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By Arthashastra, The Economics Society of Miranda House

index.

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ACKNOWLEDGEMENT

As we unveil the 14th edition of Aapoorti, we convey our heartfelt appreciation to all who have contributed to bringing this journal to life. We express sincere gratitude to our esteemed Faculty Advisor and Teacher-in-Charge, Dr. Sutapa Das, whose unwavering guidance has been instrumental in shaping this publication. We are indebted to a cadre of professors for their invaluable direction, and we extend our thanks to the Arthashastra team, particularly Dhwani Kumar (President) and Shreya Kacker (Vice-President), for their steadfast support.

Special appreciation goes to the Marketing and Design Teams for their efforts in promoting and designing our work. Our gratitude extends to interviewees Dr. Abhiroop Mukhopadhyay and Ms. Aditi Bhowmick, as well as all the guest contributors for their valuable pieces of work. A special mention goes to Dr. Annavajhula J. C. Bose, whose consistent support and ideas have been invaluable throughout the years.

To our readers and friends, thank you for your enthusiastic support. We truly hope that you find reading this edition an enriching experience. Finally, we express our sincere thanks for the unwavering commitment and relentless effort invested by our team members in creating a journal that showcases our utmost dedication and hard work.

With heartfelt gratitude and much love,

The Editorial Board

EDITOR'S NOTE

With thorough groundwork spanning months, we take immense delight in unveiling the fourteenth edition of Aapoorti. Over the years, Aapoorti has been an incubator of critical thinking and knowledge-driven learning within the economics department. This edition, centred around 'Artificial Intelligence and Economics,' underscores the pivotal role of this multidisciplinary theme in shaping society, education, and life at large. In the contemporary era, the amalgamation of Artificial Intelligence and Economics assumes paramount importance as AI becomes intrinsic to economic dynamics, reshaping decision-making and resource allocation..

Recent revelations of data protection and privacy lapses by major companies like Facebook and Google underscore the critical need for heightened scrutiny, prompting the Editorial board to delve into a research paper on the repercussions of lax data protection on consumer privacy. This exploration aims to discern whether greater compliance with data protection and privacy laws influences consumer purchasing decisions, exploring a crucial dimension of the evolving discourse on digital ethics and consumer behaviour.

Delving into insightful conversations with eminent economists, Dr. Abhiroop Mukhopadhyay and Ms. Aditi Bhowmick, provided a profound understanding of contemporary issues. Our guest contributors come from renowned colleges nationwide that resulted in diverse submissions, ranging from multidisciplinary research papers to thought-provoking perspectives. Additionally, a special collaboration with the Economic Society of Ashoka University produced a trilogy of insightful articles that explore various facets of the highly significant G20 summit hosted in India.

We aspire for this edition to provide you with novel insights and distinctive perspectives across a wide range of topics. May it enhance the reader's understanding as profoundly as the process of crafting Aapoorti enriched its authors.

Warm Regards,

Srishti and Gitika

Editors-in-Chief

FACULTY ADVISOR &

TEACHER IN CHARGE'S NOTE

I am pleased to introduce the 14th (2024) edition of Aapoorti, the annual magazine of the Economics department, Miranda House. We are happy that while choosing the journal theme, our students always take up the challenge of blending burning issues with their subject. The theme of this edition is Artificial Intelligence and Economics, the topic that has been dominating global discourse with socio-political and economic concerns.

We are heading towards an AI world where we can significantly experience the increasing use of machine intelligence, right from healthcare diagnoses to closing the education gap among students. It also addresses the productivity gap in agriculture and industry- not to mention reducing labour hires and replacing traditionally skilled workers. According to "IBM Global AI Adoption Index 2023", a survey conducted in November 2023 reveals that about 42% of enterprise-scale companies surveyed (having more than 1,000 employees), have incorporated AI in their business and 59% of those companies have had accelerating investment spending on this technology while 33% of the enterprises feel the lack of AI-skilled-labour as one of the primary challenges in the deployment of AI. Besides, it seems important to note in a similar spirit to MIT's Daron Acemoglu and Simon Johnson that the ultimate impact of AI deployment on an economy's growth and development depends on the extent to which it replaces and complements the human capital of the country.

