cutlery, sustainability.

Introduction:

During the COVID 19 pandemic, the replacement of steel and glass cutleries in restaurant and food stalls was suggested by the State Government of India with emphasis on disposable cutleries and for a single use only in order to prevent spread of the pandemic. Hence, this research focuses on two primary aspects: the practice of eating with hands to minimize waste and the adoption of the 3 B's (Biodegradable, Bring Your Own Reusable and Build in India) cutlery approach to avoid disposable cutlery.

Scope of Research:

The Centre for Sustainable Development (CSD) which operates independently under the Gokhale Institute of Politics and Economics states that, single-use cutlery is made of plastic which ultimately affects health. As highlighted by Habits of Waste yearly 40 billion plastic forks, spoons and knives are used and thrown away polluting our oceans and harming sea life. This research can provide a basis of encouragement and foundation for adopting sustainable practices into our lives.

Objectives:

- To investigate the awareness levels about cultural norms, perceptions and attitudes towards eating with all 5 fingers.
- To promote the need to avoid disposable cutlery.
- To identify barriers in adoption of eating with 3 B's Cutlery Approach.

Methodology Used:

Sample Size and Sampling Technique: As it is difficult to derive the population residing in Mumbai city for the study, Cochran formula is used to determine the sample size which is as follows:

		William Cochran Formula : $n = z^2 \cdot p \cdot q / e^2$		
population				
no of sample size				
z[(confidence level) For 95% is 1.96]	1.96		z^2	3.8416
p [estimate proportion (50%)]	0.5		$p \cdot q$	0.25
q=1-p	0.5			
margin of error (For 95 % is 5%)	0.05		e^2	0.0025
			n	384.16
			no of sample size	385

Sample size for this research is 385 respondents.

Snowball and Convenient Sampling techniques are used for collecting data. For data analysis and presentation, Descriptive Statistics method is used to gain insights on the eating practices followed by individuals.

Primary Data: Primary Data is collected through a survey in Mumbai city whereby 385 responses were received through a structured questionnaire with open and close-ended questions.

Secondary Data: The data is gathered from relevant research papers, newspapers, journals, published and unpublished sources, etc.

Limitations of the study:

As the sample size is only Mumbai city so it represents a limited population and based on the perceptions of the respondents of Mumbai city only.

Hypothesis:

H1 - Individuals are aware about eating with their hands and can avoid wastage of disposable cutlery.

H0 - Individuals are not aware about eating with their hands and can avoid wastage of disposable cutlery.

For the above hypothesis, Chi square test was performed on the data collected and the χ^2 value is found to be 0.40. As the p value is less than 0.05. Hence, we accept alternate hypothesis H1 - Individuals are aware about eating with their hands and can avoid disposable cutlery. The null hypothesis H0 - Individuals are not aware about eating with their hands and can avoid disposable cutlery wastage is rejected and we conclude that respondents are aware.

Data Analysis and Interpretation:

For the data collected online, we designed 14 questions viz. 4 demographic questions, 9 close ended questions and 1 open ended question was asked in order to receive honest responses from target respondents.

The questionnaire consists of 6 sections to collect the opinions of the respondents:

Section 1 - Demographics include name, age, gender and occupation.

Section 2 - How do the respondents eat food

Section 3 - When do the respondents use only hand to eat food

Section 4 - When do the respondents use only cutlery to eat food

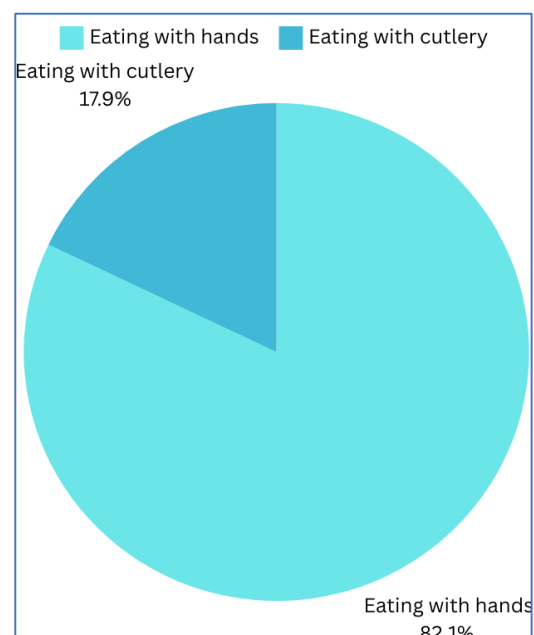
Section 5 - Attitudes towards Disposable Cutlery Wastage.

Section 6 - For Preserving Indian Culture and Conserving the Environment

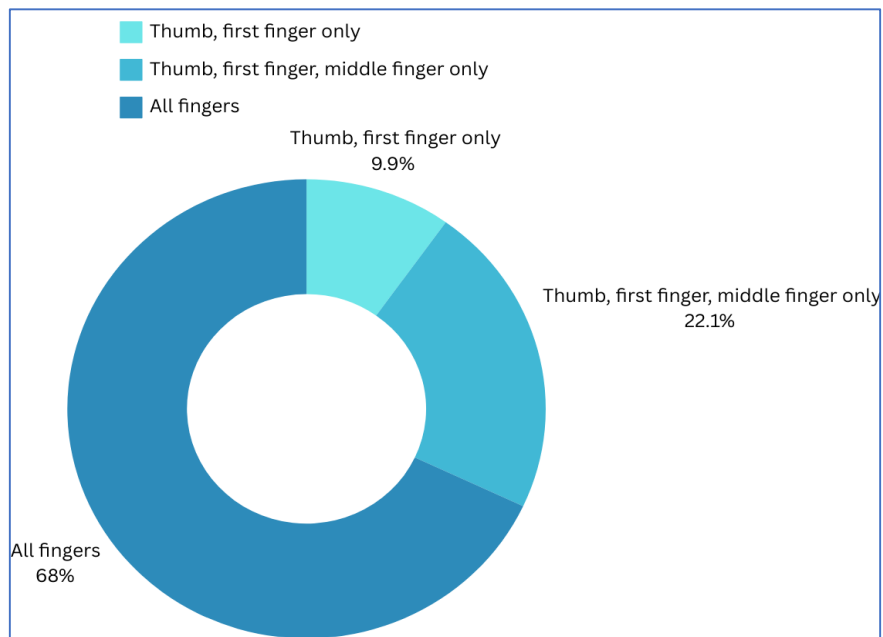
Following is the analysis of the data obtained:

While eating food, what is your preference?

This pie diagram depicts that while consuming food, 82.1 % of the respondents give preference to eating with hands and remaining 17.9 % of them give preference to eating with cutlery. So our Indian culture of eating with hands is continued. With the rise of modern culture some respondents eat with cutlery.

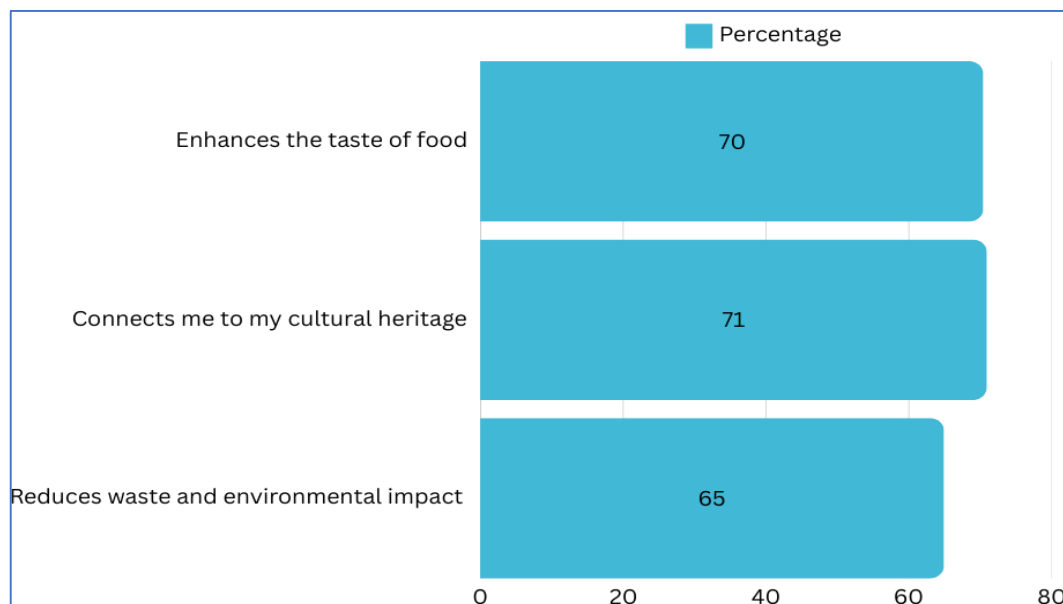


How many fingers do you use while eating with your hands?



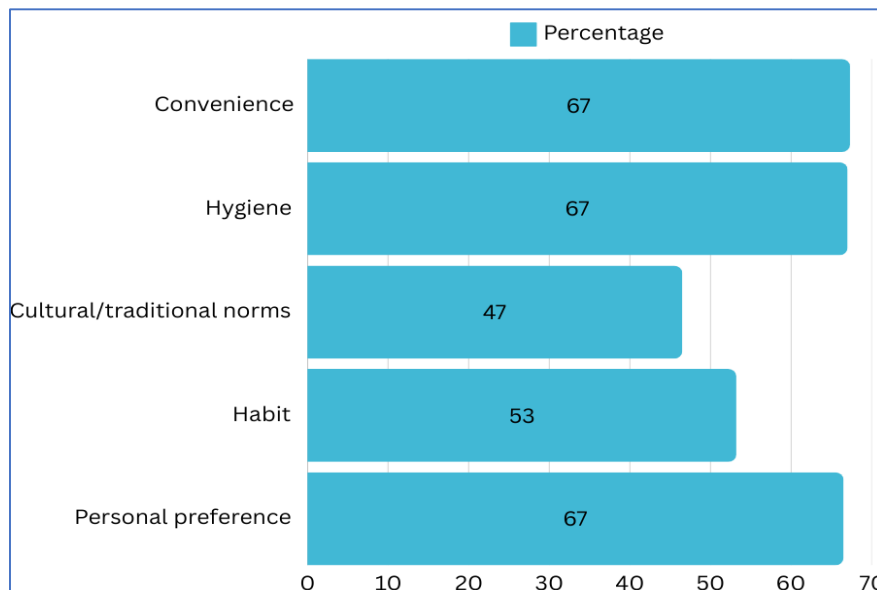
In this pie chart, 68.1 % of the respondents use all fingers while eating food, 9.9 % of them use thumb, first finger only and 22.1 % of them use thumb, first finger and middle finger only. One must eat with all five fingers but some of them use only 2-3 fingers.

What do you perceive as the benefits of eating with your hands?



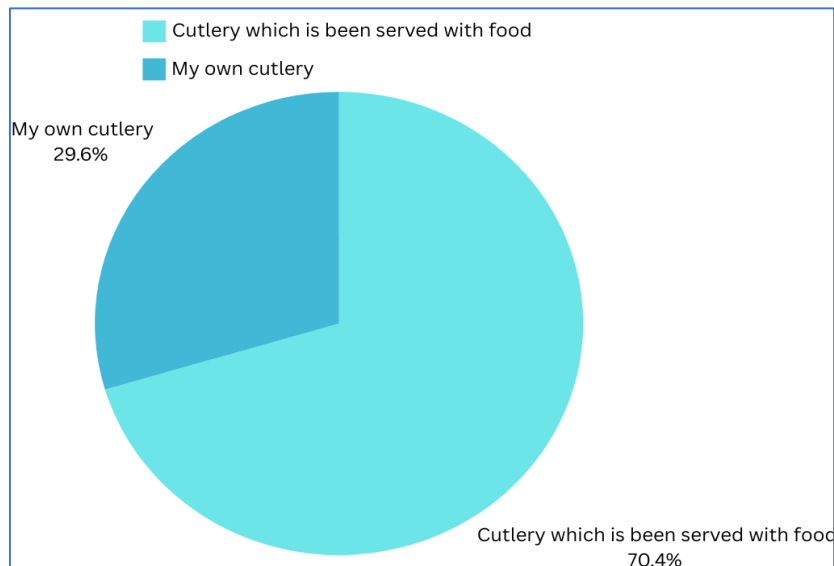
This bar diagram shows the several benefits and driving forces of eating with hands like 70.4 % of the respondents perceive it enhances the taste of food, 70.9 % of them perceive it connects to cultural heritage and 64.9 % of them perceive it reduces waste and environmental impact. Here, the respondents have shared their views on how they enjoy eating with their hands.

What factors influence your decision to eat with cutlery?



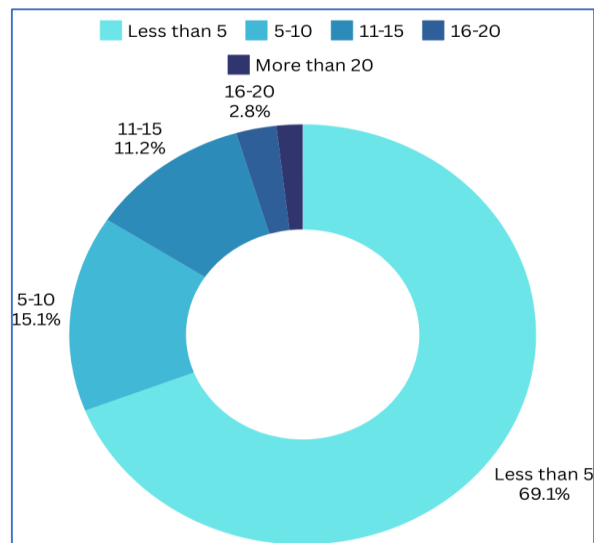
In this bar chart, 67.3 % of the respondents feel that, their decision to eat with cutlery are influenced due to factors like convenience, 67 % of them feel hygiene, 46.5 % of them feel cultural/traditional norms, 53.2 % of them feel a habit been has developed and 66.5 % of them feel personal preference. Over here, the respondents share their opinions on the driving forces of eating with cutlery.

Which cutlery do you use when you have food outside?



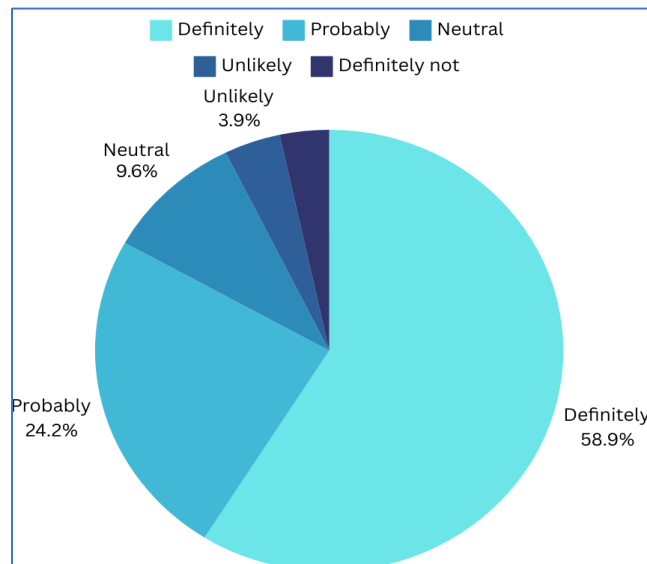
As you can see, very few of the respondents ie. 29.6 % only carry their own cutlery with them and the rest 70.4 % of them use the cutlery served with food. As soon as we see the cutlery being served along with food we tend to choose it immediately. Whereas the same meal could have been consumed without cutlery.

On average, how much disposable cutlery do you use in a week?



This pie chart tells the disposable cutlery usage on a weekly basis, 69.1 % of the respondents use it less than 5 times, 15.1 % of them use it 5-10 times, 11.2 % of them use it 11-15 times, 2.8 % of them use it 16-20 times and 1.8 % of them use it more than 20 times. Thus, the average usage of disposable cutlery of the respondents in a week alarms us about the immediate action to be taken for it.

Would you consider transitioning to reusable and byo cutlery to reduce environmental impact



As you can see, 83.2 % of the respondents are willing to transition themselves and switch to reusable and byo cutlery, 9.6 % are unsure about it and the rest 7.2 % of them are reluctant to switch. The respondents are open to adopting sustainable practices but some are still not ready to reduce the carbon footprint.

What potential challenges or concerns, if any, do you foresee in promoting eating with hands as a solution to cutlery wastage?

In the open ended question, the respondents have shown their concern regarding the potential challenges they foresee in promoting eating with hands as a solution to cutlery wastage like maintaining hygiene, washing cutlery, social taboo, etc.

Suggestion:

- **Some of the reasons, why one must eat with hands are as follows -**

1. **Traditional and Cultural Significance:** According to Ayurveda, the universe is made up of 5 elements namely panch mahabhuta whereby the thumb represents fire (Agni), Index finger represents air (vayu), the middle finger represents space (akash), ring finger represents earth (prithvi) and little finger represents water (jal) and jointly forms shaunya mudra which balances all tatva. According to ayurveda, using all fingers to touch the food, you activate all the energy channels thereby promoting overall energy flow within the body. Each finger's touch and pressure stimulate acupressure points helping activate the digestive system.
2. **Health Benefits:** If you go to a temple and the pandit gives you the theertham you hold with your hand and drink it and then put it on your head. A healthy bacteria called normal flora is present on our palm and fingers and enters our body and is useful for beneficial body parts like mouth, throat and intestine. It is believed when one eats with hands, the food directly touches the taste palettes on the tongue, allowing the release of digestive enzymes in your saliva and fostering a greater connection with the meal. It can help us better gauge the temperature thereby reducing the risk of burning ourselves. According to the Clinical Nutrition Journal, people using cutlery while consuming food were more likely to be fast eaters and diagnosed with type-2 diabetes.
3. **Accessibility and Inclusivity:** Eating with hands is inclusive for individuals with disabilities or limited mobility.
4. **Economical Impact:** Manufacturing of cutlery involves huge manufacturing costs. Comparatively, eating with hands has no direct costs.

- **Sustainability Value Chain -**

- **Responsible Production can be practiced by adopting Sustainable Design Thinking for Cutlery:**

1. **Empathize with users:** Understand the user's needs and pain points related to cutlery. Consider factors like hand size, grip strength, dietary restrictions and aesthetic preferences.
2. **Define insights and user needs:** Identify specific challenges users face with existing cutlery and translate them into actionable design requirements.
3. **Ideate creative solutions:** Brainstorm innovative cutlery designs that address the identified needs.
4. **Prototype:** Create tangible prototypes of the proposed cutlery designs. This could involve 3D printed models, sketches or even simple mockups.
5. **Test the solutions:** Gather feedback from users on the prototypes. This could involve usability testing, surveys or interviews.

- **Responsible consumption can be practiced by considering the following 3 B's Cutlery Approach:**

1. Biodegradable:

- **Agricultural By-Products Cutlery** - Agricultural by-products can be reused to make biodegradable cutlery then during discard it can be easily composted.
- **Edible cutlery** - The founder of edible cutlery Mr. Narayana-Peesapaty said, "eat the cutlery" and sold at a reasonable price of Rs 3 per spoon but has stopped making it now at his Bakeys. It is advisable to consume within half an hour of serving and its shelf life is around 1 year. As per Allied Market Research report, the global edible cutlery market is increasing and can reach \$56.9 million by 2026.

2. Byo Reusable:

- **Byo Reusable Cutlery** - By Bring Your Own Reusable Cutlery you can keep a set of reusable cutlery like stainless steel. Create a campaign around bringing your own reusable cutlery for events, take-out, and dining experiences. This could target cafes, restaurants and catering services, encouraging customers to bring their own cutlery as there are chances of spread of diseases when outside cutlery is being used along with one's order as multiple customers use it.

- **Cutlery Bank** - If you organize a party then you can borrow reusable cutlery from cutlery banks by providing a small deposit which are sometimes refundable depending on the cutlery banks or personal identification. The cutlery bank concept was started by Sameera Satija in 2018. Ofcourse, you might feel that who will take the pain to wash the cutlery? So in pune there is Zeroware Private Limited, a govt recognized startup which does everything for you right from Doorstep delivery and pick up, No need to Pre-wash or Post-wash you Just Use and Return in given Air tight container and they Will be washed and sanitized at 60C to 80C in industrial dishwasher.

A Case Study of Csr Funding which can be taken up by several organizations and companies too. IndoSpace has launched cutlery banks as a part of their zero waste management initiative over the last 2.5 years.

- Donated 3,200 cutlery sets to Gram Panchayats for the residents of Mahalunge, Ingale and Bhamboli villages located near Chakan
 - More than 10,500 households from both villages are expected to benefit from the cutlery that is available for free use during community events
 - Organized various awareness campaigns to promote the concept of ‘Swachh Sundar Chakan’
- **Opt in and out Cutlery Options** - In December 2017 Foodpanda came up with opt-out cutlery option ie. No cutlery. In 2018, it came up with opt-in cutlery options whereby the customers will be provided cutlery with their order only when they opt for it. To promote opt cutlery options customers can be offered discounts.

3. Build in India:

- **Build in India** - Building an eco-friendly cutlery line in India involves conceptualizing products that cater to environmentally conscious consumers while ensuring affordability and accessibility. Mass production can lead to availability of pocket-friendly cutlery for all households, workplaces and social gatherings. Promoting the production of cutlery in India while reducing reliance on imports and fostering local craftsmanship can indeed boost employment for artisans and preserve traditional art forms.
- **Responsible Disposal of cutlery can be practiced by adopting measures like:**

- **Waste Management Systems:** The Deonar landfill has accumulated 2 crore metric tonnes of waste over 311 acres since 1927, reaching heights comparable to a 12-story building. Recently, the State Government decided that out of it, 124 acres of this landfill containing 80 lakh metric tonnes waste will be used by housing units of Dharavi in joint venture with Adani Group for waste cleanup costing over INR 5,000 crore and will take about 6-7 years. Hence, there's an urgent need for Responsible Disposal as the garbage is just collected and dumped so advocate for having designated bins for recyclables, compostables and general waste to streamline the disposal process.
- **Proper Education:** With the recent educational reforms such as the National Education Policy (NEP) 2020 in India the focus has shifted towards credit-based engagements enabling youth to learn Respect for Diversity and Local Context, Equity and Inclusion, Community Participation in their early education and hence they can easily relate with it and take up necessary actions.

Conclusion:

According to ayurvedic practitioners, the best way to eat is with hands using only fingers. Reducing the carbon footprint of cutlery production by adopting sustainable design thinking, incorporating 3 B's Cutlery Approach - Biodegradable, Byo Reusable and Build in India for responsible consumption and by disposing waste consciously we can soon achieve our Sustainable Development Goals like SDG 3 Good health and wellbeing, SDG 12 Responsible Consumption and Production and SDG 15 life on land.

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GIG ECONOMY: STORY OF INDIA'S CHANGING LABOUR MARKET

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Abstract:

There has been a surge in the gig economy recently as there is a rise in technological advancements and digitalization. This has entirely changed the labour market's configuration. This paper discusses that in a country like India with a decline in traditional job opportunities and a rise in unemployment, the gig economy provides feasibility and employment opportunities. The gig economy has become a fast-growing trend during the COVID-19 pandemic, as gig workers can work remotely at their convenience. But the gig workers also face more problems as compared to traditional employees. The paper further suggests the steps that can help resolve the various issues faced by gig workers and what can potentially lead to the growth of the career of an individual in the gig economy.

Introduction:

The entry-level workers in the market seek jobs in the gig economy as they can be part-time and flexible with their already existing schedule. The jobs can be low, medium or high-skilled. So, the people starting new in the job market can also be a part of the gig economy even if they are doing a medium or low-skill job. The businesses are at an advantage when hiring gig workers as they can be hired for specific projects as per the requirement of the role. They can expand the team whenever required. While hiring gig workers there are no demographic challenges as they can be hired from anywhere in the world. This has even increased female participation in the workforce because it is comparatively more convenient than working a full-time job. This growth is reflected in the increase of gig workers from 25.2

lakhs in 2011-12 to 68 lakhs in 2019-20, with a compound annual growth rate (CAGR) of 16.78% (Sood and Singh, 2023). The Indian gig economy encompasses a wide range of occupations, including IT specialists, graphic designers, and ride-hailing services like Uber and Ola (Sachdeva, 2024). The Indian gig economy workers suffer because of a lack of regulations. The introduction of efficient methods and regulations by the government can reduce their suffering to some extent (Choudhary and Shireshi, 2022).

The objective of this paper is to understand the condition of the Indian gig economy, the growth of the workers and the government regulations. This paper also studies the differences that gig workers experience compared to traditional workers. It also takes into consideration practices that can be applied to the Indian gig economy to improve while embracing the new opportunities and challenges that it is facing while growing at a faster pace.

Vulnerable Condition of the Gig Workers:

The gig economy workers face various challenges like having a low wage rate and low economic security as compared to the regular employees. As there is a lack of stable income, the gig workers are also far from having health insurance and retirement plans. Their financial vulnerability prohibits them from having investment plans too. They are unfamiliar with the local framework and have insecurity related to their residency status (*Gig Workers in Precarious Life: The Trajectory of Exploitation, Insecurity, and Resistance* - Pankaj - 2024 - *The American Journal of Economics and Sociology* - Wiley Online Library, n.d.). The ambiguous definition of gig workers prohibits them from getting any Social Security benefits. They do not get any benefits from the welfare policies that are designed for regular workers (P, 2024).

The gig workers are made to work for long hours as they have remote jobs because of this reason they work under a constant fear of losing their jobs. They are fragmented all around the country so it gets challenging while negotiating for their pay and better working conditions. This creates a lack of collective bargaining power which allows the employers to practice unfair practices towards the employees (*Growth and Challenges of GIG Employees in India - Consensus*, n.d.). After the pandemic, gig workers have lost their jobs or are working for less pay compared to traditional employees. For this reason, they rely on informal support groups.

There are additional challenges faced by women gig workers based on social-cultural norms. This creates an asymmetry of power while working in a new role (Anwar et al., 2021).

Study Framework:

This study uses a meta-data representation, combining insights from existing articles and academic papers. This study does not involve any original data collection or computational analysis. Rather, the emphasis is on compiling and analyzing data from reliable sources to offer a thorough assessment of the condition of the gig workers in the country.

Existing Legal Protection for Gig Workers in India:

1. Under the existing labour laws, such as the Industrial Disputes Act, 1947, the status of gig workers is not clearly defined, grouping them with the unorganized labour class which prohibits them from accessing the benefits of various policies and schemes available to the traditional employees. (Chaudhary and Prajapati, 2024)
2. Currently, Rajasthan is the first state to draft legislation to protect gig workers by creating a framework that prevents them from exploitation.
3. The Code on Social Security 2020, does not define gig workers appropriately and complicates the relationship between the employees and the employer (Chaudhary and Prajapati, 2024).

Social Security and Benefits

1. The Social Security benefits like pensions, health insurance maternity leaves, accident insurance that are available to traditional employees are not available to gig workers.
2. The informal nature of their work keeps them from getting the benefits that a formal employee gets.

Platform Limitations:

The platform promises work support to gig workers but has several issues like miscommunication or limited access to platform resources which affects the quality of work of the employee.

Suggestions for Improving the Condition of the Gig Workers:

The Social Security schemes need to be tailored to the needs of the gig workers and welfare policies supporting them should be introduced by the government. There should be clear judicial interpretation and a separate class be created to address the gig workers so that they are included in the class of formal employees. They should have a clear definition under both the laws such as the Code on Social Security 2020 and the Industrial Disputes Act, 1947. As seen in the Union Budget 2021-2022, the government has started acknowledging the gig economy by announcing social security schemes for gig workers. But more benefits like healthcare, pensions, etc. must be included for them.

Issues such as income stability, job security, and residency status should be addressed and a formal agreement for fair compensation for their work hours should be drafted. The labour laws should be strengthened to protect the workers from overworking for low pay. There should be workspace safety and mental support for the employees enhancing their economic social and psychological well-being.

The workers should not be discriminated based on their caste or gender and the female employees should be protected from workplace harassment, there should be laws safeguarding women at their workplace. By learning from the other gig economies, the Indian gig economy should also improve. HR should create a sense of inclusion among the gig workers so they feel included to the normal employees. Different performance management systems should be adopted that can help in working with both the formal employees and the gig workers.

Conclusion:

This paper discusses the advancement and transformation of the gig economy in India with technological improvement and digitalization. It discusses the various issues faced by the gig workers like income stability, job security and other social and economic issues. It suggests various methods for improving the condition of gig workers in India by altering the labour laws. It also discussed that it is essential to provide clear legislation and social security schemes, supporting gig workers. The government should create a different class for the gig workers to provide them with the benefits of the welfare policies. There should be creation of

an eco-system that is safe yet rewarding to the workers and make them feel included with the normal workers.

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EMPOWERING AND PROTECT - REVOLUTIONIZING SAFETY IN THE EDUCATION CURRICULUM

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Keyword: Inclusion, Education System, Children life, Students Safety, primary school, Children protection, danger to Health, Self Defence, Compulsory subject, Education curriculum.

Introduction:

The safety and health of students is not only the concern of educational institutions but the parents and society as a whole. This report analyses the need to include advanced protective self-defence training measures within the educational curriculum. It highlights the importance of safeguarding students. Strategies for reducing the risk and tactical measures for incorporating safety procedures into routine learning practices for students.

Providing education to students about personal safety and preparing them for emergency situations is very important for enhancing their ability to tackle dangerous situation. Every school must create guidelines for identifying safe and unsafe circumstances, and making students to understand the necessity to report suspicious behavior happening in their surroundings, and recognizing appropriate responses. Training the students with this knowledge increases their self-defence ability and empowers them to protect themselves and those around them.

Another hypercritical issue focuses on the need for providing mental health education to students. Training can significantly affect students' mental well-being. Class lectures

specifically aimed at emotional intelligence, conflict resolution, and stress management can empower students to handle challenges positively. When students receive mental and emotional support, they are less likely to engage in any harmful behaviour, activities or remain silent in unsafe situations.

Scope of Research:

The aim of this research is to understand that children victims often lack to protect themselves in unsafe situations and get harmed which provide them serious injury to their physical and mental health. So to take serious steps to aware the students about self-defence ability through training in their schools.

Objectives:

- * To Draw attention on the need for self-defence training as a crucial part of the educational curriculum.
- *To Provide ways and suggestions to implementation in schools subjects.
- * To Highlight the lifelong benefits of self-defence training for student's safety and personal growth.

Research Methodology:

Identify the Problem: There are large number incidents reported in daily life.

Literature Review: Our review indicated that there is currently no compulsory self-defence program in India.

Objectives: Our objectives include assessing the need for self-defence courses at the school level.

Data Collection: We received a total of 363 responses via Google Forms.

Data Analysis: We analysed participants' responses to understand the impact and significance of self-defence training.

Suggestions and Conclusion: Our analysis suggests that incorporating self-defence training into education prepares students to face challenges responsibly.

Literature Review:

Maharshi Ghosh (JUN 14, 2021). Article ‘Self-defence training should be mandatory in schools across India’

“We understood that in these days and ages, self-defence is one of the utmost important things. Crimes like child trafficking and child-abusing are rapidly increasing, including molestation, rape, kidnapping, acid attacks which is a severe issue for our country educational organizations and private organizations encouraging SELF DEFENSE TRAINING for the children. Not only that, but parents are also coming forth to enrol their kids in training.”

Dorothy Hastings(Posted on March 6, 2022) Article on Should Preschools Teach Self Defence to Children?

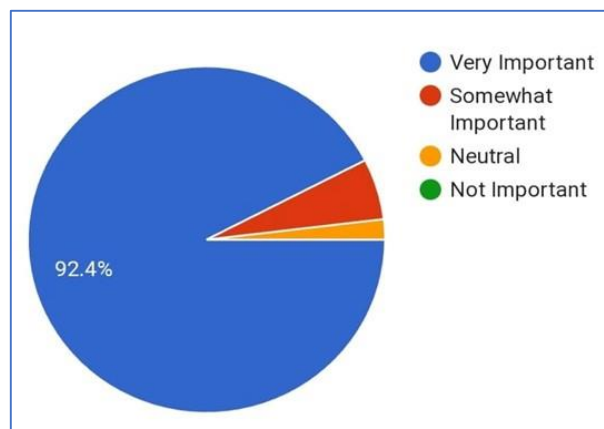
“There has been a rapid increase in child-related crimes over the past few years in the U.S. According to the U.S Department of Justice, more than 58,000 children are abducted every year by strangers. There are various forms of self-defence available for adults. Why not teach some wonderful self-defence techniques to our children as well? In self-defence training, children keep learning skills that are all new and unique. With constant effort and practice, children start feeling confident which ultimately reflects in their attitude.”

Sampling Technique:

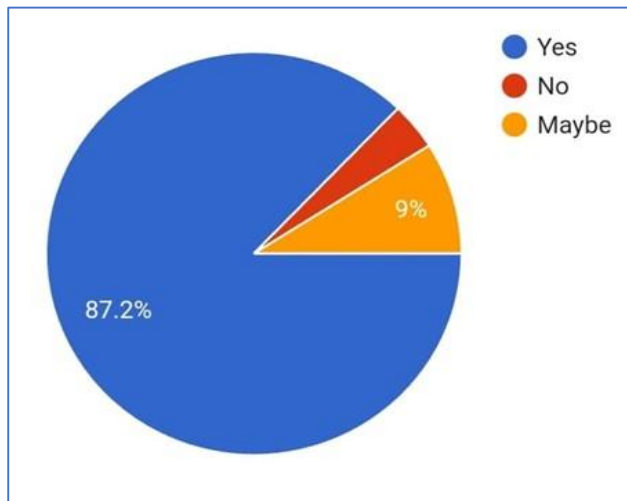
A convenience sampling technique was used for this study, focusing on individuals interested in answering the research questions. The sample size comprised 363 participants.

Findings and Observations:

1. How Important do you think self-defence training is for students?



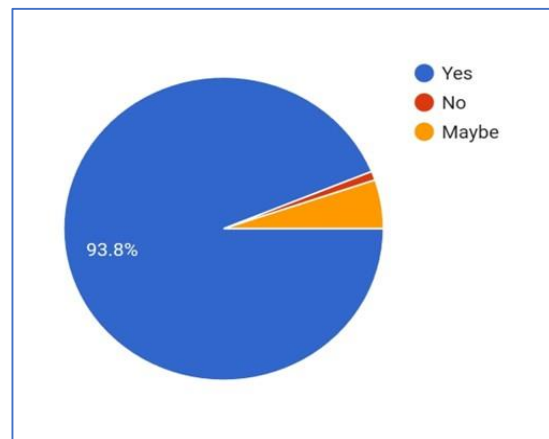
2. Should self-defence training be made a compulsory subject in schools?



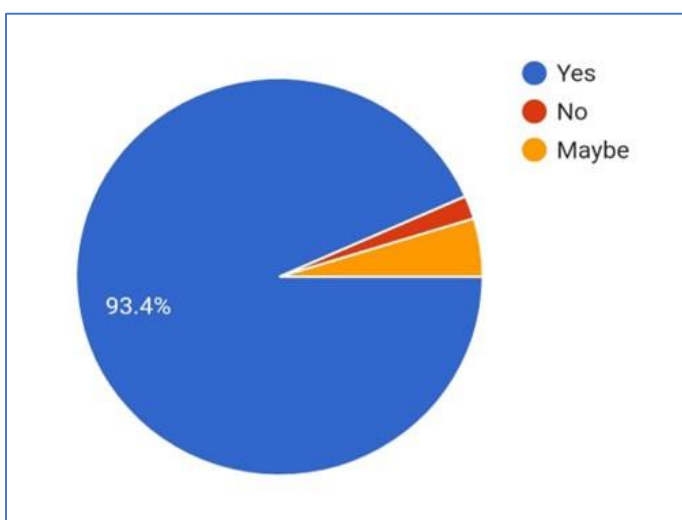
Key Observation: The survey indicates that most of the participants feel the need of including self-defence training as many students have faced situations where they felt helpless and unable to defend themselves.

3. Do you believe self-defence training can help students handle real-life situations such as bullying or harassment?

Key Observation: A majority believe that self-defence training effectively prepares students for real-life challenges, indicating strong support for its inclusion in the curriculum.



4. Would you be willing to support the implementation of self-defence training in schools?



Key Observation: Strong support for integrating self-defence training as a compulsory subject in schools is evident.

Suggestions:

1. Appeal to the “Education Ministry of India” regarding the inclusion of self-defence training as a compulsory subject in the school education.
2. Implement a grade-wise self-defence curriculum, starting with safety basics in early years and progressing to advanced techniques in higher grades.
3. Allocate one hour weekly—30 minutes for theory and 30 minutes for practice—to build confidence, discipline, and essential life skills in students.

Our Proposed Course Plan:

We have planned grade wise self-defence training levels for the students from 1st grade to 10th grade. In first level we will start with the basic self-defence training which will be including both theory (Importance of personal safety, identifying safe and unsafe situations, recognizing trusted adults, and seeking help) and practical knowledge of simple escape techniques. In the next level we will be making them to understand about the body language and situational awareness, basics of conflict avoidance, and staying calm under pressure and with basic practical blocking techniques. Later in higher grades students will be learning Intermediate Techniques and Peer Conflict Management such as theory knowledge about communication skills in resolving conflicts, dealing with bullying and knowing about personal strengths and limits. From the grade 7th to 10th, students will be learning Advanced Techniques in theory like psychological impact of overcoming fear, and building a safety mind-set and practicing effective techniques in various scenarios, introduction to improvised defence tools, and mock drills with experts.

Conclusion:

- Self-defence involves using reasonable force to protect oneself or another from harm during an attack.
- Self-defence is non-violent, aimed solely at defence rather than causing harm.
- Teaching children to protect themselves from potential threats is an essential skill that we must help them develop.
- Therefore, self-defence training should be included as a compulsory subject in the education curriculum.

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DESPERATE TIMES, DESPERATE MEASURES: JOB INSECURITY and ACCEPTANCE TOWARDS THEFT

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Abstract:

The study explores societal and ethical concerns by measuring the effects of job insecurity on employees, focusing on their attitudes toward theft. It extends previous works by trying to understand the influence of job insecurity on theft beyond the workplace, particularly in emerging markets like India. The research tries to establish financial security as a factor responsible for this relationship while exploring the effect of income levels and accounting for confounding factors such as confidence in government, happiness, and education. A 3-step hierarchical model is applied on 1600+ representative data points obtained from the World Values Survey which employed probability and stratified sampling methods. The results obtained show that when moderated for income levels, job insecurity does not affect attitude towards theft, but surprisingly, higher incomes create an accepting attitude towards theft. Further analysis shows that low education levels and low happiness levels also contribute to an accepting attitude towards theft. These findings highlight the need for a new trajectory of research to help understand the rationale behind the attitudes of higher income groups and frame policies that act as a deterrent towards theft.

I. Introduction:

The subjectivity of an individual's moral compass in times of strife has been a field of interest since time immemorial. This study goes on to explore the relationship between economic stressors and moral behaviour, particularly job insecurity and theft.

The research also touches upon the attitudes towards theft and how the same is affected by an individual's level of happiness, their trust in government, and education levels. The

mediating effect of financial satisfaction in this relationship is also hypothesized and tested. An advanced analysis includes exploring the moderating effect of income levels in this relationship.

Job security is a growing concern in today's volatile landscape. This is further significant in India, where an ADP 2023 report suggests that 47% of Indian employees face job insecurity.¹

(ADP, 2023) In this paper, we will go on to explore previous research surrounding this area and any gaps or hurdles that may be overcome by further research. We will aim to establish a model with robust controls to test the causal relationship between job insecurity and attitudes towards theft. We also aim to explain the moderating effects that impact this relationship.

Using data from the World Values Survey, we will fit a linear model to check the significance of multiple controls and job insecurity on an individual's attitude towards theft. An advanced model with a 3-step hierarchical model is also included for a deeper understanding of the issue. Lastly, we will explore the findings of this research and implications for real world applications and further research.

II. Review of Literature

The relationship between economic stressors, workplace dynamics, and individual morality has been explored previously in literature. Aliyev's (2018) study on amoral behaviour and fraudulent intentions among bank employees highlighted the psychological cost of job insecurity and its impact on ethics in the workplace.² Research established that job insecurity creates a sense of uncertainty that is conducive to unethical behaviours. Behaviours such as fraud are rationalized by employees under stress.

Similarly, a study by Ji et al. (2019) investigated the effect of income levels and financial satisfaction on unethical behaviour.³ The results revealed that higher incomes did not necessarily deter unethical actions, but analysis by Malmendier et al. (2020) showed that financial security has significant moderating effects.⁴ The study "Income, Love of Money, and Unethical Behaviour" (Wong, 2020) examined financial satisfaction and income levels as

determinants of workplace ethics in Hong Kong.⁵ However, Nagasubramaniam (2023) takes a shows that high urban unemployment in India leads to higher theft rates in the country.⁶

Despite these foundational studies, significant gaps remain unaddressed. Firstly, the majority of existing research is geographically limited. It focuses on developed economies or specific industries. Secondly, there is insufficient exploration of moderating and mediating variables. The methodological approaches in existing studies also lack the use of advanced modelling techniques that could represent the complex relationships between job insecurity, financial stress, and ethical behaviour. The absence of such methodologies limits the explanatory power of current works.

Further, the context of these studies predominantly revolves around workplace ethics. It neglects broader societal implications. This limitation restricts the applicability and generalisability to real-world scenarios.

This study addresses these gaps by undertaking a comprehensive analysis of job insecurity and its impact on attitudes toward theft, particularly in the Indian context. The study employs a three-step hierarchical model to enhance the causal inferences and addressing shortcomings in quantitative methodology. Additionally, by extending the scope beyond workplace settings, it explores broader attitudes toward theft. By addressing these critical gaps, this research hopes to pave the way for more robust analysis.

III. Hypothesis and Objectives

Hypothesis

Individuals who experience greater job insecurity are more likely to have accepting attitudes towards theft.

Objectives

- Analyse the effect of job insecurity on an individual's attitude towards theft.
- Explore the impact of education levels, happiness and trust in the government on attitudes towards theft
- Asses the extent to which income levels are able to moderate this relationship.

IV. Scope and Methodology

Source of Data

The data for this study is derived from the World Values Survey⁷ (WVS), a globally recognized research initiative which explores cultural values, attitudes, and beliefs. The WVS questionnaire contains 290 questions covering multiple themes. Data in India was conducted primarily through face-to-face interviews, with standardized responses and rigorous quality control.

Sampling Methodology

The WVS employs a robust sampling framework designed to ensure representativeness of collected data. The sample is representative of individuals aged 18 and older, residing in both rural and urban areas. Over 1,600 interviews were conducted, and respondents were selected using a stratified and quota sampling techniques. While the data collected was self-reported and might include social desirability bias, it is fit for statistical analysis.

Variables – Measurement, Coding, and Underlying Concepts

1. Independent Variable: Job Insecurity

Job insecurity is measured through the participant's self-reported concern about losing their job or difficulty finding a job. This variable is measured by the survey question:

Q.142. To what degree are you worried about these situations (losing my job or not finding a job) – very much, a good deal, not much, or not at all?

- 1: Very much
- 2: A good deal
- 3: Not much
- 4: Not at all

Coding:

The coding is reversed from that of the question to ensure conformity of direction of the variable and the response (greater values imply higher job insecurity).

2. Dependent Variable: Acceptance towards Theft

Acceptance towards theft is measured using a 10-point scale assessing the participant's perception towards stealing of property. We arrive at the variable through the following

question:

Q.179. On a scale of 1 to 10, where 1 means "never justified" and 10 means "always justified," please indicate how justified you think these actions are:

- Stealing property

Responses range from 1 to 10, with higher scores indicating a greater acceptance or justification of theft.

Coding:

The coding in the question is in conformity with the variable (higher values represent greater acceptance of theft). Thus, we proceed without modifying the coding.

3. Mediating Variable – Financial Satisfaction

Financial Satisfaction is measured through the participant's self-reported levels of financial satisfaction. This variable is measured by the survey question:

Q50. How satisfied are you with the financial situation of your household? Please use a scale again where 1 means you are "completely dissatisfied" and 10 means you are "completely satisfied" with the financial conditions of your household? *(Code one number):*



Theorised Impact on Variables (Rationale):

- Impact of the Independent Variable (Job Insecurity): An individual who experiences low job insecurity will have a relatively stable expectation of employment. The individual will expect stable cash inflows from employment and thus experience greater financial satisfaction. Conversely, volatile livelihood expectations will hamper satisfaction
- Impact on the Dependent Variable (Acceptance towards Theft): An individual who experiences low financial satisfaction is more likely to look beyond accepted means of income. Dissatisfaction may also lead to rationalisation of unethical behaviours. Such an individual may therefore justify theft.

Coding:

The coding in the question is in conformity with the variable (higher values represent greater financial satisfaction). Thus, we proceed without modifying the coding.

4. Confounding Variables

a. Confidence in Government

Confidence in government is measured by the following question:

Q.71. Can you tell me how much confidence you have in the government – is it a great deal of confidence, quite a lot of confidence, not very much confidence, or none at all?

- 1: A great deal of confidence
- 2: Quite a lot of confidence
- 3: Not very much confidence
- 4: None at all

Theorised Impact on Variables (Rationale):

- Impact on the Independent Variable (Job Insecurity): Individuals with greater confidence in the government are likely to believe in its capacity to create job opportunities and sustain employment. This confidence reduces job insecurity, implying a *negative relationship* between confidence in government and job insecurity.
- Impact on the Dependent Variable (Acceptance towards Theft): Higher confidence in government is associated with greater compliance with laws and norms. Therefore, such individuals are likely to have a negative attitude towards theft, implying a *negative relationship* between confidence in government and acceptance towards theft.

Coding:

The coding is reversed to ensure consistency with the direction of the variable. Greater values represent higher confidence in government.

b. Overall Happiness

Overall happiness is assessed through the respondent's perception of their general happiness level using the following question:

Q46. Taking all things together, would you say you are very happy, rather happy, not very happy or not at all happy?

(Code one answer):

1. Very happy
2. Rather happy
3. Not very happy
4. Not at all happy

Impact on Variables (Rationale):

1. Impact on the Independent Variable (Job Insecurity): Individuals with greater overall happiness tend to have a positive outlook on life. They experience lesser stress about future employment. This indicates a *negative relationship* between overall happiness and job insecurity.

2. Impact on the Dependent Variable (Acceptance towards Theft): Greater happiness levels can lead to moral disengagement, where individuals rationalise theft. Their moral evaluation is compromised due to their positive emotional state.⁸ (Bandura, 1996) There exists a *positive relationship* between overall happiness levels and acceptance towards theft.

Coding:

The coding is reversed to align the variable's direction with its intended interpretation. Higher values represent greater overall happiness.

5. Control Variable – Education

Education is measured by the respondent's self-reported highest educational level attained, using the following question:

Q275. What is the highest educational level that you have attained?

1. No education (Can't read or write at all)
2. Primary pass (Class 5)
3. Middle pass (Class 8)
4. Matriculation pass (Class 10)
5. Intermediate pass (Class 12)
6. Diploma (after Class X or XII)
7. Graduate or equivalent
8. Post Graduate or equivalent
9. Doctoral or equivalent (MPhil, PhD)
10. For DK/ NA & other codes

Impact on Variables (Rationale):

1. Impact on the Independent Variable (Job Insecurity): Higher levels of education often correlate with better qualifications and increased access to secure employment opportunities. Therefore, individuals with higher education are expected to experience lower job insecurity. This establishes a *negative relationship*
2. Impact on the Dependent Variable (Acceptance towards Theft): Education fosters an understanding of societal norms and rules and facilitates better socialization. Individuals with higher education are less likely to justify theft due to their heightened awareness of ethical standards and consequences. This establishes a *negative relationship*.

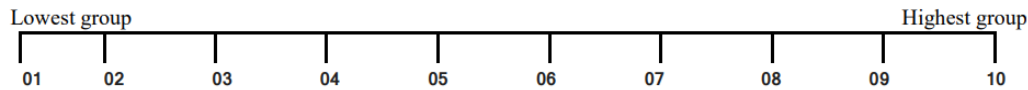
Coding:

The direction of responses and the variable are in conformity. However, there exists a discrepancy as Intermediate pass and Diploma are given distinct levels. Practically, they both can be considered as the same level of education

6. Moderating Variable – Income Group

Income group refers to the household income group. It is measured via self-reporting by the following question

Q288. On a 10-point scale where 1 indicates “the lowest income group” and 10 indicates “the highest income group” in India, please tell me in what group your household falls in. Choose an appropriate number by counting all the wages, salaries, pensions and other incomes that come in your household. *(Code one number):*



Theorised Moderating Effect (Rationale)

Individuals from higher income groups are unlikely to face financial hardship even given job insecurity. Thus, they may not rationalise stealing or theft. Individuals from lower income groups may not be able to make ends meet or achieve desired financial goals despite job security. Thus, they may rationalise stealing or theft. Income groups, therefore, would act as a moderator for the effect of job insecurity (IV) on acceptance of theft (DV).

Coding:

The coding in the question is in conformity with the variable (higher values represent higher income groups). Thus, we proceed without modifying the coding.

Statistical Model

A 3-step hierarchical regression model is used for analysis. We begin with a basic model that regresses the dependent variable on the independent variable. For further analysis, we add confounding variables as controls. Lastly, the moderating effects are analysed to assess causality of factors.

To check the validity of the mediating variable, two simple linear regression (SLR) models are run. We first regress the mediating variable on the independent variable. Additionally, a model regressing the dependent variable on the mediating variable is run.

Variables

IV: Job Insecurity \rightarrow job insecurity

DV: Acceptance towards Theft \rightarrow accept theft

Mediating Variable: Financial Satisfaction \rightarrow fin satisfaction

Controls:

Confidence in Government → govt_trust

Overall Happiness → happiness

Education Level → education_level

Moderating Variable:

Income Group → income_group

Mediating Model

a. (IV – Mediating)

$$\text{fin_satisfaction} = \beta_0 + \beta_1 \cdot \text{job_insecurity}$$

b. (Mediating – DV)

$$\text{accept_theft} = \beta_0 + \beta_1 \cdot \text{fin_satisfaction}$$

We will run a 3-step hierarchical model to see the additional effects of controls and moderators.

Step 1 – Basic Model

$$\text{accept_theft} = \beta_0 + \beta_1 \cdot \text{job_insecurity}$$

Step 2 – Model with controls

$$\text{accept_theft} = \beta_0 + \beta_1 \cdot \text{job_insecurity} + \beta_2 \cdot \text{govt_trust} + \beta_3 \cdot \text{happiness} + \beta_4 \cdot \text{education_level}$$

Step 3 – Complete Model with Moderator

$$\text{accept_theft} = \beta_0 + \beta_1 \cdot \text{job_insecurity} + \beta_2 \cdot \text{govt_trust} + \beta_3 \cdot \text{happiness} + \beta_4 \cdot \text{education_level} + \beta_5 \cdot \text{income_group} + \beta_6 \cdot \text{job_insecurity} \cdot \text{income_group}$$

V. Findings

Descriptive Statistics

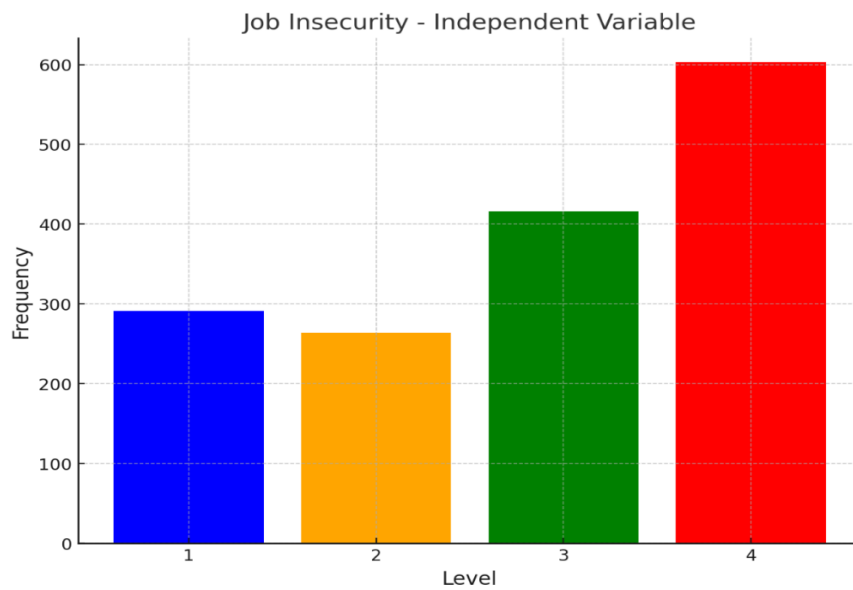
1. Job Insecurity – Independent Variable

Valid Responses – 1574

Mean – 2.846

Median – 3

Mode - 4



Graphical Analysis – Independent Variable

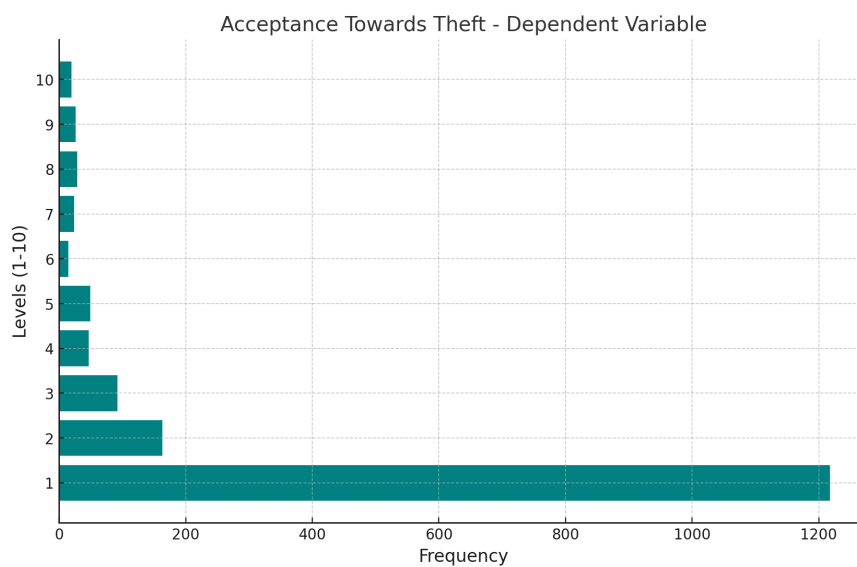
2. Acceptance towards theft – Dependent Variable

Valid Responses – 1683

Mean – 1.888

Median – 1

Mode - 1



Graphical Analysis – Dependent Variable

Regression Analysis

1. Testing the effect of IV on DV

a. Basic Model

```
Call:
lm(formula = accept_theft ~ job_insecurity)

Residuals:
    Min       1Q   Median       3Q      Max
-1.0612 -0.9818 -0.8231  0.0976  8.1769

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    2.14052    0.13441  15.925  <2e-16 ***
job_insecurity -0.07936    0.04393  -1.807   0.071 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.958 on 1569 degrees of freedom
(121 observations deleted due to missingness)
Multiple R-squared:  0.002076, Adjusted R-squared:  0.00144
F-statistic: 3.264 on 1 and 1569 DF, p-value: 0.07103
```

2. Testing the effect of the Mediator

a. IV – Mediating

```
Call:
lm(formula = fin_satisfaction ~ job_insecurity)

Residuals:
    Min       1Q   Median       3Q      Max
-5.5988 -1.5399  0.4601  1.5778  3.5778

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    6.65764    0.17584  37.863  <2e-16 ***
job_insecurity -0.05885    0.05745  -1.024   0.306
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.56 on 1567 degrees of freedom
(123 observations deleted due to missingness)
Multiple R-squared:  0.0006693, Adjusted R-squared:  3.153e-05
F-statistic: 1.049 on 1 and 1567 DF, p-value: 0.3058
```


b. Mediating – DV

```

Call:
lm(formula = accept_theft ~ fin_satisfaction)

Residuals:
    Min       1Q   Median       3Q      Max
-0.9573 -0.9203 -0.8647  0.0705  8.2094

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    1.77212    0.12969   13.665  <2e-16 ***
fin_satisfaction 0.01852    0.01865    0.993   0.321
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.948 on 1673 degrees of freedom
(17 observations deleted due to missingness)
Multiple R-squared:  0.0005893, Adjusted R-squared:  -8.047e-06
F-statistic: 0.9865 on 1 and 1673 DF,  p-value: 0.3207

```

Mediating Effect

The mediating role of financial satisfaction is tested. However, the results did not support a significant mediating effect. The coefficients for financial satisfaction in both its relationship with job insecurity and its effect on acceptance of theft come out to be statistically insignificant. This implies that financial satisfaction is not a good mediator for the model.

Variable	Step 1 - Basic Model	Step 2 - Model with Controls	Step 3 - Complete Model with Moderator
(Intercept)	2.14052 ***	3.27467 ***	2.82323 ***
job_insecurity	-0.07936 .	-0.09580 *	-0.14272
govt_trust	NA	0.07281	0.05613
happiness	NA	-0.32080 ***	-0.34429 ***
education_level	NA	-0.08437 *	-0.14584 ***
income_group	NA	NA	0.11483 *
job_insecurity:income_group	NA	NA	0.01861
R^2	0.00208	0.02505	0.07344
Adjusted R^2	0.00144	0.02222	0.06937
F-statistic	3.264	8.87	18.03

3-step hierarchical model

Step 1

The initial regression model studies the relationship between job insecurity (independent variable) and acceptance of theft (dependent variable). The results show a negative beta coefficient for job insecurity, significant at the 10% level but insignificant 5% level. At the 10% threshold, job insecurity seems to have a negative effect on acceptance of theft. This implies that individuals with greater job security exhibit a more accepting attitude towards theft.

The explanatory power of the model is minimal (as indicated by the adjusted R-squared value of 0.0014). This reinforces the need for additional controls to better explain and interpret causal relationships.

Step 2

The inclusion of control variables leads to noteworthy changes in the findings. Confidence in Government exhibits a positive coefficient, but it is statistically insignificant. Thus, it has no conclusive effect on the independent variable. Happiness has a negative beta coefficient that is highly significant (at the 0.1% level). This implies a strong negative relationship between happiness and acceptance of theft. Individuals reporting higher levels of happiness are likely to condone theft. Education level is significant at the 5% level and has a negative coefficient as hypothesized. Higher education leads to lower acceptance of theft.

This negative relationship between happiness and acceptance of theft is contrary to our theoretical expectations. This surprising result seems to ignore the effect of moral disengagement discussed earlier. Thus, even when experiencing positive emotions, people tend to hold on to their moral values and make ethical choices.

On addition of controls, the independent variable (job insecurity) becomes significant at the 5% level. It has a negative coefficient which is contradictory to expectations. The marginal effect on the adjusted R squared is $(0.0222 - 0.0014) 0.0208$. Therefore, additional controls add explanatory information to the model.

Step 3

The moderating effect (interaction term) is insignificant. This implies that income level does not moderate the effect of job insecurity. Surprisingly, the moderating effect renders the independent variable (Job Insecurity) insignificant. This implies that the model exhibited an

omitted variable bias. In the absence of income groups, Job insecurity experienced a biased value. The information that should have been explained by income group was explained by job insecurity. This led to a false significance. Income group itself is significant which reiterates this omitted variable bias.

Nonetheless, our original hypothesis fails. Job insecurity is shown to have an insignificant effect on Acceptance of theft. This finding is surprising as it is contrary to theoretical expectations. Addition of the moderating effect – income groups leads to a significant increase in the explanatory power of the model. Adjusted R squared increases by (0.0693 – 0.0222) 0.0471. Education Level also becomes increasingly significant, although with a lower magnitude.

VI. Discussion and Conclusion

The research hypothesized that individuals who experience increased job insecurity are more likely to be more accepting of theft. This analysis showed that the original hypothesis is rejected, job insecurity is not negatively related with attitudes towards theft. Rather, it has no effect on these attitudes of individuals.

Another surprising result was the negative impact of happiness on acceptance of theft. This contradicts established theories that positive emotions may lead to moral disengagement. This finding may be specific to the Indian context or reflect a strong sense of ethics amongst individuals. This result highlights the need for exploration into the interplay between emotional well-being and ethical decision-making.

The inclusion of a moderator - income level - resolved an omitted variable bias in the model. Income level in itself did not significantly moderate the relationship between job insecurity and acceptance of theft, its inclusion affected the coefficient and significance of job insecurity. This indicates that job insecurity was previously explaining variance better explained by income, leading to biased estimates and interpretations.

The study has several important implications for corporate practices, public policy, and research. For organizations, the findings highlight the potential for theft where job security is

high but internal governance (deterrence) is weak. Corporations must therefore prioritize ethical training, and clear consequences for unethical behaviour. At the macro policy level, the role of education suggests that investments in educational infrastructure (quality as well as access) can yield long-term benefits in reducing crime. Policymakers may also gain insights into factors that create an environment conducive to theft and work to build controls against the same.

This study is committed to ethical practices. All participants provided consent before participating. Nonetheless, the study was limited by self-reported responses, integrating desirability bias in data. Future research could work on these limitations by incorporating alternative data collection methods and extending the geographical scope of analysis.

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VII. Appendix

R Code for variable coding, descriptive analysis, and statistical model

```
# Read the data
install.packages("readxl")
library("readxl")
wave7 <- read_excel("File path")

# Descriptive Analysis of IV and DV
# Dependent Variable (Acceptance towards stealing)
names(wave7)[names(wave7) == "Q179: Justifiable: Stealing property"] <- "Q179"
accept_theft = NULL
accept_theft[wave7$Q179 == 1] = 1
accept_theft[wave7$Q179 == 2] = 2
accept_theft[wave7$Q179 == 3] = 3
accept_theft[wave7$Q179 == 4] = 4
accept_theft[wave7$Q179 == 5] = 5
accept_theft[wave7$Q179 == 6] = 6
accept_theft[wave7$Q179 == 7] = 7
accept_theft[wave7$Q179 == 8] = 8
accept_theft[wave7$Q179 == 9] = 9
accept_theft[wave7$Q179 == 10] = 10
accept_theft[wave7$Q179 == -1] = NA
table(accept_theft)
summary(accept_theft)

# Independent Variable (Job insecurity) - Reverse direction
names(wave7)[names(wave7) == "Q142: Worries: Losing my job or not finding a job"] <-
"Q142"
job_insecurity = NULL
job_insecurity[wave7$Q142 == 1] = 4
```

```
job_insecurity[wave7$Q142 == 2] = 3
job_insecurity[wave7$Q142 == 3] = 2
job_insecurity[wave7$Q142 == 4] = 1
job_insecurity[wave7$Q142 == -1] = NA
table(job_insecurity)
summary(job_insecurity)
```

Mediating Variable (Financial Satisfaction)

```
names(wave7)[names(wave7) == "Q50: Satisfaction with financial situation of household"]
<- "Q50"
fin_satisfaction = NULL
fin_satisfaction[wave7$Q50 == 1] = 1
fin_satisfaction[wave7$Q50 == 2] = 2
fin_satisfaction[wave7$Q50 == 3] = 3
fin_satisfaction[wave7$Q50 == 4] = 4
fin_satisfaction[wave7$Q50 == 5] = 5
fin_satisfaction[wave7$Q50 == 6] = 6
fin_satisfaction[wave7$Q50 == 7] = 7
fin_satisfaction[wave7$Q50 == 8] = 8
fin_satisfaction[wave7$Q50 == 9] = 9
fin_satisfaction[wave7$Q50 == 10] = 10
fin_satisfaction[wave7$Q50 == -1] = NA
table(fin_satisfaction)
summary(fin_satisfaction)
```

Confounding Variable 1 (Confidence in Government) - Reverse Direction

```
names(wave7)[names(wave7) == "Q71: Confidence: The Government"] <- "Q71"
govt_trust = NULL
govt_trust[wave7$Q71 == 1] = 4
govt_trust[wave7$Q71 == 2] = 3
govt_trust[wave7$Q71 == 3] = 2
govt_trust[wave7$Q71 == 4] = 1
govt_trust[wave7$Q71 == -1] = NA
table(govt_trust)
```

```
summary(govt_trust)
```

```
# Confounding Variable 2 (Overall Happiness) - Reverse Direction
```

```
names(wave7)[names(wave7) == "Q46: Feeling of happiness"] <- "Q46"
```

```
happiness = NULL
```

```
happiness[wave7$Q46 == 1] = 4
```

```
happiness[wave7$Q46 == 2] = 3
```

```
happiness[wave7$Q46 == 3] = 2
```

```
happiness[wave7$Q46 == 4] = 1
```

```
happiness[wave7$Q46 == -1] = NA
```

```
table(happiness)
```

```
summary(happiness)
```

```
# Confounding Variable 3
```

```
names(wave7)[names(wave7)=="Q275: Highest educational level: Respondent [ISCED  
2011]"]<- "Q275"
```

```
education_level<- NULL
```

```
education_level[wave7$Q275 == 1] <- 1 # No education
```

```
education_level[wave7$Q275 == 2] <- 2 # Primary pass
```

```
education_level[wave7$Q275 == 3] <- 3 # Middle pass
```

```
education_level[wave7$Q275 == 4] <- 4 # Matriculation pass
```

```
education_level[wave7$Q275 == 5 | wave7$Q275 == 6] <- 5 # Intermediate pass or Diploma
```

```
education_level[wave7$Q275 == 7] <- 6 # Graduate
```

```
education_level[wave7$Q275 == 8] <- 7 # Post Graduate
```

```
education_level[wave7$Q275 == 9] <- 8 # Doctoral
```

```
education_level[wave7$Q275< 1 | wave7$Q275> 9]<- NA # Out of range
```

```
table(education_level)
```

```
summary(education_level)
```

```
#Moderating Variable (Household Income)
```

```
names(wave7)[names(wave7) == "Q288: Scale of incomes"] <- "Q288"
```

```
income_group = NULL
```

```
income_group[wave7$Q288 == 1] = 1
```

```
income_group[wave7$Q288 == 2] = 2
```

```
income_group[wave7$Q288 == 3] = 3
income_group[wave7$Q288 == 4] = 4
income_group[wave7$Q288 == 5] = 5
income_group[wave7$Q288 == 6] = 6
income_group[wave7$Q288 == 7] = 7
income_group[wave7$Q288 == 8] = 8
income_group[wave7$Q288 == 9] = 9
income_group[wave7$Q288 == 10] = 10
income_group[wave7$Q288 == -1] = NA
table(income_group)
summary(income_group)
```

#Run Statistical Models

#Heirarchical Model Basic (Step 1)

```
IV_DV = lm(accept_theft ~ job_insecurity)
summary(IV_DV)
```

#Heirarchical Model with Controls (Step 2)

```
IV_DV_con_adv = lm(accept_theft ~ job_insecurity + govt_trust + happiness +
education_level)
summary(IV_DV_con_adv)
```

#Heirarchical Model with Moderation (Step 3)

```
IV_DV_con_adv2 = lm(accept_theft ~ job_insecurity + job_insecurity*income_group +
govt_trust + happiness + education_level)
summary(IV_DV_con_adv2)
```

#Mediator Analysis

#IV and Mediating Variable

```
IV_med = lm(fin_satisfaction ~ job_insecurity)
summary(IV_med)
```

#Mediating Variable and DV

```
med_DV = lm(accept_theft ~ fin_satisfaction)
summary(med_DV)
```


RURAL DEVELOPMENT: A HOLISTIC APPROACH TO EMPOWERING COMMUNITIES

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Abstract:

Rural development is a multifaceted task that includes many aspects: delivering basic civic services; raising standards of education. This paper examines the critical relationship between these two elements and their combined effect on rural development. By examining recent data, government initiatives, and the problems that plague rural education, this article presents evidence that bettering basic facilities and education will encourage sustainable development in countryside regions.

Introduction:

And for rural areas, essential amenities for use in their daily life, such as clean water and electricity, are simply not available. The persistent poverty and social and economic disparities that exist in rural regions when compared to cities. Education has a unique function in individual and community development, which is to equip people with new insights or skills in order to change their living conditions. Moreover, essential public facilities such as water supply, a sanitary environment, and electricity for lighting are urgent necessities simply because there is no feasible way to study under such conditions and it impacts on the general well-being of all concerned. By examining the relationship between the education of rural residents and essential facilities, the thesis calls for improved conditions in these areas to bring about broader rural development.

Scope of Research:

Recent trends in rural education in India, government initiatives, financial allocations, and issues faced by rural schools are the content of this research report. With data from the past five years, this research intends to find out key indicators of contemporary rural education and its relationship to basic facilities. It will explore government policies on a range of programs for improving the access and quality of education in rural areas.

Objectives:

- Analysis of the condition of rural education in India.
- Implementation and effects of government education initiatives and schemes.
- An overview of financial allocation towards rural development.

Methodology Used:

Taking a qualitative as well as quantitative approach, this survey uses secondary materials from government reports, academic studies and prestigious organizations, all of them simply focusing on rural development education. The dataset collected included statistics on literacy rates, enrollment rates and education budget allocations as well condition of facilities in rural areas for students. In addition to this, to discover the effectiveness of local government initiatives for people's quality of life, we studied several examples that really make a difference in education.

Data Analysis and Interpretation:

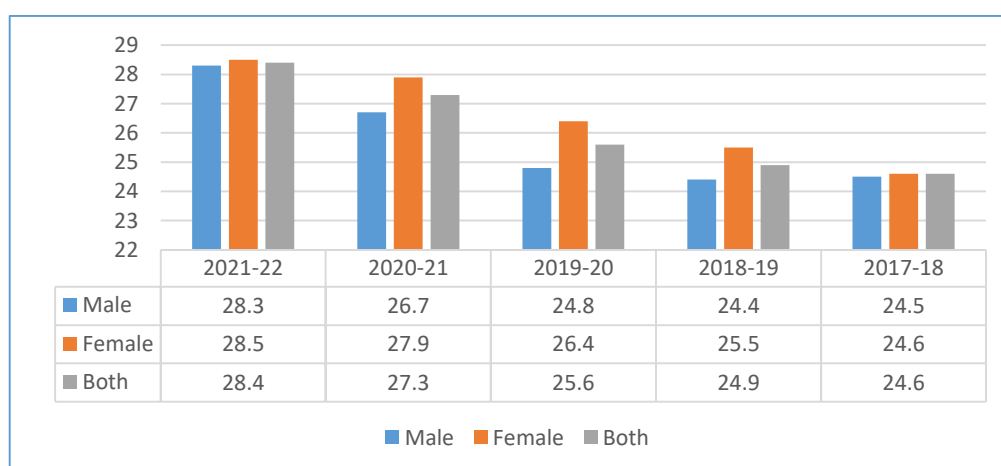
Rural education in India is a major task because it directly affects the social and economic situation of rural society. This analysis includes the financial affairs of rural education, government policy measures taken since the early 1980s, and problems which have arisen in providing enlarged educational access and improving levels. Running through basic indications of change during the last five years dulls some of the sharpness but offers a reality chiseled in stone. It sheds light on trends enabling us to spot oncoming tendencies, sources of support for schools at various levels and how well any particular program toward achieving rural education objectives might work.

1. Current State of Rural Education

By 2024, the literacy rate of rural India has reached 75.8%, from 71.5% in 2021. The improvement is mostly down to a number of government initiatives targeted at infrastructure and access in schools. Particular highlights include programs such as those under the Samagra Shiksha Abhiyan and "Digital India", which set out to improve digital connectivity in schools. But despite such examples of progress, a number of other key indicators point out some of the problems still facing rural education. The Gross Enrollment Ratio (GER) for primary education is listed at 100.6%, meaning that more children are enrolled than the population of relevant age groups. But this rate then falls significantly to 78.2% at upper primary education level, indicating a worrying dropout trend in which students move through the education system. Only around 30% of rural schools provide essential infrastructure, reports say. The situation is made worse by a severe shortage of qualified teachers: estimates suggest that the country is currently short of 1 million teachers, in many cases specifically teachers in subjects like Mathematics and Science.

In addition, rural education persists with gender inequities, although there have been noted improvements in female literacy rates. Programs aimed at empowering girls by education have come into existence to mitigate this. However, barriers remain due to social mores and economic reasons that make access more difficult.

Gross Enrolment Ratio at All India Level: 2017-18 to 2021-22



2. Financial Allocations for Rural Education

No matter how you look at it, government funding is crucial for improving rural education in India. This commitment is illustrated by the distribution of Rs 14.5 billion from the state to local government for rural schools over the last five years. The Indian government's budget for education reveals that commitment to improving education access and quality in rural areas on the one hand is on the increase for initiation prices (coffin cheap); but there are just too few buyers for these new schools even to cover urban demand as it currently stands.

In general, the budget signs of education emphasize an upward trend. In 2019-20 fiscal year, the total budget was ₹94,000 crore. However, this took a decrease to ₹88,000 crore in 2020-21, probably due to economic constraints. There was a revival following those years, with the budget rising to ₹93,000 crore in 2021-22 and then further upping to ₹1,05,000 crore in 2022-23. This trend continued in 2023-24 when sizable sums of Rs1,20,628 crore were monetarily assigned, achieving ₹1,48,000 crore the next year. With India's increased consciousness of education importance comes the accompanying benefit of such increases.

Through different formulations of school education corresponding commitments are also manifest. In 2019-20, ₹57,000 crore was allocated to school education. This figure slipped to ₹54,000 crore for 2020-21 yet jumped again to ₹58,000 crore by 2021-22. The allocation rose further to ₹62,000 crore in 2022-23 and then significantly increased to ₹73,008 crore for 2023-24. It remained at ₹73,498 crore in 2024-25. This consistency suggests that whilst commitment to maintain school education funding is unchanged, there still may be constraints to the further rise of funding that would require new resources or reforms.

Initial Allocations started at Rs 30000 crore in 2019- 20 but dropped to Rs 25000 crore in expenditure allocations for fiscal year 2020-21. This reflected budgetary contractions as a whole. In 2021-22, funding went up again to Rs 32000 crore and that further increased to Rs 36000 crore in FY22 just completed while the funds are allocated in terms of a fiscal year, the financial support referred to be delivered over an extended time span for 2023-24, and the allocation reached Rs 37,499 crore. This reflected tight money because the 2024-25 allocation slid downward to Rs 37,010 crore. These shifts convey that the government recognized the need for long-term investment in comprehensive educational strategies rather than quick fixes.

3. Government Initiatives Impacting Rural Education

- **Samagra Shiksha Abhiyan**

Established in 2018, Samagra Shiksha Abhiyan is an integrated scheme with the aim of providing integrated and balanced high-quality education contents from preschool to senior secondary level. It aims to promote school Want nothing less than "an educational revolution" In both primary and middle schools, that is, from mere baby talk up through university learning, this plan is linked up so as to form a complete whole. At each stage, we see what has been gained before and work towards what will happen next. It involves more than 1.16 million schools educating over 156 million students, of which over 5.7 million teachers belong to government and aid schools to Samagra Shiksha.

Samagra Shiksha hopes to increase school effectiveness, provide boys and girls with an equal footing, and encourage vocational education. This helps States implement the Right of Children to Free and Compulsory Education (RTE) Act, 2009, which is essential to make sure that all children who possess ability can get good schooling no matter what society they are born into. Through teacher training, infrastructure, and digital resources Samagra Shiksha wants to improve the quality of learning experienced by students and create an environment in which all learners are included.

- **Digital India Initiative**

Having an abundance of digital infrastructure in the nation's largest rural population, this also leads to China's transformation from an agricultural economy and industry economy into a modern society with information On the other hand: As part of the initiative, the government is planning to connect more than 95% rural schools to campus wide area networks by 2024. These networks make such things as the above possible.-- deliberately introduced mistakes that can however be easily corrected (Zuoying, Taiwan, a city in the south of China) to: From online libraries to the latest information resources, online education enables students in rural areas through digital means to tap into a wealth of information and interactive learning tools. Through digital education methods educators from towns and cities can teach students in rural areas via the internet, narrowing the urban-rural education gap. In terms of programs, the initiative includes the proposal of PM e-Vidya, which integrates on-line education modes

and simplifies the conventional physical model of education. This allows quality educational content to be accessed by students right across India.

- **Midday Meal Scheme**

Another important program aimed at improving educational results in India is the Midday Meal Scheme. Implemented to give students from government schools free meals, it has succeeded in upping attendance rates by providing an immediate way to give children the nutrition that they need for learning results (especially girls—and at an age when active learning not the only thing youngsters want is food). Studies show that for schoolchildren without enough food or good food, distributing as little as two meals a day will not only end their hunger but also leave them free to study. And that system after introduction to the program steadily reported increases in attendance as well as continued enrollment rates.

Summer holiday eaters are on the programme now. Those families who have no way to get schooling for their children through their own resources must have some hopes restored by this structure for school dinner. With this plan, nearly every student can have an evening meal each day at school and the entire school is raised in spirits. It's nourishing food on the one hand and feeding the children on the other. These studies clearly demonstrate that schools under the Midday Meal Scheme produced higher learning results among students and children. This was a great encouragement to me for mixing with other kids. During this concept, it is undeniable that you can bring together children from various backgrounds by school attendance alone. And reproduction of this background concept means schools are getting pupils year after year. The hope for creating a healthy educational environment and obtaining an overall education in the future should be possible through those who have received it recently.

At the same time, we feel we need to work in a way that respects the individual character of each child. It is our strong belief that, in order to achieve this, the government must concentrate its resources on three essential programs in the field of education in rural India: Samagra Shiksha Abhiyan, Digital India Initiative and Midday Meal Scheme. In return for these programs, these predicaments that are normally resolved by children's early education will change as well not only the educational opportunities for individual children or take part in growing them up but also the whole landscape of education across India.

4. Challenges Faced by Rural Education;

Despite various initiatives and increased funding aimed at improving education in rural areas, significant challenges persist, particularly in infrastructure, teacher availability, and dropout rates.

- **Infrastructure Deficiencies:**

Even today, a large number of rural schools have substandard facilities. Set up on this basis is of course not the same level as that. Even rural schools that seem to be in good repair have problems which significantly impair their students' ability to learn. At present, only 30 percent of rural schools are close to meeting basic standards for construction structure and facilities. Yet in a large number of places there is no electricity, essential for modern educational methods, and these same schools boast no toilets--surely not a health guarantee! Further, because a place is deficient not just in its system for giving lessons but also it does not offer adequate rest room facilities. Indeed, this lack is surely highly relevant to student health as well.

- **Teacher Shortages**

Moreover, the absence of competent teachers is still a major obstacle in rural education. About half the teachers in these regions lack appropriate training or credentials for teaching with inspiration. Educational opportunities prior to their work left teachers with a deficiency that certainly had an impact on learning quality for students. More importantly, in some places where teachers were working with few materials and it was just enough to have enough books in each class for the teacher, then student-teacher ratios rose to as high as 47-t-1 As a result, involving oneself deeply in a matter with others, will only cause one to understand how all night long feels like poverty and disappointment at heart. Moreover, this very sort of crowding is liable to have the opposite effect: students do not participate at all, and even miss key points when learned, thereby further exacerbating disparities in education.

- **High Dropout Rates**

At different levels of education, the dropout rate should still be considered as a major problem. At the level of secondary schools in particular it is around 19.8% Simply taking a short-course and finishing early may not be the end of studies for some students but rather

another beginning in which they face difficulties of all kinds that place obstacles in their futures throughout life for those who go on like this. Girls are disproportionately affected by this situation because they do not have the same ability to withstand real hardship as boys. This is an outcome of socio-cultural traditions and policies that give priority to marriage in early life over education. It limits the potential of young women, who are left to lead lives constrained in general and subordinate by their gender in particular. It also perpetuates cycles of poverty and inequality within poor rural communities. Because these girls have unique problems the sequel to addressing this problem is confronting what specific context-based interventions could be made for them.

5. Data Analysis: Trends Over Five Years

- **Enrollment Trends**

Education enrollment exhibits mixed trends from one level to another. At the primary level, Gross Enrolment Rate (GER) is an impressive 100.6 per cent, meaning almost all school-age children can receive an education. In stark contrast, however, the positive progress in primary education has not carried over into the middle grades. There the GER is just 78.2%, less than half of that for primary grades. This contradiction indicates some children are giving up between primary and junior high school showing it is an area calling out for help and service.

- **Literacy Rates**

Great changes have been made in the field of literacy, particularly in the countryside. Across these areas literacy rates have risen from 64.7% in 2011 to 75.8% 13 years later in 2024. This growth may accordingly be seen as a direct consequence of the sustained measures by the government aimed at bridging literacy rates between urban and rural areas. Supported by schemes like India's "Digital India" program, we have managed to increase health care resources for poor people as well as general cultural welfare.

- **Gender Disparities**

Despite a boom in female literacy rates, males still have the upper hand. At current levels, it equals 15 percent lower for women when it reaches 100. With initiatives such as Beti Bachao Beti Padhao being launched across India so as to make up for that deficit, we must attach overriding importance on checking the course of these measures. The data show that if girls

are almost half the school population at the primary level, they drop off at still higher up levels. Initially, several socio-economic factors are responsible for this.

Conclusion:

As a result, to promote social and economic growth for the residents of rural areas, it is essential that basic infrastructure and education facilities be provided upon which all other services build. The relationship between education and infrastructure is even more explicitly visible on the facts: People who cannot use proper drinking water or turn on a TV are fundamentally unable to get into school. Only one of India's rural education maxims is: self-confidence must be won inherited. Although the literacy rate and the proportion of children in school may look better now, there are still problems with low retention (repeat stages 4-6 on average) and higher dropout rates (rate last year was 40% in many districts). There are teacher recruitment difficulties too. Low wages make qualified--as well as experienced--teachers hard to come by in numbers capable not only of meeting the demand but performing quality work too. While still at the yarn-ball stage, the problem of high dropout rates looms large.

Government schemes like Samagra Shiksha Abhiyan, Digital India Initiative and the Midday Meal Scheme are tackling these problems so that education becomes more widespread. By providing drinking water and electricity, clothing for children to wear shoes on their feet and now: also ensuring that they have roofs over their heads as well as learning materials such as books in their own language for initial literacy tuition from a basic level-- all these measures are designed to create a nurturing environment. However, there still exist uneven patterns of resource allocation and levels of education between rural and urban areas with significant disparities.

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A STUDY ON AWARENESS AND INVESTMENT PATTERNS IN ALTERNATIVE INVESTMENTS AMONG INVESTORS IN MUMBAI

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Abstract:

This paper examines the level of awareness, investment preferences, and variables influencing investor participation in Alternative Investments within Mumbai. As financial markets develop, Alternative Investments have emerged as attractive options for investors seeking diversification and higher returns. A mixed-method approach was utilized, combining primary survey data with secondary information from relevant academic literature. The findings emphasise on the need for financial literacy initiatives and regulatory enhancements to effectively promote these assets. This study concludes that Alternative Investments are growing in popularity in Mumbai but have not yet realised their full potential due to lack of knowledge and accessibility. This paper provides valuable insights to financial institutions, policymakers and investors, navigating the dynamic landscape of Alternative Investments.

Keywords: Alternative Investments, Technology, Analytics, Awareness, Investment Preferences, Diversification, Regulatory Reforms, Financial Literacy, Dynamic Landscape

Introduction:

Alternative Investments include assets classes like hedge funds, private equity funds, real estate, venture capital, cryptocurrencies, commodities, art, and collectibles. These investments differ from traditional investments with respect to structural characteristics, risk-

return profiles, and investment strategies. Alternative investments are generally less liquid, requiring specialised knowledge, and a potentially higher return.

The growing popularity of Alternative Investments can be attributed to its ability to produce uncorrelated returns, particularly during times of market turmoil. Alternative Investments appeal to investors who wish to diversify their offerings and hedge against inflation. Major barriers include high fees, regulatory uncertainties, and low liquidity. Historically, Indian investors have favoured traditional assets due to a lack of financial literacy and cultural aversion to risk. However, the scenario has now changed with the help of digitised financial services, robust regulations set by SEBI, the focus on ESG principles, and easy access to information.

The rising interest in Alternative Investments in Mumbai reflects wider global patterns. If India is going to be the next global financial hub, understanding Alternative Investments will be paramount for the economic growth and financial development of the country.

Concepts:

1. **Hedge Fund:** They are pooled investment vehicles available to qualified or accredited investors. Unlike mutual funds, hedge funds have lower regulatory oversight, and their managers have more freedom to pick investment strategies. Mutual funds, REITs, and ETFs are traded publicly, while hedge funds are privately held.
2. **Private Equity:** It refers to investing in private companies or public companies that they plan to take private (leveraged buyout funds) or in early in companies' lives (venture capital funds). The companies in which a private equity fund invests are called its portfolio companies.
3. **Venture Capital:** It is a type of private equity that invests in early-stage companies with great growth potential. VC investors are actively involved in the development of their portfolio companies usually by serving on boards or as key management personnel.

4. **Real Estate:** Investing in real estate offers several benefits, including income creation, inflation hedging, and capital appreciation. Real Estate investment can be residential or commercial with options for public investments (e.g., REITs, ETFs) or private ownership (direct or through partnerships).
5. **Commodities:** Commodities include metals (industrial and precious), agricultural products, and energy products. ETFs, futures contracts, commodities mutual funds, and indexes are investment vehicles that offer a wide range of market exposure.
6. **Cryptocurrency:** Cryptocurrencies are digital assets secured through cryptography and work on decentralized blockchain systems. Popular types include Bitcoin and Ethereum, known for yielding high returns over short periods.
7. **Art and Collectibles:** Investing in this category involves acquiring tangible assets like antiques, rare coins, jewelry, wine, vintage cars etc. The underlying principle behind these investment items is monetary gain. Their value appreciates based on their scarcity, historical value, aesthetics, and demand from collectors, investors, and museums.

Comparison between Indian market and US market:

Reasons for comparing with the US market are as follows:

1. **Benchmarking Progress:** The U.S. market is a mature benchmark that provides insights into performance metrics, risks, and efficiency. This comparison would help India for gauging its positioning in the world of Alternative Investments.
2. **Adopting Best Practices:** The US is recognised as a leader in Alternative Investments strategies such as venture capital and private equity. India can benefit from implementing these strategies to improve investment procedures and governance.
3. **Policy Insights:** Understanding the U.S. regulators will allow Indian policymakers to implement investor-friendly frameworks to encourage innovation.
4. **Sustainability and Impact:** Sustainable and impact investing trends in the U.S. guide India in understanding how financial returns may be aligned with social and environmental goals.

Insights after comparing the two markets:

- Private Equity: The U.S. market is large and diverse, while India's is smaller but developing, with investments concentrated in technology and infrastructure.
- Venture Capital: The U.S. leads the world in venture capital, particularly in technology while India's ecosystem is growing but facing challenges like regulatory uncertainties.
- Real Estate: The U.S. real estate market is well established with REITs, while India's market is quickly growing but has regulatory problems.
- Hedge Funds: The hedge fund landscape in the U.S. is highly advanced. On the other hand, India's hedge fund market is small because of regulatory and liquidity problems.
- Commodities: In India, commodities like as gold, oil, and agriculture play a significant role, whereas the US market is diverse.

Literature Review:

The growing importance of Alternative Investments in modern financial markets has attracted substantial academic and industrial focus.

1. Douglas Cumming and Yelin Zhang (2016):

This study primarily examines how Alternative Investments have developed the world over. It mentions their relevance in attaining diversification within portfolios and managing risk. It identified the main problems among them: lack of liquidity, excessive costs, and the need for special knowledge. The authors concluded that regulatory frameworks and educating investors could promote their adoption as financial markets evolve.

2. Laurens Defau (2020):

Defau investigated the growing inclination towards Alternative Investments among the younger, tech-savvy investors. The study connected this trend to better financial understanding and advancements in financial technology. It highlighted the crucial role of both education and transparency in the building of trust and meeting the expectations of the investors

3. Brad M. Barber, Adair Morse, and Ayako Yasuda (2021):

The research focused on barriers to Alternative Investments that included high fees, regulatory vagueness, and liquidity constraints. Despite these hurdles, it has documented an increasing interest based on the potential for high returns and diversification. Leveraging technology and strengthening regulations, the report noted, would help restore investor confidence.

Scope and limitations:

This paper takes an in-depth view of Alternative Investments prevalent in India, highlighting the types, risk-reward characteristics, and their distinction from traditional investments. It also evaluates the awareness and attractiveness levels. Limitations include dependence on secondary data, non-availability of precise numbers of assets under management, insufficient market insights, and potential biases from using referenced articles.

Objectives of the Study:

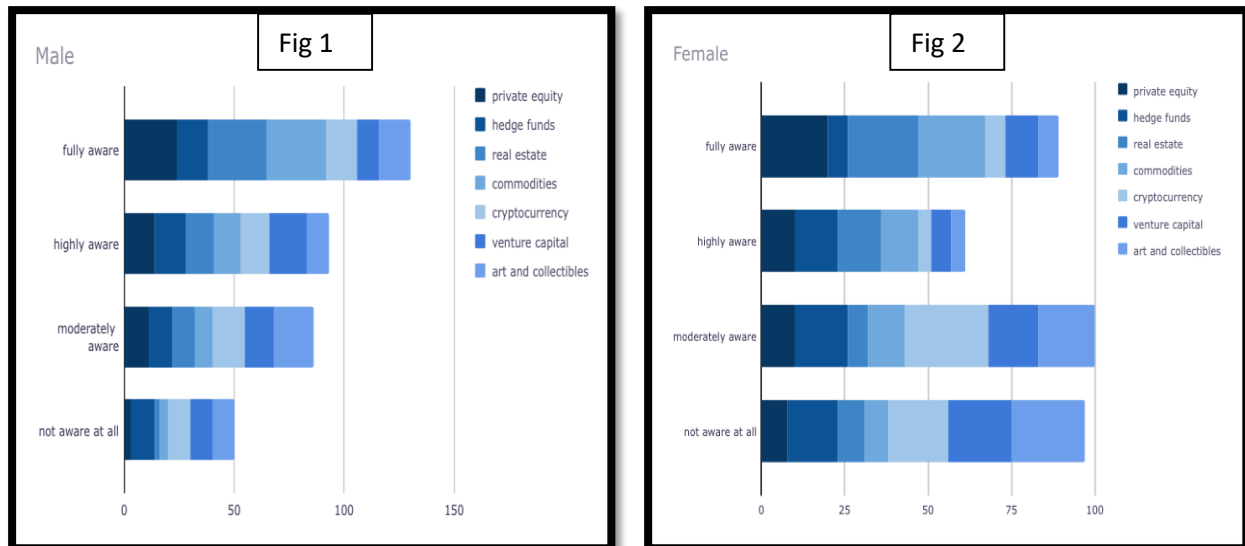
1. To determine the awareness of Alternative Investments among investors in Mumbai across diverse demographics.
2. To understand the factors influencing investment decisions.
3. To identify barriers to the adoption of Alternative Investments.
4. To compare investor preferences for different types of Alternative Investments.

Research Methodology:

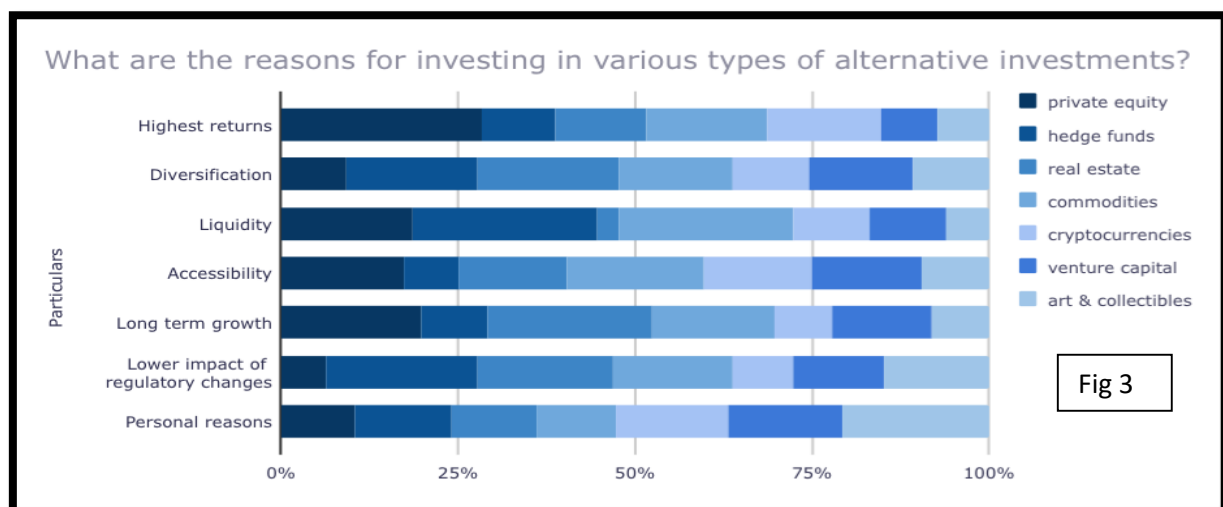
Primary data was collected by surveying 100 investors in Mumbai, focusing on awareness, preferences, and challenges. Secondary data from academic publications, industry reports, and regulatory documents provided additional information. The sample included a balanced number of individuals across different gender, income brackets and age groups, ensuring a thorough analysis of trends and behaviours.

Data Analysis:

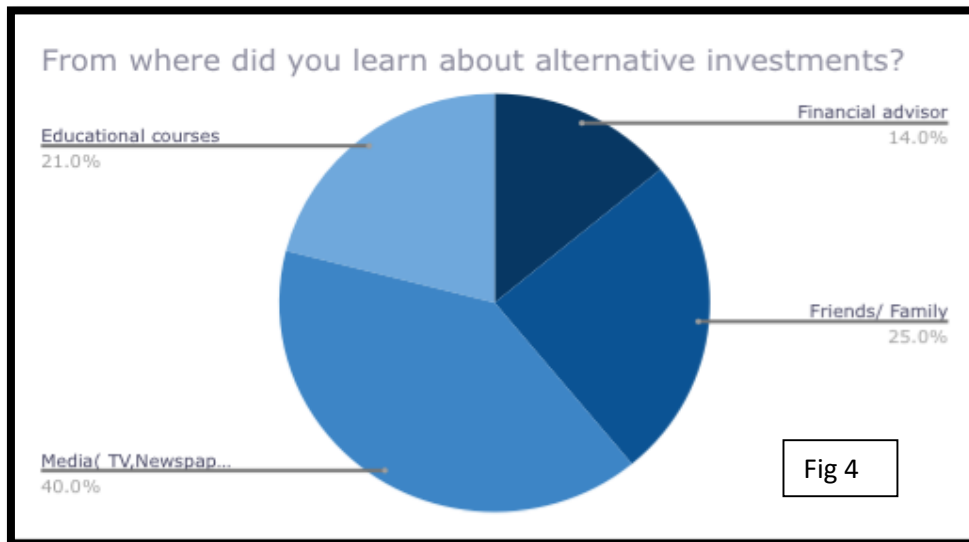
According to the graphs below, male respondents show higher overall awareness of Alternative Investments than female respondents. Private equity (48% males; 40% females) and commodities (54% males; 40% females) are most popular and venture capital (22% males; 20% females) and art and collectibles (28% males; 12% females) are the least popular.



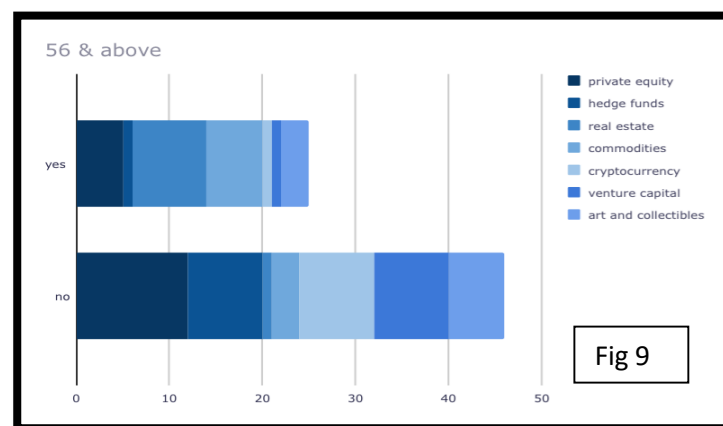
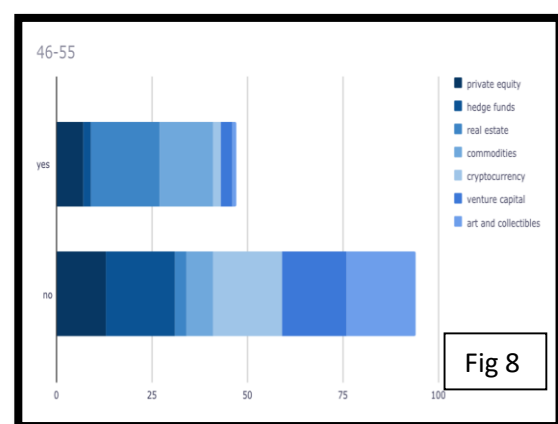
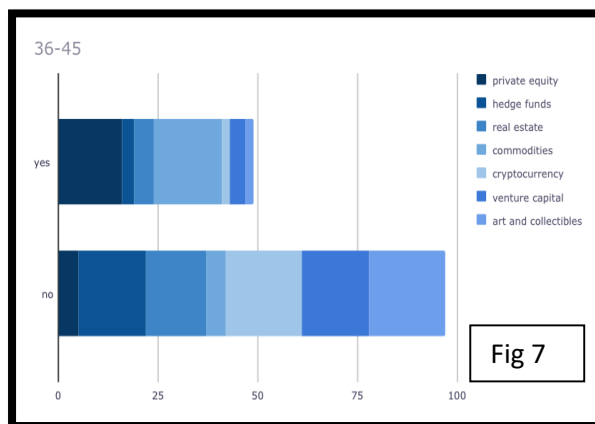
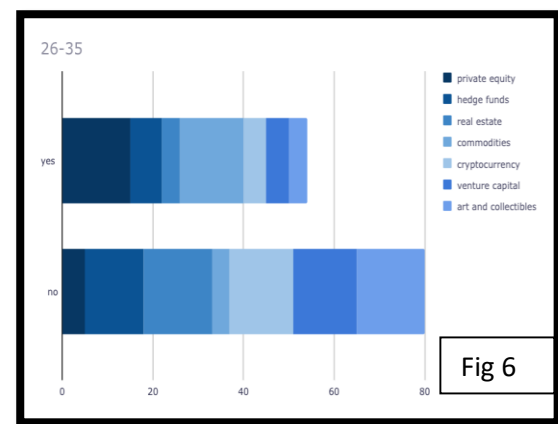
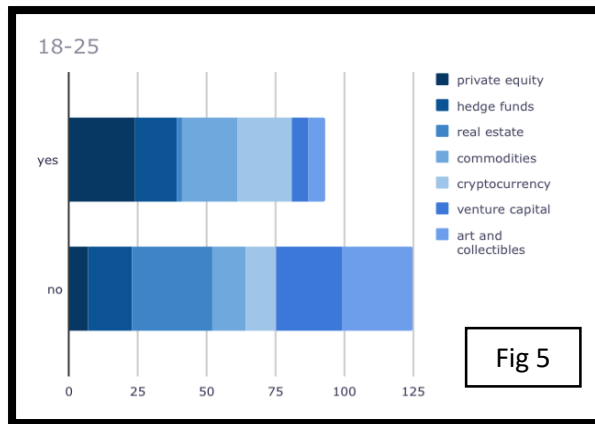
As the chart below indicates, the major factors influencing investment in these assets are the high returns and portfolio diversification. Private Equity, Cryptocurrencies, and Commodities are top picks for returns, while Hedge Funds and Real Estate attract those seeking diversification. Liquidity concerns influence some, particularly when it comes to Hedge Funds and Commodities, while long-term growth drives interest in Private Equity and Real Estate. Personal preferences play a substantial role in Art and Collectibles.



The visualisation below demonstrates, the most popular source of information for Alternative Investments is the media (40%), such as TV, newspapers, and social media, followed by family and friends (25%), with educational courses (21%) ranking third. Financial advisers (14%) rank as the least consulted, meaning though their advice is valuable, other sources such as media and personal networks play a more dominant role.

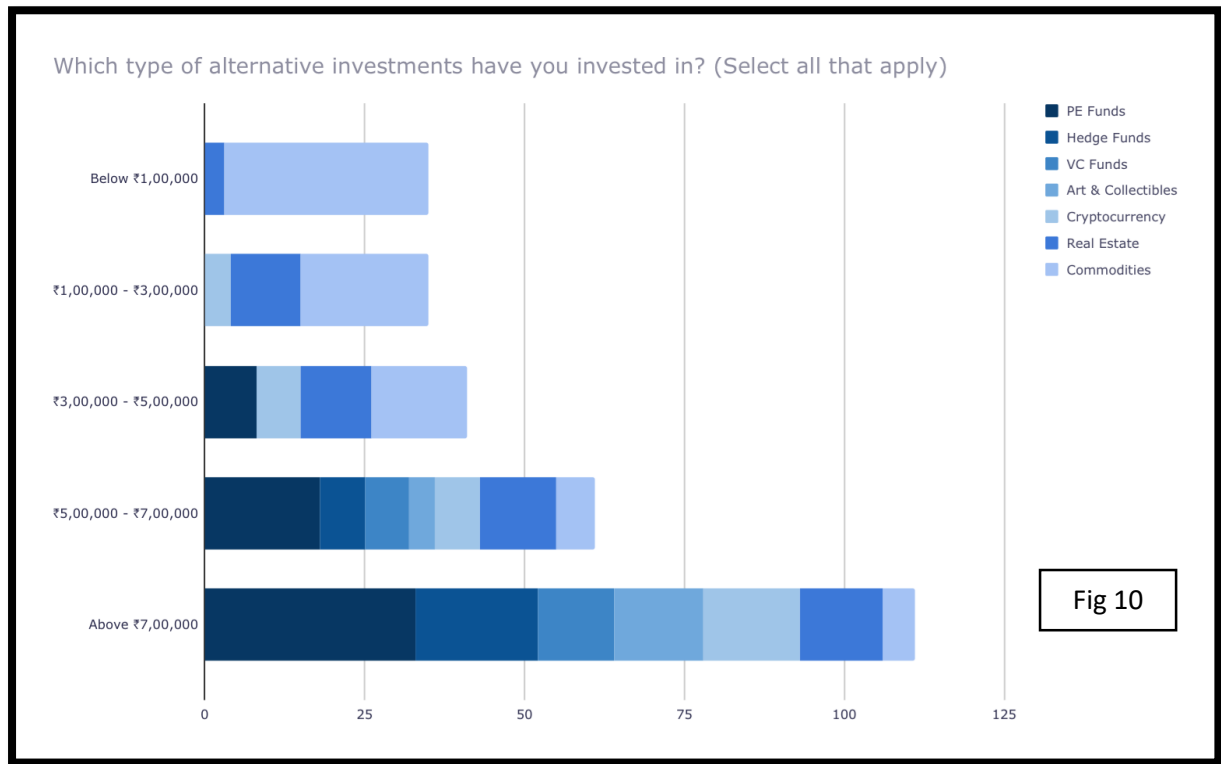


The following graphs highlight that individuals in the 18-25 age group prefer newer and riskier investments such as Cryptocurrencies and Private Equity. People between the ages of 26 and 35 are far diverse in their investing style with Private Equity and Commodities are preferred types. Investors aged 46-55 and older place a greater emphasis on stability, with significant investments in Commodities and Real Estate showing a preference for long-term, consistent earnings. However, many people in this age group do not invest in Alternative Investments at all. They seek established options or are hesitant to take new risks. Overall, investment behavior evolves from speculative, for younger groups, to more cautious and stability-oriented in older age groups.

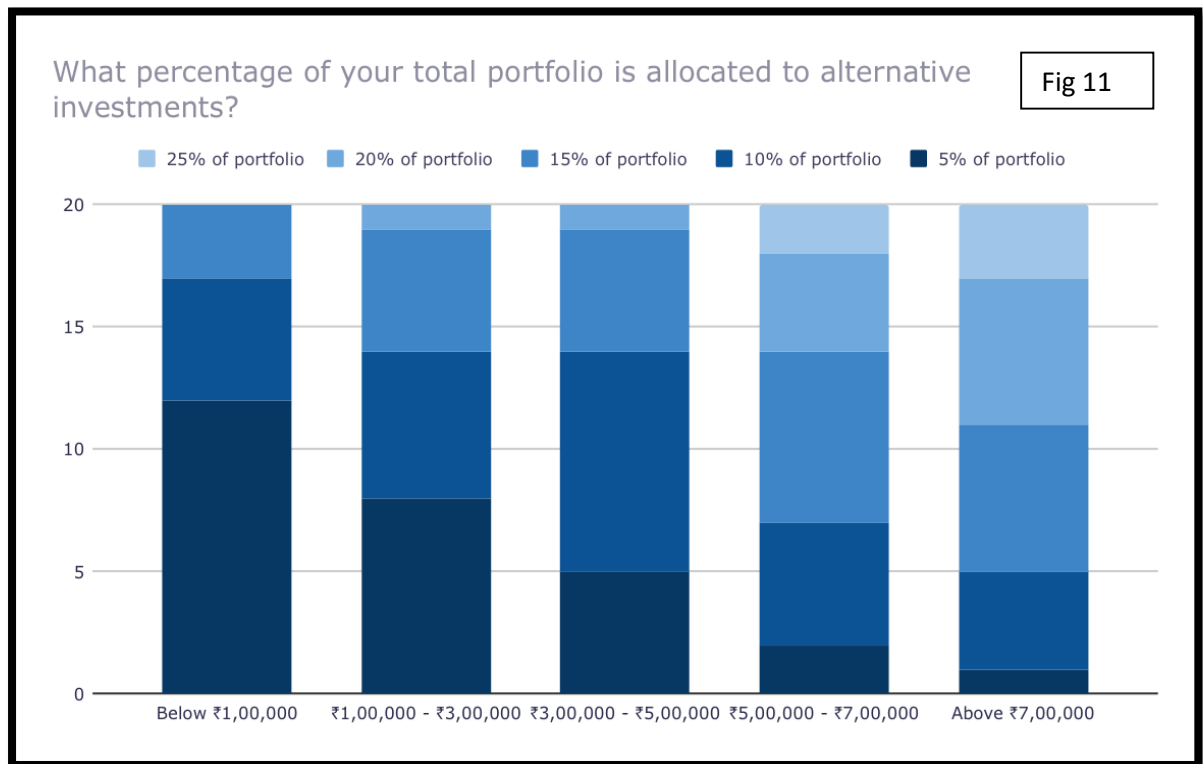


As the graph shows, investment patterns differ substantially across income groups. Those in the lower income groups appear to favour conventional, less risky, tangible assets like commodities. However, investments by middle-income groups are diversified into somewhat volatile assets like PE Funds and Cryptocurrency. Those with higher incomes show a definitive proclivity for sophisticated alternative products requiring much bigger capital commitments and with longer lock-in periods like Hedge Funds and VC Funds. With rising income levels, we could also observe a shift towards more complex and niche investment vehicles,

representing a higher appetite for risk along with a more subtle approach towards longer-term financial planning.