The present edition includes our in-house research paper 'Exploring the Impact of the European Union's General Data Protection Regulation (GDPR) on Consumer Choices: A Multifaceted Analysis' that analyses the impact of company compliance with General Data Protection Regulation (GDPR) on consumer choices, based on a primary survey within India and secondary data from three European companies focussing on the relationship between legal frameworks, consumer trust, and market dynamics. In addition to this, we have two more articles on issues related to AI- one, that advocates for a significant investment plan in the field of Artificial Intelligence to expedite conservation efforts and ensure the sustainability of the oceans on which the livelihoods of over three billion people rely. The other article explores the lessons learned since colonialism and challenges faced in adapting transformative technologies in India and advocates for public and private sectors' collaboration to ensure equitable benefits of Artificial Intelligence. Furthermore, this edition includes research articles on a wide spectrum of contemporary issues ranging from neoliberal agendas and the adoption of free market policies in India's health sector to the evaluation of digital payments in India in the light of easiness of day-to-day transactions against the uneasiness of security threats, the evaluation of India's cap-and-trade policy, an experimental project in the fight against climate change implemented in Gujarat in 2019 and impact analysis of

common currency usage on various aspects like trade, economic convergence, financial integration and foreign investments in European Union countries. We have three more articles that are the research outcome of a collaborative article series with Ashoka University on the G20, 2023 summit held in India.

I congratulate our students on the commendable teamwork and effort they put in to pursue and collate quality research at the undergraduate level, while balancing their studies and assessment requirements. I would also like to acknowledge and appreciate the guest contributors for their immense support in shaping the current edition. Wish our readers a happy and enriching reading.

Dr. Sutapa Das

Faculty Advisor, Arthashastra and

Teacher-in-charge, Department of Economics

EDITORS' DESK

THE IMPACT OF THE EUROPEAN UNION'S GENERAL DATA PROTECTION REGULATION (GDPR) ON CONSUMER CHOICES: A TWO WAY ANALYSIS

Srishti Menon, Gitika Arora, Ekanshi Makheja, M. Tharuni

1. Abstract

This research delves into the influence of company compliance with 'General Data Protection Regulation (GDPR)', on 'Consumer Demand', employing statistical methods to quantify its impact on purchasing decisions. In addition to GDPR compliance, we also examine the explanatory power of variables such as 'Selling and Marketing Expenses' and 'Unemployment' on Consumer Demand. Utilizing a primary survey , predominantly within India and secondary data from three European Companies, we illuminate the relationship between legal frameworks, consumer behaviour, and the market. We acknowledge the limitations of our study, due to constraints on data availability and sample size, and advise caution while evaluating the results of this paper. Our findings aim to

offer some perspective to the ongoing dialogue in the realm of data protection, offering valuable insights for businesses navigating the still evolving landscape of digital commerce.

Keywords: companies, compliance, Consumer Demand, European Union, General Data Protection Regulation

2. Introduction

The expansion of e-commerce has led to the amassing of significant amounts of consumer data by businesses, particularly by online retailers and marketers. This data is utilised for various purposes, including creating personalised experiences, developing targeted marketing campaigns, understanding consumer preferences, and boosting profits (Jai & King, 2016; IBM Global Business Services, 2012). However, the collection and subsequent use of consumer data raise significant privacy concerns, particularly when such data is acquired without informed consent. The collection of personally identifiable information (PII) is especially concerning, with 69% of consumers expressing limited control over their data and anxieties regarding its misuse or exposure (Pew Research Center, 2019). Consumers are selective about data sharing, often withholding it for transactions deemed less important and potentially switching to competitors exhibiting more trustworthy data practices (Clarke et al., 2019). Furthermore, despite an increasing awareness of consumer privacy, many individuals lack the knowledge to adequately protect themselves, as evidenced

by the low rates of online communication encryption and password changes (Clarke et al., 2019).

2.1 The General Data Protection Regulation (GDPR)

To address these growing concerns, numerous countries have implemented data privacy regulations. This paper focuses on the General Data Protection Regulation (GDPR) introduced by the European Union in 2018. The GDPR has significantly altered the data protection landscape, recognizing "the right to the protection of personal data concerning him or her" for all individuals (Clarke et al., 2019). It defines personal data broadly to encompass any information related to an individual and grants EU residents various data rights, including the right to access and delete their information. Additionally, the GDPR imposes obligations on businesses, such as data auditing and breach notification requirements. The regulation's potential for substantial fines (up to 4% of a company's annual revenue) has heightened awareness among businesses and the public (Clarke et al., 2019). Article 5 of the GDPR outlines key privacy and data protection requirements, including obtaining consent for data processing, anonymizing collected data, notifying of data breaches, securely handling cross-border data transfers, and mandating data protection officers for certain companies (Goddard, 2017).

2.2 Consumer Demand and Trust

Consumer demand is influenced by various factors, with trust in a company's data practices gaining increasing importance. While comprehending all aspects of data collection and usage can be challenging, consumers desire transparency in these processes. The IAPP Privacy and Consumer Trust Report revealed that clarity regarding personal data processing was the primary factor fostering trust in companies (International Association of Privacy Professionals, 2020). However, 40% of consumers struggle to understand company data privacy practices (International Association of Privacy Professionals, 2020). This limited understanding erodes trust across sectors, potentially leading to "privacy self-defence" behaviours including withholding data, obfuscating information, avoiding data-intensive transactions, and switching to privacy-conscious competitors (Cohen, 2019). Over the past year, 85% of consumers reported deleting apps, 82% opted out of data sharing, 78% avoided specific websites, and 67% refrained from online purchases due to privacy concerns (International Association of Privacy Professionals, 2020)

This research aims to contribute to a more comprehensive understanding of how data privacy regulations influence consumer behaviour. Existing research primarily focuses on the potential impact of GDPR compliance on firm performance and revenue potential, leaving a crucial gap in understanding its direct influence on customer behaviour, more specifically, consumer demand . This paper addresses this gap by examining how consumers react to companies' adherence to the regulation.

Utilising various statistical tools, this paper seeks to determine the explanatory power of GDPR compliance on consumer demand, while also identifying and quantifying the influence of other relevant independent variables such as Unemployment, Selling and Marketing expenses, and a GDPR compliance index. These findings will equip businesses with actionable insights into the factors impacting consumer demand and their relative significance, enabling them to navigate the complex privacy landscape effectively and secure consumer trust and loyalty.

To ensure a nuanced and representative analysis, this paper employs a primary survey alongside secondary research to ensure greater credibility to this endeavour. The secondary research focuses on three diverse companies representing distinct industries: Adidas (retail), Accenture (IT services), and BMW (automobiles). This cross-sectoral approach will allow us to test the generalizability of our findings.

3. Literature Review

The General Data Protection Regulation (GDPR), implemented in 2018, stands as a landmark in European data privacy law and has garnered global attention. This paper investigates the potential impact of GDPR compliance on consumer demand. The GDPR strives to address the well-documented "privacy paradox," where consumers express concern for data privacy but readily trade it for perceived benefits (Barnes, 2016). By empowering individuals with transparency

and control over their data practices, the GDPR holds the potential to reshape this dynamic. Laufer and Choi (2016) posit that increased control over data sharing fosters feelings of empowerment and autonomy, leading to greater satisfaction and trust in organisations demonstrably respecting privacy rights. This aligns with Gefen and Straub's (2003) work on building trust through ethical data practices, suggesting GDPR compliance may strengthen customer relationships and loyalty.