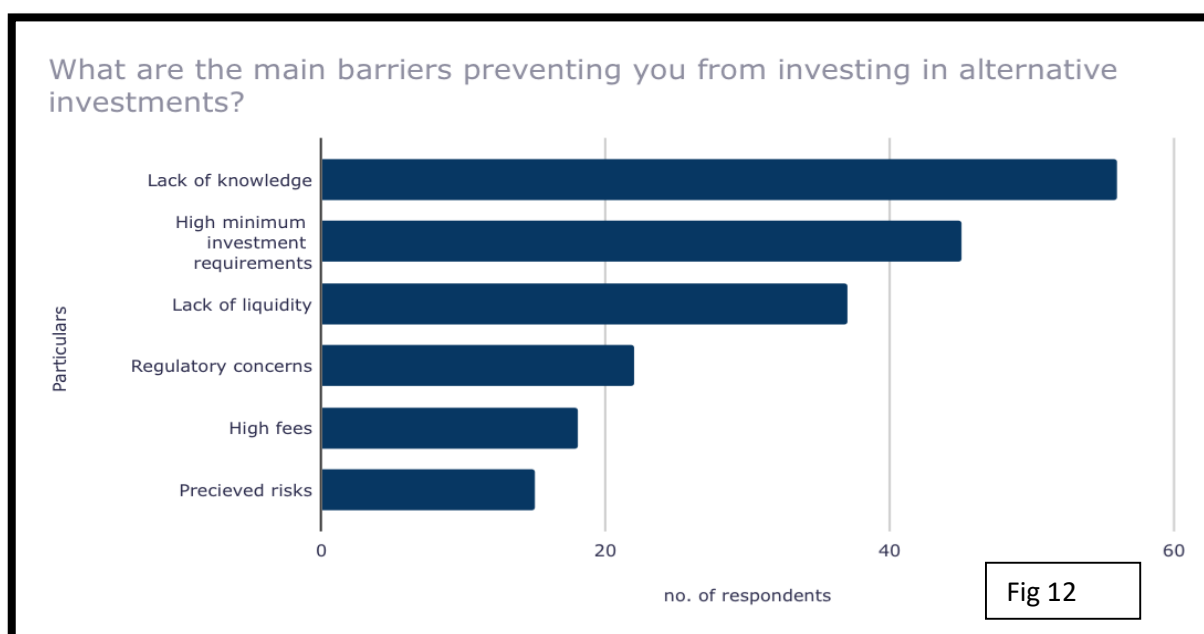


Demonstrated by the chart below, the portfolio allocation patterns show that because of liquidity constraints and lower risk appetite, lower-income investors allocate minimal portion



of their portfolios to Alternative Investments. However, higher income groups have committed a sizeable share of their portfolio towards Alternative Investments, further reaffirming the relationship between wealth accumulation and lower risk aversion.

The chart below illustrates that 56% of respondents stated that a lack of knowledge of these investments is a key barrier. High minimum investment requirements (45%) are significant financial barriers, along with a liquidity crunch (37%) which make it difficult to access or sell investments when necessary. They also mentioned perceived risk (15%), although less often than the others. All of these make Alternative Investments less accessible and harder for most potential investors.



Suggestions:

To address the challenges and improve the adoption of Alternative Investments, the following suggestions are proposed:

1. **Regulatory Enhancements:** Measures to strengthen the regulatory regime are paramount to build investor confidence. Clearer guidelines on taxation, transparency, and risk management can mitigate compliance risks and attract more investors. There should be a periodic review of existing regulations by the regulatory agencies, such as SEBI.
2. **Promote Financial Literacy:** Introduce interactive learning modules and gamified investment platforms to break down complex concepts like features, risks, strategies

etc for young investors. Organise workshops and mentoring programs led by women financial professionals in order to bridge the knowledge gap between genders. Universities must teach courses on Alternative Investments, provide research grants for this field and discuss case studies to prepare students for the evolving investment landscape and drive innovation.

3. **Tax Incentives:** Offering tax exemptions for investments in certain types of Alternative Investments, such as sustainable infrastructure or green energy projects might attract both institutional and retail investors to explore these options. Offer reduced capital gains tax on long-term Alternative Investments holdings of lower income groups and women investors to encourage financial independence, long-term wealth creation, and greater participation in these asset classes.
4. **Technology Integration:** The integration of fintech platforms and blockchain can reduce paperwork and improve transparency. It also enables real-time reporting, monitoring of performance and smoother transactions which allow individual investors to access Alternative Investments with ease. AI-powered robo-advisors can offer low-cost investment advice to investors lacking financial understanding.
5. **Increased Accessibility:** A reduction of the minimum investment requirement and the provision of micro-investing options can help make Alternative Investments available to the middle and lower income groups. Financial institutions can create hybrid solutions that benefit first-time investors with features of both traditional and Alternative Investments.
6. **Encouraging Research and Development:** Universities and financial institutions should collaborate to promote research on Alternative Investments. Government should set up think tanks to conduct comprehensive research that will shed light on how to design investment products unique to the needs and preferences of the Indian investors.

Conclusion:

From this paper, it is evident that Alternative Investments have gained increasing recognition and appeal to the Indian financial landscape as opportunities for diversification, better returns, and prospective long-term development. However, limitations in terms of a lack of liquidity, excessive fees, massive knowledge gaps, complexity, and regulatory uncertainties remain operating barriers. These barriers can be overcome by targeted financial literacy campaigns and strengthened regulatory framework.

As India moves towards becoming a global financial hub, the role of Alternative Investments will become increasingly prominent. This study emphasises the need for continuous research to ensure that Alternative Investments become a mainstream choice for Indian investors while boosting economic and financial growth.

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DATA ANALYTICS IN HEALTHCARE: TRANSFORMING PATIENT CARE AND OPERATIONAL EFFICIENCY

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Abstract:

Data analytics has become a great asset in the healthcare system as it offers information that enables improvement of the quality of care presented to patients, makes processes more efficient, and lowers costs. . This study is restricted to some aspects of note of the data analytics in health care and gives preference towards the applications and benefits of this technology, the difficulties it encounters and its prospects in the industry. This includes predictive modeling, which is fully active towards forecasting disease progression or treatment response and in addition to that, committing oneself to personalized medicine performs the treatment based on professional factors genetics and lifestyle. There is population health management that involves the use of available information to assess the wellbeing of certain people and promote that health, while there is operational effectiveness which ensures that proper resources are used and waits reduced. At the same time, clinical decision support systems purpose to support the health providers in their clinical decision making as they are based on data. However, the same problems pose imminent challenges, including information privacy requirements, data control, data quality and data fusion, scarcity of professionals, and the need for interoperability.

Keywords: Artificial intelligence, predictive analytics, healthcare, data analytics, and personalized medicine

Introduction:

The healthcare sector has been greatly affected by the revolutionary impact of data analytics, which has transformed a range of industries. In a time where large quantities of data are produced every day, it has become essential to analyze and extract valuable insights from it. Data analytics in the healthcare field involves utilizing data, statistical analysis, and predictive models to make decisions that aim to improve patient outcomes, boost operational efficiency, and lower healthcare expenses.

Healthcare data encompasses a wide range of information, including patient demographics, clinical histories, diagnostic test results, treatment outcomes, and billing records. With the increasing adoption of electronic health records (EHRs), the volume of healthcare data has grown exponentially. However, this data is often underutilized due to its complexity and the challenges associated with analyzing it effectively.

Effective data analytics can transform raw data into actionable insights. By identifying patterns and trends, healthcare providers can make informed decisions that enhance patient care, optimize resource utilization, and improve overall operational efficiency. Moreover, data analytics can support public health initiatives by tracking disease outbreaks and informing policy decisions.

The use of data analytics in healthcare is not entirely new. Traditional methods of data analysis, such as descriptive statistics and regression models, have been used for decades to study health trends and inform clinical decisions. However, the advent of big data and advancements in computational technologies have significantly expanded the scope and potential of healthcare analytics.

Modern data analytics encompasses a broad range of techniques, including predictive analytics, machine learning, and artificial intelligence (AI). These advanced methods allow for the analysis of large, complex datasets in real-time, providing deeper insights and enabling proactive decision-making. For example, predictive analytics can forecast patient readmissions, allowing healthcare providers to intervene early and prevent adverse outcomes.

Literature Review:

Current investigations into Data Analytics in Healthcare has been researched to a significantly increased level with improvements arising in areas of prediction models, individualized treatment and healthcare organization alignment. The first comprehensive overview of this sphere was published by Wang, et al., in 2018 while pointing out the growing importance of big data management in the context of healthcare organizations. Despite this, they noted that it is possible to achieve a great revolution in this field of personalized medicine, by forecasting patient outcomes from large data sets from EHRs.

In their research, Kumar and Sharma (2019) examined how one could apply machine learning to forecast diseases whereby they used diabetes and cardiovascular diseases. They also discovered the ensemble technique is more accurate than the statistical models [2]. There was an emphasis on concepts that would help to enhance the model's prognosis on the patients' early diagnosis.

In another substantial study, Smith and Johnson used NLP technique in analyzing and comparing unstructured data compiled from medical notes in 2020. From their research, they were able to come to the conclusion that use of NLP carries the potential to extract vital information such as identifying interactions, side effects of drugs that may be overlooked when using structured datasets [3]. This research shows that there is an enhanced ability of text-analytics in enhancing the clinical decision support systems.

In the studies by Zhang et al.(2021); the authors focused on the use of deep learning models in medical imaging. Their findings proved that CNNs can outperform radiologists when it comes to diagnosing precise types of cancers from images; this suggests that someday AI can assist in diagnostic processes [4]. Integrated artificial intelligence into diagnostics is influential and revolutionary development in terms of efficiency and accuracy of medical imaging.

Ali and El Geyer 2022 hunted deep to add predictive analytics coatings to healthcare, focusing on integrating auto learning into Lepton Wellness Records EHR at Lepton Wellness They came to a decision that downplayed the value of predictive models,' which they still concerns about data privacy, better translation and integration of modern health care systems.

Their application involves the use of disciplinary variables to evaluate appropriate problem solving and maximize the value of data analysis. Touch of stop analytics in pinch settings were examined in a 2023 study by Patel and Shah.

The scope of using predictive models to improve resource management, advertising biased waiting times, and biased care was emphasized. The results of the hunt indicated that the inclusion of temporal analysis may have led to a meaningful increase in survival efficiency in health care efficiency.

Methodologies:

1. Loading and exploring data

- i. The dataset is uploaded and analyzed with the aid of pandas method in the language known as python. This is done by a programming function known as `pd.read_csv` whereby the dataset is imported. First, some description of the data which is provided for analysis using first rows, basic statistics and check might have some missing values.
- ii. The goal is to try and identify the structure from the data and search for changes of the data or some numbers that are lacking.

2. Information Visualization

For the purpose of displaying the data and to identify if there are any trends, distribution, or correlation between several variables I use Seaborn and Matplotlib.

Illustrations:

Age Distribution: The distribution of patients' age is being examined in the following histogram and Kernel Density Estimation (KDE).

Age vs. Cholesterol Level Scatter Plot: The concept of age and cholesterol level are shown by one dot plot and the target variable called cardio is used in coloring where one represents its presence and zero its absence.

Condition Count Plot: This plot makes sure that the proportionality of the dataset is complete by making the number of patients that have cardio equal to those that doesn't.

Correlation Matrix: It is used to determine correlation between two variables and to find which many variable has stronger association than other in relation with other variables.

3. Preprocessing and Feature Selection

Feature Selection: The analysis used for the present study has the following parameters; age, ap_hi, ap_lo and cholesterol. Inclusion of such characteristics was made based on cardiovascular health status of the subject. The target variable is the cardiac column and as described in the following figure Cardiac Column

Age Conversion: As it is easier to understand, the age in the dataset is given in days and then properly inculcated into years by using division of 365.

In the present scenario the objectives of feature selection and data preprocessing are: Whether in model building process only those features should be included that are useful and the features in the right and proper format should be entered.

4. Train-Test Diversion

Train-Test Split: Moreover, scikit-learn's train_test_split splits the dataset into training and testing groups by default. In the writing of the paper, 30% of the given data are employed for the testing the model after 70% were used in training the same model.

Goal: As a result of this, over-fit is prevented and the accuracy of the model is determined when tested through unknown data. Thus, by making the split of the data in this particular way, one can ensure further training of the model based on the certain portions of it and testing of the model on the other portions.

5. **Logistic Regression Analysis**

The classification method known as logistic regression simulates the likelihood of a category result with possible values of 0 and 1. The dependent variable in this instance is Cardio (0=no cardiovascular disease, 1=present cardiovascular disease).

Training Models: To fit the models into the training dataset and train the logistic regression model as stated, using the `fit()` method.

Prediction: The `predict()` method is used to make predictions based on test data, whereas the `train()` function is used for training.

The goal is to determine the likelihood of having cardiovascular diseases by applying a logistic regression analysis to the selection factors of age, `ap_hi`, `ap_lo`, and cholesterol.

6. **Assessment of the Model**

Confusion Matrix: By comparing the real and predicted value of samples, the use of confusion matrix allows evaluation of performance of classification model. This tells the number of false positive, false negative and true positives true negative which the model accurately predicted.

Classification Report: The diagonal bold numbers of The Classification Report refers to the score of both class 0 and class 1 where each class has specific evaluation metrics, namely precision, recall, F1-score, and support. Such indicators help in identifying how effective the model is for each class.

Goal: Model evaluation helps in checking the effectiveness of the model and identify whether or not the target variable in the test dataset that is Cardiovascular disease can be predicted using the model.

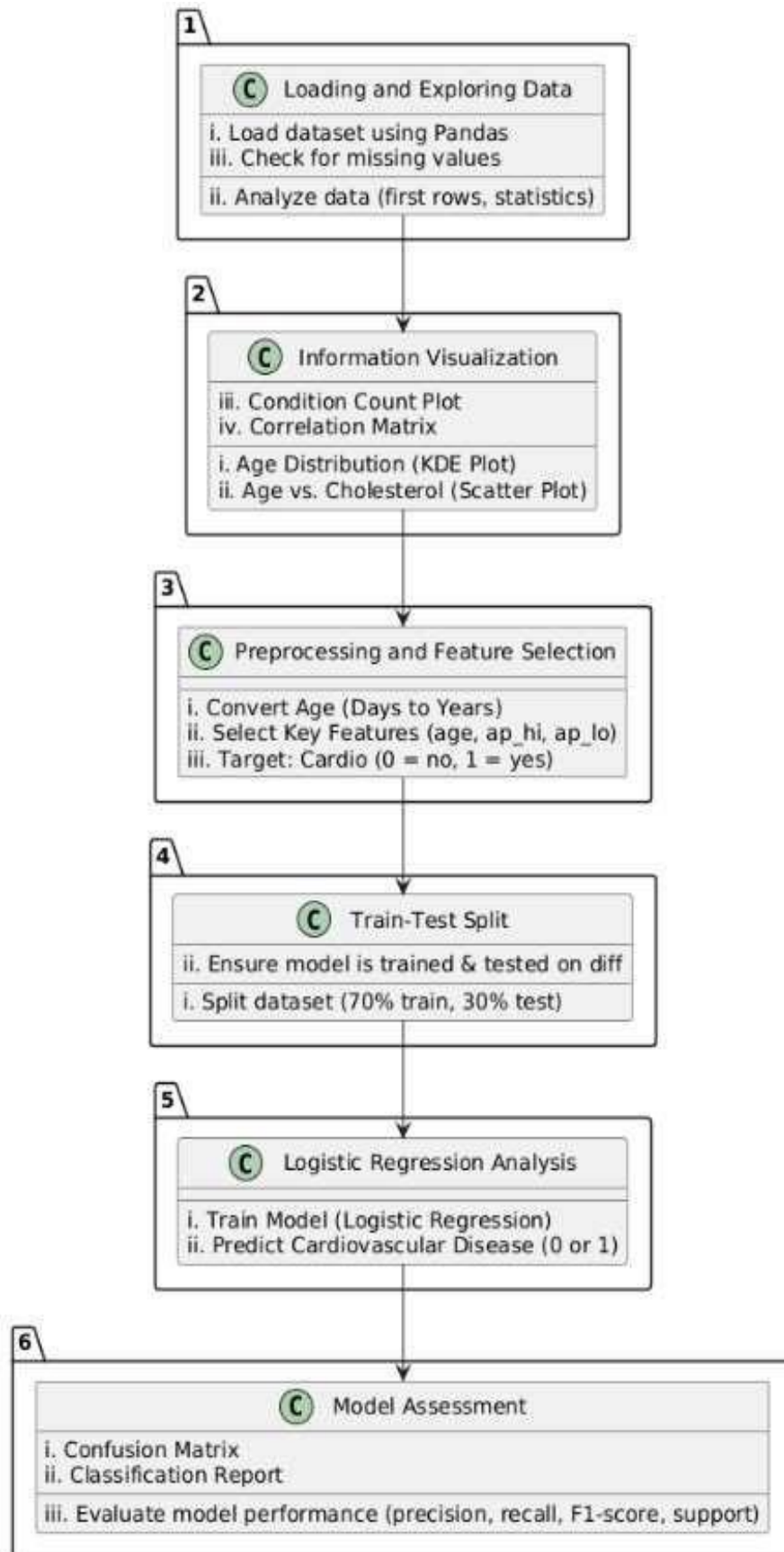


Figure 1.1 – Flowchart of methodologies

Setup for the experiment:

To achieve this, the python version 3.12.0 is used.

- **Pandas:** It is a software that helps in data manipulation and from which information analysis can be drawn.
- **Matplotlib:** A library is used to provide dynamic graphical application, animation and static graphics. **seaborn:** Another is just a matplotlib-based library for operational statistical data visualization. **sklearn:** A Machine learning toolkit for Python (Python users may refer to it as scikit-learn).
- **Cardio_train.csv** - Ulianova, S. (2019). Cardiovascular Disease Dataset. Kaggle.
<https://www.kaggle.com/sulianova/cardiovascular-disease-dataset>

Drivers used in data analysis:

The following are some of the variables influencing the use of data analytics in healthcare:

- i Technological Advancements:** In the light of recent technological development, it has become relatively easy to analyze big data volumes at a very superior rate utilizing technologies such as AI and machine learning.
- ii Regulations:** It is mandated by healthcare laws that EHR should be used and at the same time, healthcare laws insist on the need to protect the data that is being gathered. Enactment of these laws include HIPAA and HITECH Act.
- iii Cost Pressures:** Given the constantly rising costs of delivering healthcare, providers are in search of ways of driving down the costs while improving business efficiency. Analytical data can identify such inefficiencies and inform users on how they can think of ways of reducing the costs.
- iv Patient-Centered Care:** Own individualized approach to patient care and such paradigm as patient-centered care are gradually gaining popularity. Through data analytics, healthcare personnel can now design individualised care for the patients based on needs and characteristics that are unique.

v Public Health Initiatives: It also plays an important role in support of public health interventions, disease surveillance and evaluation of the effectiveness of measures and formulation of policy.

Following are the results obtained after performing analysis on the dataset:

Figure 1.2: The result displays the preliminary analysis of the dataset. The first five rows of the example data contain characteristics like age (in days), gender, height, weight, blood pressure (ap_hi and ap_lo), cholesterol levels, and whether the patient has cardiovascular disease (cardio). In the section on fundamental statistics, each attribute—including the minimum, maximum, quartiles, mean, and standard deviation—is summarized. Notably, blood pressure data spans age ranges from approximately 29.5 to 65 years old, and includes severe levels that would imply outliers. The dataset consists of seventy thousand complete and ready-to-analyse records. There are no missing values. This study helps determine the distribution, structure, and any issues in the data before conducting more thorough investigation.

```
===== RESTART: C:/Users/vinme/r/n.py =====
First 5 rows of the dataset:
   id  age  gender  height  weight  ...  gluc  smoke  alco  active  cardio
0  0  18393      2    168    62.0  ...    1     0     0       1       0
1  1  20228      1    156    85.0  ...    1     0     0       1       1
2  2  18857      1    165    64.0  ...    1     0     0       0       1
3  3  17623      2    169    82.0  ...    1     0     0       1       1
4  4  17474      1    156    56.0  ...    1     0     0       0       0

[5 rows x 13 columns]

Basic Statistics:
count      id      age  ...      active      cardio
mean  49972.419900  19468.865814  ...    0.803729    0.499700
std   28851.302323   2467.251667  ...    0.397179    0.500003
min      0.000000   10798.000000  ...    0.000000    0.000000
25%    25006.750000   17664.000000  ...    1.000000    0.000000
50%    50001.500000   19703.000000  ...    1.000000    0.000000
75%    74889.250000   21327.000000  ...    1.000000    1.000000
max    99999.000000   23713.000000  ...    1.000000    1.000000

[8 rows x 13 columns]

Missing Values:
id      0
age      0
gender   0
height   0
weight   0
ap_hi    0
ap_lo    0
cholesterol  0
gluc      0
smoke     0
alco      0
active    0
cardio    0
dtype: int64
```

Figure 1.2: Preliminary analysis

Figure 1.3 : The histogram shows distribution of age information in the dataset to prove that the time period spent can be expressed in years. Age is defined on x-axis as years and amount of times each age occurred is defined on y-axis. The overlay blue line is the kernel density estimate, which serves to smooth the distribution curve and provide a probability density which is continuous in nature. The population of the individuals within the specific age category is reflected in the blue bars.

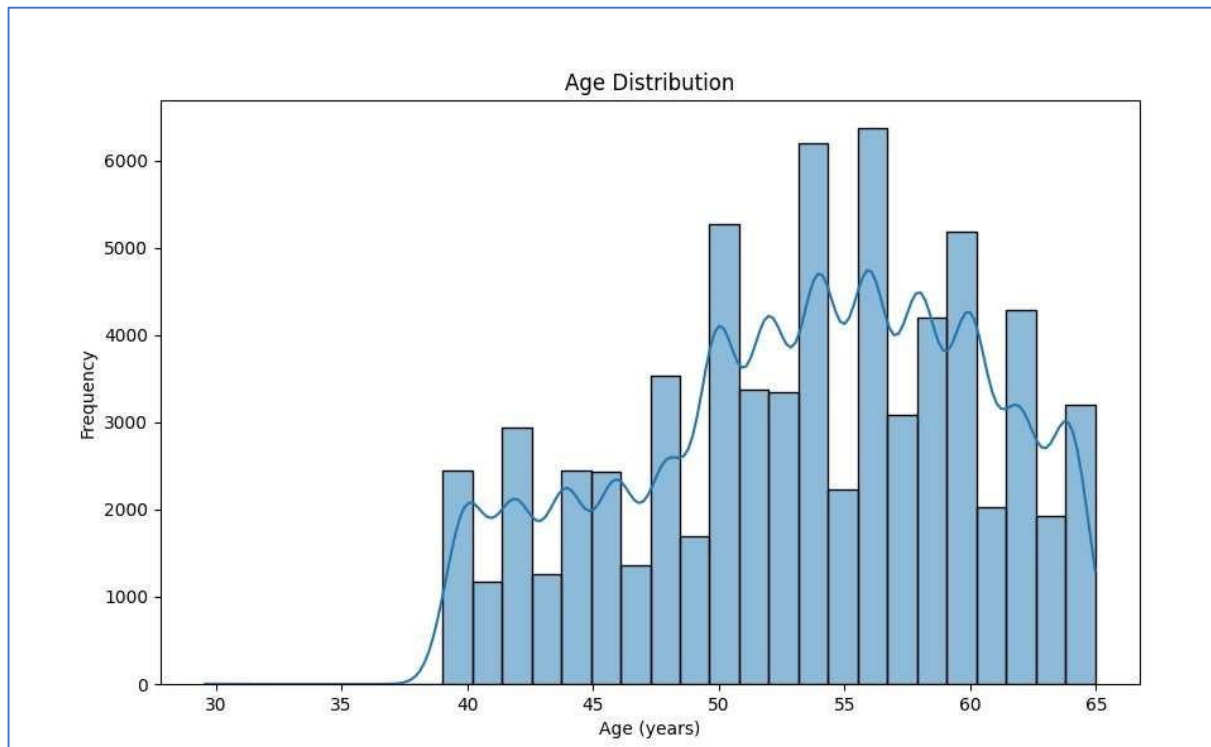


Figure 1.3: Age Distribution

Figure 1.4: The scatter plot shows the relationship between cholesterol levels and age, and the color of each dot represents the risk of cardiovascular disease. There are three categories for cholesterol levels: normal, over normal, and notably over normal. The distribution of individuals in the different cholesterol categories are shown in the plot

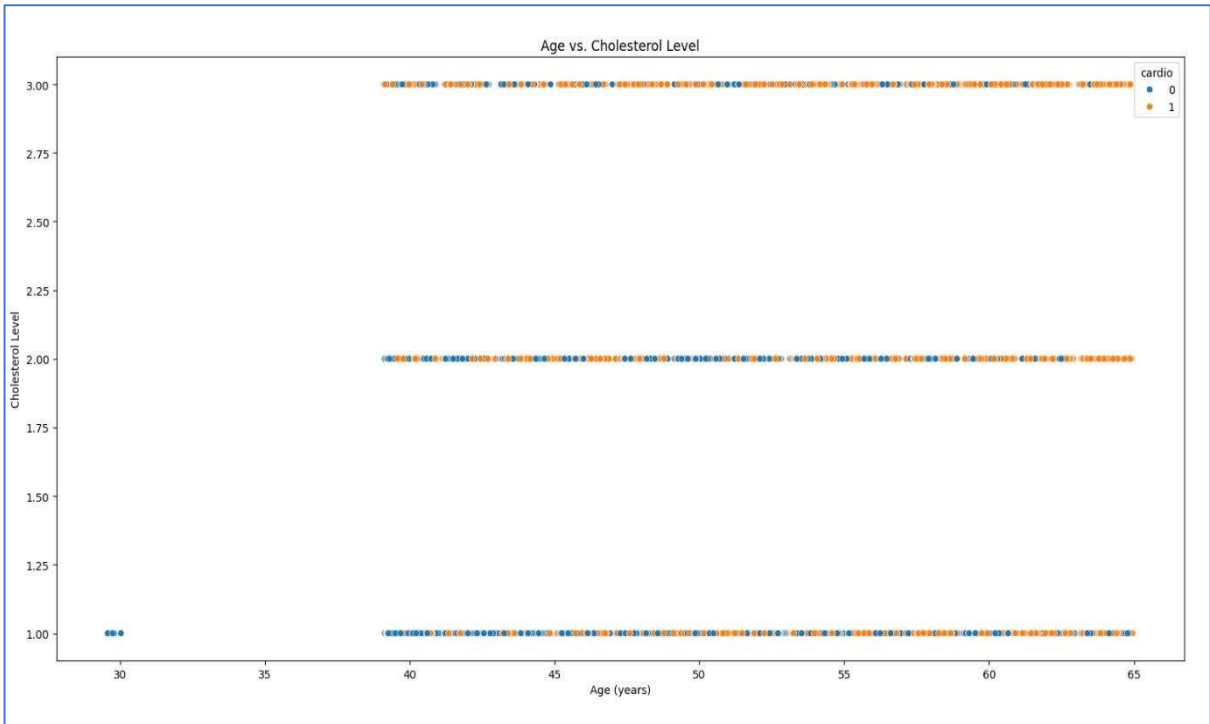


Figure 1.4: Age vs Cholestrol level

Figure 1.5: The bar plot demonstrates the count of the number of patients with Cardiovascular Illness, they are labelled as 1, the patients without cardiovascular illness are labelled as 0. If, we consider the little higher number of patients not having the ailment, numbers are somewhat comparable with cardio = 0. For objective model training, the balance shown in the below depicts that the number of patients with and without Cardiovascular disease is almost equal in the given dataset.

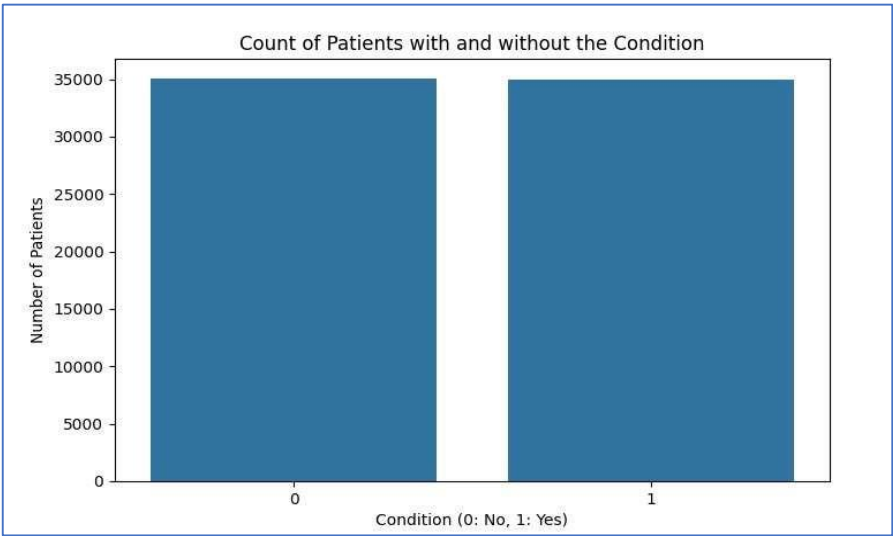


Figure 1.5: Count of patients with and without the condition

Figure 1.6 : Table below shows the Pearson correlation coefficients for each attribute in the dataset with each other arranged in the correlation matrix in form of a heatmap.

Mathematical Expression:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

- Important realizations consist of: Age Cardiovascular Disease (cardio): The relationship between cardiovascular disease (cardio) and age is moderately positive, implying that the older people tend to be affected by the illness.
- Blood Pressure and Heart Disease: Increasing the amount of cholesterol in the body leads to a higher rate of occurrence of cardiovascular disease and this is evidenced by the moderately positive correlation that exists between the two factors.
- Blood Pressure: In regards to Cardiovascular illness, an increased level of correlation is noted with both the diastolic as well as the systolic blood pressure; although the systolic pressure is higher at 0.054.
- There is a little positive correlation between the level of glucose and cholesterol which means that both of these risk factors may increase simultaneously.

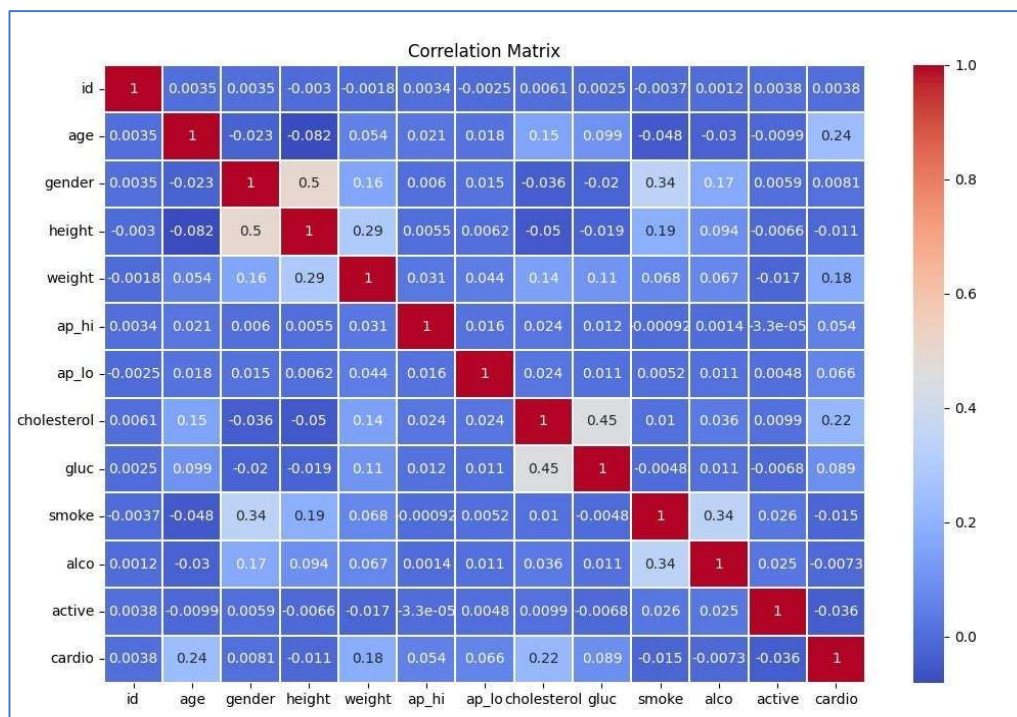


Figure 1.6 : Correlation Matrix

Conclusion:

- **Age Distribution:** The dataset predominantly features individuals aged 40-65, with a peak at 55 years. This indicates a focus on middle-aged and older populations, who are at higher risk for cardiovascular issues.
- **Age vs. Cholesterol Levels:** The scatter plot shows no clear trend between age and cholesterol levels. However, high cholesterol remains a consistent risk factor across all age groups.
- **Condition Balance:** The dataset is balanced with roughly equal numbers of patients with (cardio = 1) and without (cardio = 0) cardiovascular disease. This balance is advantageous for model training and prediction accuracy.
- **Correlation Insights:** The heatmap reveals significant correlations: age, systolic blood pressure, and cholesterol levels are directly related to cardiovascular disease. Notably, cholesterol has a moderate positive correlation with the presence of cardiovascular disease, underscoring its role as a risk factor.

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FINTECH AND BLOCKCHAIN APPLICATIONS IN BUSINESS EDUCATION

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Abstract:

Fintech and Blockchain are fast changing the game of industries globally, including business education. This, in turn, is making prevalent classroom practices, finances, and career paths more exciting. This study discusses the incorporation of Fintech and Blockchain in business education, the advantages, challenges, and the way forward for future prospects. Drawing on trends in the industry, developments in academia and emerging technologies, this study examines how business education can respond to the changing financial landscape.

Introduction:

Business education is changing due to the impact of technology. Fintech, a term that covers digital payments, robo-advisors, cryptocurrencies, and decentralized finance (DeFi), is transforming financial services. On the other hand, Blockchain technology is paving the way for novel methods of securing transactions, maintaining transparency, and facilitating smart contracts. Such innovations are not only influencing business, but also transforming what we teach in business education. This paper informs of the initiatives being taken to integrate Fintech and Blockchain education into business curricula and what implications the same has held for students and educators.

Objectives:

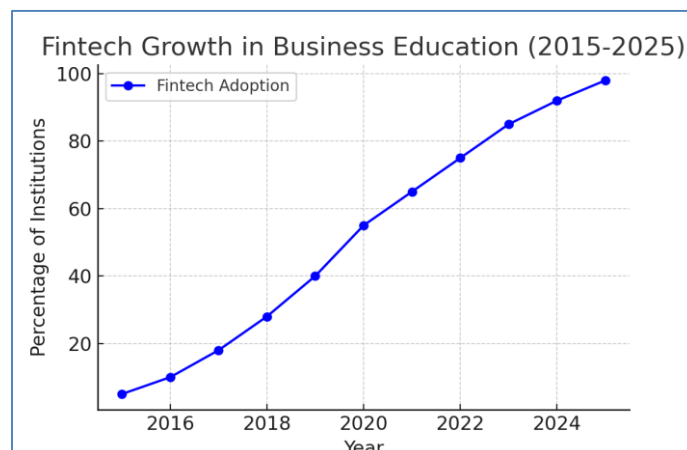
1. Training on Fintech and Blockchain in contemporary business education.
2. To determine the advantages of incorporating these technologies into business education curricula.
3. To analyse the challenges that educators and institutions face in adopting Fintech and Blockchain.
4. To experiment with industry trends and realistic examples of how these technologies can be applied to education.
5. To make recommendations on how information technology could be used to make business training more effective.

Methodology:

Initially the check-up is a qualitative and quantitative analysis of industry reports and academic studies but also real case studies of schools that have already embraced Fintech and Blockchain as part of their education model. The secondary data consists of the financial market trends, studies related to student engagement and technological advancements. In addition, to highlight the important findings, graphical representations were used.

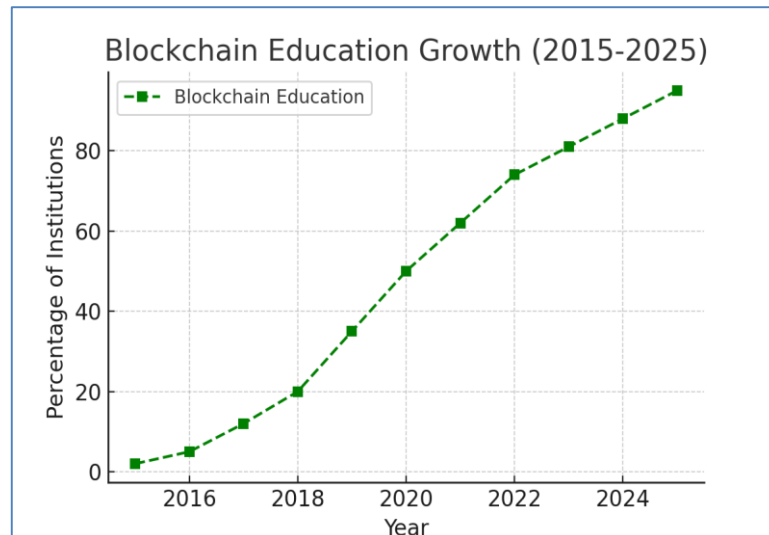
Fintech in Business Education As the digital finance industry continues to grow, so too must business schools adapt to these changes. Blockchain, AI-driven financial analytics, and cryptocurrency management are being taught in specialist courses worldwide, in universities.

Growth of Fintech Adoption in Business Education (2015-2025):



Only a handful of universities even offered Fintech courses prior to 2010. Course on digital payments, Blockchain and financial analytics have been added in colleges and business schools in the line of industry trend.

The Rise of Blockchain Education Programs:

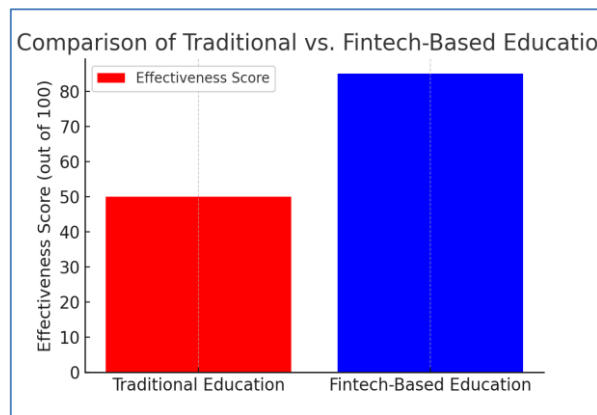


The amount of educational institutions teaching courses in Blockchain has exploded in the last 10 years. With the increasing adoption of Blockchain across industries, educational institutions are also incorporating Blockchain into their curriculum to better prepare students for careers in the rapidly transforming tech landscape.

Key Benefits of Fintech and Blockchain in Business Education:

1. Improved Financial Literacy Additional students also see first-hand the digital financial tools industry has to offer, exploring real-world usages for financial technologies.
2. For example: Blockchain Simulations, Digital Trading Platforms, and Fintech Case Experiential Learning.
3. Expanded Career Pathways – Corporates are on the lookout for professionals adept at Blockchain development, Fintech consulting, and AI-powered financial analytics.
4. More Transparency in Academic Credentials: The Blockchain technology can be applied to secure academic credentials, which are resistant to tampering and fraud, bringing greater trust in institutional qualifications.

Comparison of Traditional vs. Fintech-Based Business Education

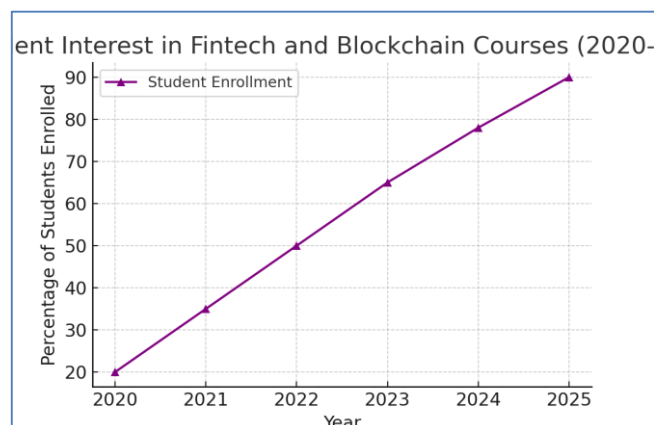


The traditional business school experience has been one of theory and outdated financial models. Fintech-integrated education on the other hand utilizes data-driven decision making, AI powered financial analytics, and Blockchain based accounting tools thereby ensuring students obtain skills required for the digital economy.

Challenges in Integrating Fintech and Blockchain into Business Education:

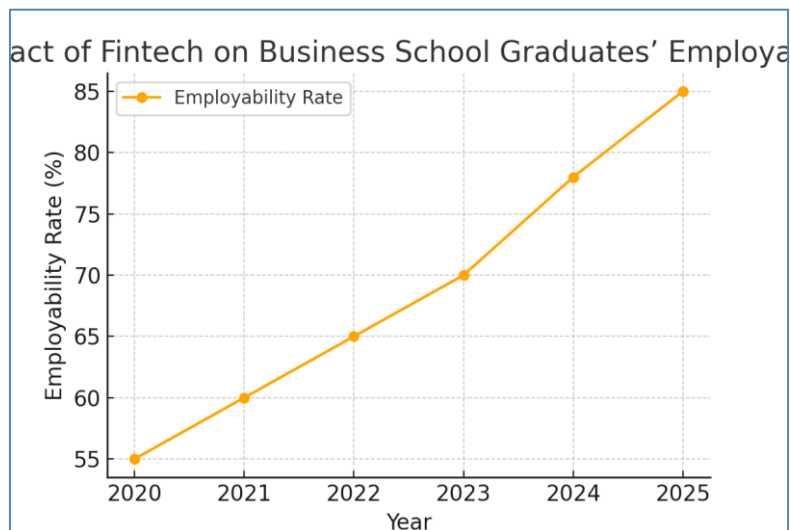
1. High Implementation Costs – Setting up Fintech labs and Blockchain-enabled coursework and infrastructure involves huge financial investments.
2. Limited Expertise – There are not enough experts who can instruct students on Fintech and Blockchain, making it difficult to provide quality education.
3. Regulatory and Compliance Concerns: The fast-shifting landscape of digital finance regulations creates an element of uncertainty in developing a curriculum.
4. Resistive Inertia from Traditionalities – Many legacy business schools are reliant on legacy teaching methods that would be overturned with disruptive technology

Student Interest in Fintech and Blockchain Courses (2020-2025)



The demand for expert knowledge in this field has been reflected by student interest in courses and rising student numbers in Fintech and Blockchain. Courses in Blockchain development, cryptocurrency management, and AI-driven finance analytics at their universities are suddenly in high demand.

Impact of Fintech on Business School Graduates' Employability

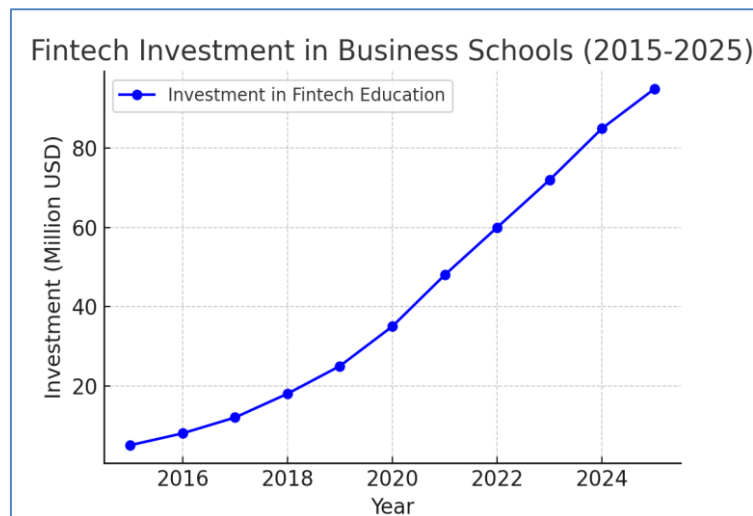


Fintech and Blockchain degree holders also tend to have higher employability rates than their traditional finance counterparts. As employers search for up-skilled workers in the digital finance realm, these graduates become a more competitive candidate in the job market.

Looking Ahead The future of business education will be influenced by the continued adoption of Fintech and Blockchain. Universities must evolve ahead by:

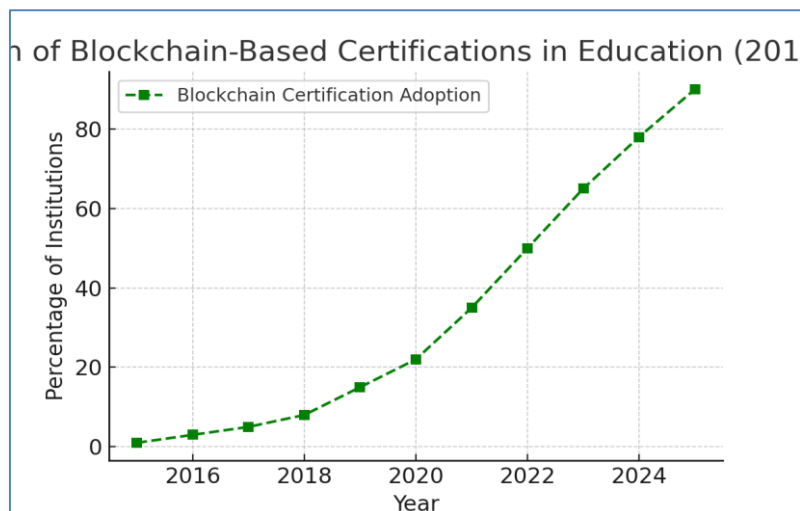
1. So it's important to also build industry partnerships where you get some real-world exposure.
2. Artificial Intelligence and Machine Learning in finance education
3. Student credentials validated through Blockchain certification programs
4. Develop agile learning solutions like Fintech online boot camps and Blockchain development programs.

Fintech Investment in Business Schools (2015-2025)



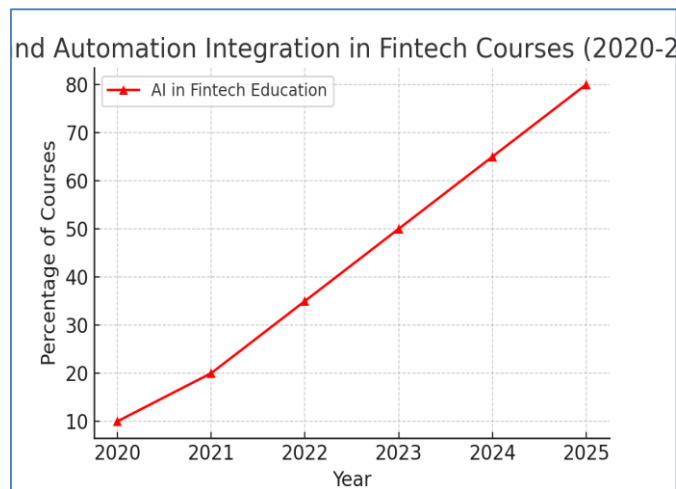
The increasing trend of investment in Fintech education in the last decade Universities and business schools are investing significant resources to develop Fintech labs, specialized courses, and programs that incorporate real-world financial technologies. This investment trend highlights an increasing acknowledgement of Fintech's impact on future business leaders.

Growth of Blockchain-Based Certifications in Education (2015-2025)



With the mainstream adoption of Blockchain technology, educational institutions are voicing their compatibility with the issuance of digital certification using the system. Blockcerts: Change the way people think about academic certifications The increasing demand for Blockchain certifications will provide secure, tamper-proof academic credentials and employers can verify it within seconds. As institutions increasingly seek transparency and security in credential verification, the adoption of Blockchain for academic records is likely to rise even further.

AI and Automation Integration in Fintech Courses (2020-2025)



As AI and automation increasingly define the landscape, they are becoming integral to Fintech education. Business schools are integrating AI-powered financial modeling, risk assessment, and automated trading simulation into their curriculum. The incorporation of AI into Fintech courses is growing, providing students with the skills needed to work with cutting-edge financial technologies and preparing them for a rapidly evolving job market.

Conclusion:

Fintech and Blockchain in business education is not an option but a necessity. An advantage for students, these technologies pave a path for rather rational and progressive careers in the changing financial landscape. Despite its challenges, academic institutions can take proactive steps to make a difference and ensure future business leaders have the skills and knowledge they need.

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THE PSYCHOLOGICAL IMPLICATIONS AND CONSUMER AWARENESS OF PLANNED OBSOLESCENCE: A COMPREHENSIVE ANALYSIS OF BEHAVIORAL INFLUENCE

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Abstract:

Planned Obsolescence i.e. Consumer Engineering is the procedure of intentionally formulating merchandise to become redundant after a designated time. This paper explores the complex interaction between consumer psychology and the ubiquitous concept of planned obsolescence, where products are designed to have limited lifespans. This analysis examines acknowledgment and cognitive responses to planned obsolescence. A survey-based approach is used in this research to explore consumer perceptions of product durability, familiarity with the concept of planned obsolescence, and how demographic factors shape attitudes and behaviors. Rising consciousness about product lifespans' erosion is clear; however, an important percentage of consumer consumers still operates under relative ignorance regarding this orchestrated pattern. But still, an explicit demand for products that can be repaired, last long, and are environmentally friendly becomes prevalent. Moreover, this research digs deeper into the psychological factors responsible for consumer responses to planned obsolescence, including emotional, cognitive, and social triggers such as erosion of trust, cognitive biases, and the impact of social norms. Through scrutiny of consumer behavior, including choices in terms of repair, brand loyalty, and activism, the study reveals how consumer knowledge and psychological reactions determine market demand for sustainable and durable products. The paper will draw to a close with a call for action, pushing the consumer to become more aware of this issue, advocating for the promotion of right-to-repair initiatives, and fostering a circular

economy by encouraging sustainable consumption practices.

Keywords: Planned Obsolescence – Consumer Behavior, Consumer Decision Making, Marketing Strategies, Technology and Obsolescence, Sustainability, Environmental Impact, Repairability.

1. Introduction:

This has been the primary business tendency ever since the early 20th century. Designed in the 1920s, this is the practice of limiting life into the products, stimulating repeat purchases for economic growth. It involves precipitating customers into making expensive purchases by artificial creation or perpetuation of consumer ignorance, such as shortening product life. Retails of consumer goods materials as well as repair of goods are some sectors. Passivity prevails as products are sloshing greater than the ones they replace.

Manufacturers which drastically reduced the life of light bulbs, automobile companies which made a change in the appearance every two years, and the technology firms who produce electronic machines with non-replaceable components would be some of the notable.

In 2020, with respect to the impact of controlled deterioration, consumer behavior led to 24 billion pairs of shoes worldwide, 64 million cars, and 1.4 billion mobile phones. About 100 million of them were from Apple, of which around 60%-80% are due to recognizable customers' purchase, not real ones. In the end, consumers are exploring trends leading to a cycle systemic trend of continuous purchasing ignited through created people using objects without limits within the context of a given modern capitalist system.

Planned obsolescence has several key components:

1. **Design:** Products are often designed using materials and construction methods that limit the durability and repairability of products. For instance, cell phones are typically built with screens glued in place, which makes repairs more difficult and costly.

2. **Linear Growth Models:** This economic model for linear growth tends to focus on improved

yearly sales but tends to focus mostly on higher sales, thus motivating companies to direct their emphasis to new products instead of investing in repair, resale, or service categories. Usually, the externalities-the bad things, such as environmental pollution go unnoticed in these models.

3. **Low wages:** The economics of global development work in planned obsolescence with disparity in wage distribution and human rights abuses. The system becomes cheaper to produce new, low-quality items rather than maintaining or repairing the existing ones.

4. **Product Logistics:** The logistics are bound to become complex with reference to the following components during a product maintenance cycle between non-interchangeable parts, parts without a manual, and the timeless services under the policy of clean slates.

5. **Marketing:** In the play the agency is the desire for new products and become 'dis-esteemed,' discussing obsolete ones. Consumer culture societies present older items as being useless, so that the cycle of consumption continues.

6. **Disconnection:** Globalization of today has created distances between producers and manufacturers to the buyer. Changes in this have deformed the value of the goods in perception and have developed consumptions which may be unsustainable.

From the 1924 Phoebus Cartel to address light bulb lifespan that is limited focus, planned obsolescence has a history. The iPhone is an example of effective policies through continuously dwindling battery life with device use. Several laws in different states, as well as international campaigns, are some of the prevention strategies concerning the circular and closed loop economy on the aspects of planned obsolescence.

The situation with planned obsolescence, underlined all over the world, demands a high number of people who stand against the massive production of waste. This can be on the part of users who demand products that are both very durable and can be repaired, while businesses, on the other hand, could look at circular business models, among other aspects. Policymakers play a crucial role in implementing regulations. Coordinated efforts can counter planned obsolescence and promote sustainable, equitable consumption.

2. Objectives:

1. To Explore the Knowledge and Psychological Impact of Planned Obsolescence in the General Public
2. To suggest avenues for future research
3. To offer consumers strategies for reducing planned obsolescence.

3. Methodology:

The data for the research was collected through the questionnaire method, using Google Forms. The questionnaire was administered to 62 respondents, Including college-going Students, Teaching faculty, Colleagues, Friends, and Family.

3.1 Collection of Primary Data:

- Primary Data was collected through Questionnaire.
- Findings on interviewing professors and professionals in the field.

3.2 Sample Size:

- 62 respondents' opinions, including College Students, Teaching faculties, Colleagues, Friends, and Family, were recorded.