However, GDPR compliance presents its own set of hurdles. Culnan and McDevitt (2010) warn that stricter data collection procedures and opt-in processes can introduce friction and inconvenience for consumers accustomed to seamless online experiences. This aligns with Acquisti's (2018) concerns about "privacy fatigue," where frequent exposure to consent requests and privacy notices can diminish their effectiveness and even induce resentment. Striking a balance between robust data protection and user-friendly experiences becomes crucial for organisations seeking GDPR compliance without deterring consumers.

The other explanatory variables employed in this paper also deserve to be analysed in this section. Kohli and Jaworski (1998) suggest that research into aspects such as marketing , Research and development (R&D), to name a few, enhances customer satisfaction and enhances business performance. Thus, there seems to be a positive relationship between investments in segments like

marketing and consumer demand, assuming consumer satisfaction is directly correlated to consumer demand. Whereas, unemployment renders people with no steady source of income. It erodes their disposable income and people tend to spend less. Unemployment is associated with decrease in spending (Ganong and Noel, 2016).

The relationship between GDPR compliance and demand becomes even more intricate when considering moderating factors. Smith (2019) emphasises how variables like age, technological savviness, and pre-existing privacy awareness can shape individual reactions to stricter data practices. Kim and Sundar (2020) highlight the role of industry characteristics, suggesting the perceived value of data control might vary depending on the nature of data collection and its relevance to consumer choices in specific sectors. Degeling and Freeling (2019) remind us that even the implementation approach of the GDPR – transparency, user-friendliness, and communication – can significantly impact the perceived experience and its influence on consumer behaviour.

Empirical evidence offers both encouraging and conflicting perspectives. Evans (2023) found increased opt-in rates for data sharing in GDPR-compliant organisations, suggesting the potential for trust-building. Conversely, Park et al. (2021) reported decreased website conversions after implementing cookie consent banners, highlighting the potential for friction and inconvenience in certain contexts. These mixed findings underscore the need for further

research that delves deeper into the role of moderating factors and explores how GDPR compliance influences demand across different industries and consumer segments.

4. Methodology and Findings

We have conducted a primary survey in India with a sizeable sample size of 75 alongside analysing secondary data to give greater credibility to our findings.

4.1 Primary Research

To understand the correlation of consumer demand with parameters like investment in product marketing and data compliance, a primary survey was undertaken to understand the variables of interest and their correlation with consumer demand. A Google form consisting of the following questions was shared across people from different age groups and occupational structures, of which more than 50% of the respondents were in the age group of 18-21 years. The adjoining table depicts the questions asked:

Table 1: Questionnaire

Serial no.	Survey Questions
1	Have you ever given feedback, raised complaints regarding consumer satisfaction to the products/services of various companies that you use?
2	*If yes, In the long run do you think they were taken into consideration by the companies?*
3	*Do you think such efforts undertaken by the companies affect your demand positively?*
4	*How much of an influence does an advertisement have on you, to shift to a particular company from a closer substitute?*
5	*Do you believe that Data Protection and compliance to data privacy laws by companies are important?*
6	*If a company adheres to data privacy laws and complies to Data Protection laws, does that positively affect your demand towards those products/services?*

A total of 75 responses were recorded. Interpretations from the questions enlisted in Table 1 are as follows:

It appears that 66.7% of the sample have given feedback or raised complaints to various companies regarding their satisfaction from consumption of a particular product or service. However, only around 16% believe that their concerns, issues or feedback have been taken into account by those companies. Further, 64% of the sample believes that if such efforts are actually taken into account, this would positively affect their demand towards the consumption of the company's products.

To understand the next explanatory variable, advertisement expenditure, the respondents were asked about the extent of influence advertisement had on their consumer demand. While 76% claim that it positively affects their demand to some extent, for approximately 15% of the sample, advertisements have a sure-shot impact on influencing their demand.