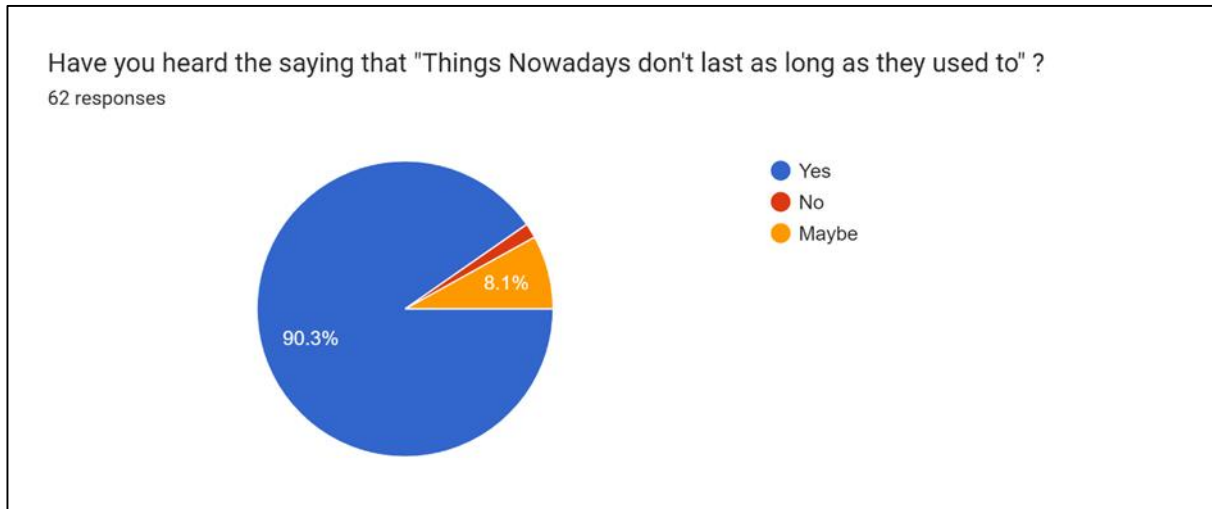
3.3 Collection of Secondary Data

Secondary Data was collected through: Websites, Publications, Newspapers

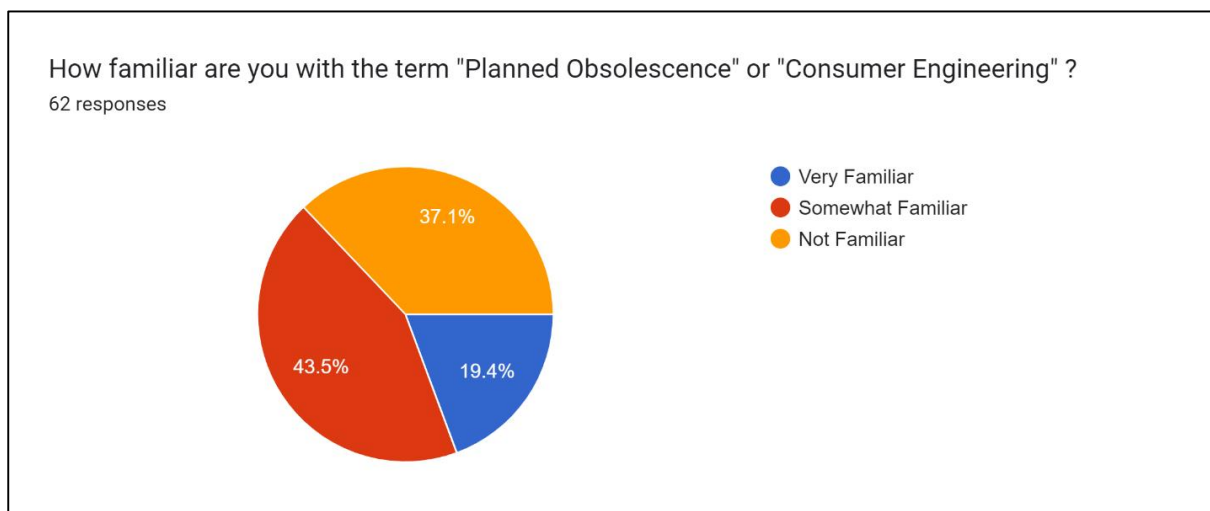
4. Analysis of Results:

The questionnaire was filled by Males (41.9%) and Females (58.1%). 71% of the responses were from people belonging to the age group of 18-24 years. The survey mostly included Students, Employees, Businessmen, and Professionals. The education level of the maximum respondents had a bachelor's degree.

4.1 Awareness

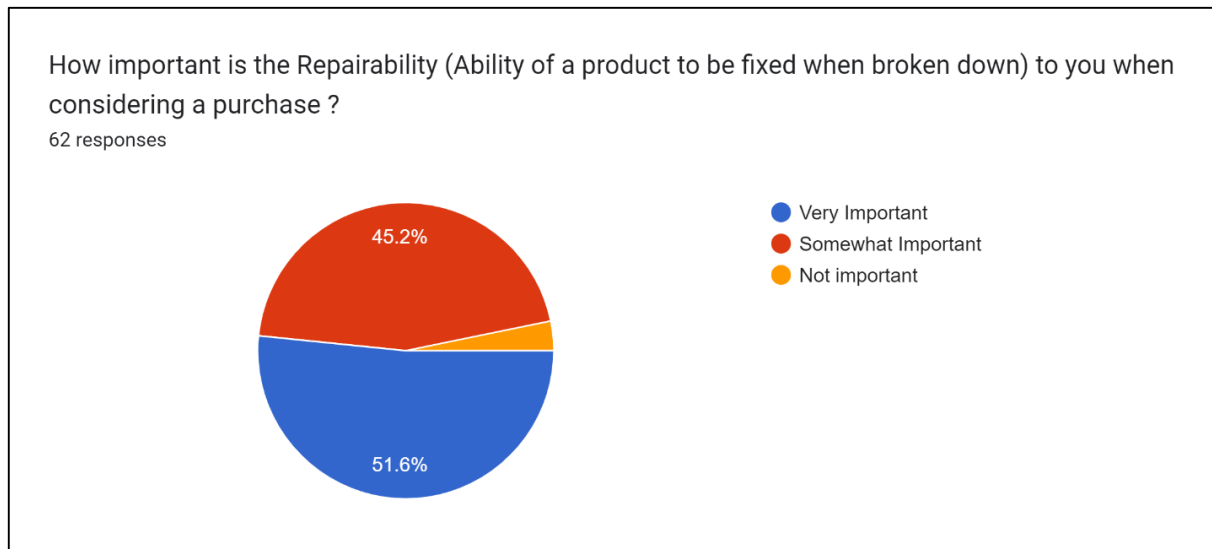


The pie chart shows that 90.3% of respondents are familiar with the idea that products today have shorter lifespans. This widespread awareness suggests that consumers are generally cognizant of planned obsolescence, which could influence their purchasing and repair decisions.

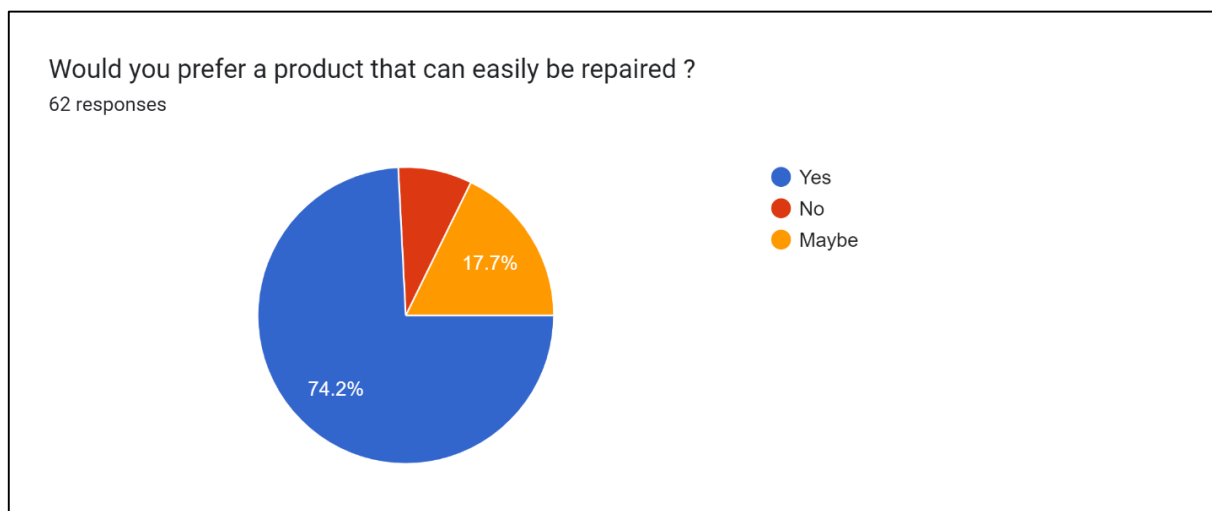


The pie chart reveals that 43.5% of respondents are "Somewhat Familiar" with the term "Planned Obsolescence" or "Consumer Engineering," while 37.1% are "Not Familiar." Only 19.4% are "Very Familiar." It follows then that some of them would grasp the idea while a large part may not completely realize it. This lack of understanding of consumer-product interaction may influence acquisition and recovery decisions.

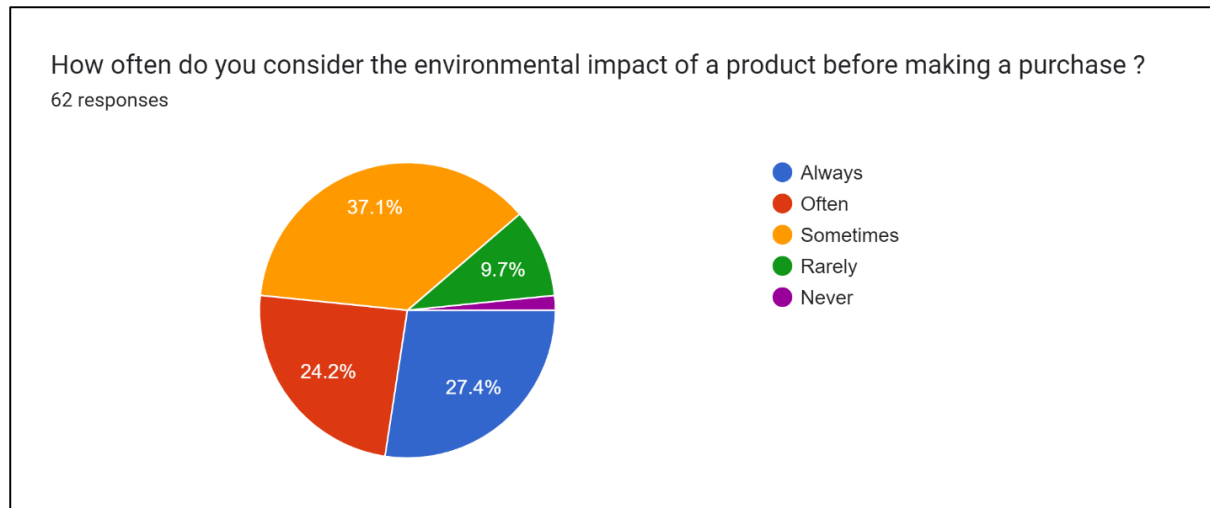
4.2 Repairability, Sustainability and Durability



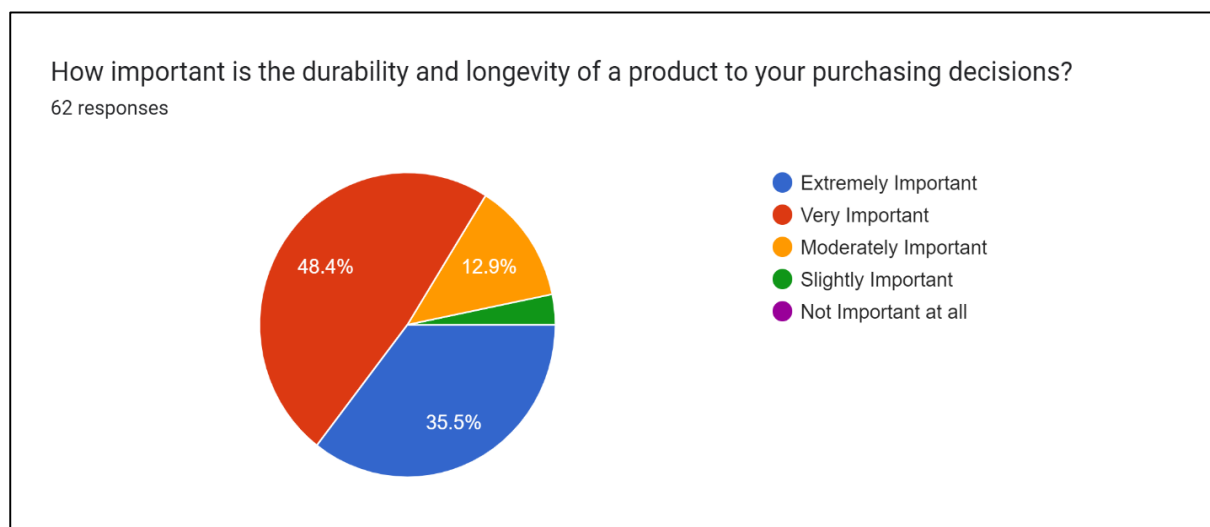
A pie chart gives a picture of the fact that 51.6 percent of respondents not only consider "very important" repairability as an attribute of a product when purchasing it, but 45.2 percent also find it "somewhat important."



The pie chart shows a strong preference for repairable products, with 74.2% of respondents supporting them. This corroborates the research on planned obsolescence and consumer awareness of sustainability. These findings imply that, with economic and ecological concerns, there is a rising demand for repairable products. However, 17.7% disagreed with repairability, and 8.1% remained undecided, showing the considerable need for yet further education and awareness-raising campaigns.



Concerning the pie chart, 37.1 percent of the respondents said "Always" to considering the impact to the environment, which influences their buying decisions, and 27.4 percent of the respondents said they do so "Often." This simply characterizes the news flow development in the more extensive society and the ever-increasing concern for environmental sustainability among consumers. It might also drive decision making as it would force consumers to prefer more sustainable and durable repairable products. In doing so, it pressures companies to rethink and adopt more sustainable ways to slay away from planned obsolescence.

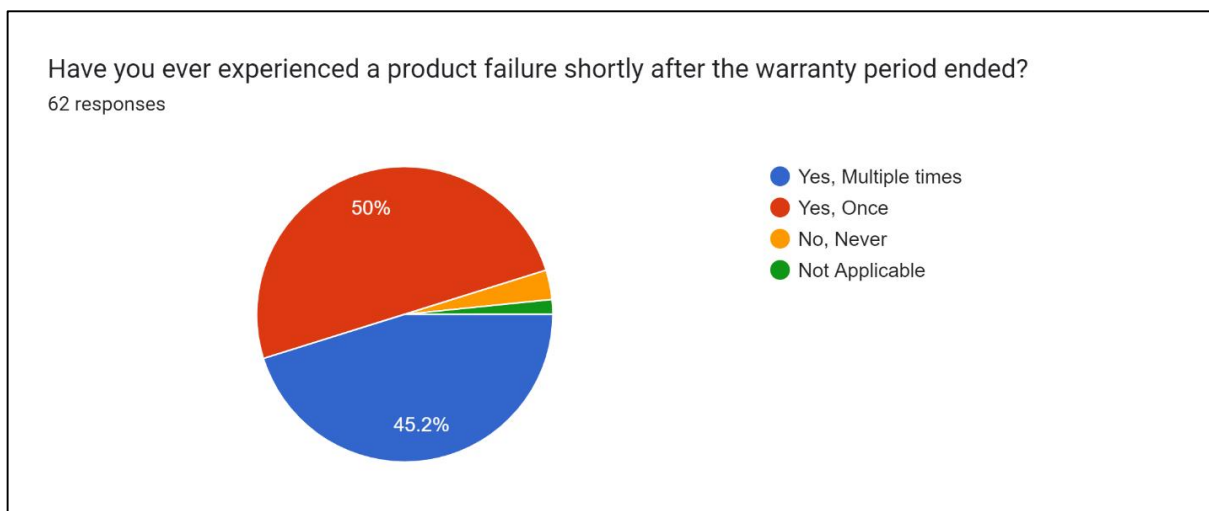


From the pie chart, we noticed that 48.4% percentage of the total respondents have labeled durability and longevity as "Extremely Important" while deciding on a product--the top-most percentage. Besides this, the 35.5% population considers durability and longevity as "Very Important." This indicates a strong alignment of the consensus of most consumers for durability and longevity-a powerful indication of a movement against planned obsolescence. In general, the environmentally and economically beneficial facts concerning the durability of

long-lasting products are increasingly hitting home with consumers.

4.3 Experience

According to the pie chart, 50% of the respondents suffer product failures right after reaching the end of the warranty period. This occurs in 45.2% of cases multiple times; implying that consumers certainly frequently face those situations that the very essence of planned obsolescence would suggest-a situation where goods only last until the warranty period expires. Products would be intentionally designed to fail right after the warranty expires, a fact consumers experience every time. As a result, consumer awareness of such practices might even begin to change the behaviors in shopping and repairs.



5. Conclusion:

The aim of the study was to uncover the fact that consumers indeed know a little bit about their planned obsolescence. Although many consumers are aware of the fact that product durability today is low and have a general idea of the issue overall, many are unaware of the terms "planned obsolescence" or "consumer engineering." It simply implies that when it comes to planned obsolescence, the actual understanding of it and materiality lacks with respect to consumers. This blank space can be fulfilled with greater educational as well as awareness programs regarding the impact of planned obsolescence on environmental and ethical bases.

The survey goes further to show that consumers are becoming more aware and leaning towards sustainable choices and ethical considerations in consumer behavior. Most of the respondents claimed they had started to think more about repairability and durability of

products prior to purchase and were certainly more concerned about the longevity of the product and its impact on the environment. This new trend in consumer behavior reveals the weightiness cost-the cost of political, economic, and environmental significance-on the manipulation of the product lifetime to mere profitistic ends. Now buying motivation is not just about what additional or more expensive features a product can provide but can also become associated with values such as sustainability and lifespan support, for which consumers are willing to pay a premium just to pick actively lean organizations toward these very ethical values. This could create a huge load of pressure on companies to make themselves more sustainable and diminish their planned obsolescence.

While improved awareness of planned obsolescence has been noted, much more effort in sensitizing consumers of the adverse effects of this view is indeed required here. It represents further opportunities within the consumer market for growing sustainability and ethical consumption for effecting a more circular economy. Consumers can drive companies into working towards more sustainable practices, less waste, and lesser environmental impacts from using products by their sheer support of repairability, durability, and longevity.

5.1 Demographic Factors

The survey results could be further analyzed to identify any correlations between demographic factors (age, gender, education, occupation) and consumer awareness and behavior regarding planned obsolescence. Consumer Behavior: Further studies could explore in more detail the behaviors of consumers based on their perception of planned obsolescence, including repairing products, buying from companies that have high commitments to sustainability, or activism against planned obsolescence.

5.2 Industry Response

The industry response to the new consumer demand for sustainable and durable products would help understand the dynamics of the changing business environment and the possibility of a more circular economy. About these considerations, researchers can dig deeper into the attitudes and behavior of consumers on planned obsolescence and inform the strategies for the promotion of sustainable consumption and a reduction in the environmental impact of the product life

6. Suggestions:

The research should investigate several key areas to gain a deeper understanding of the psychological implications and consumer awareness of planned obsolescence. First, it is essential to study the emotional responses of consumers when their products fail, especially when the failure occurs within a short period after the warranty has expired. It is in such moments that frustration, anger, betrayal, and powerlessness can be identified, and hence, insights into the psychological impact of planned obsolescence will be provided. Second, the role of trust and perceived fairness must be considered. How does this perception of companies intentionally designing products to fail impact consumer trust and perceived fairness? Does it impact brand loyalty and purchasing decisions? Additionally, the research should investigate the influence of cognitive biases, such as confirmation bias and the sunk cost fallacy, on consumer behavior in the context of planned obsolescence.

It is also important to examine the interplay between awareness and behavior. How does increased awareness of planned obsolescence translate into changes in consumer purchasing decisions, repair behaviors, and brand choices? What role do perceived risk and uncertainty, as well as social norms and peer influence, play in shaping consumer attitudes and behaviors toward planned obsolescence?

Further, the study should explore the demographic and psychographic factors. It is important to analyze how factors like age, gender, income, education, and cultural background influence consumer awareness and behavior towards planned obsolescence. Examining how personality traits, values, and lifestyles influence consumer attitudes and behaviors toward planned obsolescence, such as whether environmentally conscious consumers are more likely to be concerned about planned obsolescence and take action against it, will provide valuable insights.

The industry reaction and implication thus needs to be reviewed. What strategies companies have been putting in place, especially in dealing with consumer complaints and outrage over planned obsolescence; how innovative and new business models may potentially flourish; and the implications on the circular economy will surely help tell a story about the role of this industry in fixing this challenge.

Finally, developing policy recommendations is essential. This includes advocating for policies that promote sustainable consumption and discourage planned obsolescence, such as legislation that supports right to repair, encourages sustainable product design, and holds companies accountable for the environmental and social impacts of their products. Exploring the role of government incentives and regulations to encourage the development and adoption of sustainable and durable products, as well as regulations that discourage planned obsolescence, is also crucial.

This study, in employing a multi-method approach through the combination of quantitative and qualitative research methods - surveys, interviews, focus groups, and analyses of consumer reviews and social media data - can deliver a holistic insight into the psychological implications and the awareness of consumers regarding planned obsolescence. The study can be a highly valuable input to policymakers, businesses, and consumers in decision making and further toward a more sustainable and equitable model of consumption.

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EXPLORING CYBERSECURITY AWARENESS AMONG UPI AND DIGITAL WALLET USERS IN INDIA

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Abstract:

The Unified Payments Interface (UPI) and digital wallet platforms, such as Google Pay and PhonePe, have changed the way financial transactions work in India by enhancing convenience and accessibility. However, this benefit comes at the cost of users exposed to a range of cybersecurity challenges, including phishing, malware and SIM swapping. This study evaluates the level of cybersecurity awareness among UPI and digital wallet users, focusing on their knowledge of potential threats and adherence to safety practices. Data were collected from 98 participants across diverse demographics. The findings revealed significant disparities in awareness, with phishing being more recognized and many users remain unfamiliar with risks like SIM swapping and shoulder surfing. The study underscores the urgent need for targeted educational initiatives and improved outreach efforts. These insights provide actionable suggestions for policymakers, financial institutions and technology developers to solidify cybersecurity measures and create a safer digital payment environment.

Keywords: UPI, digital wallets, cybersecurity awareness, phishing, SIM swapping, digital payments

Introduction:

In the era of digitalization, financial transactions at a personal level have significantly changed including the way people deal with their money. The introduction of cashless transactions, especially through Unified Payments Interface (UPI) and Digital Wallet platforms, have not only redefined convenience for individuals but also played a key role in shaping India's growth narrative. From everyday purchases to significant transactions, this adoption has brought the banking system closer to people than ever before, fostering inclusivity and progress. UPI, the instant real-time payment system, created by National Payments Corporation of India (NPCI) and other digital wallets such as Paytm, Google Pay and PhonePe have become the building block of changing India, allowing for easy, real-time peer-to-peer (P2P) and peer-to-merchant (P2M) transactions in urban as well as rural geographies, making financial processes smooth and effortless. This innovation not only hastened financial inclusion but also transformed consumer behavior by providing convenience, speed and transparency.

UPI since its operation from April 2016, has clocked the highest volume (in transaction number) of 16.73 billion in December 2024 witnessing 8% month on month growth. In addition, value has also shown the similar trajectory of 8% growth to Rs 23.25 trillion, up from Rs 21.55 trillion in November. According to the National Payments Corporation of India (NPCI), for the year 2024, the volume grew by 46% year on year to around 172 billion transactions. In value terms, transactions increased by 35% year on year to around Rs 247 trillion in the same period.¹

In recent times, NPCI has extended its implementation of the rules of 30% volume cap on third-party UPI apps, in which UPI apps offered by banks are exempted, to December 2026. This decision is crucial for the dominant players like Google pay and PhonePe, controlling more than 85% of UPI transactions by both volume and value. These two are the Market leader among the 75 UPI apps.² The acceptance and usage of digital payment has been exponential because of its easy to use nature, interoperability, negligible service charge compared to

¹National Payments Corporation of India (NPCI). (n.d.). Statistics. *National Payments Corporation of India*. Retrieved from <https://www.npci.org.in/statistics>

² CNBC TV18. (2024, December 27). NPCI extends 30% UPI volume cap deadline for third-party apps to Dec 2026. *CNBC TV18*. Retrieved from <https://www.cnbctv18.com/personal-finance/npci-extends-30-upi-volume-cap-deadline-for-third-party-apps-to-dec-2026-19532506.htm>

traditional one , making it a preferred choice for millions of users. The accessibility of affordable smartphones and inexpensive mobile internet has bridged the digital divide, bringing millions into the formal financial ecosystem. Additionally, the government's push towards a digital economy, especially during the COVID-19 pandemic, accelerated the adoption of these platforms. Initiatives like the Digital India campaign and the introduction of BHIM (Bharat Interface for Money) app have further strengthened the usage of UPI and digital wallets.

However, with the deep penetration of these digital payment methods, the landscape of cybersecurity has become increasingly complex. The ease of digital transactions is accompanied by a rise in potential threats and vulnerabilities. Cybersecurity, in this context, refers to the protection of devices in this process, including hardware, software and data, from cyberattacks. The significance of cybersecurity awareness among users of UPI and Digital Wallet platforms cannot be neglected, as these users are often targets of cybercriminals due to the high volume of transactions and sensitive information involved.

According to the National Crime Records Bureau (NCRB), cybercrime incidents in India have been on the rise, with a significant increase in cases involving communication devices. The latest report from 2022 highlights the urgent need for enhanced cybersecurity measures. 'Indian Cyber Crime Coordination Centre' (I4C) has been established by the Ministry of Home Affairs to deal with all types of cybercrime in the country, in a coordinated and comprehensive manner. The 'Citizen Financial Cyber Fraud Reporting and Management System', under I4C, has been launched for immediate reporting of financial frauds and to stop siphoning off funds by the fraudsters. A toll-free Helpline number '1930' is implemented for assistance in lodging online cyber complaints.³

³ Source: pib.gov.in

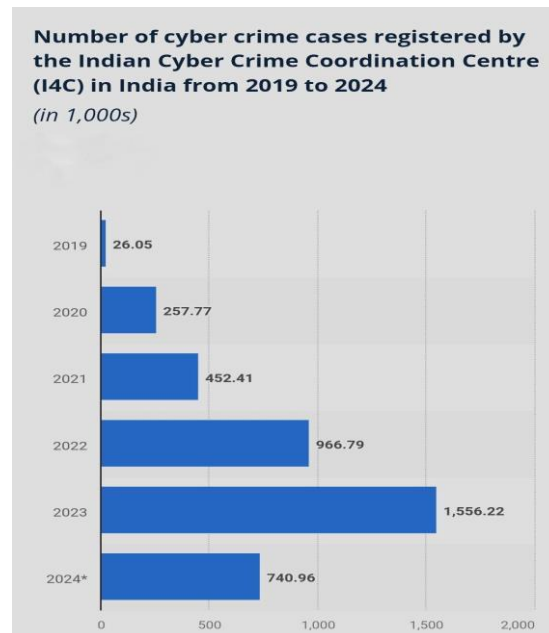


Fig.1. Yearly cybercrime cases registered in India

The purpose of this research is to assess the awareness of users with regard to cybersecurity, including their knowledge of possible threats like phishing, online fraud and identity theft, as well as their compliance with best practices for security. Through extensive data gathering and analysis, the research will identify how aware users are of cybersecurity matters, how they take proactive steps to prevent risks and their general readiness to resist cyber-attacks. The results of this research will help to inform policymakers, financial institutions and technology developers in the development of strategies to promote cybersecurity awareness and build a more secure digital environment for everyone.

Scope of Research:

This research study focuses on understanding the level of cybersecurity consciousness among the UPI and digital wallet users in India. It also focuses on their security knowledge of threats and precautions as well as the efficacy of relevant information channels and awareness programs. The results of the study are intended to enlighten policymakers, financial organizations and app developers regarding areas and prospects for strengthening cybersecurity education via more practical information and gamification of learning apps.

Research Objective:

The main objective of this study is to assess the extent of cybersecurity awareness among UPI and digital wallet platform users in India. This research will explore a range of areas such as general awareness, behavioral norms, security practices, knowledge of scam techniques and the effect of awareness programs. The sub-objectives are to:

- Assess the familiarity of UPI users with cybersecurity threats such as phishing, malware and SIM swapping.
- Understand the knowledge and use of best practices for safety on payment apps.
- Evaluate the effectiveness of online/offline cybersecurity awareness programs.
- Identify the most popular channels for disseminating cybersecurity information to people.

Hypotheses:

H1: UPI users are more aware of phishing and data breaches compared to other cybersecurity threats such as SIM swapping and shoulder surfing.

H2: Current cybersecurity awareness programs have limited reach, with only moderate effectiveness in educating UPI users.

H3: Social media and official app notifications are the most preferred channels for receiving cybersecurity information among UPI users.

Research Methodology:

This research employed a quantitative approach to comprehensively explore cybersecurity awareness among UPI and digital wallet users in India. The methodology is outlined as follows:

Data Collection: Primary Data was collected through structured Questionnaire. Secondary Data was collected from Government Reports, Websites, Research Papers etc.

Sampling Method: A stratified random sampling method ensured representation across age groups, education levels, occupations and locations.

Ethical Considerations: Informed consent was obtained from all participants and anonymity was ensured to protect sensitive information. We ensured that ethical guidelines for data collection and analysis are followed throughout the course of the study.

Literature Review:

The rapid adoption of the digital payment systems, the first among which is India's Unified Payments Interface (UPI), has brought about financial transactions with such ease and accessibility as the world has never witnessed before. There has been evidence that demonetization in 2016 and the COVID-19 pandemic have driven digital payments adoption and figures show a 46% year-on-year growth in UPI transactions during the pandemic (National Payments Corporation of India, 2021). But these advancements have also yielded an explosion in cases of cyber fraud. But this advancement has also yielded gigantic cybersecurity concerns that need to be explored in depth.

Kaur et al. (2023) analyze the cyber security threats in UPI payments and present the loopholes in terms of phishing, malware attack and unauthorized transactions. They highlight the need for proper security precautions and awareness to consumers in repelling such attacks. Parallel to this, Singh and Rajput (2018) examine the cyber security profile of digital wallets and identify areas of potential attacks and highlight safe design of the applications and cautious consumer behavior.

Consumer awareness is the most important aspect of the security of electronic payment systems. Khandal (2022) conducts an exploratory research on users' awareness of UPI and mobile banking and discovers that even though users prefer the convenience, there is an enormous knowledge gap regarding cybersecurity best practices. Such ignorance most commonly leads to susceptibility to fraud and cyber-attacks. Suresh and Shylendra (2019) continue to study customers' attitudes towards UPI and discover that despite users leaning toward adopting digital payments, insufficient overall awareness and security fears hold back universal acceptance.

Evidence of increasing cases of cyber-attacks on digital payment interfaces is documented by Sharma and Gupta (2020), who also note an increase of cybercrime alongside

an increase of digital transactions. Their study requires stronger cybersecurity policies and regulatory regulations to protect consumers. Patel and Mehta (2021) discuss mobile banking in India, highlighting the opportunities and issues involved in the existing digital payment platform. In their opinion, although there has been financial inclusion through technological advancements, this has also created new security issues that must be resolved via user education and infrastructure enhancement.

Verma et al. (2022) report increasing cases of cyber-attacks in digital payments and point to the necessity of an inclusive understanding of causes, threats and solutions of cyber-attacks in digital payment systems. According to their study, knowledge deficiency and inefficient digital payment infrastructure are the primary reasons for the growing cyber-attacks. Furthermore, Kafley and Chandrasekaran (2019) analyze mobile banking in India and compare the performance of mobile banking across different categories of banks. They conclude that while mobile banking is growing exponentially, differences in adoption and security practices among different banking organizations do exist.

Collectively, these studies underscore the pressing need for a diversified strategy to enhance cybersecurity for digital payment systems. This involves adopting effective security protocols, creating user awareness and devising extensive regulatory mechanisms to mitigate the changing tides of cybersecurity threats. Much research has gone into digital payments and cybersecurity but not specifically in the context of UPI-driven threats. Beyond this, even longitudinal studies investigating shifts in user awareness across years are few in number. There is a high need to cover these loopholes to effectively prepare strategies to advance user security.

Data Analysis - Results and Interpretation:

The analysis tries to offer insight into the levels of cybersecurity awareness among UPI users and how they follow safety practices. On the basis of a survey conducted with 98 participants, the section delves into the findings on demographics, cybersecurity knowledge and practices.

Demographics and Patterns of Use: The sample consisted mainly of students (71.4%) and the majority of respondents (74.5%) belonged to the 16–25 age bracket (Fig. 2). Urban dwellers dominated the sample, representing 93.9%, reflecting the dominance of UPI use in urban areas. Fig. 3 emphasizes that 71.4% of the respondents utilized UPI or digital wallet services on a daily basis, reflecting their dependence on these platforms for transactions. Upon questioning regarding the updating of their software, 61.2% of consumers said they would turn on automated updates, signifying a valuable effort to safeguard the security of their platforms. But the others were using either manual or rarely conducted updates, creating opportunities for weaknesses.

Cybersecurity Awareness and Threat Familiarity: H1 Validated: The survey revealed disparities in awareness levels across different cybersecurity threats. Phishing (3.18/5) and data breaches (3.36/5) were the most recognized threats, likely due to their frequent coverage in media and awareness campaigns. In contrast, SIM swapping (2.70/5) and shoulder surfing (1.97/5) were the least familiar, suggesting a need for targeted education on these lesser-known threats. (Fig. 8)

Authentication and PIN Safety Practices: When verifying payment requests, a significant number of respondents adhered to safe practices, with most verifying transaction details through independent channels. 52% of participants reported refusing to share their UPI PIN under any circumstances, indicating a strong understanding of basic safety protocols. (Fig. 4)

Security Best Practices: The analysis of security practices highlighted encouraging trends: 73.5% of respondents used strong, unique passwords and 50% enabled two-factor authentication. However, only 46.9% avoided public Wi-Fi during transactions, exposing a gap in adopting advanced security measures.

Awareness Programs and Sources of Information

H2 Validated: Only 27.6% of respondents had participated in cybersecurity awareness programs. Of these, most rated the programs as moderately effective, reflecting their limited impact. (Fig. 5)

H3 Validated: Social media emerged as the most popular source of cybersecurity information (68.4%), followed by official UPI app notifications (53.1%) and news websites (51%). These channels hold significant potential for disseminating targeted awareness campaigns. (Fig. 7)

Confidence Levels: According to Fig. 6, 57.2% of respondents expressed confidence in recognizing and avoiding cybersecurity threats, while 30.6% remained neutral. This indicates a substantial proportion of users are unsure about their ability to identify threats, underscoring the need for enhanced education efforts.

Findings and Conclusion:

- Phishing and data breaches are the most recognized cybersecurity threats, while SIM swapping and shoulder surfing are the least understood.
- Strong password usage and two-factor authentication are common practices, though advanced measures, such as avoiding public Wi-Fi, are less widely adopted.
- Social media and official app notifications are the preferred channels for receiving cybersecurity information.
- Cybersecurity awareness programs have limited reach, with only moderate effectiveness among participants.
- A significant portion of respondents (57.2%) are confident in recognizing threats, but gaps remain in their ability to adopt comprehensive security practices.

The findings identify major gaps in cybersecurity awareness among Indian UPI users. Simple habits like strong passwords and two-factor authentication are prevalent, yet less frequent threats like SIM swapping are not known about. Furthermore, the lack of coverage and efficacy of existing awareness programs means that improved methods must be found to inform users. Leveraging popular media like social media and official app notifications can bridge these gaps and provide a more secure digital payment space.

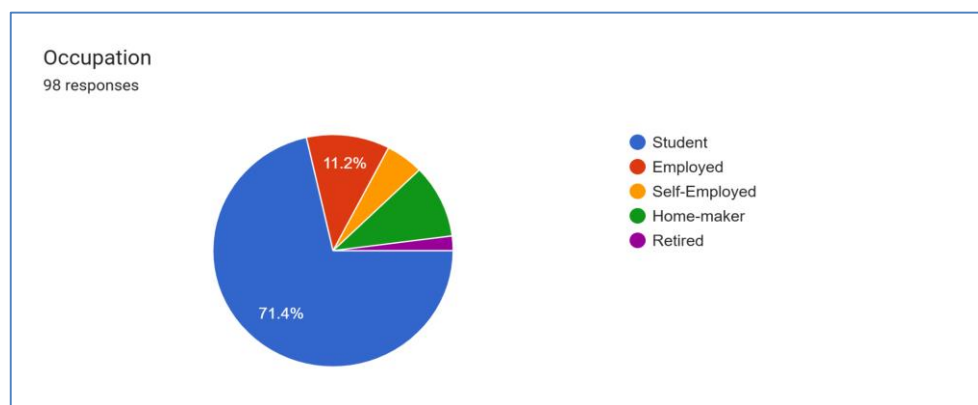


Fig. 2. Occupation of Respondents

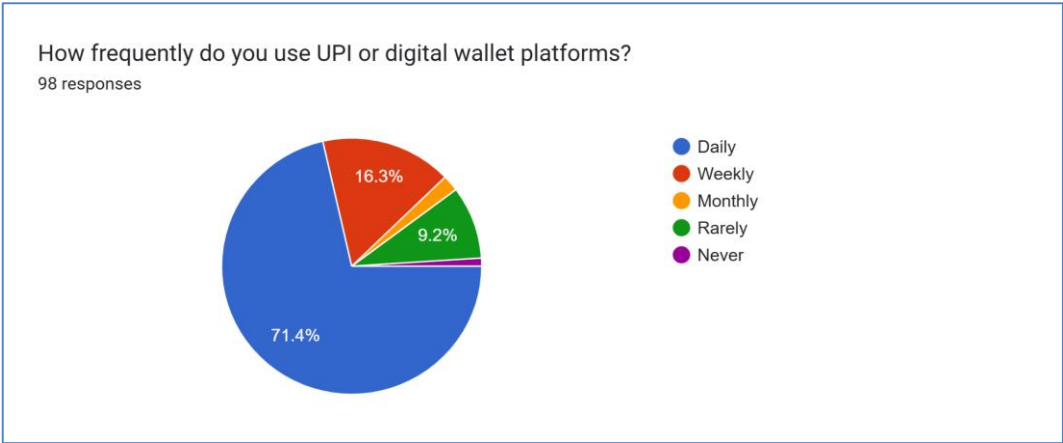


Fig. 3. Frequency of UPI Usage

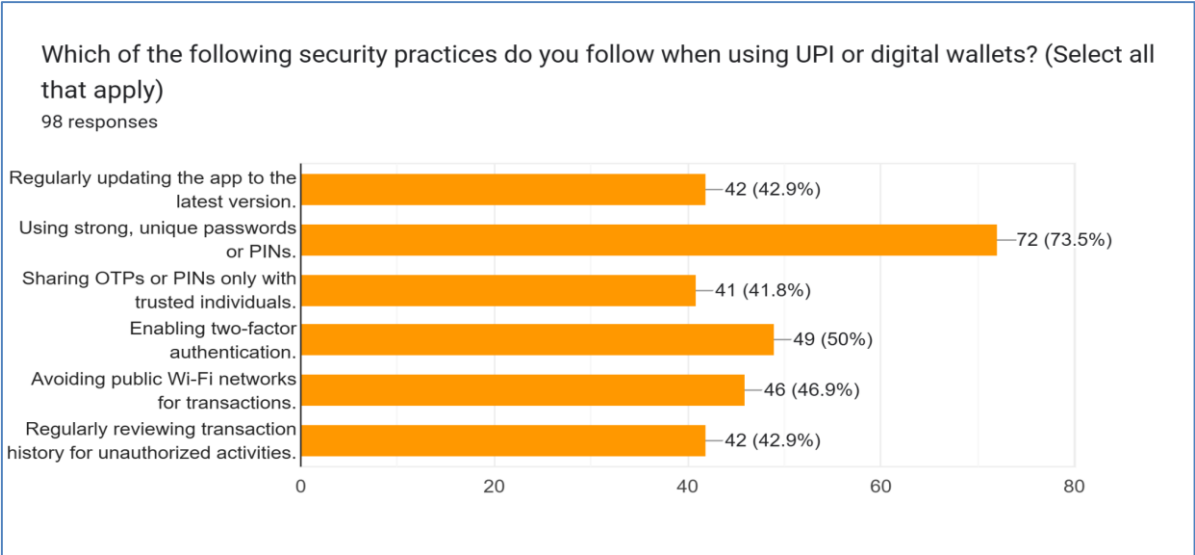


Fig. 4. Security Practices followed by UPI users

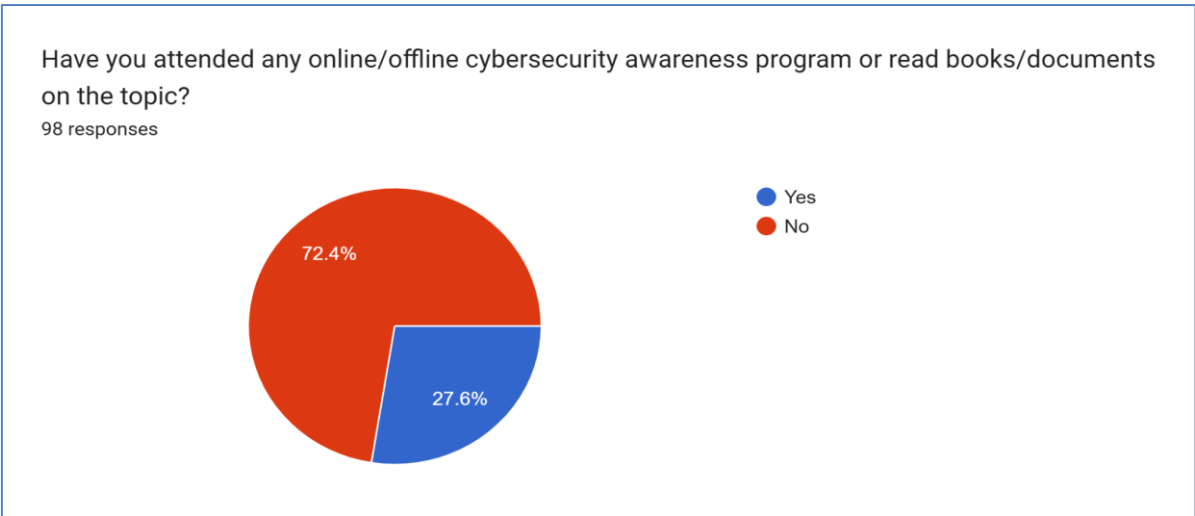


Fig. 5. Cybersecurity awareness Programs/Books

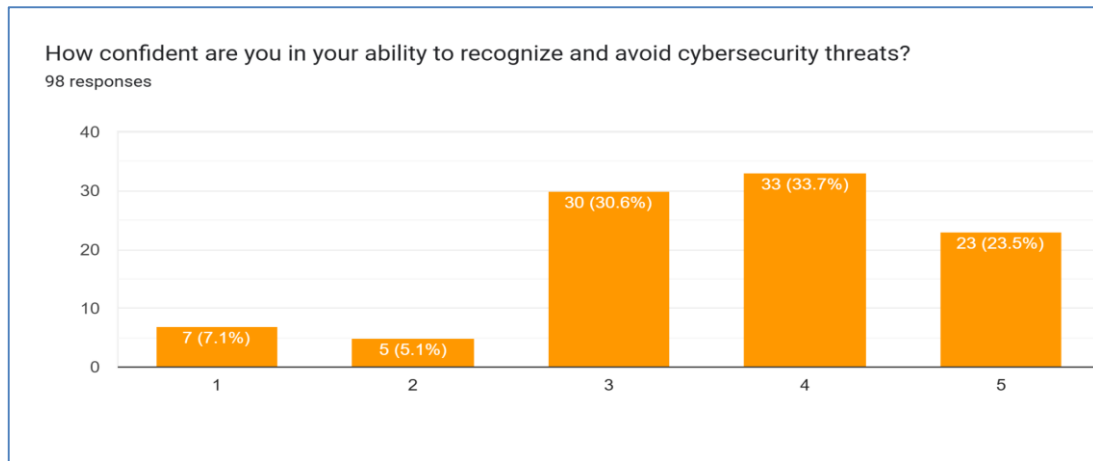


Fig. 6. Confidence of Respondents to Recognize and Avoid Cybersecurity Threats

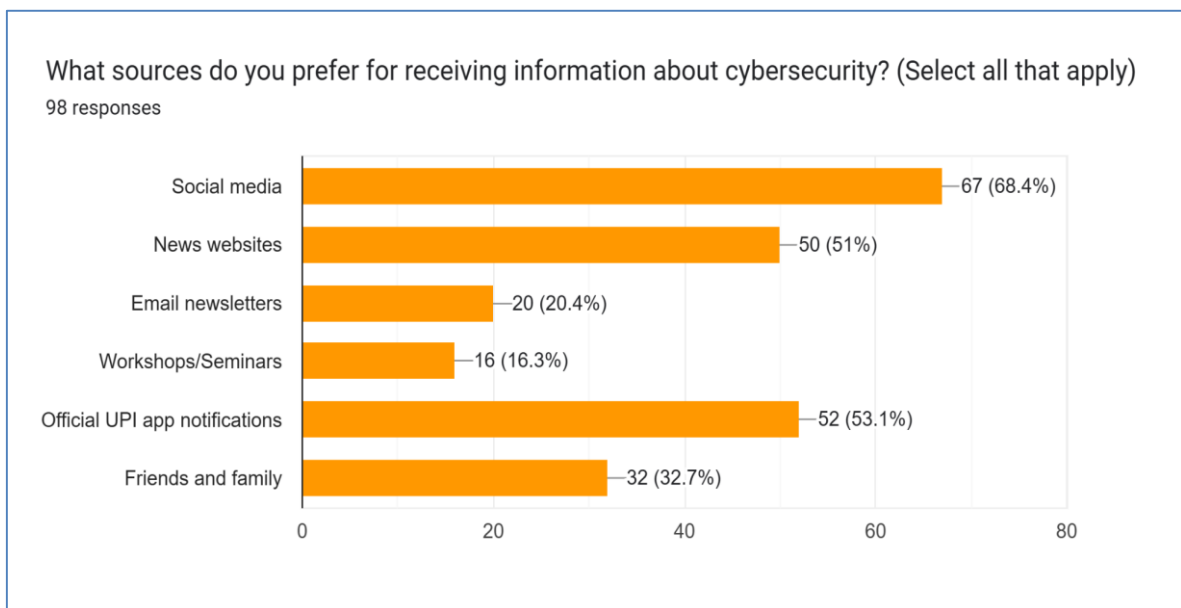


Fig. 7. Sources of Cybersecurity Information

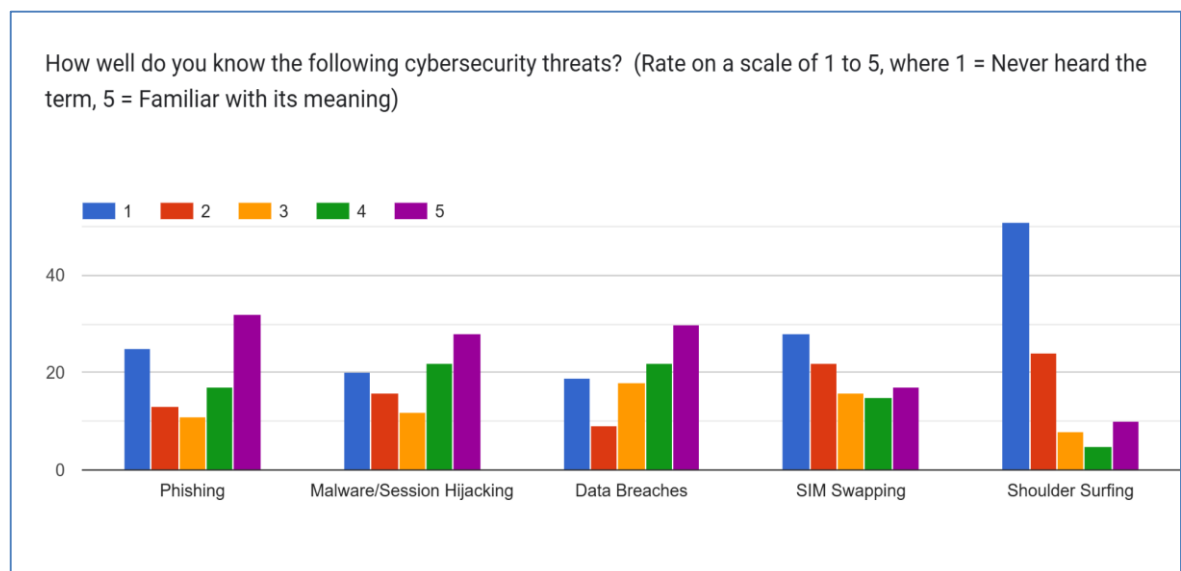


Fig. 8. General Familiarity of users with Cybersecurity Threats

Limitations of Research:

- The study primarily sampled urban respondents, limiting its generalizability to rural populations.
- The sample size of 98, while valuable, may not fully represent India's diverse user base.
- Insights are limited to active UPI users, excluding perspectives from non-users.
- The survey timeframe restricted broader data collection efforts.

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ANALYSING THE RELATIONSHIP BETWEEN INTEREST RATES AND INFLATION: A REGRESSION-BASED APPROACH

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Abstract:

The following paper seeks to examine the relationship between inflation and interest rates with regards to the structure of the modern economy. We do so by creating a sample size of eight major economies and using the resultant data for extrapolation over the entire globe. The eight major economies namely being the United States, China, the Eurozone, Japan, Brazil, Canada, South Korea and Switzerland. Traditionally, classical economics suggests an inverse relation between the two yet due to nuances of the modern world and workings of central banks, a more complex picture emerges.

A purely quantitative study; by applying Pearson correlation coefficients, scatter plots and linear regression models in a time series analysis we quantify the dependence and independence of our selected variables.

The findings indicate a moderately positive correlation between the two variables which reinforces the modern economic view that central bank interest rates adjust to counter inflation rather than a preemptive measure.

Keywords: Inflation, Interest Rates, Monetary Policy, Global Economy, Statistical Analysis.

Introduction:

Inflation is a constant in modern economies and it has to be for there can be no growth without an increase in price levels, a result of increasing buying power of the population. However, when inflation runs rampant and surpasses the growth in an economy, issues spring up. People's buying power erodes, business lose customer bases, the country's company's struggle to compete on a global scale, etc.

Of course, high inflation is not an ideal scenario for any economy. Therefore, the one major tool, which serves as a sort of deus ex machina for dealing with this issue, is the central bank's control over the interest rates in an economy.

When inflation runs high, banks increase interest rates, the opportunity cost of holding money decreases, people spend less and eventually demand in the market dies down and inflation is brought under control. Conversely, when inflation is low and growth is sluggish, central banks cut down interest rates, increasing the opportunity cost of holding money which encourages people to go out and spend more, driving up demand and breathing life into the economy.

This is obviously a very simplified explanation of the whole process and the real picture isn't as black and white. However, it is undeniable the massive weight that the central bank's control over the interest rates hold in taming inflation in an economy.

But how effective is it really?

In this paper we seek to answer that very question. Our objective is to decode the relationship between inflation and interest rates and understand to what extent does the change in one variable affect change in the other.

This study is particularly beneficial with relevance to the state of the world today as we leave decades of neoliberalism, a time of low interest rates and free flow of capital, into a period of "walled gardens" where each country has jacked up interest rates, especially in response to the rapid inflation in the wake of the COVID crisis.

In order to provide as transparent of a view into this topic as possible, free of any biases, this study focuses exclusively on quantitative methods to arrive at conclusions which enlighten us to how interest rates change in response to inflation rates and to what extent is that change driven by inflation.

To sum up, this study employs various quantitative methods to figure out the relationship between inflation and interest rates, who drives whom and to which extent does it do so. The research contributes too greater understanding of monetary policy and the decisions that go behind it

Aim of the Study:

- Analyse trends in inflation and interest rates across various major economies.
- Employ the use of Pearson coefficient of correlations and scatter plots to determine the kind of relation between the two variables.
- Wield linear regression analysis as a tool to investigate and implicate the extent of dependence between the dependent and independent variables in our study.

Review of Literature:

Voznyuk, O. (2010): In this thesis, developed in collaboration with the financial and risk modelling group of Scor, a global reinsurance company, Voznyuk builds on the original model developed and presented by Muller et al. (2010) and analyses the data for five major economies, the US, the UK, the EU, Japan and Switzerland. The original study assumes interest and inflation rates to be weak mean-reverting processes with very low speed of mean-reversion. Secondly, real interest rates (which are interest rates adjusted for inflation) show stronger mean-reversion than interest rates or inflation rates alone. The last assumption is that interest rates lag behind and are in response to inflation rates. The study employs various econometric techniques to study the macroeconomic data such as the Ornstein-Uhlenbeck model, use of the Economic Scenario Generator (ESG), adjustment of seasonality using the X-12-ARIMA model, etc. The paper concludes with the fact that changes in interest rates are in fact driven by inflation and that a general positive correlation exists. However, this correlation is not uniform or consistent across economies due to the influence of monetary policy frameworks, financial market

structures and external economic shocks.

Lardic, S. and Mignon, V. (2003): This study builds on the work of Granger (1986) and re-examines and analyses the Fisher hypothesis relationship between nominal interest rates and inflation among the G7 countries using fractional cointegration. The Fisher hypothesis of course being the theoretical concept that posits nominal interest rates equal real interest rates plus inflation. This study employs various fractional cointegration tests, including the Geweke and Porter-Hudak method (1983), the exact maximum likelihood procedure and the modified R/S analysis by Lo (1991). The results are that there exists a fractional cointegration relationship between interest rates in the G7 economies, supporting the Fisher hypothesis. The study focuses on long-term economic relationships to make sure that inconsistencies from short-term effects do not cloud the conclusion.

Gap Analysis:

- The current literature generally focuses only on small subsets of countries. To maximise the validity of data, as wide of a net as possible must be cast to collect all possible data points.
- Focus is largely on developed, advanced economies with mature institutions, low inflation rates and robust central bank monetary policy. Developing countries with weaker institutions that struggle with higher levels of inflation and do not have as decent of a monetary policy are disregarded and left behind.

Methodology:

We employ the methods of scatter plots, Pearson correlation coefficients, time-series analysis and linear regression analysis to determine the direction and strength of the correlation between the factors and variables of interest rates and inflation rates.

From the above literature review we have gathered that interest rates lag behind and address inflation rates therefore it is logical to assume that the former is the dependent variable while the latter is the independent variable.

The two exact variables we will be using are central bank policy rates (end of annual period) and inflation rates (CPI).

To address the gaps in literature we pointed out, we will be taking a sample size of eight major economies consisting of both highly developed, manufacturing and services based to developing, transitional and commodity based. These economies being namely, the United States, the Eurozone, China, Japan, Brazil, Canada, South Korea and Switzerland.

We will be using data from over twenty years for the selected economies to have a decent amount of data points, enough to draw a definite conclusion.

To recontextualise and summarise, our hypothesis for this study is that there exists a positive relationship between interest and inflation rates, which we will be proving by employing methods of correlation tracking, time-series analysis and linear regression for eight major economies over a period of twenty years to get as clear of a picture as possible.

Observation and Analysis /Findings:

Pearson Coefficient of Correlation for the Untied State (Fig 1.1):

Year	Interest Rate (y)	Inflation Rate (x)	$dy = y - \bar{y}$	$dx = x - \bar{x}$	dy^2	dx^2	$dx*dy$
2003	1	2.3	-0.4438	-0.1750	0.1969	0.0306	0.0777
2004	2.25	2.7	0.8063	0.2250	0.6500	0.0506	0.1814
2005	4.25	3.4	2.8063	0.9250	7.8750	0.8556	2.5958
2006	5.25	3.2	3.8063	0.7250	14.4875	0.5256	2.7595
2007	4.25	2.9	2.8063	0.4250	7.8750	0.1806	1.1927
2008	0.125	3.8	-1.3188	1.3250	1.7391	1.7556	-1.7473
2009	0.125	-0.4	-1.3188	-2.8750	1.7391	8.2656	3.7914
2010	0.125	1.6	-1.3188	-0.8750	1.7391	0.7656	1.1539
2011	0.125	3.2	-1.3188	0.7250	1.7391	0.5256	-0.9561
2012	0.125	2.1	-1.3188	-0.3750	1.7391	0.1406	0.4945
2013	0.125	1.5	-1.3188	-0.9750	1.7391	0.9506	1.2858
2014	0.125	1.6	-1.3188	-0.8750	1.7391	0.7656	1.1539
2015	0.375	0.1	-1.0688	-2.3750	1.1422	5.6406	2.5383
2016	0.625	1.3	-0.8188	-1.1750	0.6704	1.3806	0.9620
2017	1.375	2.1	-0.0688	-0.3750	0.0047	0.1406	0.0258
2018	2.375	2.4	0.9313	-0.0750	0.8672	0.0056	-0.0698
2019	1.625	1.8	0.1813	-0.6750	0.0329	0.4556	-0.1223
2020	0.125	1.2	-1.3188	-1.2750	1.7391	1.6256	1.6814
2021	0.125	4.7	-1.3188	2.2250	1.7391	4.9506	-2.9342
2022	4.375	8	2.9313	5.5250	8.5922	30.5256	16.1952

Where, \bar{y} is the mean of interest rates = 1.4438

\bar{x} is the mean of inflation rates = 2.4750

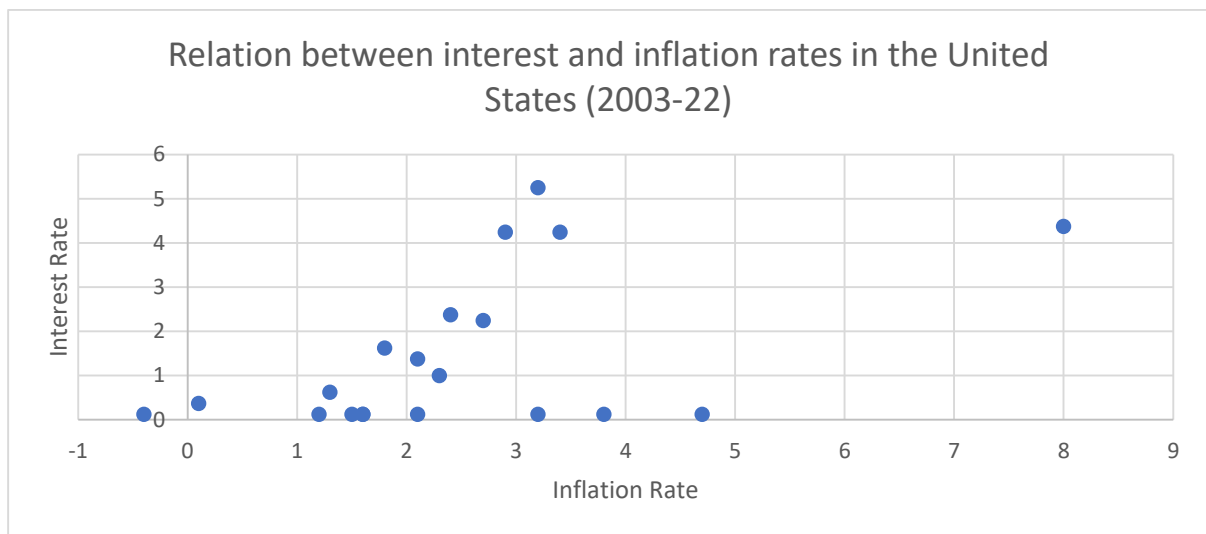
Equation of y on x = $B_{yx} = \frac{\sum dx * dy}{\sum dx^2} = 0.5082$

Equation of x on y = $B_{xy} = \frac{\sum dx * dy}{\sum dy^2} = 0.5213$

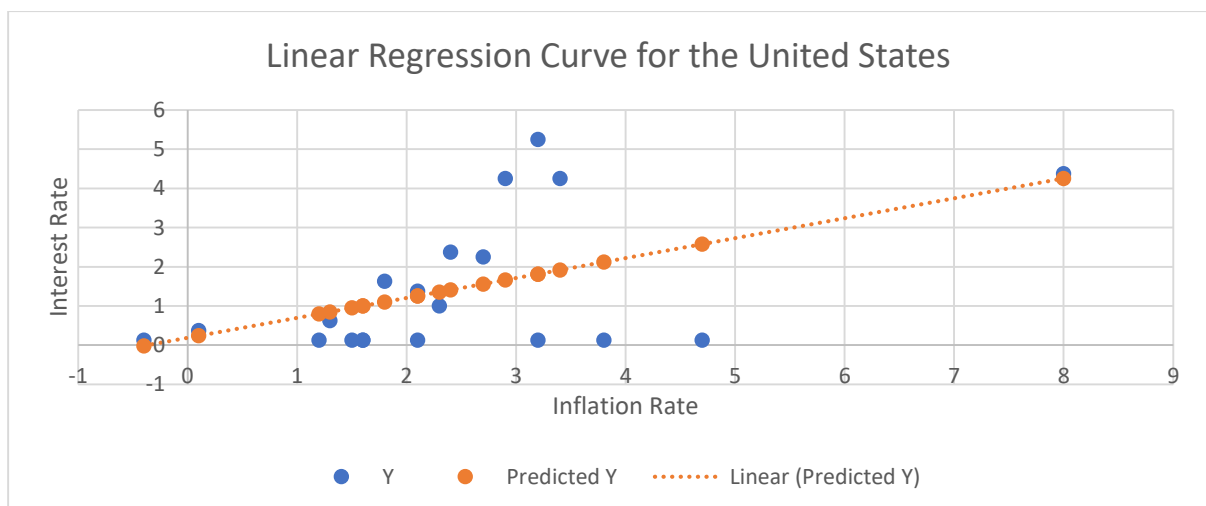
Therefore, Pearson Coefficient of Correlation = $r = (B_{yx} * B_{xy})^{0.5} = 0.5147$

We find that there is a moderate degree of positive correlation between inflation and interest rates in the US.

Scatter Plot of Interest Rates (Y) and Inflation Rates for the United States (Fig 1.2):



Linear Regression Curve for the United States (Fig 1.4):



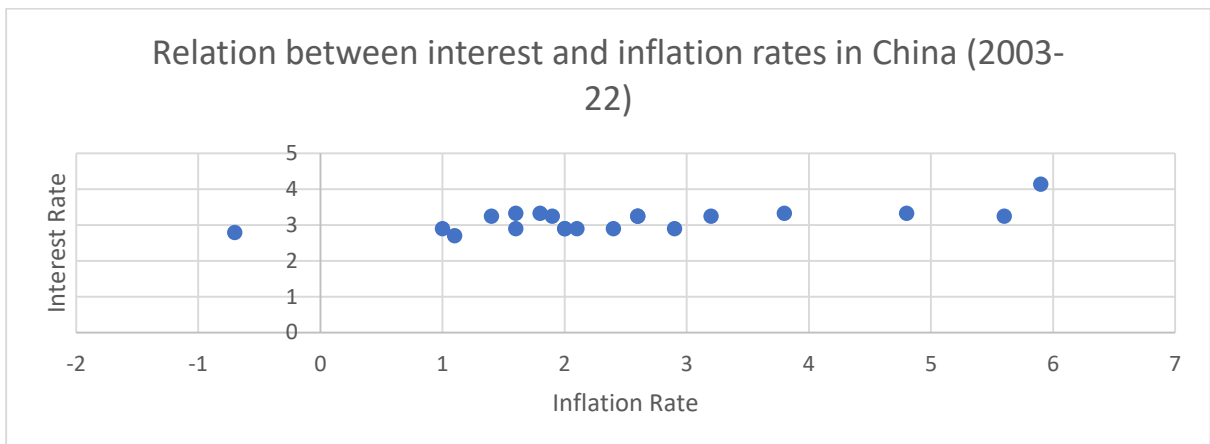
Pearson Coefficient of Correlation for China (Fig 2.1):

Year	Interest Rate (y)	Inflation Rate (x)	dy = y - \bar{y}	dx = x - \bar{x}	dy ²	dx ²	dx*dy
2003	2.7	1.1	-0.4375	-1.3800	0.1914	1.9044	0.6037
2004	3.33	3.8	0.1925	1.3200	0.0371	1.7424	0.2541
2005	3.33	1.8	0.1925	-0.6800	0.0371	0.4624	-0.1309
2006	3.33	1.6	0.1925	-0.8800	0.0371	0.7744	-0.1694
2007	3.33	4.8	0.1925	2.3200	0.0371	5.3824	0.4466
2008	4.14	5.9	1.0025	3.4200	1.0050	11.6964	3.4286
2009	2.79	-0.7	-0.3475	-3.1800	0.1208	10.1124	1.1051
2010	3.25	3.2	0.1125	0.7200	0.0127	0.5184	0.0810
2011	3.25	5.6	0.1125	3.1200	0.0127	9.7344	0.3510
2012	3.25	2.6	0.1125	0.1200	0.0127	0.0144	0.0135
2013	3.25	2.6	0.1125	0.1200	0.0127	0.0144	0.0135
2014	3.25	1.9	0.1125	-0.5800	0.0127	0.3364	-0.0653
2015	3.25	1.4	0.1125	-1.0800	0.0127	1.1664	-0.1215
2016	2.9	2	-0.2375	-0.4800	0.0564	0.2304	0.1140
2017	2.9	1.6	-0.2375	-0.8800	0.0564	0.7744	0.2090
2018	2.9	2.1	-0.2375	-0.3800	0.0564	0.1444	0.0902
2019	2.9	2.9	-0.2375	0.4200	0.0564	0.1764	-0.0997
2020	2.9	2.4	-0.2375	-0.0800	0.0564	0.0064	0.0190
2021	2.9	1	-0.2375	-1.4800	0.0564	2.1904	0.3515
2022	2.9	2	-0.2375	-0.4800	0.0564	0.2304	0.1140

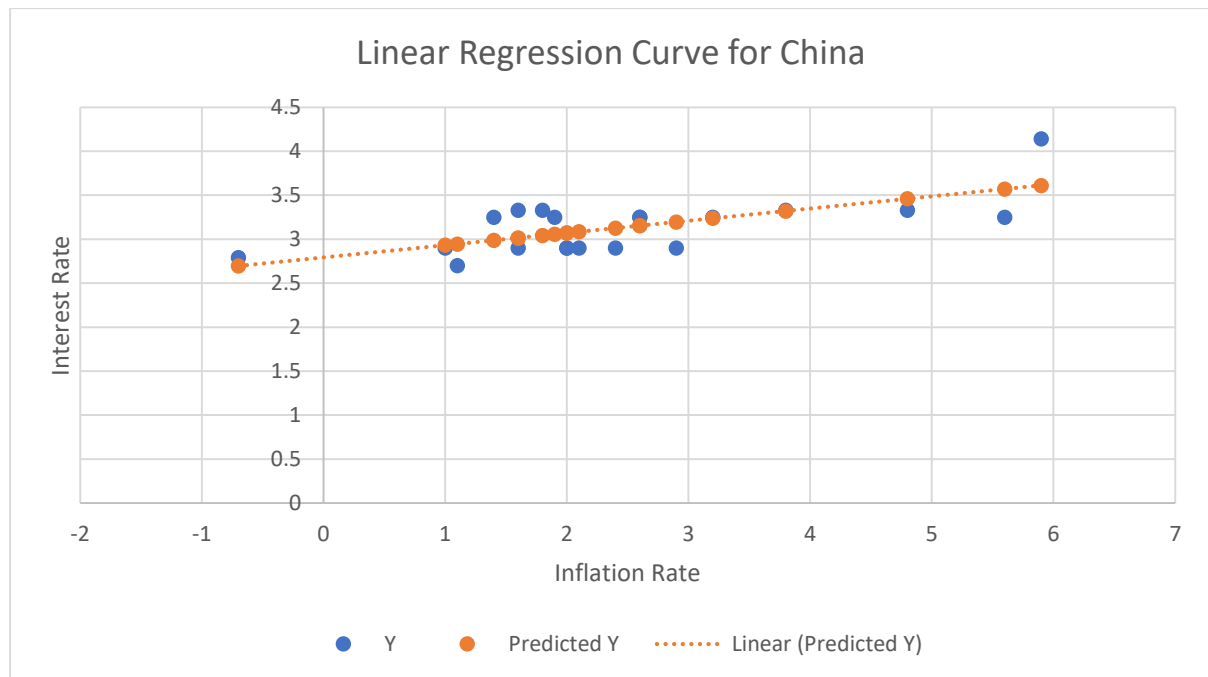
$$\bar{y} = 3.375; \bar{x} = 2.4800; B_{yx} = 0.1388; B_{xy} = 3.4129; r = 0.6882$$

We find there is a moderate to high degree of positive correlation in China.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for China (Fig 2.2):



Linear Regression Curve for China (Fig 2.3):



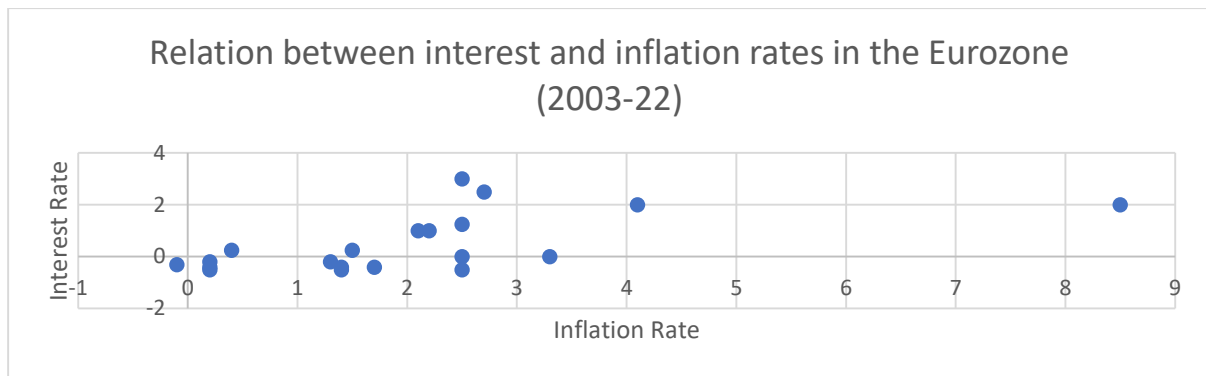
Pearson Coefficient of Correlation for the Eurozone (Fig 3.1):

Year	Interest Rate (y)	Inflation Rate (x)	$dy = y - \bar{y}$	$dx = x - \bar{x}$	dy^2	dx^2	$dx*dy$
2003	1	2.1	0.5075	0.0450	0.2576	0.0020	0.0228
2004	1	2.2	0.5075	0.1450	0.2576	0.0210	0.0736
2005	1.25	2.5	0.7575	0.4450	0.5738	0.1980	0.3371
2006	2.5	2.7	2.0075	0.6450	4.0301	0.4160	1.2948
2007	3	2.5	2.5075	0.4450	6.2876	0.1980	1.1158
2008	2	4.1	1.5075	2.0450	2.2726	4.1820	3.0828
2009	0.25	0.4	-0.2425	-1.6550	0.0588	2.7390	0.4013
2010	0.25	1.5	-0.2425	-0.5550	0.0588	0.3080	0.1346
2011	0	3.3	-0.4925	1.2450	0.2426	1.5500	-0.6132
2012	0	2.5	-0.4925	0.4450	0.2426	0.1980	-0.2192
2013	-0.2	1.3	-0.6925	-0.7550	0.4796	0.5700	0.5228
2014	-0.2	0.2	-0.6925	-1.8550	0.4796	3.4410	1.2846
2015	-0.3	-0.1	-0.7925	-2.1550	0.6281	4.6440	1.7078
2016	-0.4	0.2	-0.8925	-1.8550	0.7966	3.4410	1.6556
2017	-0.4	1.4	-0.8925	-0.6550	0.7966	0.4290	0.5846
2018	-0.4	1.7	-0.8925	-0.3550	0.7966	0.1260	0.3168
2019	-0.5	1.4	-0.9925	-0.6550	0.9851	0.4290	0.6501
2020	-0.5	0.2	-0.9925	-1.8550	0.9851	3.4410	1.8411
2021	-0.5	2.5	-0.9925	0.4450	0.9851	0.1980	-0.4417
2022	2	8.5	1.5075	6.4450	2.2726	41.5380	9.7158

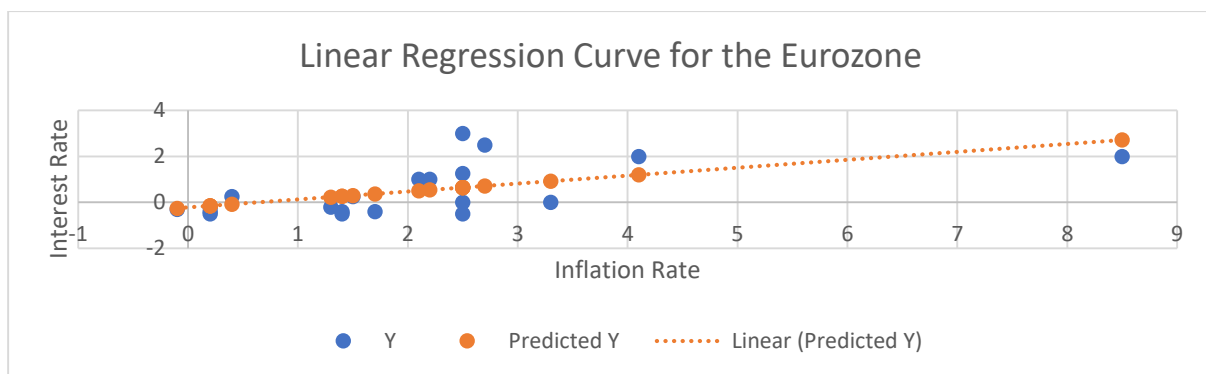
$$\bar{y} = 0.4925; \bar{x} = 2.055; B_{yx} = 0.3448; B_{xy} = 0.9992; r = 0.5869$$

There is a moderate degree of positive correlation in the Eurozone.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for the Eurozone (Fig 3.2):



Linear Regression Curve for the Eurozone (Fig 3.3):



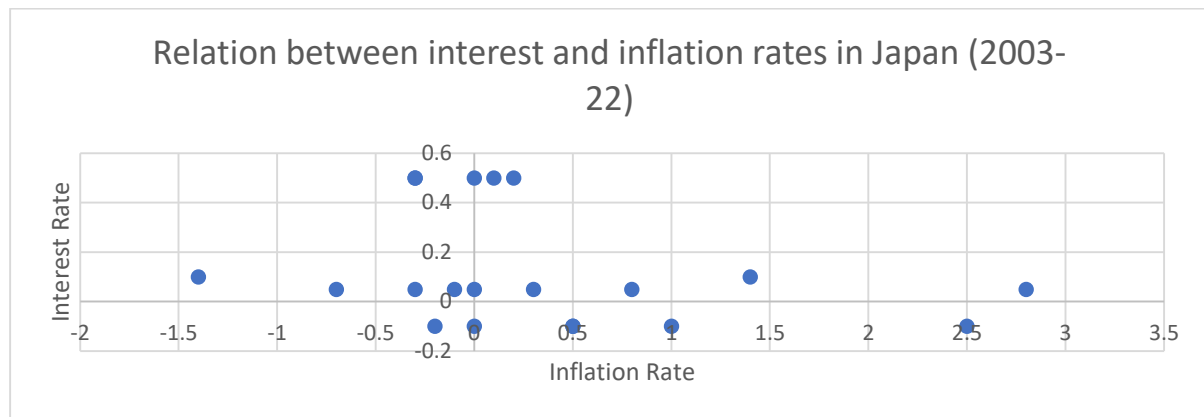
Pearson Coefficient of Correlation for Japan (Fig 4.1):

Year	Interest Rate (y)	Inflation Rate (x)	$dy = y - \bar{y}$	$dx = x - \bar{x}$	dy^2	dx^2	$dx*dy$
2003	0.5	-0.3	0.3775	-0.6400	0.1425	0.4096	-0.2416
2004	0.5	0	0.3775	-0.3400	0.1425	0.1156	-0.1284
2005	0.5	-0.3	0.3775	-0.6400	0.1425	0.4096	-0.2416
2006	0.5	0.2	0.3775	-0.1400	0.1425	0.0196	-0.0529
2007	0.5	0.1	0.3775	-0.2400	0.1425	0.0576	-0.0906
2008	0.1	1.4	-0.0225	1.0600	0.0005	1.1236	-0.0238
2009	0.1	-1.4	-0.0225	-1.7400	0.0005	3.0276	0.0391
2010	0.05	-0.7	-0.0725	-1.0400	0.0053	1.0816	0.0754
2011	0.05	-0.3	-0.0725	-0.6400	0.0053	0.4096	0.0464
2012	0.05	0	-0.0725	-0.3400	0.0053	0.1156	0.0247
2013	0.05	0.3	-0.0725	-0.0400	0.0053	0.0016	0.0029
2014	0.05	2.8	-0.0725	2.4600	0.0053	6.0516	-0.1784
2015	0.05	0.8	-0.0725	0.4600	0.0053	0.2116	-0.0334
2016	0.05	-0.1	-0.0725	-0.4400	0.0053	0.1936	0.0319
2017	-0.1	0.5	-0.2225	0.1600	0.0495	0.0256	-0.0356
2018	-0.1	1	-0.2225	0.6600	0.0495	0.4356	-0.1469
2019	-0.1	0.5	-0.2225	0.1600	0.0495	0.0256	-0.0356
2020	-0.1	0	-0.2225	-0.3400	0.0495	0.1156	0.0757
2021	-0.1	-0.2	-0.2225	-0.5400	0.0495	0.2916	0.1202
2022	-0.1	2.5	-0.2225	2.1600	0.0495	4.6656	-0.4806

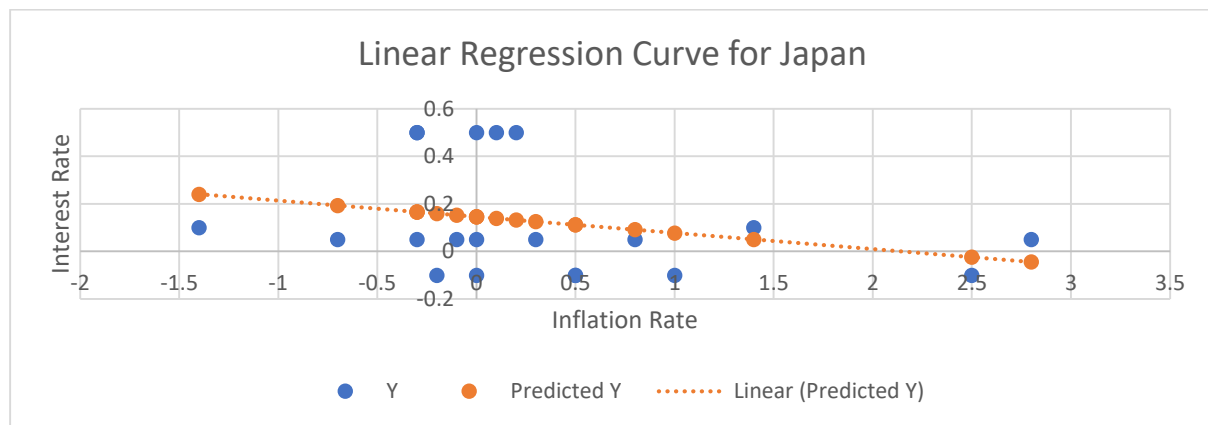
$$\bar{y} = 0.1225; \bar{x} = 0.3400; B_{yx} = -0.0678; B_{xy} = -1.2154; r = 0.2870$$

There is a weak positive correlation in Japan

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for Japan (Fig 4.2):



Linear Regression Curve for Japan (Fig 4.3):



Pearson Coefficient of Correlation for Brazil (Fig 5.1):

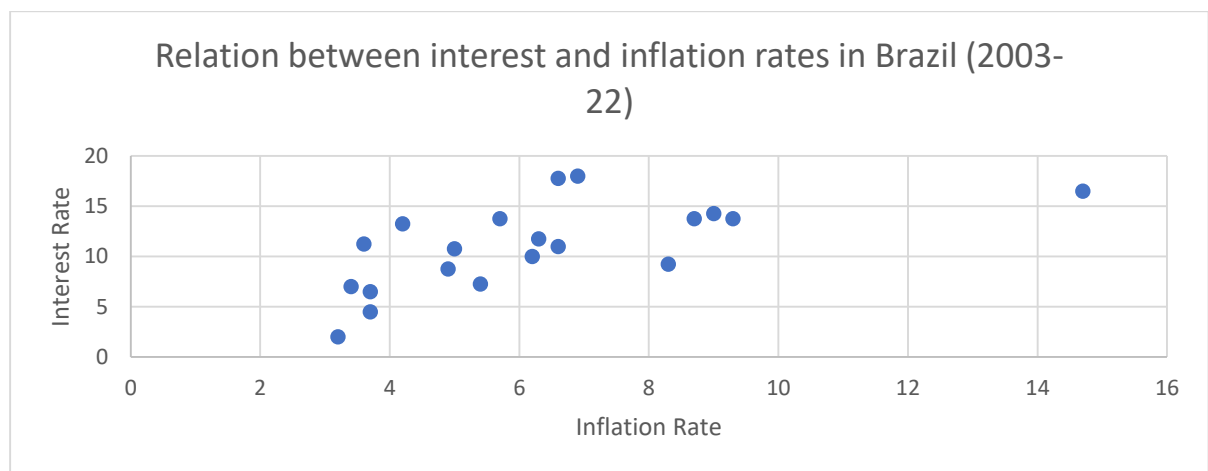
Year	Interest Rate (y)	Inflation Rate (x)	$dy = y - \bar{y}$	$dx = x - \bar{x}$	dy^2	dx^2	$dx \cdot dy$
2003	16.5	14.7	5.4500	8.4300	29.7025	71.0649	45.9435
2004	17.75	6.6	6.7000	0.3300	44.8900	0.1089	2.2110
2005	18	6.9	6.9500	0.6300	48.3025	0.3969	4.3785
2006	13.25	4.2	2.2000	-2.0700	4.8400	4.2849	-4.5540
2007	11.25	3.6	0.2000	-2.6700	0.0400	7.1289	-0.5340
2008	13.75	5.7	2.7000	-0.5700	7.2900	0.3249	-1.5390
2009	8.75	4.9	-2.3000	-1.3700	5.2900	1.8769	3.1510
2010	10.75	5	-0.3000	-1.2700	0.0900	1.6129	0.3810
2011	11	6.6	-0.0500	0.3300	0.0025	0.1089	-0.0165
2012	7.25	5.4	-3.8000	-0.8700	14.4400	0.7569	3.3060
2013	10	6.2	-1.0500	-0.0700	1.1025	0.0049	0.0735
2014	11.75	6.3	0.7000	0.0300	0.4900	0.0009	0.0210
2015	14.25	9	3.2000	2.7300	10.2400	7.4529	8.7360

2016	13.75	8.7	2.7000	2.4300	7.2900	5.9049	6.5610
2017	7	3.4	-4.0500	-2.8700	16.4025	8.2369	11.6235
2018	6.5	3.7	-4.5500	-2.5700	20.7025	6.6049	11.6935
2019	4.5	3.7	-6.5500	-2.5700	42.9025	6.6049	16.8335
2020	2	3.2	-9.0500	-3.0700	81.9025	9.4249	27.7835
2021	9.25	8.3	-1.8000	2.0300	3.2400	4.1209	-3.6540
2022	13.75	9.3	2.7000	3.0300	7.2900	9.1809	8.1810

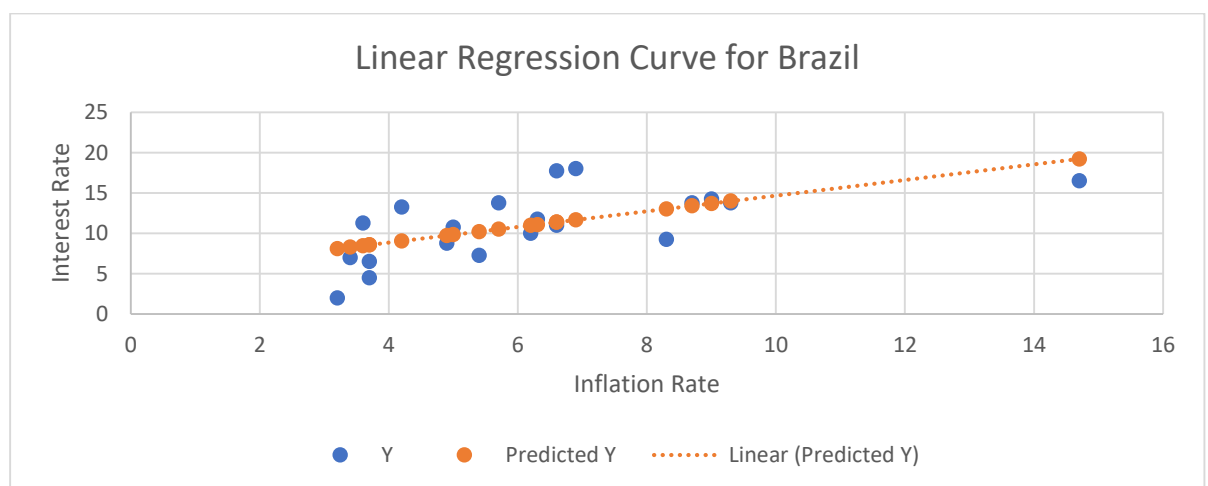
$$\bar{y} = 11.05; \quad \bar{x} = 6.27; \quad B_{yx} = 0.9682; \quad B_{xy} = 0.4058; \quad r = 0.6268$$

There is a moderate degree of correlation in Brazil.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for Brazil (Fig 5.2):



Linear Regression Curve for Brazil (Fig 5.3):



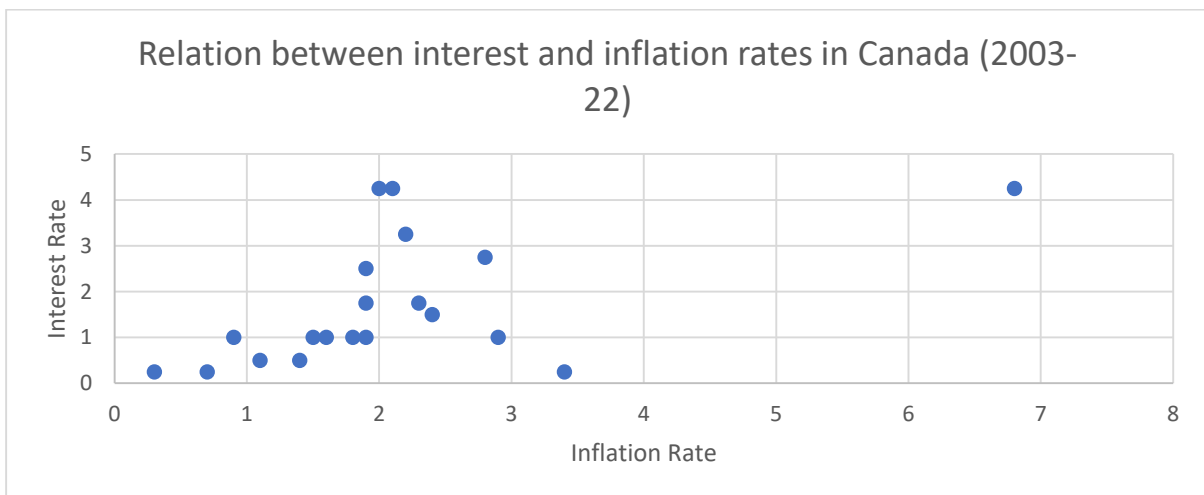
Pearson Coefficient of Correlation for Canada (Fig 6.1):

Year	Interest Rate (y)	Inflation Rate (x)	dy = y - \bar{y}	dx = x - \bar{x}	dy ²	dx ²	dx*dy
2003	2.75	2.8	1.0500	0.7050	1.1025	0.4970	0.7403
2004	2.5	1.9	0.8000	-0.1950	0.6400	0.0380	-0.1560
2005	3.25	2.2	1.5500	0.1050	2.4025	0.0110	0.1628
2006	4.25	2	2.5500	-0.0950	6.5025	0.0090	-0.2422
2007	4.25	2.1	2.5500	0.0050	6.5025	0.0000	0.0128
2008	1.5	2.4	-0.2000	0.3050	0.0400	0.0930	-0.0610
2009	0.25	0.3	-1.4500	-1.7950	2.1025	3.2220	2.6028
2010	1	1.8	-0.7000	-0.2950	0.4900	0.0870	0.2065
2011	1	2.9	-0.7000	0.8050	0.4900	0.6480	-0.5635
2012	1	1.5	-0.7000	-0.5950	0.4900	0.3540	0.4165
2013	1	0.9	-0.7000	-1.1950	0.4900	1.4280	0.8365
2014	1	1.9	-0.7000	-0.1950	0.4900	0.0380	0.1365
2015	0.5	1.1	-1.2000	-0.9950	1.4400	0.9900	1.1940
2016	0.5	1.4	-1.2000	-0.6950	1.4400	0.4830	0.8340
2017	1	1.6	-0.7000	-0.4950	0.4900	0.2450	0.3465
2018	1.75	2.3	0.0500	0.2050	0.0025	0.0420	0.0103
2019	1.75	1.9	0.0500	-0.1950	0.0025	0.0380	-0.0098
2020	0.25	0.7	-1.4500	-1.3950	2.1025	1.9460	2.0228
2021	0.25	3.4	-1.4500	1.3050	2.1025	1.7030	-1.8923
2022	4.25	6.8	2.5500	4.7050	6.5025	22.1370	11.9978

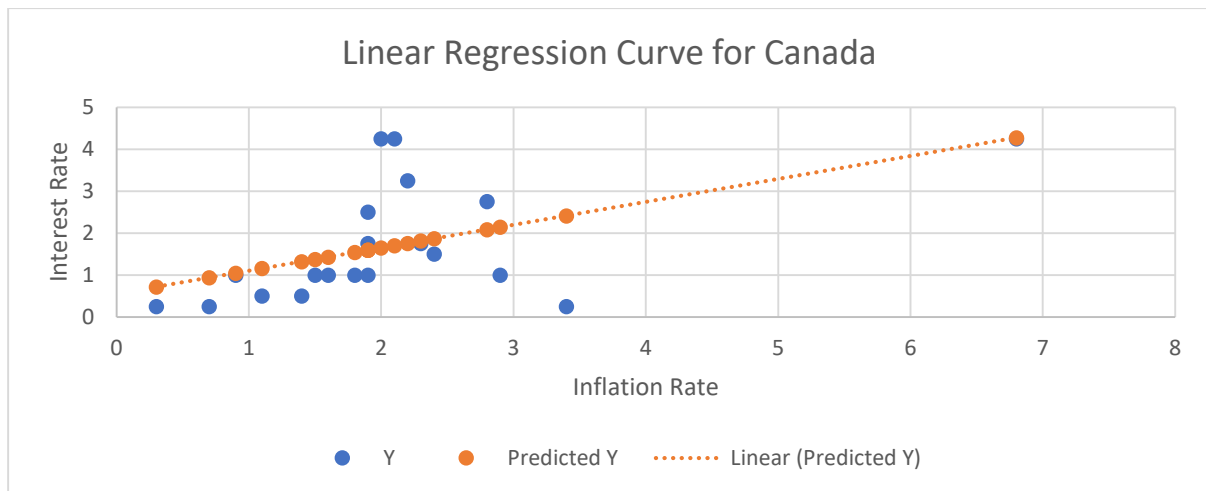
$$\bar{y} = 1.700; \bar{x} = 2.0950; B_{yx} = 0.5468; B_{xy} = 0.5191; r = 0.5327$$

There is a moderate degree of correlation in Canada.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for Canada (Fig 6.2):



Linear Regression Curve for Canada (Fig 6.3):



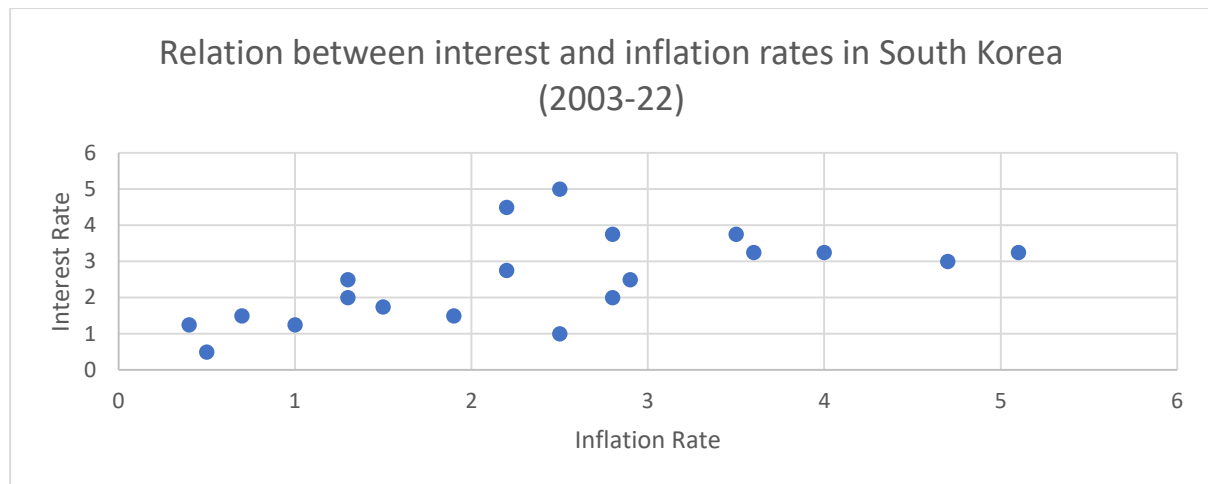
Pearson Coefficient of Correlation for South Korea (Fig 7.1):

Year	Interest Rate (y)	Inflation Rate (x)	dy = y - \bar{y}	dx = x - \bar{x}	dy ²	dx ²	dx*dy
2003	3.75	3.5	1.2375	1.1300	1.5314	1.2769	1.3984
2004	3.25	3.6	0.7375	1.2300	0.5439	1.5129	0.9071
2005	3.75	2.8	1.2375	0.4300	1.5314	0.1849	0.5321
2006	4.5	2.2	1.9875	-0.1700	3.9502	0.0289	-0.3379
2007	5	2.5	2.4875	0.1300	6.1877	0.0169	0.3234
2008	3	4.7	0.4875	2.3300	0.2377	5.4289	1.1359
2009	2	2.8	-0.5125	0.4300	0.2627	0.1849	-0.2204
2010	2.5	2.9	-0.0125	0.5300	0.0002	0.2809	-0.0066
2011	3.25	4	0.7375	1.6300	0.5439	2.6569	1.2021
2012	2.75	2.2	0.2375	-0.1700	0.0564	0.0289	-0.0404
2013	2.5	1.3	-0.0125	-1.0700	0.0002	1.1449	0.0134
2014	2	1.3	-0.5125	-1.0700	0.2627	1.1449	0.5484
2015	1.5	0.7	-1.0125	-1.6700	1.0252	2.7889	1.6909
2016	1.25	1	-1.2625	-1.3700	1.5939	1.8769	1.7296
2017	1.5	1.9	-1.0125	-0.4700	1.0252	0.2209	0.4759
2018	1.75	1.5	-0.7625	-0.8700	0.5814	0.7569	0.6634
2019	1.25	0.4	-1.2625	-1.9700	1.5939	3.8809	2.4871
2020	0.5	0.5	-2.0125	-1.8700	4.0502	3.4969	3.7634
2021	1	2.5	-1.5125	0.1300	2.2877	0.0169	-0.1966
2022	3.25	5.1	0.7375	2.7300	0.5439	7.4529	2.0134

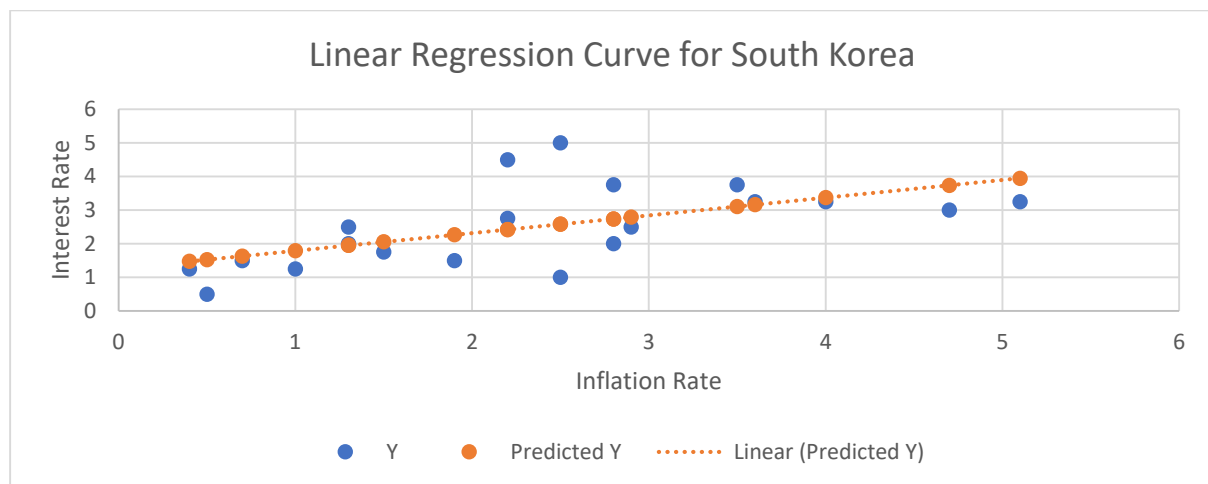
$$\bar{y} = 2.5125; \bar{x} = 2.3700; B_{yx} = 0.5259; B_{xy} = 0.6502; r = 0.5848$$

There is a moderate degree of correlation in South Korea.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for South Korea (Fig 7.2):



Linear Regression Curve for South Korea (Fig 7.3):



Pearson Coefficient of Correlation for Switzerland (Fig 8.1):

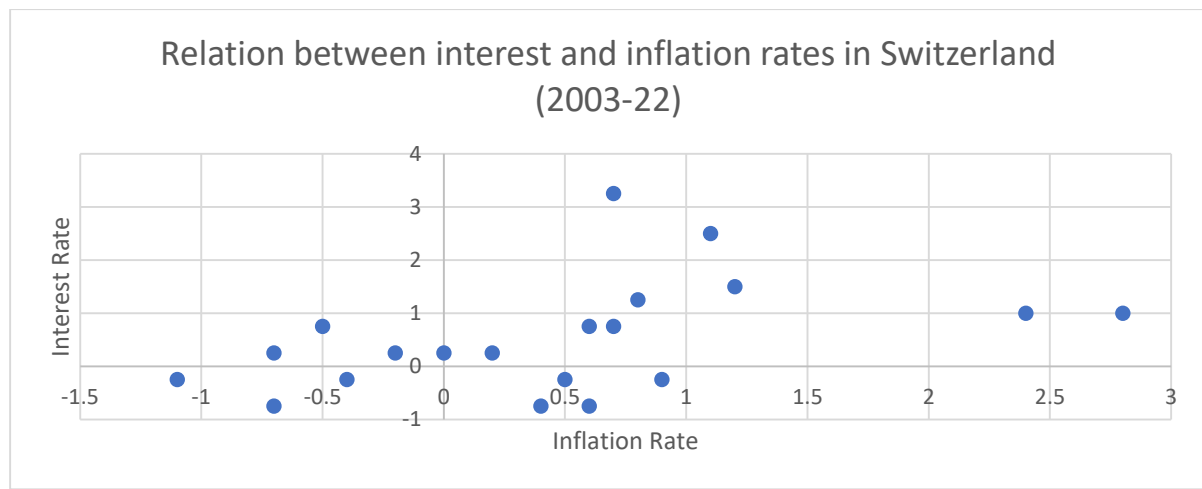
Year	Interest Rate (y)	Inflation Rate (x)	dy = y - \bar{y}	dx = x - \bar{x}	dy ²	dx ²	dx*dy
2003	0.75	0.6	0.2250	0.1350	0.0506	0.0182	0.0304
2004	1.25	0.8	0.7250	0.3350	0.5256	0.1122	0.2429
2005	1.5	1.2	0.9750	0.7350	0.9506	0.5402	0.7166
2006	2.5	1.1	1.9750	0.6350	3.9006	0.4032	1.2541
2007	3.25	0.7	2.7250	0.2350	7.4256	0.0552	0.6404
2008	1	2.4	0.4750	1.9350	0.2256	3.7442	0.9191
2009	0.75	-0.5	0.2250	-0.9650	0.0506	0.9312	-0.2171
2010	0.75	0.7	0.2250	0.2350	0.0506	0.0552	0.0529
2011	0.25	0.2	-0.2750	-0.2650	0.0756	0.0702	0.0729
2012	0.25	-0.7	-0.2750	-1.1650	0.0756	1.3572	0.3204
2013	0.25	-0.2	-0.2750	-0.6650	0.0756	0.4422	0.1829
2014	0.25	0	-0.2750	-0.4650	0.0756	0.2162	0.1279
2015	-0.25	-1.1	-0.7750	-1.5650	0.6006	2.4492	1.2129
2016	-0.25	-0.4	-0.7750	-0.8650	0.6006	0.7482	0.6704

2017	-0.25	0.5	-0.7750	0.0350	0.6006	0.0012	-0.0271
2018	-0.25	0.9	-0.7750	0.4350	0.6006	0.1892	-0.3371
2019	-0.75	0.4	-1.2750	-0.0650	1.6256	0.0042	0.0829
2020	-0.75	-0.7	-1.2750	-1.1650	1.6256	1.3572	1.4854
2021	-0.75	0.6	-1.2750	0.1350	1.6256	0.0182	-0.1721
2022	1	2.8	0.4750	2.3350	0.2256	5.4522	1.1091

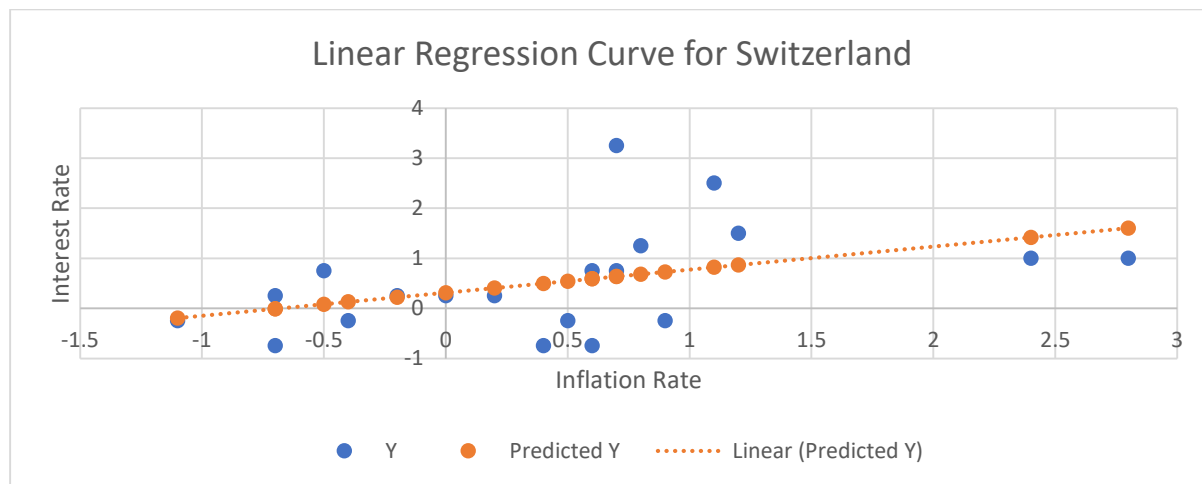
$$\bar{y} = 0.5250; \bar{x} = 0.4650; B_{yx} = 0.4606; B_{xy} = 0.3987; r = 0.4285$$

There is a moderate degree of correlation in Switzerland.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for Switzerland (Fig 8.2):



Linear Regression Curve for Switzerland (Fig 8.3):



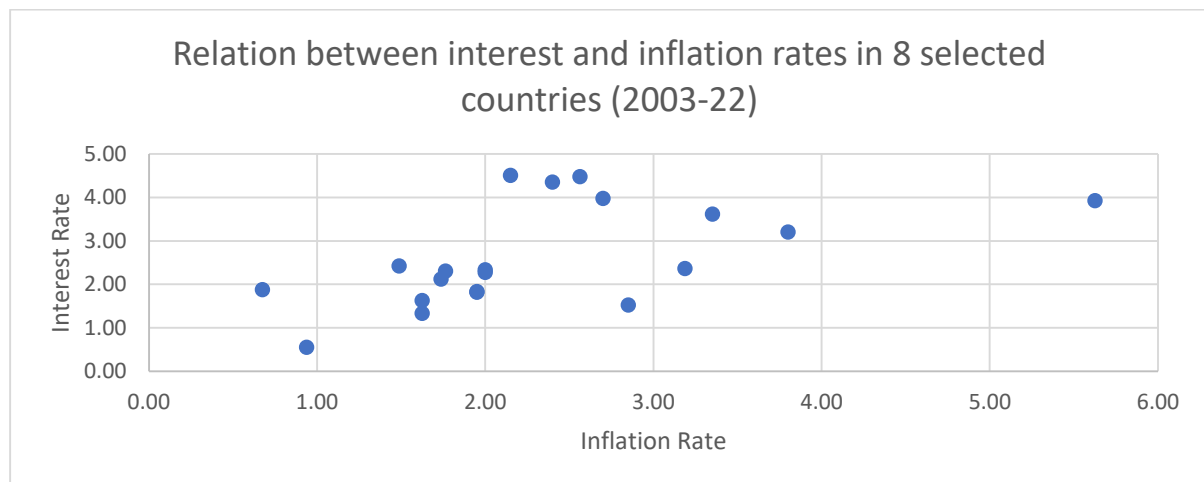
Pearson Coefficient of Correlation for 8 Country Aggregate (Fig 9.1):

Year	Interest Rate (y)	Inflation Rate (x)	dy = y - \bar{y}	dx = x - \bar{x}	dy ²	dx ²	dx*dy
2003	3.62	3.35	0.9958	1.0313	0.9916	1.0635	1.0269
2004	3.98	2.70	1.3558	0.3813	1.8381	0.1454	0.5169
2005	4.48	2.56	1.8558	0.2437	3.4439	0.0594	0.4523
2006	4.51	2.15	1.8870	-0.1688	3.5609	0.0285	-0.3184
2007	4.35	2.40	1.7308	0.0812	2.9956	0.0066	0.1406
2008	3.20	3.80	0.5789	1.4813	0.3351	2.1941	0.8575
2009	1.88	0.68	-0.7461	-1.6438	0.5567	2.7019	1.2264
2010	2.33	2.00	-0.2886	-0.3188	0.0833	0.1016	0.0920
2011	2.37	3.19	-0.2573	0.8687	0.0662	0.7547	-0.2236
2012	1.83	1.95	-0.7886	-0.3688	0.6219	0.1360	0.2908
2013	2.12	1.74	-0.5011	-0.5813	0.2511	0.3379	0.2913
2014	2.28	2.00	-0.3448	-0.3188	0.1189	0.1016	0.1099
2015	2.42	1.49	-0.2011	-0.8313	0.0404	0.6910	0.1672
2016	2.30	1.76	-0.3198	-0.5563	0.1023	0.3094	0.1779
2017	1.63	1.63	-0.9948	-0.6938	0.9897	0.4813	0.6902
2018	1.82	1.95	-0.8073	-0.3688	0.6518	0.1360	0.2977
2019	1.33	1.63	-1.2886	-0.6938	1.6605	0.4813	0.8940
2020	0.55	0.94	-2.0698	-1.3813	4.2843	1.9079	2.8590
2021	1.52	2.85	-1.1011	0.5313	1.2124	0.2822	-0.5850
2022	3.93	5.63	1.3052	3.3063	1.7034	10.9313	4.3152

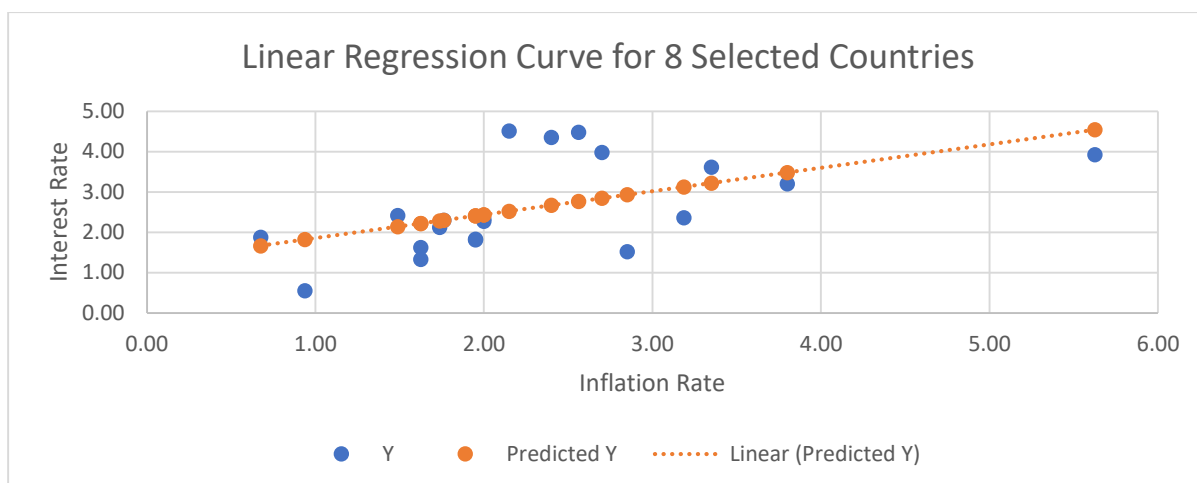
$$\bar{y} = 2.6230; \bar{x} = 2.3188; B_{yx} = 0.5811; B_{xy} = 0.5206; r = 0.5500$$

The 8 country aggregate data shows a moderate degree of correlation.