The next important explanatory variable is concerned with adherence to data privacy laws. It is interesting to note that, more than 90% of the sample believe that compliance with data privacy laws is important and more than 70% claim that it positively impacts their demand towards the companies. This suggests that it becomes extremely important for companies to adhere to crucial data protection laws as it has substantial impacts on consumer demand. Since GDPR falls under the purview of data protection and privacy laws, we can safely

assume that consumers might have a similar stance with regards to this particular regulation as well.

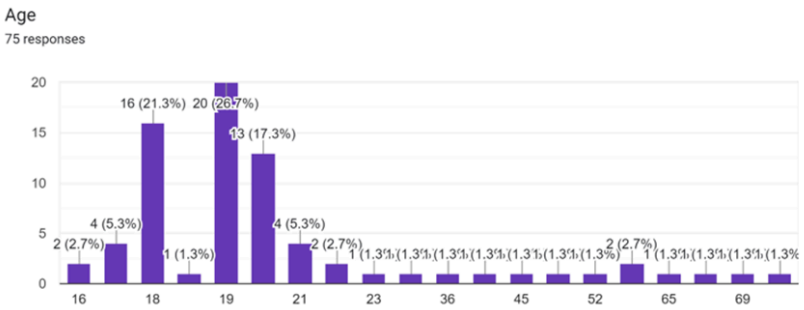


Figure 1: Age distribution of respondents

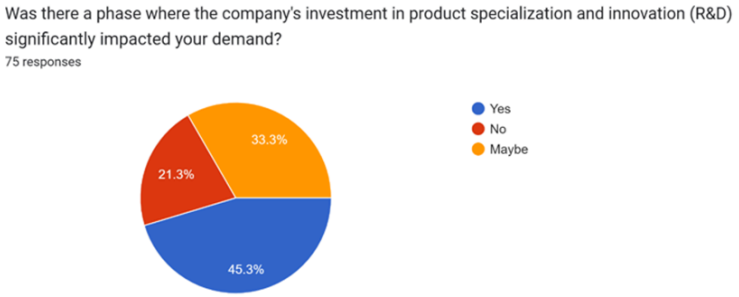


Figure 2: Perceptions of Company Investment on Demand

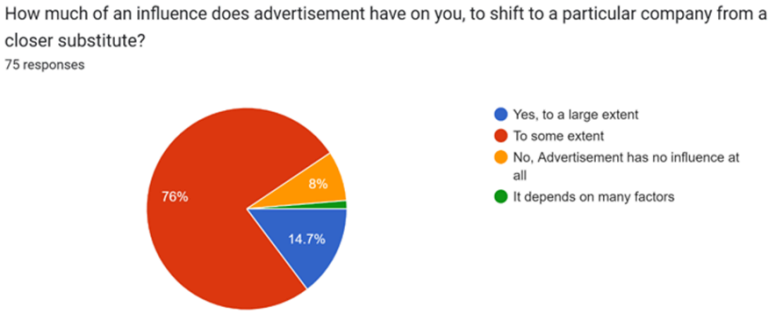


Figure 3: Influence of Advertisements and Brand Loyalty

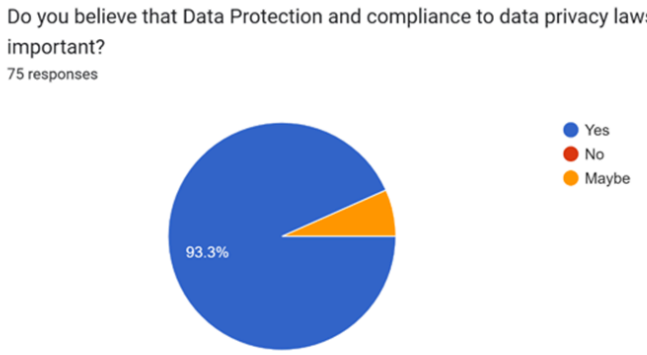


Figure 4: Perception on Data Privacy

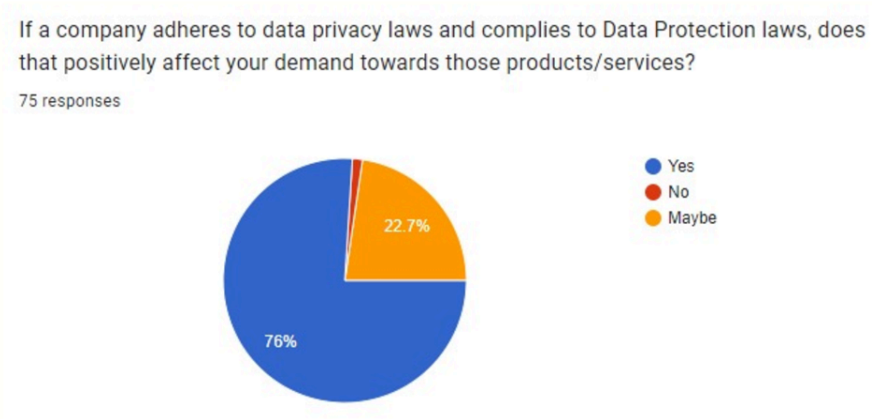


Figure 5: Impact of Data Protection on Consumer Demand

4.2 *Secondary data research*

For the purpose of this analysis, we have chosen three European companies namely- Adidas (Germany), Bayerische Motoren Werke i.e., BMW (Germany) and Accenture (Ireland). Since GDPR is applicable to firms that process data of European residents, we have selected data driven companies based in Europe, for ease of information availability. The firms have been selected in a manner

that each belongs to a unique industry which makes our data more representative and far reaching, lending greater accuracy to the results of this study. For instance, Adidas belongs to Textiles, Apparel and Luxury Goods; BMW falls under the purview of Automobiles and lastly, Accenture can be categorized under IT Services.

Variable Description

1. Dependent Variable:

Consumer Demand is chosen as the dependent variable here. We analyse this variable using data from the sales revenue of the three selected European companies. Information on sales revenue has been obtained from the financial statements of each company from 2018 to 2022. Due to lack of data availability on consumer demand, we have considered sales revenue to be a close proxy for consumer demand.