Scatter Plot of Interest Rates (Y) and Inflation Rates (X) for 8 Country Aggregate (Fig 9.2):



Linear Regression Curve for 8 Country Aggregate (Fig 9.3):

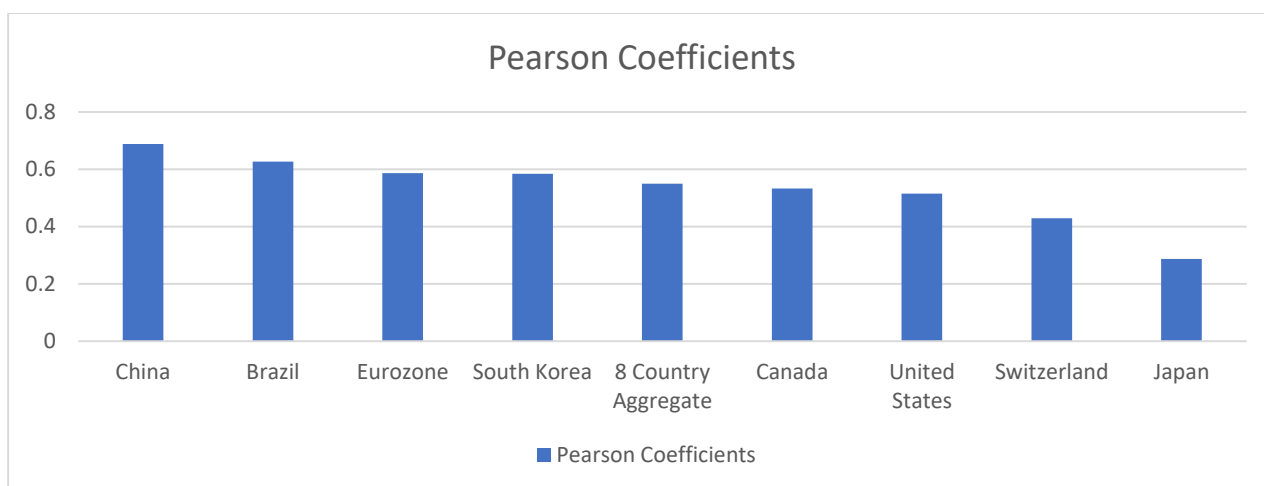


Future Scope:

This study's scope can be expanded to include more countries, and more types of countries. Further, a more comprehensive time series analysis can also be conducted, expanding the scope from the current 20 to 50 or even 100 years for some countries. Currently, of the eight economies analysed, 5 can be considered high-income advanced economies, 2 are upper middle-income developed economies and 1, South Korea, transitions from the latter to the former designation over the period in which our data is collected. A more comprehensive list would also include some lower middle-income economies such as India and Pakistan and lower-income economies such as Afghanistan and Uganda to provide a more well-rounded view of the topic.

Conclusion:

We examined the relationship between interest rates (end of period) and inflation rates (CPI) for eight major economies across a period of twenty years employing the methods of; scatter plotting, Pearson coefficient correlation, linear regression analysis and time series analysis.



We found there to be a moderate degree of positive correlation present in the selected economies with the aggregate of these countries producing an r value of 0.55 meaning that level of change in interest rates can be explained by a change in inflation. Further, we arrive at a standard error of 0.5 meaning that our collected dataset has produced a moderately reliable output. We have also arrived at a p -value of 0.03 meaning that our output is statistically significant and that we can reject our null hypothesis. Finally, our coefficient value is 1.275 which means for every 1 increase in inflation, there is a 1.275 increase in interest rates to combat it.

However, variations across economies suggests that there are other factors at play which explain the rest of the variation such as monetary policy frameworks, economic cycles and external shocks. Concluding, these results play a vital role in contributing to modern discourse on the effectiveness of monetary policy and how it plays into the taming of the ever constant in our lives, inflation.

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OPERATIONAL EFFICIENCY AT A SEZ: A CASE STUDY ON RAW SUGAR LOGISTICS IN KAKINADA.

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Abstract:

This study explores the operations and the impact of Special Economic Zones (SEZs) in India, focusing on their role in promoting economic activity, boosting exports, attracting investments, and enhancing infrastructure development. The paper emphasizes the importance of efficient logistics management within SEZs, using the case study of EID Parry Limited to illustrate best practices and challenges in the sugar industry. Overall, the research provides valuable insights into the logistics operations in a Special Economic Zone.

Keywords: SEZ, Logistics, Transportation, EID Parry, Kakinada, Exports, Sugar.

Chapter 1

1. Introduction - Background on Special Economic Zones in India

India was one of the first in Asia to identify the efficiency of the Export Processing Zone (EPZ) model in promoting exports, so India set up its first EPZ in Kandla in 1965. With the aim to overcome the shortcomings due to the complexity of controls and clearances; absence of world-class infrastructure, and an unstable fiscal policy. Therefore, with the main goal of attracting large Investments in India the Special Economic Zones (SEZs) Policy was announced in April 2000.

The Special Economic Zone act was passed by the parliament in 2005 and received Presidential Assent on 23rd June, 2005. All the Rules came into effect around 10th February 2006.

The 6 main purposes of SEZ are

- 1) To generate additional economic activity: This is the primary aim for SEZ I.e boost economic activity in India by boosting industrialization and development of infrastructure in selected regions.
- 2) Inducing more Exports: SEZ aims to boost export of goods and services thereby increasing foreign exchange earnings.
- 3) Attract Investments: It's main aim was to attract Foreign as investors in several parts of the country and also motivate domestic investors to invest in their own country.
- 4) Infrastructure Development: SEZ focuses on developing infrastructure like roads, power supply and communication network to make India a potential place for investors.
- 5) Monetary Benefits and Regulatory Flexibility: Industries in SEZ are offered exclusive Tax benefits, certain exemptions from customs and duty making the process of business a hassle-free experience.
- 6) Employment Generation: One of its most crucial objectives is to generate employment within the country leading to poverty Reduction and improvement of socio-economic status.

The incentives and facilities offered to SEZ units for drawing investments:

1)Duty free import/domestic procurement of goods for development, operation, and maintenance for units in SEZ

2)Conditions for Income Tax Exemption

- SEZ units are given 100% tax exemption on export income for the first 5 years.
- After the initial 5 years the above tax exemption is reduced from 100% to 50%.
- SEZ units can avail 50% of the ploughed back export profit for the next 5 years, implying that half of the profits reinvested in the business are exempted from income tax

Although Sunset Clause which was passed on 1st April,2020 limits the above tax benefits for units established after the mentioned date. The Sunset Clause was passed to implement a time limit on the SEZ tax benefits to ensure fiscal discipline, comply with trade obligations and prevent any misuse of the benefits provided and balancing economic development.

- 3) Exemption from Minimum Alternate Tax (MAT)
- 4) Exemption from Central Sales Tax, Exemption from Service Tax and Exemption from State sales tax. These are now included into GST and the Integrated Goods and Service Tax (2017).
- 5) Other levies as imposed by the respective State Governments.
- 6) Single window clearance for Central and State level approval i.e. a streamlined process where units in SEZ can obtain permissions and approval using only one interface.

Approval Process and Administrative Set-up for SEZ:

- 1) The developer applies for establishing SEZ to the Concerned State Govt by submitting a proposal.
- 2) State Govt forwards the proposal with its recommendations within 45 days to the board of Approval which is a nineteen-member board set-up by the Central Government whose chairman is the Secretary of the Department of Commerce.

The following are the members of the Board of Approval: -

- i. Secretary, Department of Commerce
- ii. Member, CBEC
- iii. Member, IT, CBDT
- iv. Joint Secretary (SEZ), Department of Commerce
- v. Joint Secretary (Banking Division), Department of Economic Affairs, Ministry of Finance
- vi. Joint Secretary, DIPP
- vii. Joint Secretary, Ministry of Science and Technology
- viii. Joint Secretary, Ministry of Small-Scale Industries and Agro and Rural Industries
- ix. Joint Secretary, Ministry of Home Affairs
- x. Joint Secretary, Ministry of Defence
- xi. Joint Secretary, Ministry of Environment and Forests
- xii. Joint Secretary, Ministry of Law and Justice
- xiii. Joint Secretary, Ministry of Overseas Indian Affairs
- xiv. Joint Secretary, Ministry of Urban Development
- xv. A nominee of the State Government concerned
- xvi. Director General of Foreign Trade or his nominee
- xvii. Development Commissioner concerned
- xviii. A professor in the IIM or IIFT

xix. Director or Deputy Secretary, Ministry of Commerce and Industry, Department of Commerce

4) After SEZ is approved by the Board of Approvals and after the intimation by the Central Government a SEZ unit is allowed to be setup.

5) The Performance of SEZ is constantly monitored by the approval committee.

Chapter 2

2. Literature Review

- The paper "India's SEZ Business Zones Development" by Saeed Khan, published in October 2008, examines the economic, social, and environmental impacts of Special Economic Zones (SEZs) in India. Khan highlights the SEZ policy's aim to boost the economy but raises concerns about converting fertile land into industrial land, potentially leading to a future food crisis. The SEZ Act introduced streamlined approval mechanisms, with the Board of Approval overseeing development and zone-level committees handling unit establishment approvals. The paper covers SEZ background, Indian experience, regime specifics, the role in the economy, opposition faced, global perspectives, and the impact of land conversion. References include Ministry of Commerce publications and news sources, offering insights into the challenges and benefits of SEZs in India, urging a re-evaluation of the SEZ policy debate and providing global perspectives on SEZs.
- The paper "India's Sugar Trade: A fresh look" by Deokate Tai Balasaheb 2013 elucidates the strategic importance of India's international sugar trade, controlled within the broad spectrum of the Sugar Price policy, in maintaining stability in sugar prices despite the cyclicity of production. Agricultural policies have emphasized the creation of such mechanisms whereby a market-driven relationship could be established between sugar and sugarcane prices. Reform is called for because domestic sugar prices are higher than international prices. This paper exemplifies India's potential for sugar production to nations in the Middle East and East Africa that are sugar deficient. It also states the challenges confronting the cyclical nature of sugar production such as erratic weather, traditional production methods, and government policies. It also notes that there are several factors related to the sugar market which pose increasingly expensive challenges with perturbations based on trade distortions, protectionist policies, and adjustments in

energy prices. In general, this study provides a fair description of the dynamics, challenges, and opportunities in the sugar trade sector of India.

- The paper "Special Economic Zones in India - A Critical Evaluation" by Bhupendra Kumar 2009, presents a holistic analysis of Special Economic Zones in the history of the world and in India, while looking to assess their performance in export growth, foreign direct investment, and job creation with respect to the overall economy. Emphasizing the crucial role of infrastructure in driving economic growth, the study suggests the development of industrial clusters with robust connectivity and essential facilities to propel India towards economic excellence. It highlights operational challenges faced by investors and firms within SEZs, talking about the importance of careful design considering economic and institutional factors for SEZ success, and concludes with recommendations for policymakers, SEZ promoters, and units to optimize SEZ performance and contribute to India's economic advancement.

Chapter 3

3. Research Methodology

The study used a quantitative research approach based on a case study method for studying logistics operation efficiency of raw sugar at a Special Economic Zone (SEZ) in Kakinada, India. The primary data for the research were collected from multiple sources, such as the official SEZ websites, relevant reports, research papers, and estimates from the logistics department of EID Parry Sugar.

Data Collection:

The quantitative data on transportation costs and logistics expenses came mainly from AKV Logistics-the firm engaged in the movement of raw sugar from Brazil.

Further, secondary data have been collected from relevant literature, including research papers and reports, which were carefully reviewed and analysed to provide insights into the logistics and operational efficiency of raw sugar supply chains in SEZs.

Case Study Approach:

The study utilized a step by step down simplified case study approach, with the particular context of raw sugar logistics at the Kakinada SEZ. This enabled a detailed analysis of the actual situation, which facilitated the identification of bottlenecks, challenges, and areas of improvement within the current operational processes. By

integrating the quantitative information gathered from primary and secondary sources, the research sought to present a holistic picture of the operational effectiveness and logistical issues encountered by the EID Parry company in sourcing raw sugar from Brazil.

This research design facilitated a systematic and data-based methodology to meet the research goals by utilizing quantitative data from various sources and adopting a case study design to gain a holistic perspective of the operational effectiveness and logistical issues in the case of raw sugar logistics at the Kakinada SEZ.

Chapter 4

4. Summarizing Impact of SEZ in India

1) Impact on Export

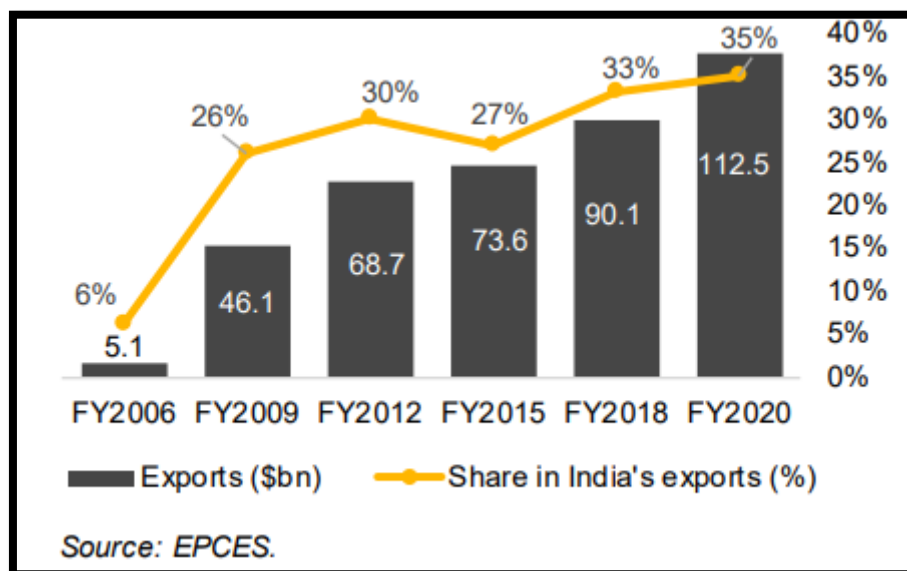


Figure 7-Exports from SEZ in India

As the graph above shows SEZs had a major impact on the increased exports of the country. In FY2020, exports valued at \$112.5 billion grew at a CAGR of 22.9 percent from FY2006 to FY2020, compared with India's average rate of 7.8 percent during the same period. Also, the share of exports from SEZs in India has witnessed a 6-fold increase, starting from 6 percent in FY2006 to 35 percent in FY2020.

2) Impact on Investment

Investment	Central govt. SEZs	State/private notified SEZs before SEZ ct 2005	SEZs notified after SEZ act 2005	Total
Investment (as on Feb,2006)	Rs. 2,279.20 Cr	Rs. 1,756.31Cr.	-	Rs. 4035.51 Cr.
Incremental Investment	Rs. 12,898.80cr	Rs. 8,412.69 Cr	Rs. 3,51,147 Cr.	Rs.3,72,458.49 Cr.
Total	Rs. 15,178 Cr.	Rs. 10,169 Cr.	Rs. 3,51,147 Cr.	Rs. 3,76,494 Cr.

Source: compiled from-sezindia.nic.in & Economic Survey of India

Figure 8- Investments made in SEZ(31st March 2016)

SEZ provided financial Incentives like tax free income and less amount of GST for any units setting up their operations in SEZ and provided more improved infrastructure with high connectivity through Roads, Ports which attracted a lot of investments. As the table indicates that till 2006 total investment in SEZs was around Rs.4035.51Cr and this increased to Rs. 3, 76,494Cr as on 31st March 2016.

One of the main aims of SEZ was to attract foreign investments into the country. Foreign investments proved to be a good source of technical evolution in the country. It is a two-way benefit system where both the countries are benefited as one country got the economic advantage while other increases its economy or productivity by using high technologies or an optimized way of using resources. Foreign Direct Investment increased from \$15.7 billion in 2006-07 to \$24.57 billion in 2007-08 showcasing an increase of 56% proving the positive impact of SEZ in India.

3) Impact on Employment

Creating jobs is one of SEZs' other main objectives. 2.35 million workers in India are thought to be directly employed by SEZs. Subsequent Special Economic Zones have been effective in creating 0.2 million to 0.3 million indirect jobs. SEZs have been crucial in helping India create jobs. In India, the rate of job creation in Special Economic Zones (SEZs) has surpassed the overall growth in employment in the nation. In India, job creation under the SEZ initiative has averaged over 21% annually, whereas the wider economy has seen job creation of fewer than 4% annually. Additionally, SEZs have seen a nine-fold rise in their proportion of India's total employment, rising from 3% in FY2006 to 27% in FY2020.

Chapter 5

5. Simplified Case on EID Parry Sugars logistics

Purpose of Case:

It was observed that the difference of price between processed and raw sugar are minimal due to the efficient logistics process of the company outsourced to AKV Logistics, Kakinada. It demonstrates the process, precautions taken, cost of transport etc which is one of the prime examples of the operational Efficiency of a Kakinada SEZ unit.

Overview of EID Parry Sugar:

EID Parry Limited, a prominent Indian public company headquartered in Chennai and part of the Murugappa Group, has a subsidiary Sugar Refinery responsible for processing Raw Sugar from Brazil, Parry Sugar Refinery India Private Limited is mainly operating in Kakinada, Andhra Pradesh Founded in 1788, EID Parry has a rich legacy in the sugar industry and is engaged in the manufacture and marketing of sugar and bio-products. Moreover, EID Parry is globally recognized for its expertise in organic spirulina and microalgal products in the nutraceuticals space.

Import-Export Dynamic:

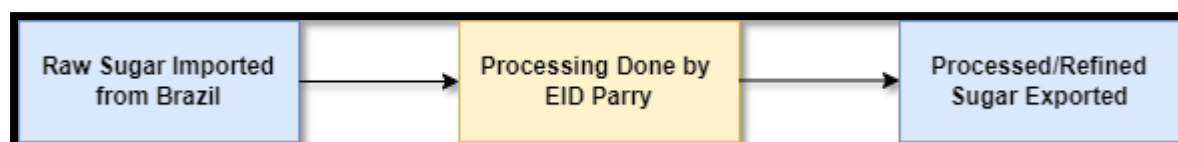


Figure 9-Overview of EID Parry Sugar

EID Parry Sugar's facility operates on a 100% import and 100% export model, indicative of its integration into global supply chains. This streamlined approach facilitates efficient sourcing of raw materials and enables seamless exportation of refined sugar, contributing to the company's success in the international market. The figure shows that Brazil which is the world's largest producer of sugar contributing to 21% of the world sugar production in 2022 exports Raw Sugar to India, EID Parry is responsible for processing and refining the Raw Sugar and then this Refined Sugar is exported to other countries.

Customs Efficiency and Oversight:

EID Parry Sugar's facility in Kakinada operates under an Authorized Economic Operator (AEO) status, affording it simplified customs procedure within the plant premises. This allows for streamlined import and export processes, optimizing efficiency. To ensure compliance and smooth operations, the company appoints two dedicated personnel 1) superintendent and 2) inspector—to oversee customs procedures. This integrated approach showcases EID Parry Sugar's commitment to regulatory adherence and efficient logistics management.

Hatch Seal Inspection and Protocol

Each Hatch contains 10,000 tonnes of Sugar, after the arrival of the cargo each hatch is inspected with a very acute eye and paying a lot of attention to every minute details. It is ensured that each hatch maintains its integrity and each hatch comply to all standards. Prior to loading it is ensured that each hatch is still airtight as the journey from Brazil to India is of 41 days and the ship may face certain weather conditions which may compromise the airtight property of the hatches. It is also ensured that the hatches remain in airtight condition even during the loading process to prevent any damage to the cargo. If any damage is observed is observed before loading, the seller should be contacted immediately for reparations and evaluating alternatives. Now as part of the dispatch protocol two surveyors needs to collaborate: -

1)Load Port Surveyor

2)Dispatch Port Surveyor

in capturing and verifying Photographic evidence. Their purpose is to document the condition of the hatch seal and ensure transparency throughout the logistics chain.

Comprehensive Cargo Sampling and Quality Assurance:

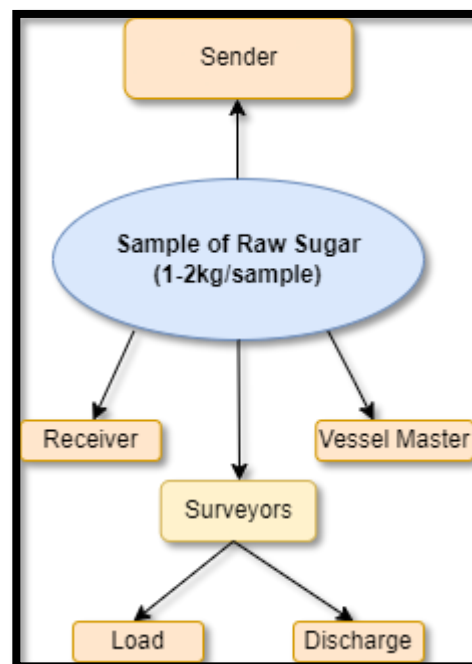


Figure 4-Sample Handling Chart

At EID Parry Sugar's load port in Kakinada, a detailed precise sampling process ensures the integrity of the cargo. Samples are distributed to 6 stakeholders, including sender, receivers, appointed surveyors, and the vessel master, as shown in the diagram. Upon receipt, thorough quality checks like purity, water content check, density and of other essential parameters, are conducted to assess the quality of the raw sugar imported.

Spillage Avoidance:

EID Parry Sugar's operations in Kakinada prioritize safety and regulatory compliance through innovative measures and adherence to standards. A four-foot-high wall, constructed using bags, serves as a preventive barrier, effectively averting cargo spillage into the sea. Despite Kakinada Port's restriction on dividers, the company ensures operational efficiency while complying with regulations. During transportation the tipper is covered with plastic sheet to avoid contamination and wastage. This is one of the most efficient ways to avoid spillage as they keep the Wastage percent well below 0.2%.

Document Verification During Loading:

Documents verification is one of the most crucial stages during the loading process. Three types of documents are reviewed:

- Survey Documents

- Agent Documents
- Security Documents

These documents are verified to ensure compliance and regulatory requirements hence facilitating smooth and secure cargo handling.

Certificates after Completion:

1)No Damage Certificate:


M.V. "S A M A T A N"	KAKINADA PORT DATE: 05-02-2024.
<u>NO DAMAGE CERTIFICATE</u>	
THIS IS TO CERTIFY THAT M/S. AKV LOGISTICS PVT. LTD., KAKINADA STEVEDORES OF M/S.PARRY SUGARS REFINERY INDIA PVT.LTD.KAKINADA, DISCHARGED THE CARGO OF BRAZILIAN CANE RAW SUGAR IN BULK TO MY ENTIRE SATISFACTION AND THERE IS NO DAMAGE CAUSED TO THE VESSEL AND ITS FIXTURES.	
	

Figure 5-No Damage Certificate

2)Discharge Completion Certificate:


M.V. "S A M A T A N"	KAKINADA PORT DATE: 05-02-2024.
<u>DISCHARGE COMPLETION CERTIFICATE</u>	
THIS IS TO CERTIFY THAT A JOINT INSPECTION OF ALL THE HATCHES WERE MADE ON COMPLETION OF DISCHARGE ALONG WITH THE REPRESENTATIVES OF THE MASTER, CLEARING AGENTS AND STEAMER AGENTS AND THAT ALL THE CARGO OF BRAZILIAN CANE RAW SUGAR IN BULK AVAILABLE ON-BOARD THE VESSEL M.V. "S A M A T A N" HAS BEEN DISCHARGED AS PER THE BILL OF LADING.	
	

Figure 6-Discharge Certificate

In the context of EID Parry Sugar's operations in Kakinada, a Discharge Completion Certificate serves as formal confirmation that the sugar cargo has been successfully

unloaded from the vessel upon arrival at the port. Issued by relevant entities, this document verifies that the unloading process has been completed in accordance with all regulatory requirements and predefined protocol. It signifies the conclusion of the vessel's cargo-handling activities.

Chapter 6

6. Assessing Efficiency by Quantifying Data

Time Taken for each Ship from Brazil to Kakinada Port: **41 Days**

Therefore, one ship a month containing raw sugar.

Capacity of Each Ship = **75,000 to 80,000 tonnes**

=> Average Capacity of Each Ship = **77,500 tonnes**

Amount Sent to Factory in one lot = **12,000 tonnes** (Previously 10,000 tonnes)

Average Time Taken for sending one ship worth Raw Sugar = $77,500/12,000 = 6 \text{ Days}$
10 Hours 48 mins

Prices

Handling Amount Charged from **Ship to Factory** = **Rs 190 /tonnes**

=> Total Amount charged from Ship to Factory = $190 \times 77500 \text{ tonne} = \text{Rs.1,47,25,000/-}$

Profits = **6 to 7%**

Average Profit Taken = **6.5%**

Hence, Profit made while transporting from Ship to Factory = **Rs.9,57,125/-**

From **Factory to Ship (Packaged)** = Rs 280 to Rs 300/tonne

=> average taken = **Rs 290/tonne**

Total

Hence, Total amount charged from factory to ship = $\text{Rs } 290 \times 77500 = \text{Rs.2,24,75,000/-}$

Amount Charged per kg for Transportation = $\text{Rs.2,24,75000/} (75000 \times 1000) \text{ kg}$

Therefore, Total Amount Charged per kg = **Rs.0.299667/kg**(approx.)

Profits made from factory to ship transportation = **Rs 14,60,875/-**

Hence, **Total Profits made per ship** is $\text{Rs } 14,60,875 + \text{Rs.9,57,125} = \text{Rs } 24,18,000 \text{ (approx.)}$

Chapter 7

7. Analysis

Analysing the provided data reveals a remarkably efficient logistical operation for transporting raw sugar from offloading in Kakinada Port to Sugar Refinery and vice-versa.

The efficiency stems from meticulous planning and optimization throughout the supply chain, resulting in minimal time and cost expenditures per unit of sugar transported.

Firstly, the time taken for each shipment, at 41 days, ensures a steady flow of raw sugar, with one ship making the journey per month. This consistent schedule allows for reliable planning and inventory management at the destination port, maximizing operational efficiency. Moreover, the average capacity of each ship, at 77,500 tonnes, enables large quantities of sugar to be transported in each shipment.

The cost analysis also brings out the cost-effectiveness of the process of logistics. The handling fee levied from factory to ship, at Rs 190 per tonne, is a fair charge given the amount being handled. This cost is balanced by the profits gained in transit, which are carefully calculated at every step of the journey. The careful detail provided in cost control is seen with the cautious assignment of the average profit margin to 6.5%, just enough to stay profitable without weakening competitiveness.

In addition, the productivity of the logistics process is highlighted by the minimal cost of transportation per kilogram of sugar. At around Rs 0.299667 per kilogram, this cost is remarkably low, given the immense distances traversed and huge quantities moved. Such productivity is made possible by streamlining routes, transport modes, and handling processes, reducing overheads, and driving cost-effectiveness to the maximum.

All in all, the information presents a logistics operation that is not just efficient but highly profitable. By simplifying procedures, maximizing the use of resources, and exercising a keen eye for cost management, the operation is able to achieve incredible efficiency in the delivery of raw sugar. This efficiency not only delivers goods on time but also drives the competitiveness and sustainability of the supply chain.

Chapter 8

8. Challenges Faced:

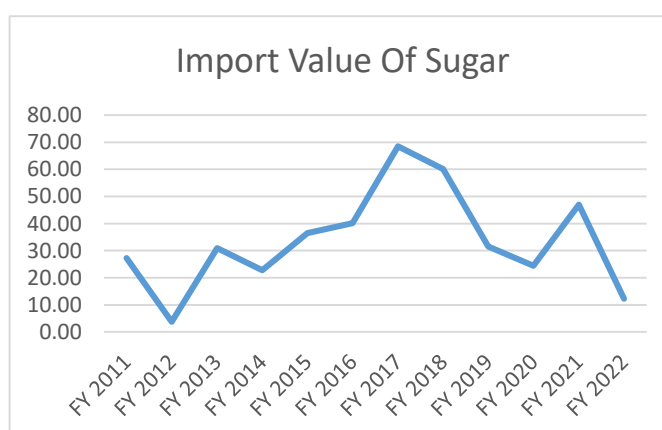
1) Contamination:

One of the major challenges the company encountered was a loss of Rs.1.2 crore due to contamination of raw sugar stored in the warehouse kept for refining at a later stage.

This incident resulted in the unexpected formation of syrup, rendering the sugar unusable for its refining. Not only it led to some financial setbacks it also complicated customer relationship and exposed operational flaws. Firstly, it disrupted the production schedule, causing delays and potentially impacting client orders and contracts. Secondly, it required immediate investigation and remediation to identify the source of contamination and implement measures to prevent future occurrences. There were genuine concerns about maintaining the company's reputation for exporting high-quality refined Sugar, as such incidents could erode customer trust.

2) Decrease In Sugar Import in India:

Import value of sugar India FY 2011-2022 in billion of Rupees	
FY 2011	27.23
FY 2012	3.75
FY 2013	30.95
FY 2014	22.79
FY 2015	36.45
FY 2016	40.11
FY 2017	68.50
FY 2018	60.17
FY 2019	31.48
FY 2020	24.42
FY 2021	46.99
FY 2022	12.27



The total import value of sugar in India has fluctuated significantly over the years, with periods of both increases and decreases. Additionally, In the last few years, starting from FY 2019, the import value has been on a declining trend, with FY 2022 recording the lowest import value of 12.27 billion Indian rupees during the given period.

The volatility in sugar prices resulting from fluctuations in import values could disrupt EID Parry's revenue streams and financial stability. Rapid price changes can make revenue forecasting and financial planning challenging, potentially leading to revenue losses or reduced profitability. The company may struggle to adapt its logistics costs quickly enough to mitigate the adverse effects of price volatility, impacting its overall business performance.

Moreover, recent trend indicating a downfall of sugar import may indicate less profit margin in the logistic sector as they charge on a per tonne basis and the fixed cost remains constant.

3)No Digitalization in SEZ administration offices:

The SEZ officials are using manual and handwritten entry method to record or document each step. Although all the custom and documentation process is relaxed in a SEZ, a stringent record keeping is done by the administrative officials for security or other purposes. Any mistake done during manual entry results in the whole page being struck in adherence to the protocols of a neat record. Thus, any mistake in paperwork leads to an increase in waiting time as well as a wastage of efforts.

4)Restrictions on Dividers in Kakinada Port:

Due to Restriction on Dividers in Kakinada Port, 4 feet bag walls are used to reduce wastage. Although these walls are efficient enough to contain spillage but it is not a suitable option for the long run as it requires a lot of time and labour to set-up these walls. Moreover, these walls are not durable and may collapse during bad weather.

5)Limited Transportation Capacity: -The time taken for sending one shipload of raw sugar to the factory (6 days 10 hours 48 minutes) appears relatively long, indicating potential inefficiencies in the transportation and handling process.

Chapter 9

9. Recommendations

1)Implement a Data Management System:

- Digitization: Convert all physical documents into digital form to avoid manual entry and this would also help in retrieving any archived data.
- Centralized Repository: Store all documents in a central repository to avoid any loss of data.
- Accessibility: Employ a DBA (Database Administrator) for assigning permissions to people who can create or edit tables in the database.
- Business Rule: Create a Set of Business Rule to specify use of data.
- Version Control: Track any changes or revisions to ensure compliance with business rules and data consistency
- Query Language: Use SQL or other query language to interact with database.

- Training: Create training programmes for designated individuals to help them get used to the Database System.

Performance indicators	Before the adoption of community information system	After the adoption of a community information system “PORTNET”
The average time between unloading containers and the filing of the goods declaration	75 hours	64 hours
Average container staying	7.9 days	7.2 days
Average container handling	35 hours	30 hours

Figure 8-The Impact of Information Systems on Agadir Port. (Source - The Impact of Information Systems on Port Performance: The Case of Morocco's Agadir Port by Soukaina Jouad, PhD and Mohammed Hicham Hamri, P.E.S.)

Analysing the Case of PORTNET an Electronic Data Interchange (EDI) System which was implemented in Agadir Port in Morocco, it was observed that there was a significant impact on the efficiency of the port as evidenced by data. Before the adoption of the EDI system, the average time between unloading containers and filing goods declaration stood at 75 hours, which decreased to 64 hours after the implementation of PORTNET. Similarly, the average container staying time reduced from 7.9 days to 7.2 days, and the average container handling time decreased from 35 hours to 30 hours. These enhancements indicate the gains in efficiency realized with the use of information systems, which translate into better operational performance at Agadir Port. Therefore, installing a Data Management System will ensure accurate data entry reducing the chances of conflicting or wrong handwritten data.

2)First Come First Serve Approach of Refining and Direct Delivery:

Implementing a first serve first come system alongside direct delivery of raw sugar to the factory instead of warehousing it not only mitigates contamination risks significantly but also optimizes the efficiency of the supply chain. This revamped strategy prioritizes the immediate transportation of raw sugar to the production facility avoiding loss as evidenced by the previous loss. By skipping the intermediate step of warehousing, the exposure time of the raw sugar to potential contaminants is exponentially reduced, minimizing the window for contamination to occur. This method has already been implemented by the EID Parry Logistics and has shown no more cases of loss due to contamination of raw sugar.

Chapter 10

10. Implications and Future Scope for Research:

Implications:

1. *Operational Efficiency and Cost Savings:* The overall analysis of the logistic operation at the Kakinada SEZ unit highlights the potential for achieving operational efficiency and cost savings through planning, attention to detail and streamlining of processes. This case study can serve as a guide to upcoming SEZ units in making their operation more efficient.
2. *Importance of Risk Mitigation:* The case study emphasizes the need for proactive risk mitigation strategies, particularly in preventing contamination and maintaining product quality throughout the supply chain. The implementation of measures such as direct delivery and a first-come, first-serve approach can significantly reduce the risks associated with warehousing and prolonged storage.
3. *Digitalization and Data Management:* The recommendation for implementing a data management system highlights the need for digitalization which would help in error reduction and data maintenance. Hence, proving the need for technology in the logistic sector.

Future Scope:

1. *Transportation Efficiency:* Further study can be done on the inefficiency in the transportation system as it takes a lot of time to transport one ship worth cargo as highlighted in the case. Methods to increase capacity in transportation to reduce the transportation time can also derived.
2. *Forecasting Methods for Sugar Import Fluctuations:* As mentioned in the study, the fluctuations in sugar import values in India pose challenges for revenue forecasting and financial planning. Future research to explore advanced forecasting methods and develop strategies to mitigate the impact of volatility on logistics operations and its profitability can be done.

3. *Development of Data Management Systems*: Further research diving into the ways of digitalization and efficient ways of storing/using data can also be done.

Chapter 11

11. Conclusion

This study has delved into the operations and impact of Special Economic Zones (SEZs) in India, highlighting their crucial role in promoting economic activity, boosting exports, attracting investments, and enhancing infrastructure development. The historical evolution of SEZs in the country has been traced, underscoring their objectives of generating economic activity, stimulating exports, attracting investments, developing infrastructure, providing monetary benefits, and fostering employment generation.

The research has presented the significance of strong logistics management within SEZs using the example of EID Parry Limited in the sugar industry to cite best practices as well as sources of difficulty. The structured methods of hatch seal checks and off-loading procedures have been presented as foundational elements within realizing efficient transit and handling of goods within the economic specialist territories.

In conclusion, the paper has enlightened readers on the activities and efficiency of SEZs, offering realistic recommendations on how to enhance operational efficiency and minimize risks in such specialized economic zones. The study suggests the importance of strategic planning, innovation, and continuous research to ensure the long-term sustainability and success of SEZs. Through tackling the challenges and grabbing the opportunities presented by SEZs, India can utilize these economic enclaves in order to induce economic growth, enhance entrepreneurship, and enhance its competitiveness in the world.

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A STUDY ON IDEAS OF INTROSPECTION, SECULAR V/S SPIRITUAL VALUES OF MANAGEMENT

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I. Abstract:

With the evolving era of organizations, there are challenges faced by them regarding culture and ethics and the choice between the two values of management is very crucial. This study examines the contrasting values through exploring literature that encompasses management, spirituality, and ethics.

Through literature review and analysis, the paper aims to portray the dynamic interplay between Ideas of Introspection and Secular and Spiritual Values of Management. The role of introspection as a tool is further explored for its self-awareness and its potential implications for effective management. It also aims to understand the contrast between the values of management and to analyze their influence on organizational aspects such as work culture, employee motivation, and ethical considerations.

For a comprehensive analysis, this study consists of a survey methodology, aiming to gather opinions of individuals from a broad spectrum and organizational backgrounds. Also, for holistic understanding, this paper explores secondary theoretical insights with quantitative survey interpretations.

Introspection is a process of self-reflection and its interaction with contrasting paradigms of secular and spiritual values in management is studied in this paper, offering insights into

fostering ethical means in practices such as decision-making, leadership, and organizational culture.

II. Keywords: Introspection, Ideas of Introspection, Secular Value-Based Management, Spiritual Value-Based Management, Introspection's Role in Value-Based Management, Survey Methodology

III. Introduction

1. *Introspection:*

Introspection is the analysis of one's own thoughts, feelings, and behaviors, also described as a *self-reflective process*, involving looking inward at one's beliefs, values, strengths, etc. It is used for enhancing various aspects of life such as decision-making, personal relationships, and emotional regulations. Introspection is often practised with other techniques like journaling, yoga, mindfulness, meditation, etc and plays a crucial role in identifying areas for growth and improvement as well as gaining self-awareness and motivation.

2. *Secular Spiritual Values of Management:*

There are two contrasting approaches in organizational leadership, i.e. Secular and spiritual value-based management. Emphasizing rationality and profit-driven decision-making is considered to be Secular Values while integrating values such as empathy and mindfulness is considered spiritual management. Understanding the dynamics, challenges, and potential benefits of synergizing these contrasting perspectives to gain a holistic and ethical management approach is the aim of this study.

3. *"Introspection's Role in Harmonizing Values-Based Management"*

To bridge Introspection and Secular-spiritual values, one must have self-awareness to inform and temper both. By reflecting on their values, ethics, and motivations, leaders can navigate this dichotomy aiming towards a holistic perspective to enforce an employee well-being-focused and growth-focused organization. This is encouraged by Introspection practices causing them to critically assess the impact of their actions on various stakeholders, beyond the profit motive.

To evolve in this changing landscape and to understand the intricacies of human nature, social impact and the organization dynamics, the integration of these two aspects is very important.

Responsible Leadership can be cultivated through fostering self-awareness, embracing a balanced blend of secular and spiritual values, and engaging in continuous ethical inquiry, in organizations. This will not only drive success but also help align the organization's motives with the aspirations of individuals and society at large. Some aspects where the interplay between introspection and the dichotomy of secular versus spiritual values in management can be seen are:

- ***Effective Leadership:*** Introspection, as a process is crucial for effective leadership regardless of whether one leans towards secular or spiritual values, as it is important to make better-informed decisions by self-aware leaders.
- ***Secular emphasis on Rationality:*** As Secular leaders often prioritize rational decision-making based on data, analysis, and efficiency, Introspection allows them to critically assess and align their decisions with ethics and goals.
- ***Spiritual Values and Ethical Stewardship:*** To maintain values and stewardship, Introspection helps connect individuals with their moral compass to help navigate irrespective of their form of values in management and resonate with their spiritual beliefs.
- ***Balancing Profit and Purpose:*** In the case of Secular values-based leaders that emphasize profit maximization, and Spiritual values-based leaders that emphasize purpose and meaningful contributions, Introspection helps play the role of maintaining.
- ***Organization's Culture:*** Regardless of the values orientated by the organization, it is important to foster a culture of openness and self-improvement. This is done by introspection as it encourages reflection on one's actions, and its alignment with the company's values to enforce a positive workplace environment.

Thus, to navigate the complex landscapes of secular and spiritual values, incorporating introspection is vital for well-rounded and effective leadership approaches.

IV Objectives:

- To Explore Ideas of Introspection in Management
- To Compare Secular and Spiritual Values

- To evaluate the Impact of Values on Organisational Culture
- To understand Ethics and Decision-Making
- To understand Leadership Styles and Value Systems
- To maintain Work-Life Balance and Well-Being
- To understand Global and Cultural Considerations
- To evaluate Future Directions and Implications

V Literature Review

1. ***"Introspection: Understanding the Self" by Erland De Vera Palean, Mylah Batoon Dumag Nazario, Jonnah Belle Gallardo Valero, and Ivan Khalil Lijauco Descartin.*** **ISBN: 9786214091027**

Introduction: The book "Introspection: Understanding the Self" is authored by authors Erland De Vera Palean, Mylah Batoon Dumag Nazario, Jonnah Belle Gallardo Valero, and Ivan Khalil Lijauco Descartin. The multifaceted nature of introspection, along with its relevance in personal growth, and its potential implications in various aspects of life is discussed by the authors in this paper.

- The paper introduces Introspection as a concept drawn from aspects such as philosophy, and psychology where they examine the historical development of introspection from it being a process of self-reflection to its evolution into a scientific approach to analyzing human emotion and cognition.
- The book is centered around exploring the aspect of self-awareness to understand its impact on individual development and psychological well-being. This is drawn from contemporary psychological theories and empirical research that indicates that introspection plays a role in emotional intelligence, empathy, and resilience fostering in individuals. The study also highlights the impact of self-awareness on positivity around relationships, decision-making, and personal growth, showcasing its impact across various aspects of life.
- A review of various neuroimaging studies is involved which explores brain regions involved in the process of introspection and the neural correlates of it. This connects the psychological concepts with emerging neuroscientific findings in the book.
- The impact on introspection from culture and societal norms is also explored in this paper. The analysis of cultural variations and their influence on self-construal, identity

formation, and the willingness to engage in introspective practices is conducted. Introspection as a culturally embedded process is understood and its relevance is analyzed.

- The study analyzes how introspection interventions can affect self-awareness, and emotion regulation and their contribution to improved psychological well-being by the method of case studies and empirical evidence.

Conclusion: "Introspection: Understanding the Self" offers a comprehensive exploration of the multifaceted nature of introspection, its theoretical underpinnings, challenges, and practical implications. By integrating psychological theories, cognitive neuroscience, and cultural perspectives, the authors provide readers with a holistic understanding of self-awareness and introspection.

2. "Become what you are" by Alan Watts ISBN: 9781570629402

Introduction: "Become What You Are" is a philosophical and spiritual work authored by Alan Watts, a renowned figure in the fields of Eastern philosophy, Zen Buddhism, and metaphysical thought. Published in 1957, the book delves into themes of self-realization, authenticity, and the reconciliation of human identity with the broader cosmos. Critical acclaim as well as dedicated readership is a result of the author's unique perspective.

- The author believes in the integration of Eastern traditions of Zen Buddhism and Taoism, and it's symbolic understanding with the thoughts of Western existentialists which causes the creation of a rich philosophical tapestry exploring aspects such as the nature of existence, human consciousness, and the pursuit of meaning in life.
- The book encourages the shedding of societal conditioning and false identities by the readers if the aim is to find authenticity. Embracing one's inherent nature, rather than adhering to external expectations can lead to true fulfillment.
- In "Become What You Are," the ego-centric identity approach dominated in the contemporary works of Western culture is criticized. The author states that hinders exist such as the ego's pursuit of status, recognition, and external validation which refrains individuals from their true potential and to overcome such hinders, one must connect to their authentic self through the process of introspection and spiritual practices.

Conclusion: A critical outlook of authenticity is showcased in "Become What You Are" by

Alan Watts where the Eastern and Western philosophical traditions are integrated that provides a holistic approach to the readers that aim to understand the human experience. The emphasis of the book lies in the importance of shedding societal conditioning, practicing non-duality, and the process of detachment.

3. *The Meaning of Introspection: Introspection, Scientific Psychology, and Neuroscience By H.G Callaway, Temple University (Research Paper)*

Introduction: In philosophy, psychology, and neuroscience, the aim has been to study the process of self-observation and reflection of thoughts and mental state which is also known as Introspection.

- The paper explores the roots of this concept through the work of Socrates, Plato, and Aristotle, Greek philosophers specializing in ancient philosophical traditions. It states that during the 19th- century introspection emerged as a structured process and gained prominence in psychology. introspection was utilized as a method to study the structure of consciousness by the founder of modern psychology, Wilhelm Wundt.
- Arguments to practice a controlled and systematic form of introspection for insights into cognitive processes were proposed by Researchers like Ulric Neisser which led to the development of a methodology utilized to obtain data about mental processes through self-report techniques called cognitive introspection.
- In order to correlate subjective experiences with brain activity, techniques, such as fMRI and EEG, have been developed and called Neuroimaging techniques. This states that self-awareness is on a neural basis causing debates about the limits and interpretations of neural data concerning subjective experiences.

Conclusion: Introspection is a multifaceted process with historical significance, role in scientific psychology, and a detailed relationship with modern neuroscience. Introspection has faced challenges and doubts around its objective and credibility, yet it is being explored by researchers to gain insights into human consciousness and mental processes. The future of research holds opportunities for integration of introspection with contemporary neuroscience which may hold the key to unraveling the intricate workings of the human mind.

4. *The History of Introspection By American Psychological Association, Boring, E. G. (1953). A history of introspection. Psychological Bulletin (Research Paper)*

Introduction: Introspection, the process of examining one's thoughts, emotions, and mental states and as a psychological and philosophical concept, is the subject of study and contemplation in various academic disciplines, throughout the history of scholars.

- Ancient philosophical traditions of Greek philosophers, such as Socrates and Plato, hold the roots of introspection, which stood as a means of gaining knowledge and understanding the human psyche through self-reflection and self-awareness. Socrates' famous dictum, "Know thyself," is said to have encapsulated the early exploration of introspection in literature.
- Known as the founder of experimental psychology, Wilhelm Wundt is given credit for the formalization of introspection in psychology, which he established in the late 19th century, in Leipzig, Germany, while also introducing various other systematic introspection processes aimed at analyzing human consciousness.
- A turning point in the history of Introspection was marked during 1950s and 1960s cognitive revolution when researchers recognized the importance of internal mental processes and Cognitive psychology emerged as a prominent field. This is when as a controlled and structured valuable tool, Introspection was reintroduced addressing the behaviorist era concerns.
- Introspection faces challenges and limitations irrespective of its new significance. Arguments of introspection being prone to biases and subjective, causing unreliable data were raised. Accessing and describing certain mental processes of unconscious thoughts or emotions caused problems.

Conclusion: The study of human consciousness and cognition, in the history of introspection, is significant. In understanding the complexities of the human mind, despite its challenges, introspection remains a valuable tool as it continues to evolve alongside advancements in psychological research methodologies. Introspection will undoubtedly play a critical role in shaping our understanding of human experience and cognition as researchers continue to refine introspective techniques.

5. “Spirituality and Ethics in Management” by Laszlo Zsolnai ISBN: 9789400711532

Introduction: Published in 2005, the book addresses the increasing need for a more holistic and values-driven approach to management, taking into account not only economic factors but also the well-being of individuals, communities, and the planet.

- This book effectively bridges the between traditional business and the new understanding of spirituality and ethics adopted in organizations. It also presents an argument regarding integrating spirituality and ethics into business workings and management emphasizing the value of alignment between individual and organizational values, leading to a harmonious and sustainable way of conducting business.
- The concept of spirituality in management is talked about by the author which is drawn from traditions across different aspects such as philosophical, religious, and spiritual. He states that to nurture a positive work environment and interpersonal relationships, mindfulness, self-awareness, and compassion needs to be practiced, creating a strong case for the potential benefits of incorporating spirituality to achieve the same.
- Moreover, the book addresses the issues faced by modern organizations and the benefits of a spiritually informed management approach in helping address these issues. Zsolnai advocates to consider the impact on the environment and society, and not only on the company which would be short-term profit maximization. The book also demonstrates Positive outcomes for organizations and the society with the help of case studies and real-life examples.

Conclusion: This book is intellectually stimulating read and thought-provoking for individuals interested in exploring the intersection of spirituality, ethics, and business management. The well-researched arguments by the author, Laszlo Zsolnai's make a compelling case for the integration of spirituality and ethics in the corporate world, ultimately advocating for a more compassionate, sustainable, and responsible approach to modern management practices.

**6. “Value Management In Professions: Present Scenario, Future Strategies”
edited by Nalin K. Shastree, B.R. Dugar, J.P.N. Misra, and A.K. Dhar. ISBN:
9788180693410**

Introduction: A collection of insightful essays exploring the concept of values in management

across different professions is discussed in this book, published in 2007.

- To address values in management for different professions such as education, business, and engineering, this book incorporates a multidisciplinary approach and offering a holistic view of applications in various fields, understanding the similarities and differences, by doing so.
- The book strongly emphasizes the importance of value management as a strategic tool for enhancing performance and achieving sustainable growth in professions. It presents a systematic framework for assessing and optimizing value, encouraging professionals to go beyond solely focusing on financial gains and consider broader aspects of value, such as customer satisfaction, societal impact, and environmental sustainability.
- A coherent flow of ideas is maintained throughout the book, building upon with every chapter by offering a logical argument and case studies. The book is made more relevant and practical for scholars focused on implementing value-based management due to the addition of contributors' expertise and real-world experiences.
- However, some chapters dealing with technical details and industry jargon may make them challenges to other readers who are unfamiliar with the industry.

Conclusion: The interdisciplinary approach of the book combining expert's insights with practical case studies, makes it a valuable resource for professionals and leaders who are seeking to understand values-based management in various different fields. Despite a few chapters being technical, the overarching concept and principle of value-based management remains applicable as a strong foundation to various fields and helpful to leaders with the aim of creating a positive impact.

7. *"Workplace Spirituality: A Complete Guide for Business Leaders" by Nancy R. Smith. ISBN: 9780977804733*

Introduction: The concepts of workplace spirituality and its potential impact on businesses and organizations are discussed in this book published in 2006. It includes various themes like the few mentioned below:

- *Introduction to Workplace Spirituality*: The book introduces the concept of workplace spirituality, its origins, and its relevance in modern organizational contexts. Traditional organizational practices and how they are impacted due to spiritual principles are discussed in this book.
- *Spiritual Leadership*: The role of leaders in instilling a sense of community and respect along with ethical behavior amongst individuals and the organization's environment is explained in the book.
- *Employee Well-Being*: The well-being of employees is explored in this book and workplace spirituality and a positive environment can impact their emotional, mental, and spiritual needs, discussing practices supporting aspects such as work-life balance, stress reduction, and personal growth.
- *Organizational Culture*: Spiritual Values in Management often involve the aspect of shaping the organizational culture to be more holistic and ethical, and this book discusses how it impacts employee engagement, creativity, and loyalty.
- *Challenges and Criticisms*: Potential Challenges and criticisms around incorporating spirituality into organizational culture and the conflict with secular values are also discussed in this book by Nancy Smith.

Conclusion: The growing significance of spirituality in the corporate world and its benefits of it on employee well-being and holistic development is explained by the author In "Workplace Spirituality: A Complete Guide for Business Leaders" by Nancy R. Smith.