2. Explanatory Variables:

i. Primary Variables: Our primary variables include ‘GDPR compliance index’ and ‘Selling and Marketing Expenses’.

Since there was no comprehensive index indicative of GDPR compliance, we have created a simple yet comprehensive index using the weighted rating method to compute a compliance score for each company out of 10. We chose

four parameters integral to the data privacy statements of companies, which are as follows:

a. Data Collection transparency

b. Consent and Legal basis

c. Data security measures

d. Allegations of data breach against the company

Each parameter was assigned a weight (in percentage terms) and then multiplied with the rating graded on a scale of 1 to 10, to yield the GDPR compliance index score for each firm.

Selling and Marketing Expenses have been obtained from the financial statements of each company from 2018 to 2022.

ii. Control Variables: To enhance result accuracy we used a control variable : 'Unemployment'. Unemployment data has been obtained from the government records of the countries to which the chosen three companies belong.

In order to obtain definite results, we have opted for a simple model with 3 explanatory variables due to a small time period of 5 years from 2018-2022.

Adidas

This segment aims to capture the explanatory power of the GDPR compliance index on Consumer Demand (measured by Sales Revenue) of Adidas (Germany) using multiple linear regression.

Table 2: Summary Statistics for Adidas (representative textile, apparel company)

	GDPR compliance index (on a scale of 10)	Consumer Demand (Measured by Sales Revenue) (in Million Euros)	Sales and Marketing Expenses (in Million Euros)	Unemployment (in %)
mean	7.36	21547	7631.4	3.3878
std	0.78613	1951.14595	561.027	0.34521
min	6.5	18435	6974	2.989
25%	6.8	21234	7329	3.14
50%	7.3	21915	7451	3.38
75%	7.7	22511	8039	3.57
max	8.5	23640	8364	3.86

The multiple linear regression model is specified with 'Consumer Demand' as the dependent variable and 'Selling and Marketing Expenses,' 'Unemployment,' and 'GDPR compliance index' as independent variables. The model is fitted using the Ordinary Least Squares (OLS) method, results of which are shown in Table 3.

Table 3: OLS Regression Analysis Results: Adidas

Variable	Coefficient	Remarks
Selling and Marketing Expenses	-1.8856 [0.844] {-0.251}	Not significant
Unemployment	-8359.0411 [0.604] {-0.717}	Not significant
GDPR compliance index	-483.2171 [0.746] {-0.422}	Not significant

Note: Value within square bracket depicts p-value
Value within curly bracket depicts t-value

While coefficients indicate negative associations, none are statistically significant (p-values > 0.05). The model's overall fit, assessed by the F-statistic, indicates moderate significance (p-value = 0.403).

The large condition number prompts consideration of multicollinearity. The regression model exhibits a high R-squared value (0.896), implying substantial explanatory power. The lack of statistical significance in individual coefficients and potential multicollinearity weakens our model.

In order to address the above-mentioned issues, we performed a Linear Regression on the variables 'Selling and Marketing Expenses', 'Unemployment'. Whereas a Polynomial Regression is run on the variable 'GDPR compliance index'. Table 4 depicts the results of the linear regression.

Table 4: Linear Regression Results: Adidas

Variable	Coefficient	Remarks
Selling and Marketing Expenses	-4.1282 [0.418] {-1.012}	Not statistically significant
Unemployment	-1.17E+04 [0.0221] {-1.759}	Mild statistical significance

Note: Value within square bracket depicts p-value
Value within curly bracket depicts t-value

The linear regression model examines the relationship between consumer demand and two independent variables: selling and marketing expenses (x1) and

unemployment (x2). The results indicate that the model's R-squared value is 0.878, suggesting that approximately 87.8% of the variability in consumer demand can be explained by the chosen predictors. The adjusted R-squared value accounts for potential overfitting and is 0.756. The F-statistic tests the overall significance of the model, yielding a p-value of 0.122, suggesting no statistical significance at a conventional significance level (i.e., 0.05). The coefficients for the selling and marketing expenses, and unemployment are presented with their associated t-values, and p-values. Notably, the p-values for the individual coefficients indicate that selling and marketing expenses are not statistically significant whereas unemployment is mildly significant.

The polynomial regression model (results which are depicted in table 5) explores the relationship between consumer demand and the GDPR compliance index, incorporating quadratic terms.

Table 5: Polynomial Regression Results: Adidas

Variable	Coefficient	Remarks
GDPR compliance index (Linear term)	-3.78E+04 [0.395] {-1.075}	Not statistically significant
GDPR compliance squared (Quadratic term)	2.51E+03 [0.396] {1.072}	Mild statistical significance

Note: Value within square bracket depicts p-value
Value within curly bracket depicts t-value

The Polynomial Regression Results show that the GDPR compliance index (linear term), and GDPR compliance index squared (quadratic term) have associated coefficients. The coefficients provide insights into the estimated impact of GDPR compliance on consumer demand. However, the adjusted R-squared value for the polynomial regression is 0.367, suggesting that the model's explanatory power is limited, with only approximately 36.7% of the variability in consumer demand captured by the GDPR compliance index.

BMW

We now investigate the relationship between the Consumer Demand (measured by Sales Revenue) of BMW (Germany) and key independent variables—GDPR Compliance Index, Selling and Marketing Expenses, and Unemployment—utilizing Ordinary Least Squares (OLS) regression.