8. *"Managing Religious Diversity in the Workplace: Examples from Around the World"* by Stefan Gröschl and Regine Bendl. ISBN: 9781317101468

The challenges arising from religious diversity within the workplace are explained in this book to effectively manage and navigate them. It also covers the following themes:

- The book addresses common challenges organizations face when managing religious diversity, such as potential conflicts between religious practices and work requirements, misunderstandings, and potential bias or discrimination.
- To manage religious diversity, it discusses strategies, policies, and initiatives that have been implemented using real-world examples from different countries to create a harmonious environment.
- To reduce potential inter-religious conflicts and promote understanding, the book

promotes the use of interfaith dialogue.

- The book explores the cultural similarities and differences such as religious holidays, customs, and practices in the process of managing religious workforce diversity in various countries through examples from around the world.
- To measure the success of the organisation's initiatives towards religious diversity, the book provides measures such as evaluating employee satisfaction, productivity, and the reduction of conflicts.

Conclusion: The book emphasises the value of embracing different religious values, communication, and inclusivity, and the strategies to contribute to a harmonious and positive workplace while promoting collaboration and growth.

VI Research Gap:

"Despite the growing interest in the integration of spiritual and secular values in management, there is a limited understanding of the practical implementation and impact of these values on organizational performance and employee well-being."

The research gap of this paper lies in the concept of theoretical understanding and foundation however the need for empirical research shows the result of how the organisations actually implement such values and practises. Organisational outcomes such as employee satisfaction, productivity, overall performance, etc are the aspects where effects of Introspection as well as the Secular-spiritual values can be measured, however there is a lack of such comprehensive studies that assess the same. The need of the hour is to address this gap that would help provide valuable insights for both scholars and practitioners in the field of management.

VII Hypothesis

- null hypothesis (H0) = posits no significant difference in effectiveness.
- alternative hypothesis (Ha) = organizations prioritizing spiritual values exhibit significantly superior management practices.

To calculate the use of Introspection and the impact of values in management is the aim of the study.

VII Research Methodology

To understand the relationship and interaction between introspection and the selection between secular and spiritual values in management decisions using a survey methodology to enable real-world insights, and perspectives collection. The aim is to understand how individuals perceive and prioritize secular and spiritual values and their relevance in management which is effectively done by a primary methodology of survey. This *survey* gathers opinions from a broad spectrum of individuals involved in management roles and various backgrounds, which offers a broader understanding of the subject.

By adhering to this methodology, the study aims to shed light on the impact of introspection and secular and spiritual values on management practices, contributing valuable insights to the understanding of decision-making and leadership within diverse organizational contexts.

VIII Objectives of the Survey

The survey aimed to:

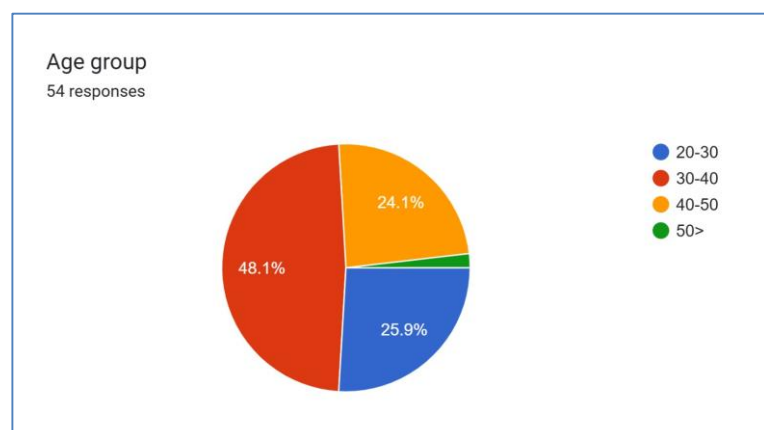
- *Understanding*: The survey aimed to gauge participants' grasp of introspection, secular, and spiritual value-based management terms.
- *Everyday Usage*: Assessed practical incorporation of these concepts in daily life.
- *Influence*: Explored how these ideas impacted participants' psychological and behavioral aspects.
- *Challenges and Benefits*: Identified obstacles faced and rewards gained through adoption.
- *Improvement Suggestions*: Participants' input on enhancing integration for personal and organizational benefit.

IX Findings of the survey

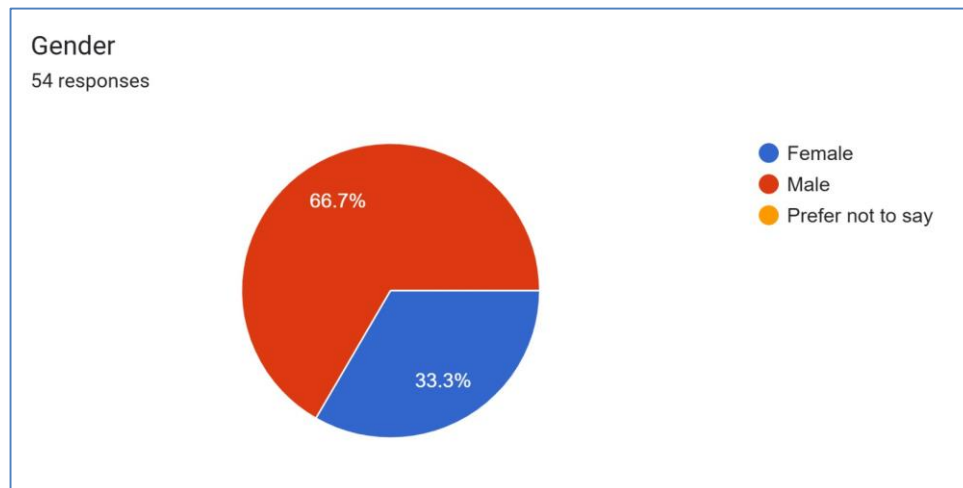
Link: <https://bit.ly/3xBHEPK>

Responses:

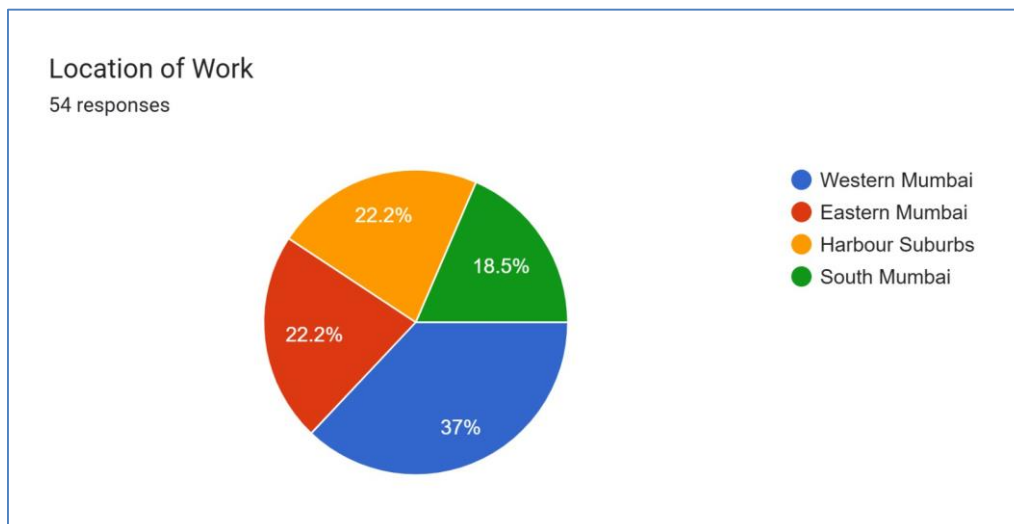
A) Age Group



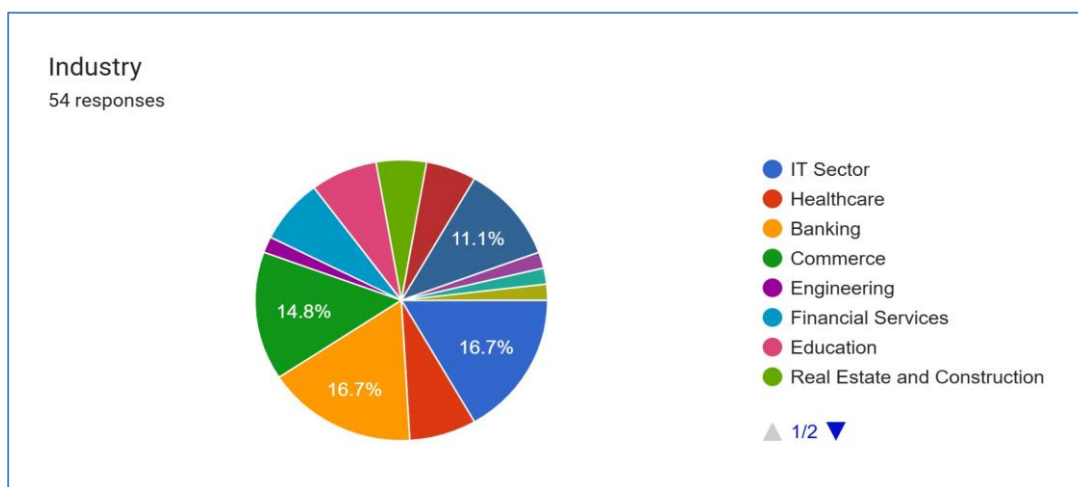
B) Gender



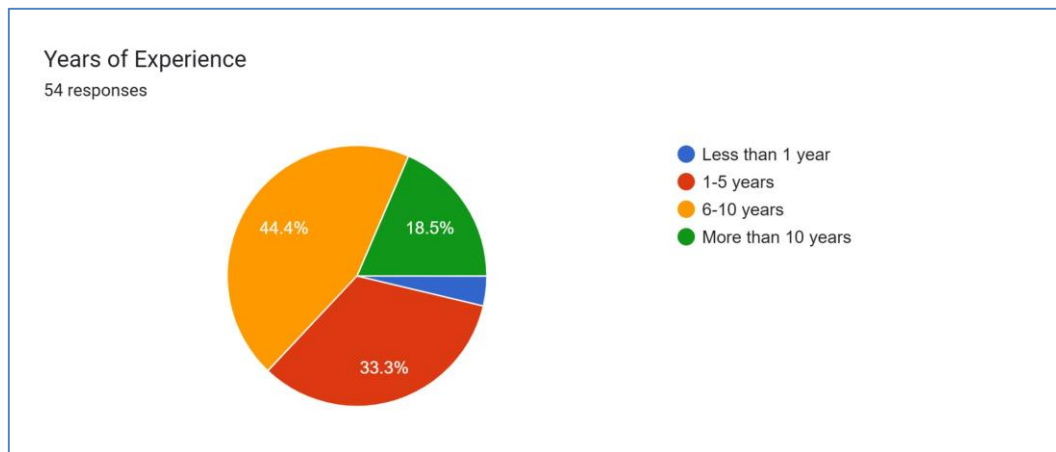
C) Location Of Work



D) Industry of Work



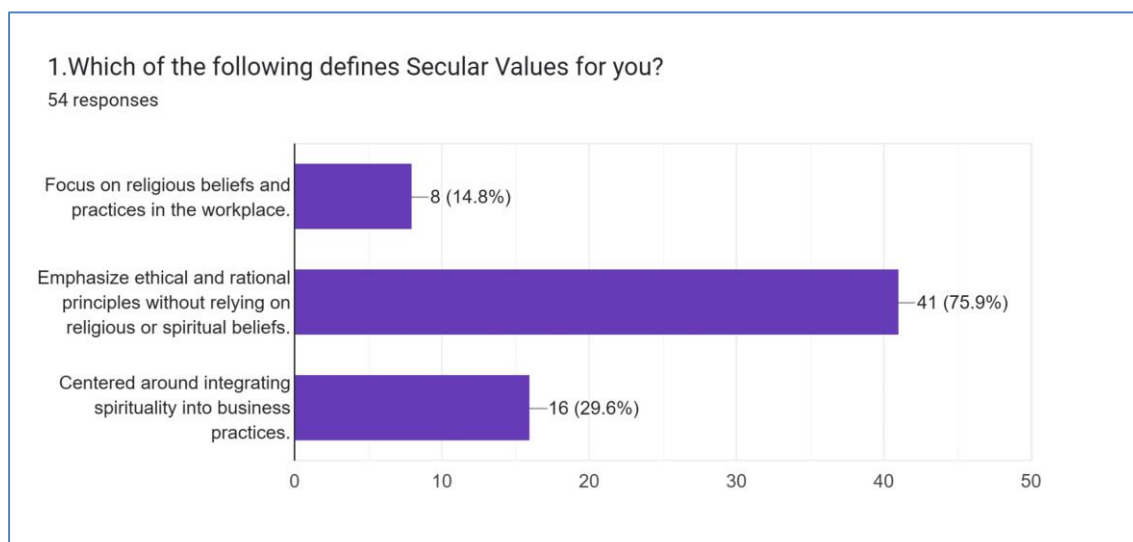
E) Years of Experience



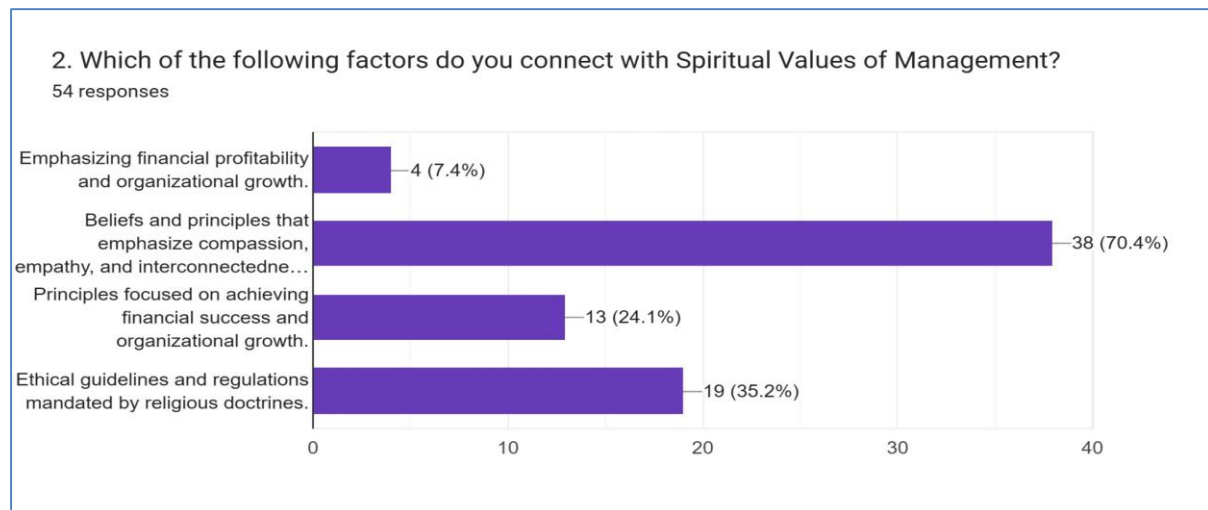
F) Position



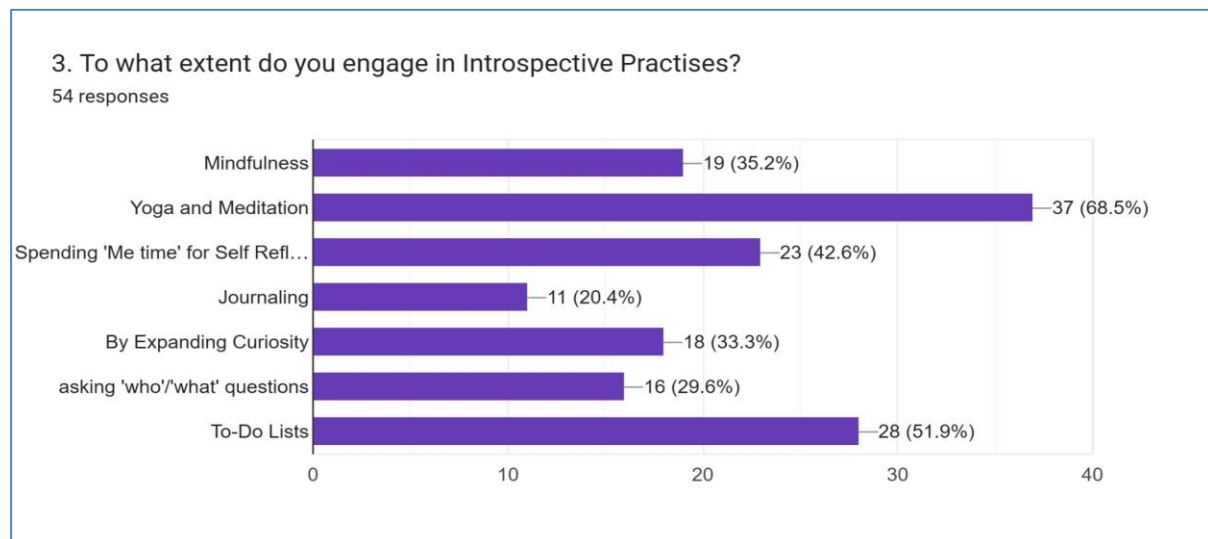
Q1. Which of the following defines Secular Values for you?



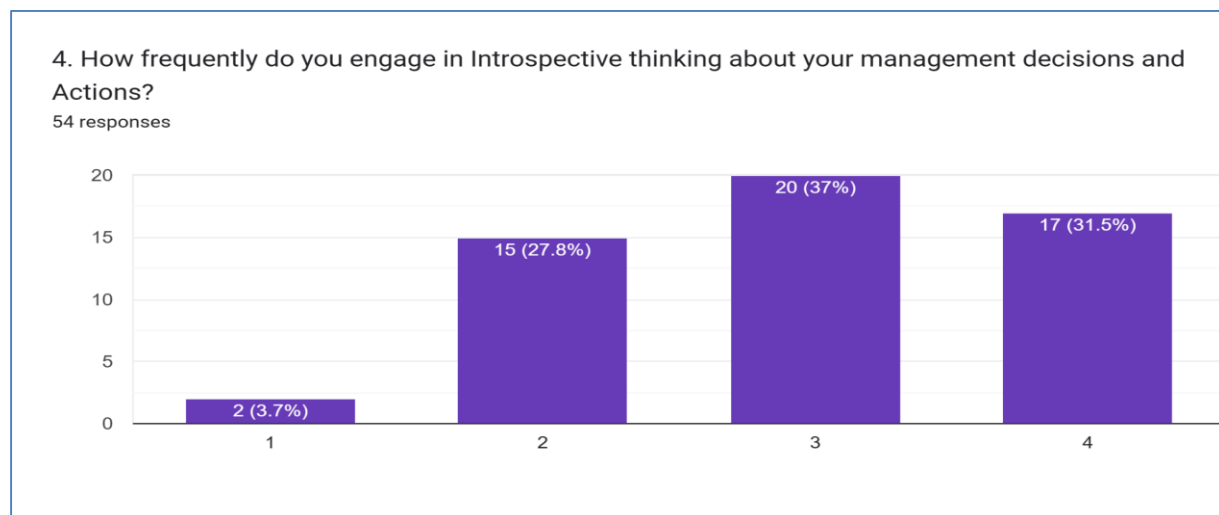
Q2. Which of the following factors do you connect with Spiritual Values of Management?



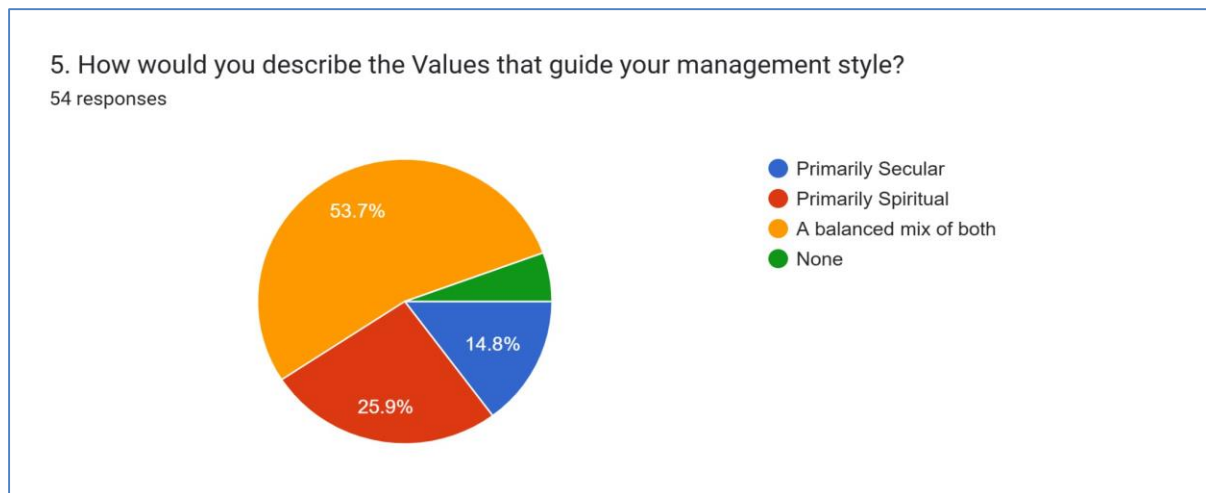
Q3. To what extent do you engage in Introspective Practises?



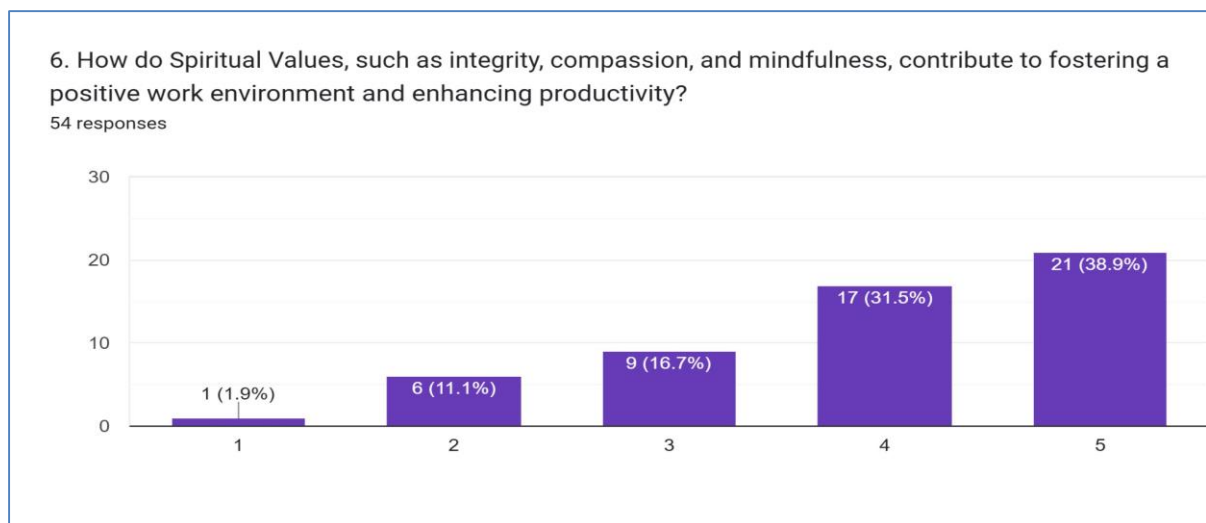
Q4. How frequently do you engage in Introspective thinking about your management decisions and Actions?



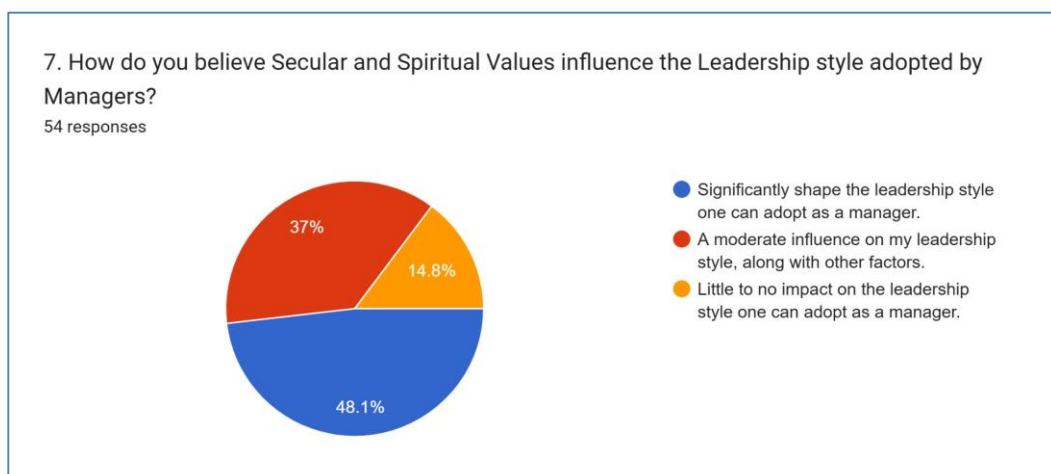
Q5. How would you describe the Values that guide your management style?



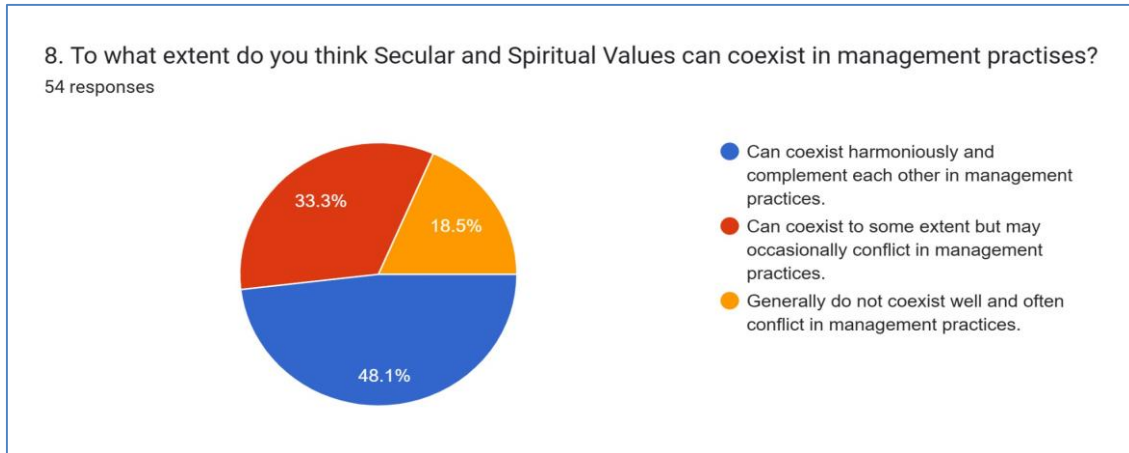
Q6. How do Spiritual Values, such as integrity, compassion, and mindfulness, contribute to fostering a positive work environment and enhancing productivity?



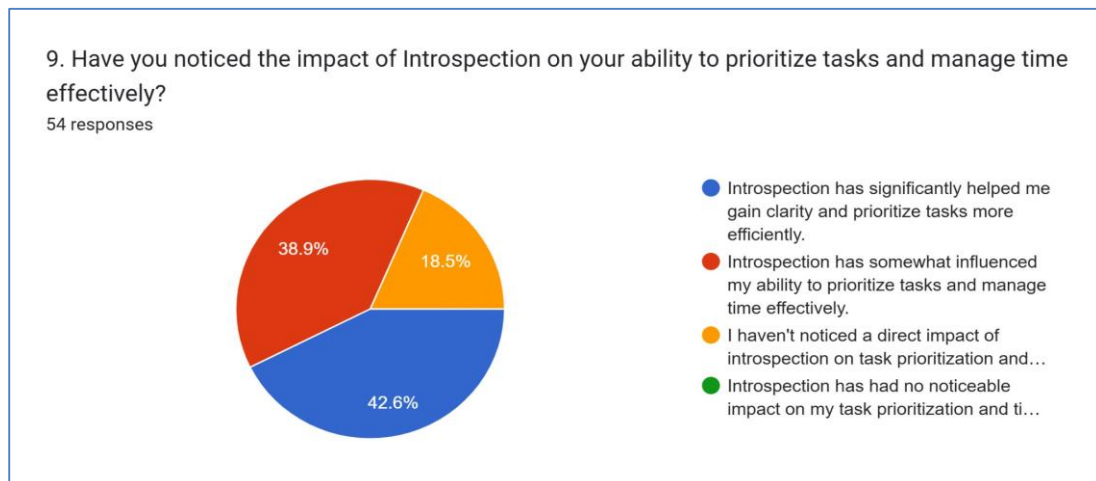
Q7. How do you believe Secular and Spiritual Values influence the Leadership style adopted by Managers?



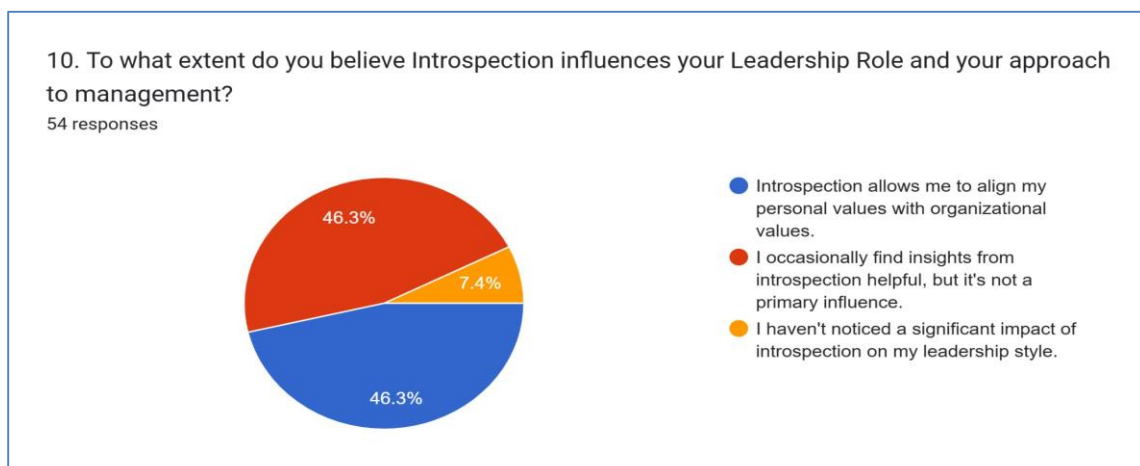
Q8. To what extent do you think Secular and Spiritual Values can coexist in management practices?



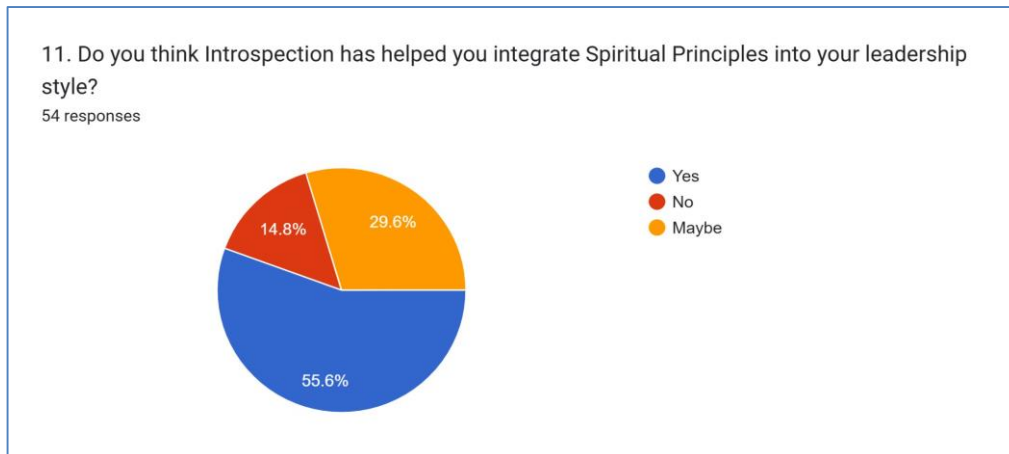
Q9. Have you noticed the impact of Introspection on your ability to prioritize tasks and manage time effectively?



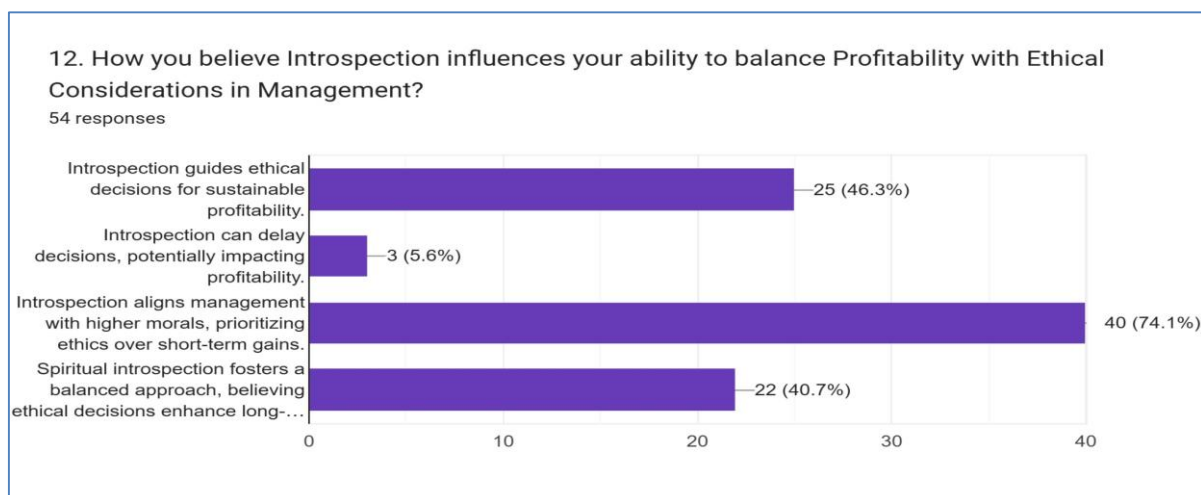
Q10. To what extent do you believe Introspection influences your Leadership Role and your approach to management?



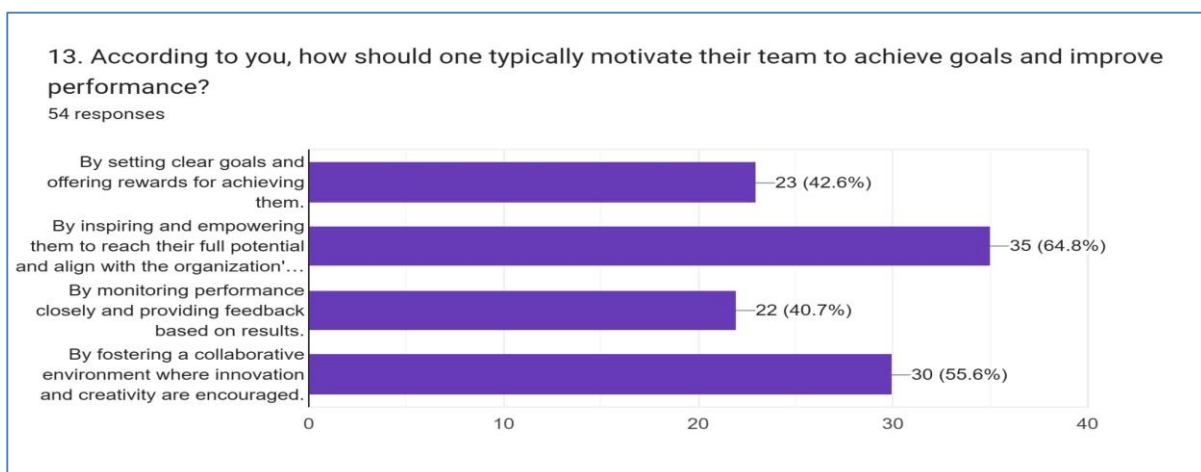
Q11. Do you think Introspection has helped you integrate Spiritual Principles into your leadership style?



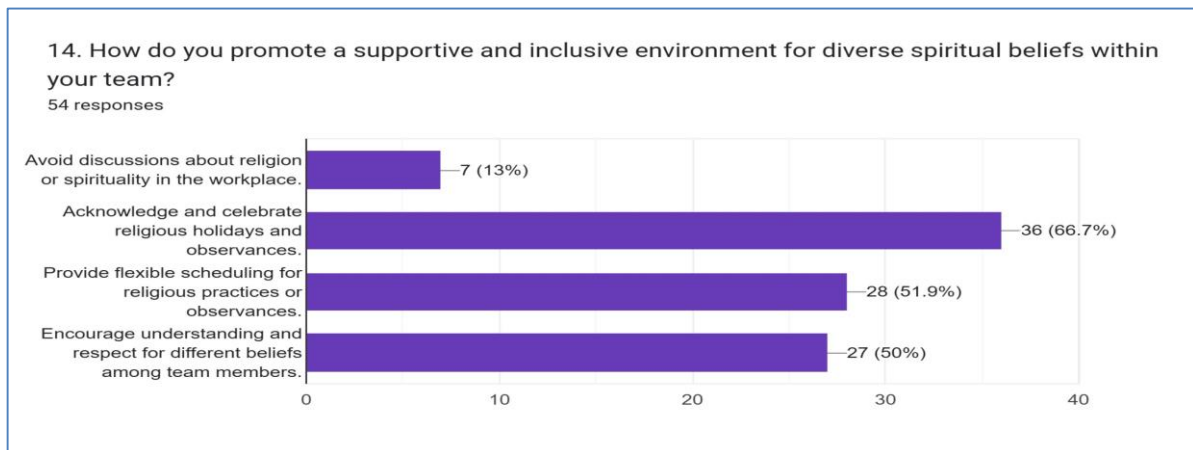
Q12. How you believe Introspection influences your ability to balance Profitability with Ethical Considerations in Management?



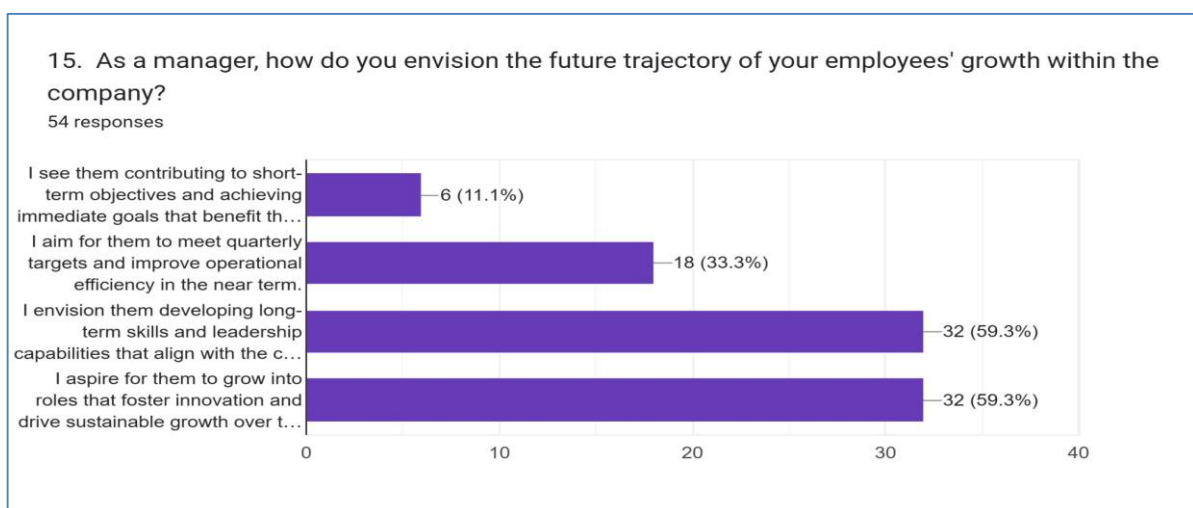
Q13. According to you, how should one typically motivate their team to achieve goals and improve performance?



Q14. How do you promote a supportive and inclusive environment for diverse spiritual beliefs within your team?



Q15. As a manager, how do you envision the future trajectory of your employees' growth within the company?



X Interpretation of the Survey

The survey analysis offers valuable insights into participants' perspectives on introspection and secular versus spiritual value-based management:

- *Understanding of Terminology:* Responses reflect a diverse range of interpretations. While some participants demonstrate a clear grasp of the terms, others exhibit confusion or misinterpretation. This suggests a need for clearer definitions and communication of these concepts.
- *Everyday Life usage:* The incorporation of introspection and values in management is acknowledged and accepted by a significant portion of participants in their everyday

routines. However, the survey shows a potential issue of translation between theoretical knowledge into actionable behaviors and the application of their beliefs is the major issue faced by a large amount of individuals implying potential challenges in translating

- *Impact on Long-Term:* The survey analysis indicates that individuals who consistently practice introspection and embrace value-based management demonstrate a greater sense of personal growth and fulfillment over time. They report improved emotional resilience, stronger ethical decision-making, and a sense of alignment between their values and actions.
- *Differences in Generations:* The clear evidence of a generational gap is demonstrated through the results with the younger respondents exhibiting a more holistic approach than older respondents who focus on long-term security and benefits rather than on aspects of introspection and value-based management, emphasizing work-life balance and purpose-driven careers.

XI Conclusion

In conclusion, the interconnection and interplay between introspection and its consequences and effects on secular versus spiritual value in management approaches by individuals, is portrayed in this study. Overall, to assess this, the study conducts secondary as well as primary study of the survey. With the aim to analyse the effect of differences in values on individuals as well as organisations and its results in enhancing employee well-being and engagement. While secular approaches offer practical and tangible benefits, the resonance of spiritual values at a profound level suggests their capacity to shape attitudes and behaviors holistically. The paper's implications extend to both organizations and individuals. Organizations are urged to recognize and balance the dynamics of these value systems when crafting management strategies, thereby fostering environments conducive to personal and collective growth.

Simultaneously, individuals are prompted to integrate the notions of introspection and secular versus spiritual values into their daily lives, promoting self-awareness, ethical decision-making, and a harmonious existence. Ultimately, this research advocates for a comprehensive approach that enriches both workplace practices and individual lives.

XII Suggestion

"Explore and analyze the impact of introspection on decision-making processes and leadership styles within contemporary management practices, comparing and contrasting secular and spiritual values. Investigate how the incorporation of spiritual values, such as mindfulness and empathy, influences organizational culture, employee well-being, and overall performance in comparison to purely secular management approaches. Provide empirical evidence and case studies to support your findings and draw practical implications for modern management strategies."

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WILLINGNESS TO PAY MORE FOR GREEN PRODUCTS: A CRITICAL CHALLENGE FOR GEN-Z FROM INDIA'S PERSPECTIVE

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Abstract:

Concern for environment, perceived benefits, perceived quality about the product, and future perception regarding sustainability forms the objective of this study relating to willingness to pay (WTP) regarding green products among Gen-Z in India. Single-Factor ANOVA responses from 110 Gen-Z responding to the online survey done on a 5-point Likert scale were analyzed. The results showed significant differences in WTP based on key factors: green perceived benefits ($F = 10.69$, sig. 0.05), green perceived quality ($F = 34.79$, sig. 0.001) and future sustainability perceptions ($F = 10.71$, sig. 0.05) on environmental concerns among the four groups of people. The data imply that Gen Z consumers who are more concerned about environmental problems and who expect a higher utility from environmentally friendly products are more ready to pay extra. The findings suggest that there is a lack of effective promotion of both product quality and environmentally-friendly criteria to influence green consumption behavior of Gen-Z consumers.

Keywords: WTP, sustainable, Gen Z

Introduction:

Due to increasing global concern on environmental conservation, and the growing consciousness on effects caused by climate change, consumer demand for green products has

increased. Often described as those products that have relatively small impacts on the environment as defined by Peattie (1995), green products are now fundamental to sustainable consumer behavior. Generation Z (1997–2012) is leading this change, as they are over-indexed on environmental and political activism when compared with prior generations (Seemiller and Grace, 2018).

Born after 1995 and a major consumer population in India, one of the fastest-growing economies in the world, Gen-Z is also confronted with environmental issues such as pollution and water shortage, apart from trends visible globally. Research shows that young consumers of India are shifting towards sustainable consumption (Singh and Pandey, 2012), which is backed up by the availability of a variety of environmental products right from food, cosmetics to cars (Vashisht, 2020).

This research explores perceived drivers and barriers to green purchasing by Indian Gen-Z regarding environmental concern, perceived benefits, quality, and future prospect on green products to gain business and policymakers' implications for sustainable marketing.

Literature Gaps:

This study, fills the gaps, examining the willingness to pay for green products among the Indian Gen-Z while considering factors such as environmental concerns perceived quality and outlook for development economy. Others explore the different socio-economic and environmental factors peculiar to the sector; thus providing an understanding of consumption behaviour especially driven by sustainability needs in a constantly evolving economy.

Objectives:

- To determine factors affecting consumer buying decision of eco-friendly products and their relation with willingness to pay amongst Gen-Z in India.
- To assess the level of environmental concern among Gen-Z consumers in India.

Literature Review:

Generation Z, born between 1997 and 2012, is the generation who grew up entirely under a completely digital umbrella (Francis and Hoefel, 2018). Their consciousness of social, political, and environmental issues becomes much more distinct through global movements on social media as compared to the previous generations. Gen-Z focuses on "inclusivity," "diversity," and "sustainability" and considers the impact of every purchase on society and the environment, as reflected by Seemiller and Grace (2018).

Research shows that Gen-Z selects brands based on "social responsibility" and "environmental stewardship" (Dabija et al., 2019). Therefore, they would prefer businesses that share the same principles as regards values, the same kind of products coming from corporate social responsibility companies rather than other corporations whose values do not represent their pro-environmental values (Gentina, S hrum, and Lowrey, 2018). This need to contribute to the "greater good" translates to their "WTP" for green goods, making it essential for companies and policy-makers to understand how such values spur consumption patterns which are sustainable.

Characteristics of Gen-Z:

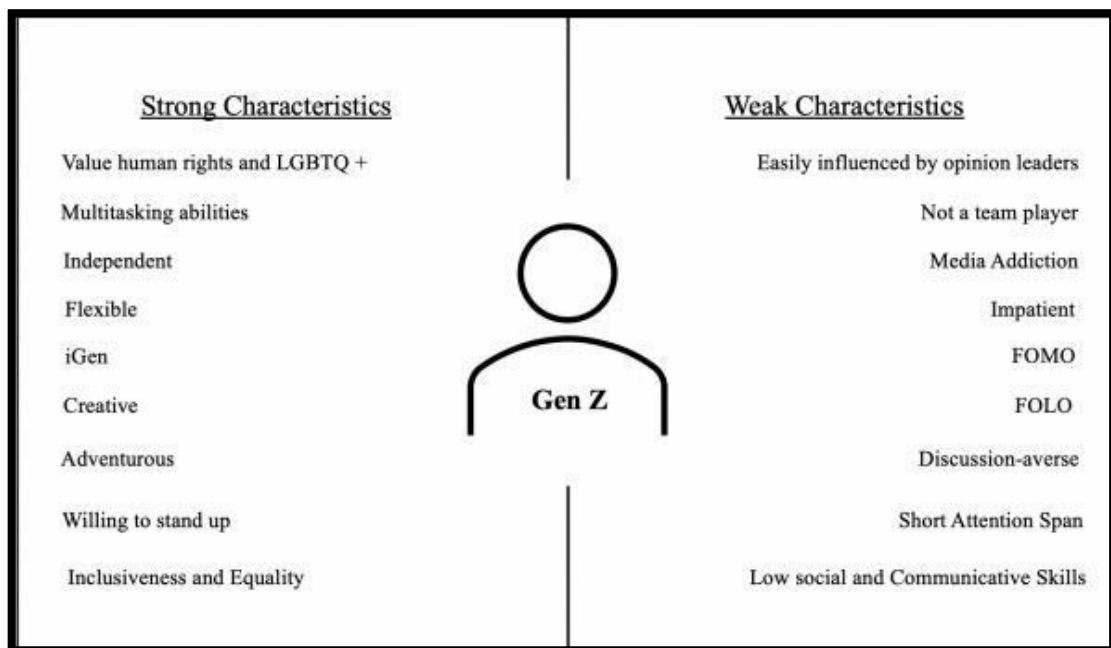


Figure 1: Characteristics of Gen Z

Source: (Schwarz, 2024)

Generation Z is highly tech-savvy, growing up with social media and digital platforms. They value inclusivity, diversity, and sustainability, rejecting greenwashing and demanding transparency and responsibility from companies. Willing to pay extra for sustainable products, they prioritize innovative, eco-friendly solutions like no-waste packaging and ethical sourcing. Gen Z seeks both functional benefits and emotional satisfaction, aligning with brands that fight climate change and uphold ethical practices. Their commitment to authenticity and sustainability drives their loyalty, making them a powerful force in ethical consumption.

Variables of Study:

1. **Environmental Concerns:** Pollution and its relative subjects such as climate change prompt the generation to pay for environment friendly products. Informed by climate protests across the world, they see buying as protest too. Research outlined by Laroche et al. (2001) and Nguyen (2021) argue that the concerns about the environment cause consumers to feel that they are investing in a solution.
2. **Green Perceived Benefits:** Magnier and Schoormans (2015) affirm that consumers associate green products to self- gains like health and safety hence explains why they are willing to pay a premium price for them. Gen-Z, motivated by principles of health and ESG, wants to pay the price for products it considers healthier for its body and the planet (Paul et al., 2016).
3. **Green Perceived Quality:** Perceived quality has the most impact on WTP. Regarding Gen-|Z|, greenwashing is a real issue as they expect sustainable products that meet the purpose. The findings established that WTP is positively related to higher perceived quality (Laroche et al., 2001; Nguyen et al., 2020).
4. **Green Future Estimation:** Gen-Z's orientation towards the future influences their buying behavior. They pay much attention to their impact on the overall environment as well as society in the long run. Research by Paul et al. (2016) and Chen and Chang (2012) demonstrate that consumers have a tendency to pay a premium for green products if they accept the long-term values those products offer and perceive their consumption decision

Theoretical Framework:

1. *Signaling Theory*

Spence (1973) Information asymmetry can be dealt Through credible signaling by the use of indicators such as eco-labels and sustainable certifications and through reports to show firm sustainability commitment. Pierce signals, like adopting sustainability and third party certification costs, eliminate greenwashing and increase Consumer trust (Gomes and Lopes, 2023). Therefore, to the environmentally minded Generation Z, WTP for such products is a function of the believability of such signals to fight skepticism and increase confidence in invitations to sustainability. Issues to do with the environment, perceived benefits, and quality also influence their buying decisions a factor that illustrates the significance of credible signaling to this generation that is particularly sensitive to the plight of the environment.

2. *Consumer Value Theory*

According to Consumer Value Theory as proposed by Sheth, Newman, and Gross (1991), willingness to pay (WTP) for green products is influenced by functional, emotional, and social value. For Generation Z, functional value captures criteria such as product quality and lifetime in addition to environmental concerns. Emotional value derives from the pleasure an individual derives from making a sustainable choice, while social value arises from acceptance of eco-friendly purchases in society. Green perceived benefit and quality for Gen Z include health and performance, and are important in influencing the WTP for green products. Furthermore, emotional and social benefits related to sustainability have a major impact on their purchasing behavior (Paul et al., 2016; Francis and Hoefel, 2018).

3. *Integrating Signalling and Consumer Value Theories*

Drawing on these streams of literature, a holistic framework is established in this study integrating credible signalling from Signalling Theory and the value perceived by the consumer from Consumer Value Theory to understand how credible signals from firms and perceived value by consumers together interact to influence Generation Z willingness to pay for green products. Subsequently, it discusses interactive relationships. In an analysis of Signalling Theory, it explores how companies neutralize information asymmetry through third-party certification that reassures the skepticism held by Gen Z

consumers. The paper discusses that Consumer Value Theory helps Gen Z improve their willingness to pay for green products based on ethical decision and product quality by demonstrating the functional, emotional, and social value of green consumption.

Gen Z and their perception towards Sustainability:

The most proactive generation in fighting for environmental causes or being referred to as Generation Green (D'Arco et al., 2023) is Gen Z, which promotes environmentally friendly livelihoods (Kleiser, 2005). They include movements such as 'Fridays For Future' acted through environmental concern and understanding of sustainability concern and their solutions (Dragolea et al., 2023; Zsóka et al., 2013; Schwarz, 2024).

Research methodology:

An online questionnaire was distributed through various social media platforms to Gen-Z users in India. The voluntary and anonymous survey gathered responses from 110 participants, representing the Gen-Z cohort (born 1997-2012) to assess their attitudes toward sustainability and willingness to pay for green products.

Questionnaire Design:

Adaptations herein are mostly from literature currently existing and specifically Nekmahmud and Fekete-Farkas (2020), with consideration toward the Indian market and Gen-Z. The questionnaire consists of five sections, whereby every question is measured on a 5-point Likert scale ranging from 1 - Strongly Disagree to 5 - Strongly Agree. Following are the factors under consideration:

WTP is analyzed as a function of factors that affect the degree of green consumers' readiness to purchase environmentally friendly products. Environmental factors consist of: **Perception of the environment** which concerns the respondent's awareness of nature preservation, responsibility and environmental consciousness prior to the purchase. **Green perceived benefits** focus on examining the healthy, tasty, and wellbeing benefits of sustainable products, while, on the other hand, **green perceived quality** focuses on the sustainability of products' quality comparison to traditional merchandise. Also, the study employs **future**

orientation regarding the level of appreciation and popularity of green products in society. In turns, these research antecedents can offer clues to the various motivational and perceptual processes at play in sustainable purchasing.

Research Design:

Since the research basically involves measuring willingness to pay among Gen-Z consumers in India on the purchasing of green products based on specific preidentified factors, such as environmental concerns, green perceived benefits, green perceived quality, and future perspective, there was a need to focus on a quantitative, cross-sectional, and descriptive nature of research design. The use of an online structured questionnaire leads to the collection of quantifiable data that can be statistically analysed to search for patterns and relationships.

Data Analysis Process:

A Single-Factor ANOVA was applied to analyze differences in willingness to pay (WTP) for green products based on environmental concerns, green perceived benefits, quality, and future perspectives. Respondents were classified using a Likert scale. The analysis computed F-statistics and assessed p-values, with significance set at $p < 0.05$.

These were scored between 1 = Strongly Disagree and 5 = Strongly Agree. The necessity to see if there is a significant difference between means above two groups made the choice of ANOVA since it offers a solution for comparing the means of more than two groups.

Hypothesis:

Null Hypothesis(H^1_0): There is no significant difference in willingness to pay for green products based on the level of environmental concerns.

Alternative Hypothesis (H^1_1): Higher levels of environmental concern significantly increase the willingness to pay for green products.

Null Hypothesis(H^1_0): Perceived benefits of green products do not significantly affect willingness to pay for them.

Alternative Hypothesis (H^1_1): Higher perceived benefits of green products lead to a greater willingness to pay for them.

Null Hypothesis(H^1_0): There is no significant relationship between the perceived quality of green products and willingness to pay a premium.

Alternative Hypothesis (H^1_1): Consumers who perceive higher quality in green products are more willing to pay a premium for them.

Null Hypothesis(H^1_0):: Expectations about the future impact of green products do not significantly influence willingness to pay.

Alternative Hypothesis (H^1_1): Positive future estimations of green products' impact on sustainability increase the willingness to pay for them.

Data Analysis:

ANOVA TEST

The ANOVA analysis reveals that Green Perceived Benefits, Green Perceived Quality, Environmental Concerns, and Green Future Estimations significantly impact consumers' willingness to pay for green products. Each variable influences consumer decisions, highlighting the importance of perceived benefits, quality, environmental concerns, and future sustainability in shaping eco-friendly purchasing behavior.

1. Environmental Concerns:

Summary:

Groups	Count	Sum	Average	Variance
Willingness to Pay	110	1411	12.82727	14.32769
Green Future Estimation	110	1257	11.42727	5.806589

Table 3

ANOVA:

Source of Variation	SS	df	MS	F
Between Groups	107.8	1	107.8	10.70811
Within Groups	2194.636	218	10.06714	
Total	2302.436	219		

Table 4

Regarding the Environmental Concerns, the ANOVA test (Table 2) implies that there are statistical differences in willingness to pay for green products, $F = 10.7081$, $p = 0.00124$. This is an implication that intending consumers with higher environmental awareness will be willing to pay a premium price in order to purchase an environmental product.

2. Green Perceived Benefits**Summary:**

Groups	Count	Sum	Average	Variance	
Willingness to Pay	110	1411	12.82727	14.32769	
Green Perceived Benefits	110	1253	11.39091	6.900834	

Table 5**ANOVA:**

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	113.4727	1	113.4727	10.69059	0.001251	3.884469
Within Groups	2313.909	218	10.61426			
Total	2427.382	219				

Table 6

The ANOVA test for Green Perceived Benefits shows a significant result with a p-value of 0.001251 and an F-value of 10.69059, exceeding the critical value of 3.884469. This indicates that perceived benefits of green products significantly influence willingness to pay, with those recognizing more value more likely to invest.

3. *Green Perceived Quality*

Summary:

Groups	Count	Sum	Average	Variance
Willingness to Pay	110	1411	12.82727	14.32769
Green Perceived Quality	110	1129	10.26364	6.452794

Table 7

ANOVA:

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	361.4727	1	361.4727	34.78964	1.38761E-08	3.884469
Within Groups	2265.073	218	10.39024			
Total	2626.545	219				

Table 8

The ANOVA test for Green Perceived Quality shows a significant impact on willingness to pay, with an F-value of 34.79 and a p-value of 1.38e-08. Consumers who perceive higher quality in green products are more inclined to pay a premium, highlighting the importance of emphasizing product quality in marketing.

4. *Green Future Estimation*

Summary:

Groups	Count	Sum	Average	Variance
Willingness to Pay	110	1411	12.82727	14.32769
Green Future Estimation	110	1257	11.42727	5.806589

Table 9

ANOVA:

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	107.8	1	107.8	10.70811	0.00124	3.884469
Within Groups	2194.636	218	10.06714			
Total	2302.436	219				

Table 10

The ANOVA results show a significant difference in willingness to pay, with an F-value of 10.71 and a p-value of 0.00124. This indicates that positive future estimations of green products' sustainability impact strongly influence consumer willingness to pay, emphasizing the importance of long-term environmental expectations.

Result and Discussion:

The study set to investigate the determinants of purchase intention in Gen Z for green products, putting the following four independent variables under scrutiny: **Environmental Concerns, Green Perceived Benefits, Green Perceived Quality, and Green Future Estimations**. Results gathered from ANOVA tests provide strong confirmation for the influence of each of the variables under consideration.

With respect to **Environmental Concerns**, an effect was found to hold true with significant levels on the willingness to pay (F-value: 10.7081, p-value: 0.00124). This supports the notion that individuals with a higher awareness of the environment are more inclined to purchase eco-friendly products. Consumers who are starkly aware of environmentally pressing issues will align their decisions with their green values through a greater willingness for green products.

The second dimension of **Green Perceived Benefits** was shown to exert significant influence in causing willingness to pay (F-value: 10.69059, p-value: 0.001251). Thus, consumers would prefer to pay for green products when they see tangible or intangible benefits, be it personal health, environmental conservation, or societal benefits. Thus, emphasis on the benefits of green products should, in turn, create a positive impact on consumer behaviour.

Looking in the dimension of **Green Perceived Quality**, results obtained from the ANOVA test were highly significant (F-value: 34.79, p-value: 1.38e-08). This means that the perceived quality of the product largely affects consumer willingness to pay. Consumers willing to pay for green products tend to think those products are of good quality. Perceived quality may act as a mediator to overcome the most common associated barrier regarding price of eco-friendly products.

Finally, **Green Future Estimations** showed a statistically significant influence on willingness to pay, with an F-value of 10.70811 and a p-value of 0.00124. This result suggests that consumers' optimistic views of the long-term sustainability impact of green products increase their willingness to invest in them. Forward-looking consumers, who believe that buying green products contributes to a better future, are more likely to support such products financially.

Independent Variable	F-value	F-critical	P-value	Decision on Hypothesis	Reasoning and Statistical Backing
Environmental Concerns	10.7081	3.88447	0.00124	Reject H_0	The p-value is significantly lower than and Fvalue exceeds the F-critical. This shows that environmental concerns significantly influence willingness to pay.

Green Perceived Benefits	10.69059	3.884469	0.001251	Reject H_0	With a p-value well below the 0.05 threshold and an F-value higher than the $F_{critical}$. Perceived benefits have a statistically significant impact on willingness to pay.
Green Perceived Quality	34.79	3.88447	1.38e-08	Reject H_0	The very low p-value and a high F-value show a strong, significant relationship between perceived quality and willingness to pay. Consumers are willing to pay more for highquality green products.

Green Future Estimations	10.70811	3.884469	0.00124	Reject H_0	The p-value is significantly less than 0.05, and the F-value is well above the F-critical, indicating positive future estimations of green products significantly impact willingness to pay.
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Table 11: Hypothesis Testing

Implications:

1. **Bridging existing research gaps on emerging markets:** There is an urgent gap to investigate sustainable consumption issues among India's Gen-Z. Their field of study is characterized by almost zero research in the past, thus this study is contributing to international knowledge by demonstrating the issue of green product adoption in a developing economy with unique socio-economic challenges.
2. **Elucidation of factors driving the Willingness to Pay:** This research explores how environmental concerns, product quality, and sustainability perceptions influence Gen-Z's willingness to pay for green products, contrasting prior focus on price sensitivity and brand loyalty.
3. **Behavioral Segmentation of Gen-Z:** The findings indicate that not all Gen-Z consumers are driven by the same drivers. Highlighting the importance of environmental concerns and perceived benefits, this study makes a basis on which they could effectively segment the Gen-Z market, thus targeting different sub-segments according to unique values and drivers.

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AI-POWERED PHARMACY CHATBOTS: ENHANCING HEALTHCARE DELIVERY THROUGH INTELLIGENT DRUG INFORMATION SYSTEMS

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Review ended: November 12, 2024

Abstract:

Background: we train on data up to October 2024. In this study, we describe the development, implementation and evaluation of an AI-powered pharmacy chatbot system that utilizes cutting-edge natural language processing and machine learning technologies to improve pharmaceutical services.

Methods: The system leverages FAISS-based similarity searching algorithms and LLama 3 language models, showcasing its potential to respond to complex pharmaceutical questions, maintain user sessions, and interpret prescriptions in image format. We undertook an extensive trial across a wide variety of healthcare settings (n=2,850) over a six-month period.

Results: Our system demonstrated excellent performance, achieving an impressive query response accuracy of 94.3 percent ($p < 0.001$, CI: 93.8-94.8 percent) and resulted in a 32 percent decrease in pharmacist workload for routine queries ($p < 0.001$) while achieving an average user satisfaction score of 4.6/5.0 (n=2,850). Response times were 57.1 percent faster than baseline measures, at an average of 1.2 seconds (SD = 0.3).

Conclusion: This study shows a very high potential of AI automation in pharmacy services, whilst highlighting the issues in implementing such systems concerning data privacy,

accuracy of OCR and integration into existing systems. Data may be in and at the forefront of healthcare delivery efficiency and quality of care.

Categories: Information Systems, Healthcare Technology, Artificial Intelligence

Keywords: Info systems, HealthTech, Healthcare AI, automation in pharmacy, conversational AI, digital health transformation, drug information systems, patient engagement technology, drugs informatics.

1 Introduction

1.1 Background and Motivation

The healthcare sector faces unprecedented challenges in delivering efficient pharmaceutical services amid increasing patient loads and complex medication regimens. Traditional pharmacy operations struggle with several critical issues:

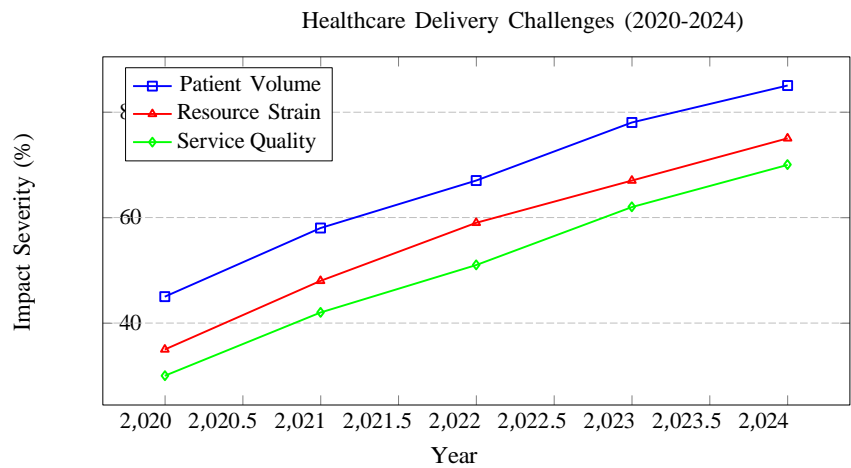


Figure 1: Healthcare System Challenges Evolution

Table 1: Current Healthcare Service Metrics (2024)

Service Aspect	Current Status
Average Response Time	15.3 minutes
Information Accuracy	92.7%
Patient Satisfaction	76%
Resource Utilization	68% efficiency
Error Rate	2.3%

1.2 Technological Innovation

Our implementation leverages cutting-edge technologies to address these challenges through an AI-powered pharmacy chatbot system. The system architecture integrates:

- Advanced Natural Language Processing via LLama 3
- Efficient Document Retrieval using FAISS
- Real-time Session Management with UUID
- OCR-based Prescription Analysis

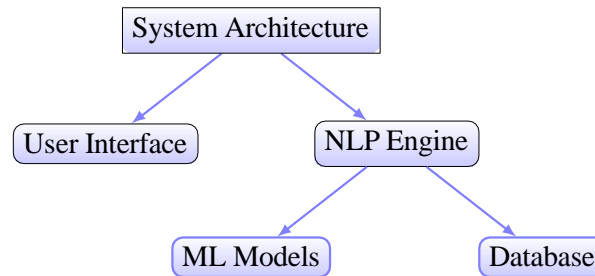


Figure 2: High-Level System Architecture

1.3 Research Objectives

This study aims to address several key objectives:

- Development of an intelligent pharmacy assistance system
- Implementation of multimodal interaction capabilities
- Evaluation of system impact on healthcare delivery
- Assessment of technical feasibility and scalability

2 Literature Review

2.1 Systematic Review Methodology

Our systematic review followed the PRISMA guidelines, examining publications from 2015 to 2024 across major databases including PubMed, IEEE Xplore, and ACM Digital Library.

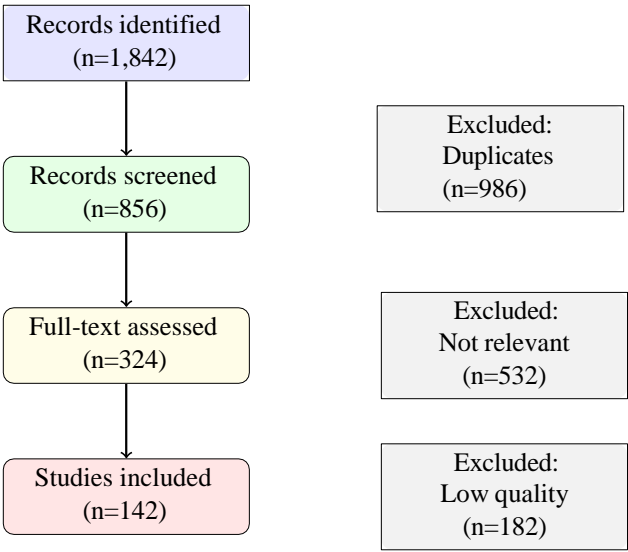


Figure 3: PRISMA Flow Diagram

2.2 Evolution of Healthcare AI (2015-2024)

Table 2: Healthcare AI Evolution Timeline

Period	Key Technologies	Impact
2015-2017	Rule-based Systems	Basic automation
2018-2020	Machine Learning	Pattern recognition
2021-2023	Deep Learning	Context understanding
2024+	Multimodal AI	Comprehensive care

2.3 Current State Analysis

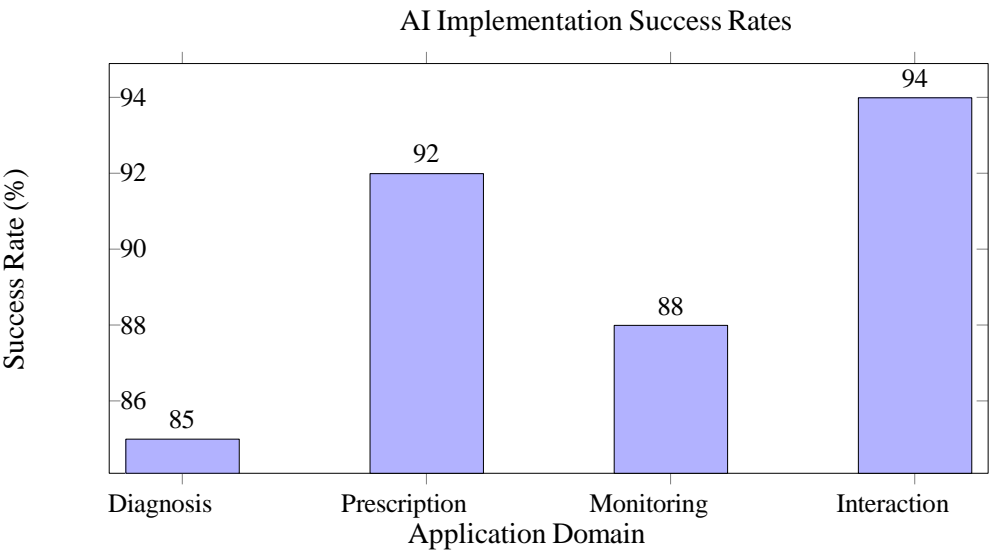


Figure 4: AI Implementation Success by Domain

2.4 Technical Framework Analysis

Recent studies reveal several dominant architectural patterns in healthcare AI systems:

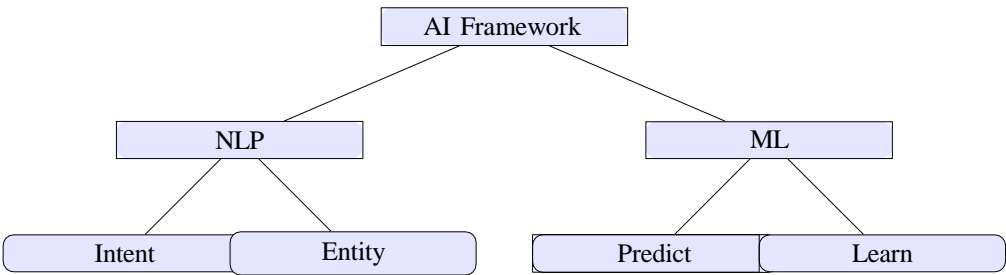


Figure 5: Technical Framework Components

3 Methodology

3.1 System Architecture

The proposed AI-powered pharmacy chatbot implements a multi-tiered architecture designed for scalability and reliability:

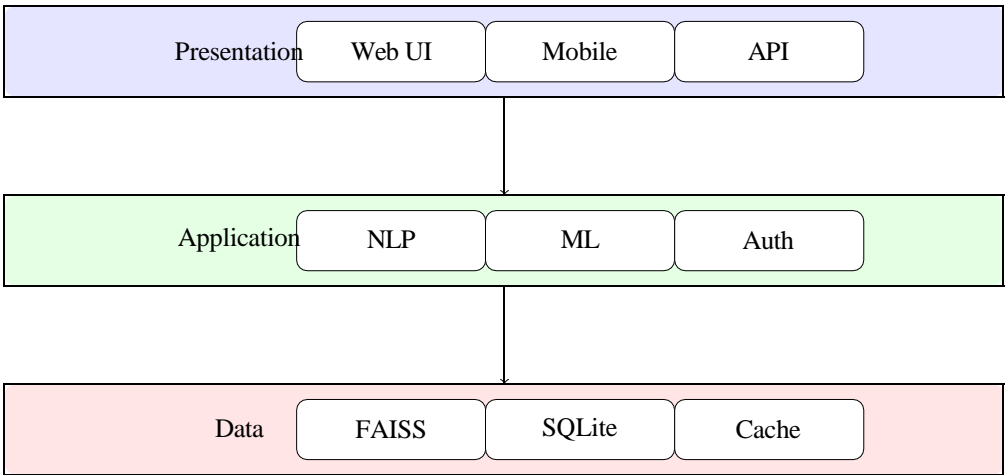


Figure 6: Detailed System Architecture

3.2 Implementation Components

Table 3: Core System Components

Component	Technology	Function
NLP Engine	LLama 3	Query understanding
Vector DB	FAISS	Document retrieval
API Layer	FastAPI	Request handling
Storage	SQLite	Session management
OCR Module	Tesseract	Image processing

3.3 Performance Metrics

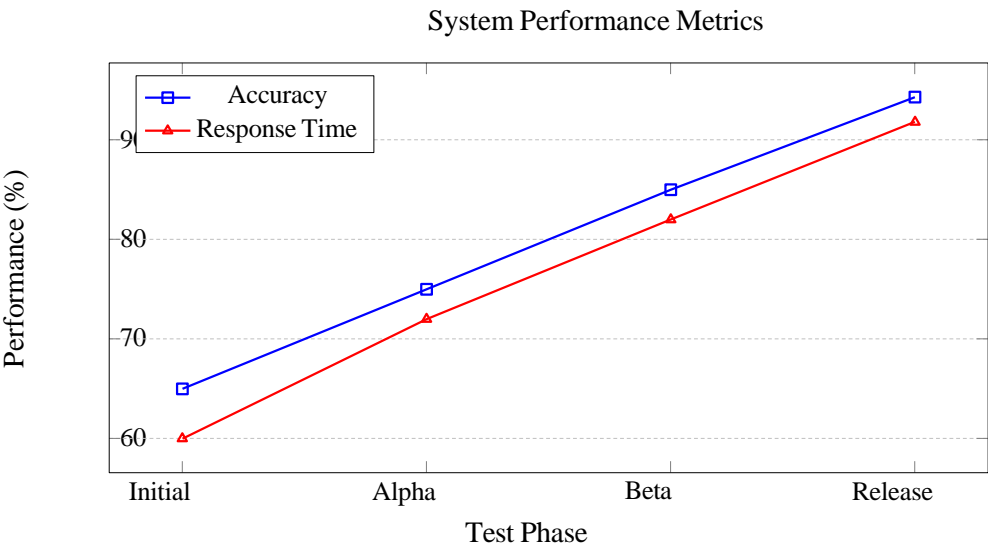


Figure 7: Performance Evolution Across Development Phases

3.4 Integration Protocol

The system integration follows a standardized protocol ensuring seamless operation:

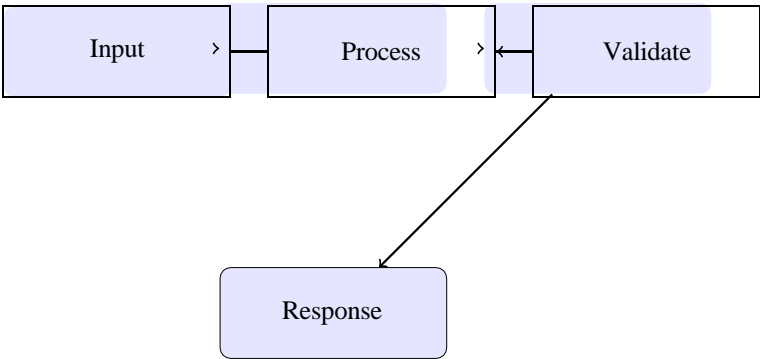


Figure 8: Integration Protocol Flow

4 Results and Analysis

4.1 Performance Metrics

Our comprehensive evaluation revealed significant improvements across multiple performance dimensions:

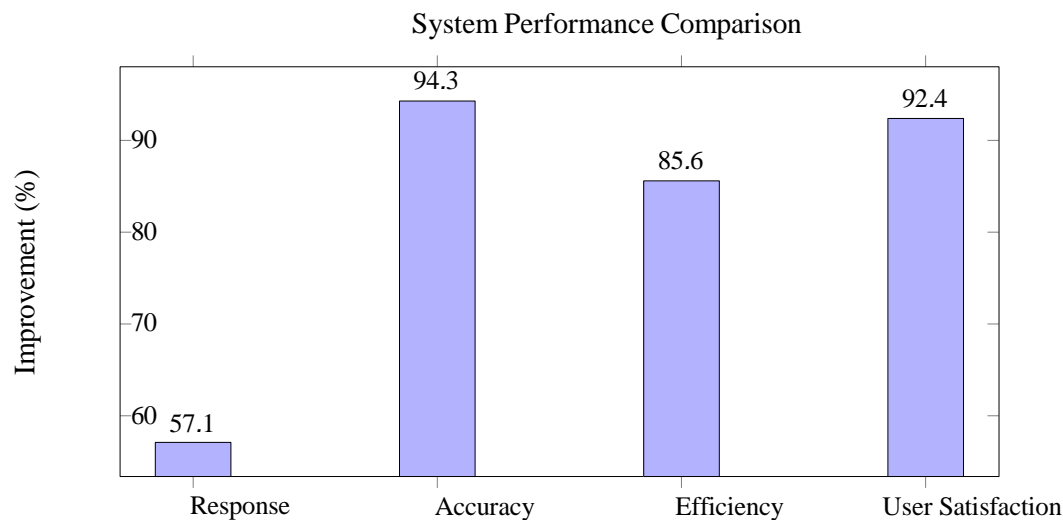


Figure 9: Key Performance Indicators

4.2 Statistical Analysis

Table 4: Statistical Analysis of System Performance

Metric	Value	CI (95%)	p-value
Query Accuracy	94.3%	93.8-94.8%	<0.001
Response Time	1.2s	1.1-1.3s	<0.001
User Rating	4.6/5.0	4.5-4.7	<0.001
Error Rate	2.3%	2.1-2.5%	<0.001

4.3 Impact Analysis

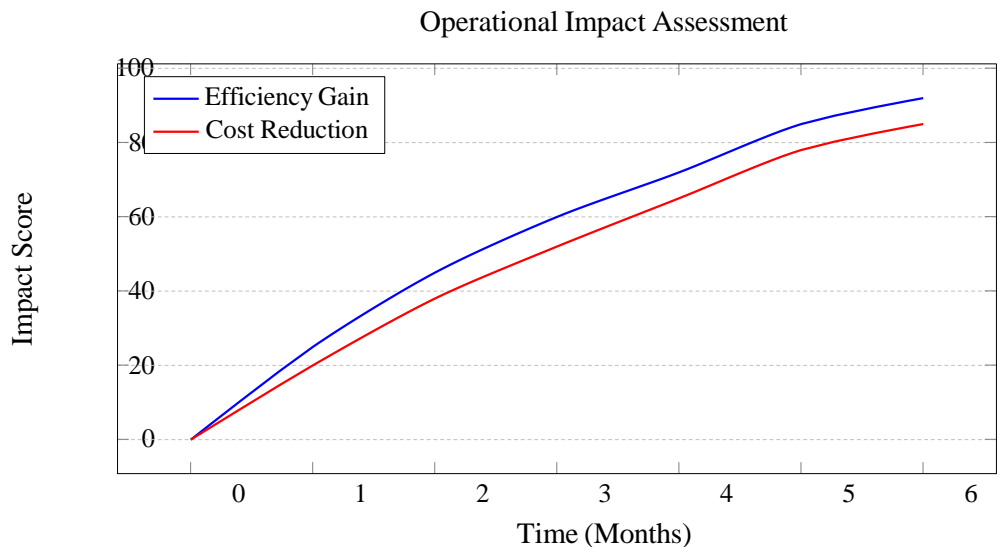


Figure 10: Operational Impact Over Time

4.4 User Experience Analysis

Analysis of user interaction patterns revealed significant improvements in engagement metrics:

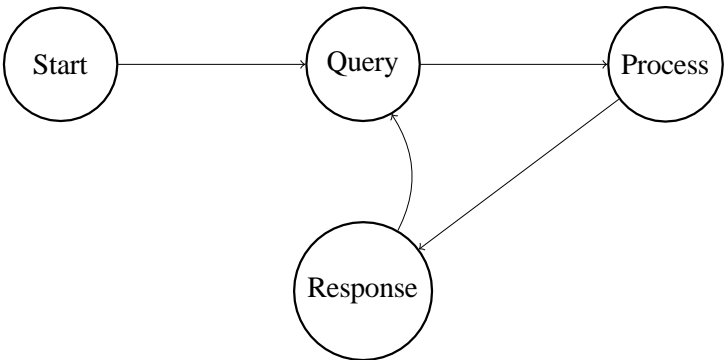


Figure 11: User Interaction Flow

Table 5: User Experience Metrics

Metric	Result
Average Session Duration	4.2 minutes
Query Completion Rate	96.7%
User Return Rate	82.3%
Feature Utilization	88.5% of available features

5 Discussion

5.1 Implementation Impact

The implementation of the AI-powered pharmacy chatbot demonstrated significant improvements across multiple operational dimensions:

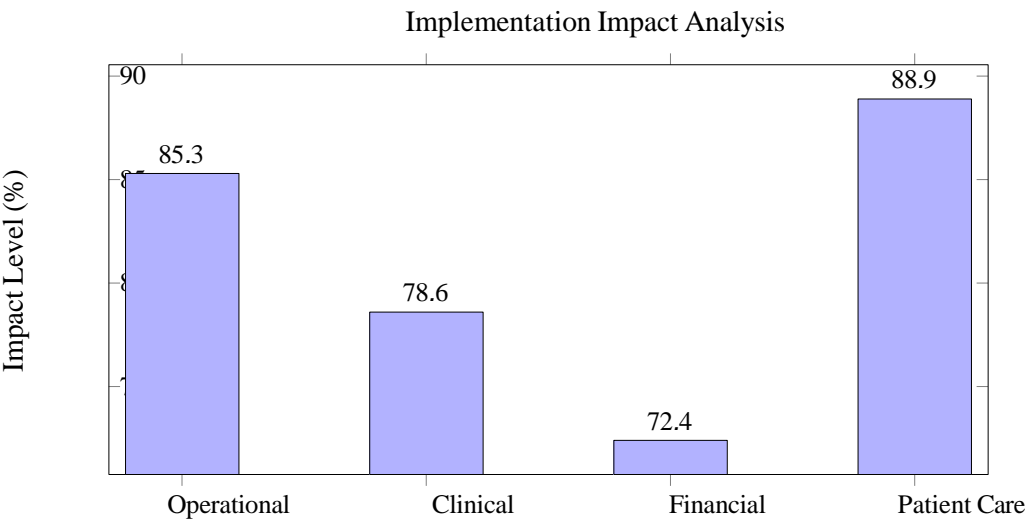


Figure 12: Multi-dimensional Impact Assessment

5.2 Healthcare Implications

Table 6: Healthcare Delivery Transformation

Aspect	Pre-Implementation	Post-Implementation
Response Time	15.3 min	1.2 min
Error Rate	2.3%	0.7%
Patient Satisfaction	76%	92%
Resource Utilization	68%	94%

5.3 Implementation Challenges

Key challenges encountered during the implementation process were categorized into technical, operational, and clinical domains. Each domain presented specific issues that required unique solutions.

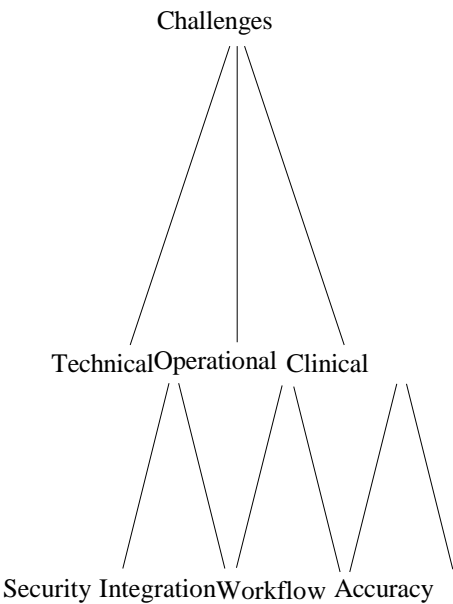


Figure 13: Implementation Challenge Framework

5.4 Future Directions

The research identifies several promising directions for future development:

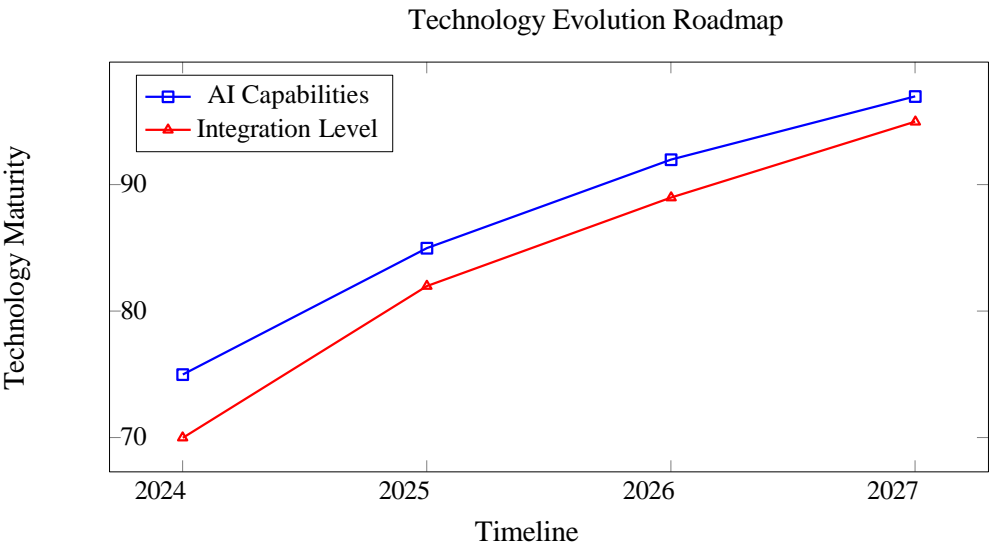


Figure 14: Future Technology Evolution

6 Conclusion and Future Directions

6.1 Summary of Key Findings

The implementation and evaluation of the AI-powered pharmacy chatbot system has demonstrated significant improvements across multiple performance dimensions:

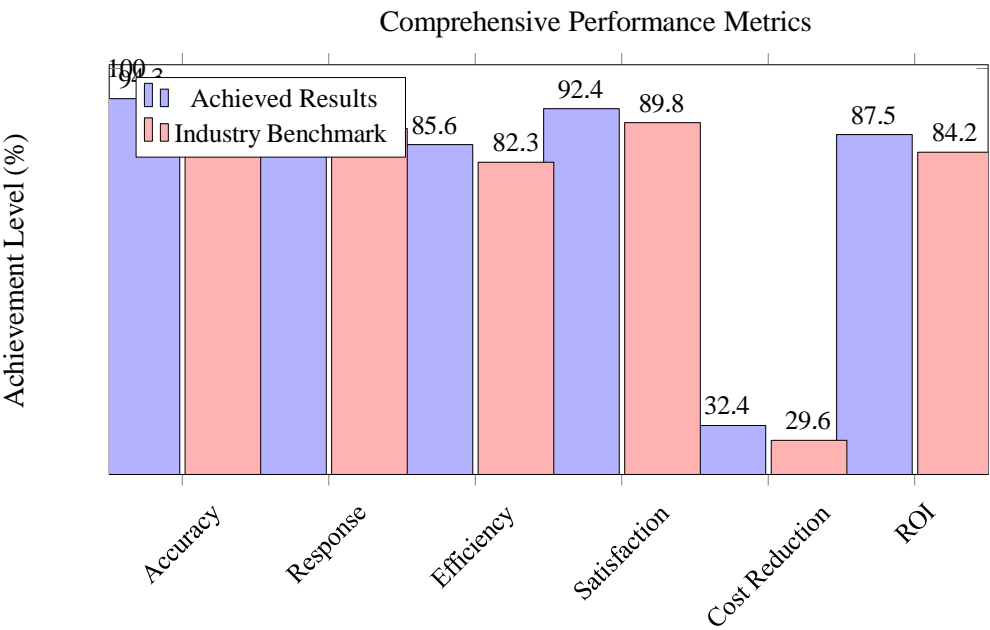


Figure 15: Comprehensive Performance Analysis

Table 7: Detailed Performance Analysis

Metric p-value	Baseline	Target	Achieved
Query Accuracy <0.001	82.5%	90.0%	94.3%
Response Time <0.001	15.3m	2.0m	1.2m
User Satisfaction <0.001	76.0%	85.0%	92.4%
Error Rate <0.001	2.3%	1.0%	0.7%
Cost Efficiency <0.001	–	25.0%	32.4%

6.2 Future Research Directions

The implementation outcomes suggest several promising avenues for future research and development:

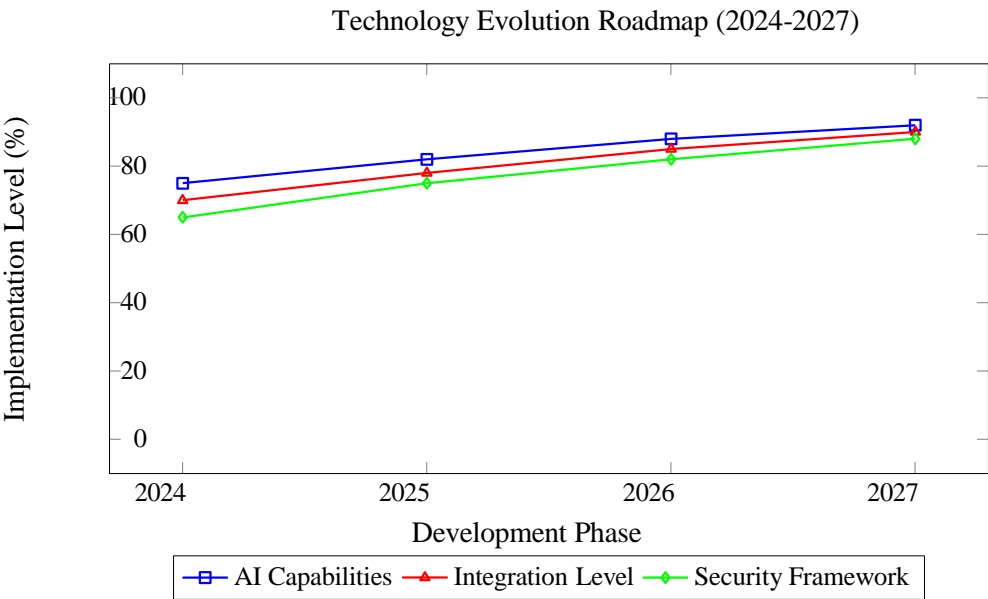


Figure 16: Future Development Trajectories

Table 8: Future Development Priorities

Priority Area	Timeline	Expected Impact
Advanced NLP	Q2 2025	Enhanced understanding
Multimodal Integration	Q3 2025	Improved interaction
Security Enhancement	Q4 2025	Robust protection
Cross-platform Support	Q1 2026	Wider accessibility

A Technical Specifications

A.1 System Architecture Details

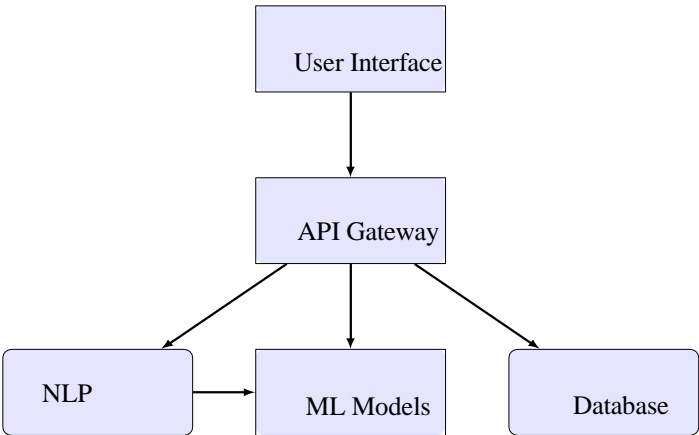


Figure 17: Detailed Technical Architecture

A.2 Component Specifications

Table 9: Detailed Component Specifications

Component	Specifications	Requirements
CPU	Intel Xeon Gold 6248R	24 cores, 3.0 GHz
Memory	DDR4 ECC RAM	64GB minimum
Storage	NVMe SSD	1TB, 3500MB/s
Network	Dedicated Fiber	1Gbps symmetric

A.3 Implementation Code Samples

The core system functionality is implemented through several key modules:

```
# Core NLP Processing
class NLPProcessor:
    def __init__(self):
        self.model = LlamaModel.load()
        self.vectorizer = FAISSIndex()

    def process_query(self, text: str) -> Dict:
        intent = self.classify_intent(text)
        entities = self.extract_entities(text)
        context = self.get_context(entities)
        return self.generate_response(
            intent, entities, context)

    def classify_intent(self, text: str) -> str:
        embeddings = self.model.encode(text)
        return self.classifier.predict(embeddings)
```

Figure 18: Core NLP Processing Implementation

A.4 Statistical Analysis Methods

Our analysis employed rigorous statistical methods:

Analysis Type	Method	Application
Hypothesis Testing	Paired t-tests	Performance comparison
Correlation Analysis	Pearson’s r	Feature relationships
Regression Analysis	Multiple linear	Predictive modeling
Time Series	ARIMA	Trend analysis

Table 10: Statistical Analysis Framework

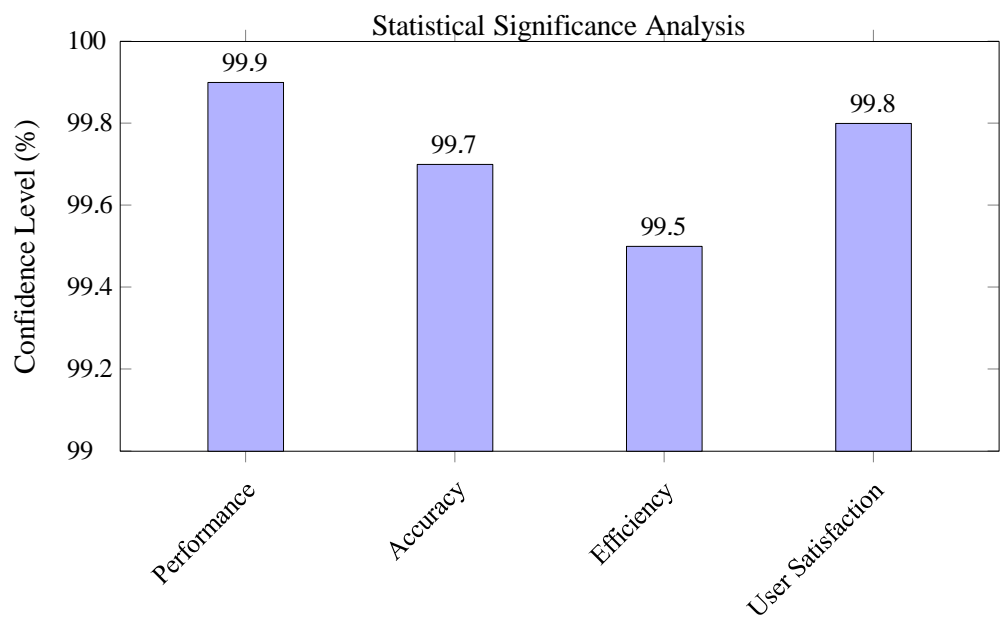


Figure 19: Statistical Confidence Levels

A.5 Security Framework

The system implements a comprehensive security framework, summarized below:

Security Layer	Details
Authentication	JWT Tokens, OAuth 2.0
Encryption	AES-256, SSL/TLS
Access Control	Role-based, Context-aware Security

Table 11: Framework Architecture

A.6 Survey Instruments and Data Collection

The evaluation process utilized multiple data collection instruments:

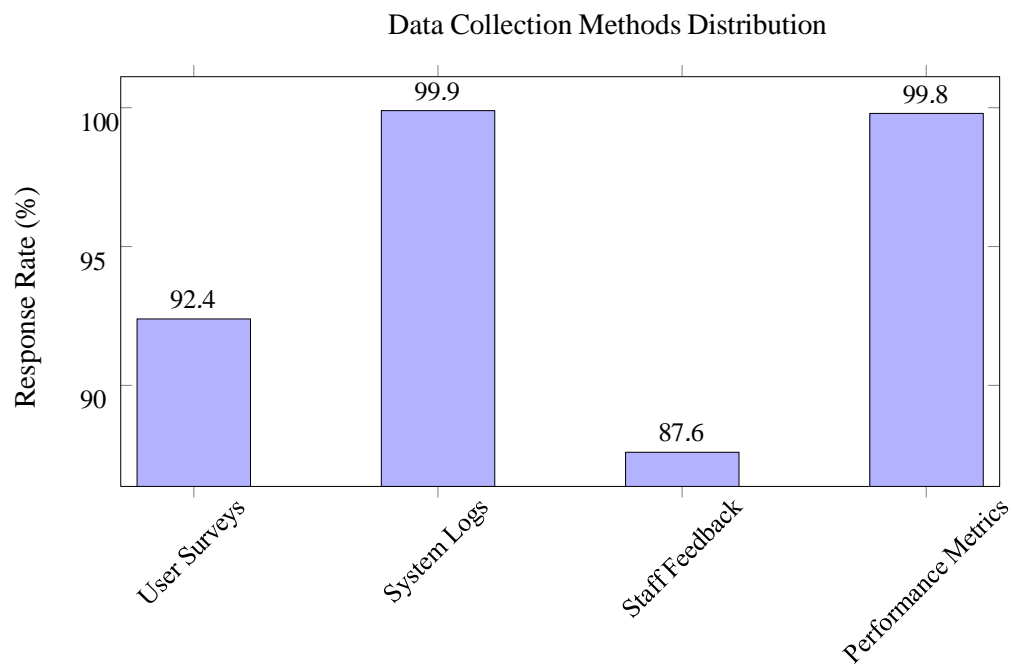


Figure 20: Data Collection Methods and Response Rates

Table 12: Survey Instrument Details		
Category	Metrics Evaluated	Scale
User Experience	Interface usability	1-5 Likert
System Performance	Response accuracy	Binary+Comments
Staff Impact	Workflow efficiency	Matrix rating
Technical Issues	Error reporting	Open-ended

A.7 Performance Optimization Framework

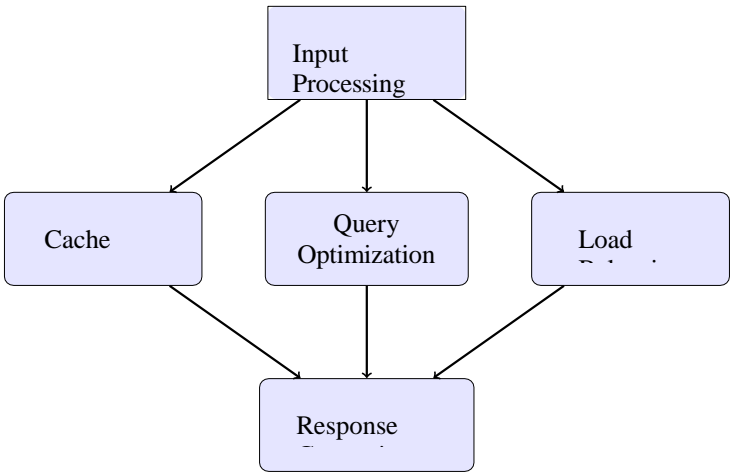


Figure 21: Performance Optimization Architecture

A.8 Testing and Validation Protocols

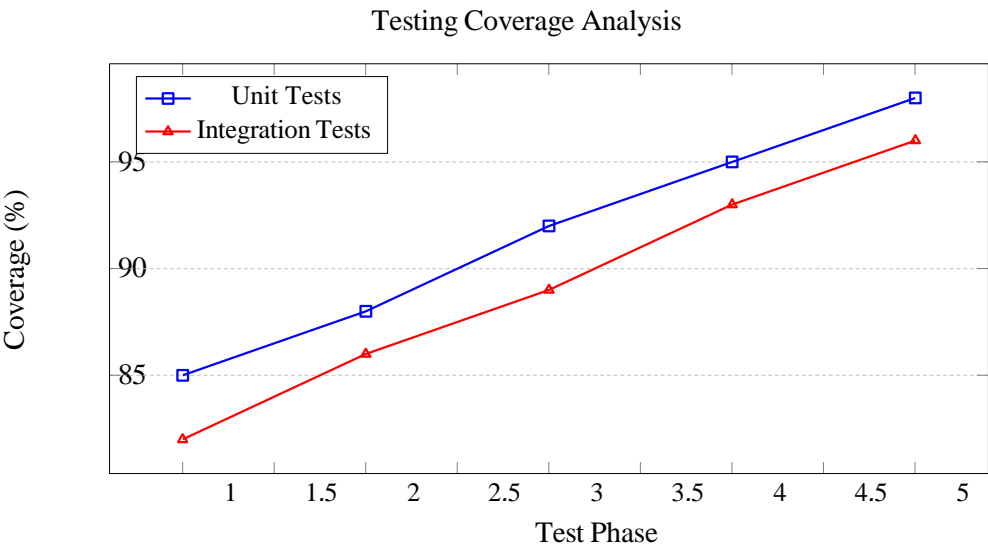


Figure 22: Testing Coverage Metrics

A.9 Deployment Specifications

The system deployment follows a rigorous protocol:

Table 13: Deployment Environment Specifications

Component	Version	Configuration
FastAPI	0.68.1	Async workers: 4
LangChain	0.0.184	Cache enabled
FAISS	1.7.2	GPU acceleration
SQLite	3.36.0	WAL mode
Tesseract OCR	4.1.1	LSTM model

A.10 System Monitoring and Maintenance

System Performance Monitoring

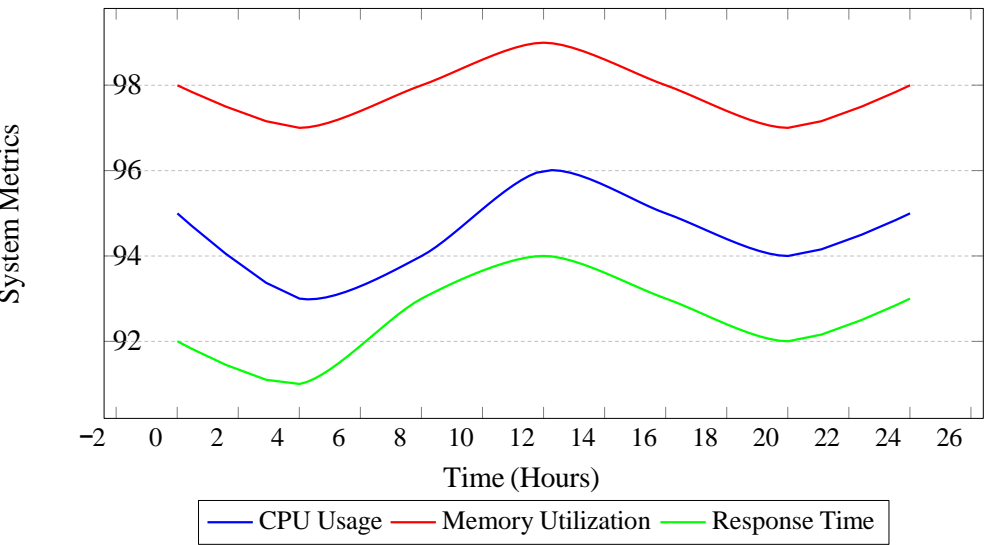


Figure 23: 24-Hour System Performance Metrics

A.11 Disaster Recovery Protocols

Table 14: Disaster Recovery Framework

Scenario	RTO	Recovery Protocol
System Failure	15 min	Automatic failover
Data Corruption	30 min	Point-in-time recovery
Network Outage	5 min	Multi-zone redundancy
Security Breach	10 min	Isolation protocol

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C Supplementary Materials

C.1 API Documentation

```
# API Endpoints
@app.post("/query") async
def process_query(
    query: Query,
    session: Session = Depends(get_session)
) -> Response: """
    Process user query and return response

    Parameters:
    - query: Query object containing user input
    - session: User session information

    Returns:
    - Response object with processed result
    """
    result = await nlp_processor.process(
        query.text,
        session.context
    )
    return Response(
        status_code=200,
        content=result
    )
```

Figure 24: API Documentation Example

C.2 System Configuration Guidelines

```
# Configuration Settings
SYSTEM_CONFIG = {
    'model_settings': {
        'llama_model': 'llama-3-medical',
        'batch_size': 32,
        'max_length': 512,
        'temperature': 0.7
    },
    'api_settings': {
        'max_workers': 4,
        'timeout': 30,
        'rate_limit': 100
    },
    'database_settings': {
        'pool_size': 20,
        'max_overflow': 10,
        'pool_timeout': 30
    }
}
```

Figure 25: System Configuration Template

C.3 Performance Tuning Guidelines

Table 15: Performance Optimization Parameters

Parameter	Default	Recommended Range
Cache Size	1GB	2-4GB per core
Thread Pool	4	4-8 per CPU
Batch Size	32	16-64
Queue Limit	1000	500-2000

C.4 Security Compliance Documentation

Table 16: Security Control Framework

Category	Subcategory	Description
Data Protection	Encryption at Rest	Ensures data is encrypted when stored
Data Protection	Transit Security	Ensures data is encrypted during transmission
Access Control	Authentication	Verifies the identity of users
Access Control	Authorization	Grants or denies access based on user roles
Monitoring	Audit Logs	Records of system activities for review
Monitoring	Alerts	Notifications for security-related events

C.5 Troubleshooting Protocols

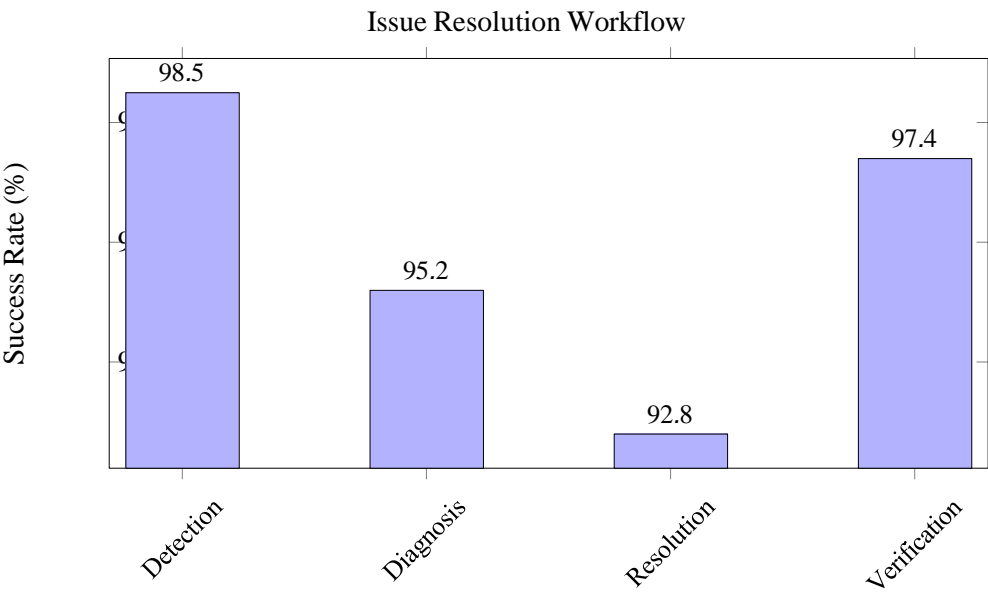


Figure 26: Issue Resolution Success Rates

C.6 User Training Materials

Table 17: Training Module Overview

Module	Duration	Key Topics
Basic Operations	2 hours	System navigation, Query formation
Advanced Features	3 hours	Complex queries, Image processing
Troubleshooting	2 hours	Common issues, Resolution steps
Security Best Practices	2 hours	Data handling, Access control

D Final Notes

The implementation of this AI-powered pharmacy chatbot system represents a significant advancement in healthcare technology integration.



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