Table 6: Summary Statistics: BMW (Representative automobile company)

	GDPR compliance index (on a scale of 10)	Consumer Demand (Measured by Sales Revenue) (in Million Euros)	Sales and Marketing Expenses (in Million Euros)	Unemployment (in %)
mean	7.63	110780.8	8158.4	3.39
std	0.68	18637.56	589.45	0.35
min	6.75	96855	7503	2.99
25%	7.4	98990	7870	3.14
50%	7.5	104210	8067	3.38
75%	7.9	111239	8268	3.57
max	8.6	142610	9084	3.86

Table 7: OLS Regression Analysis Results: BMW

Variable	Coefficient	Remarks
Selling and Marketing Expenses	36.402 [0.224] {2.729}	Not statistically significant
Unemployment	6616.6749 [0.823] {-0.285}	Not statistically significant
GDPR compliance index	5.16E+05 [0.247] {2.449}	Not statistically significant

Note: Value within square bracket depicts p-value
Value within curly bracket depicts t-value

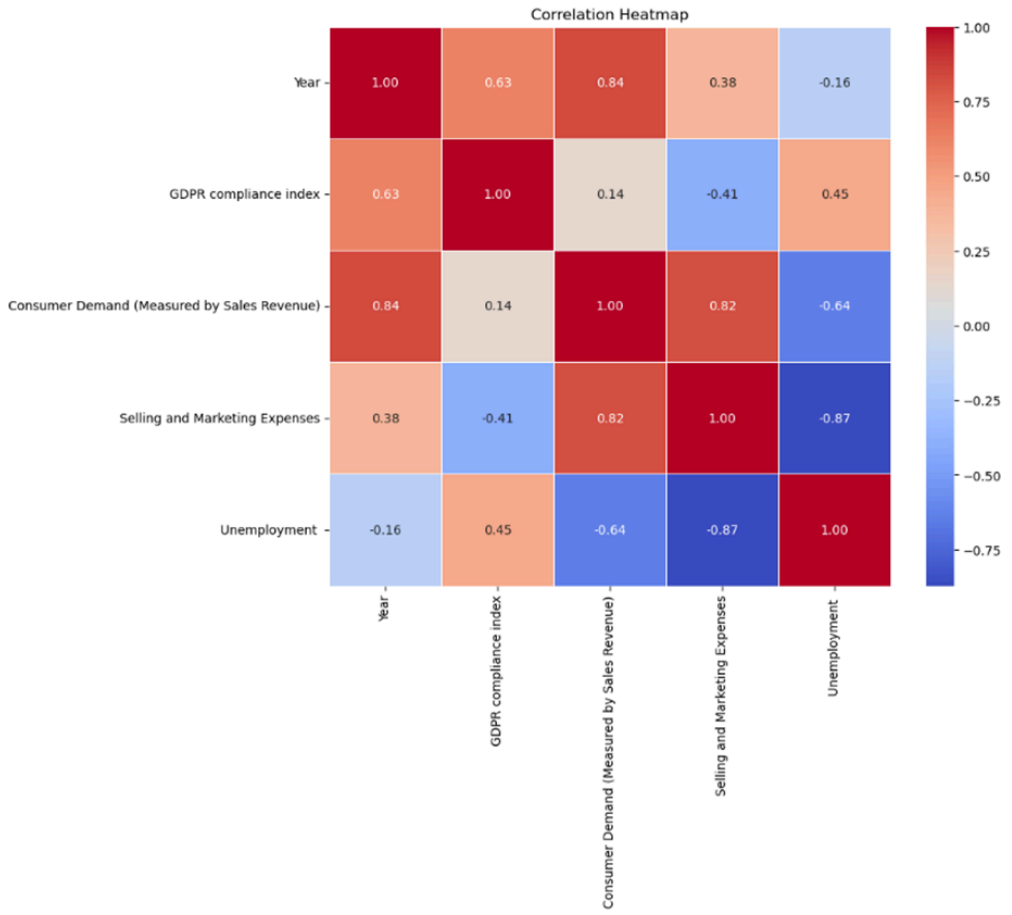
The OLS Regression Analysis Results Table is shown above. GDPR Compliance Index exhibits a positive impact, although statistically insignificant (p-value: 0.247). Selling and Marketing Expenses show a positive impact, with no statistical significance (p-value: 0.224). Unemployment's negative impact lacks statistical significance (p-value: 0.823).

A condition number of 8.28e+05 raises concerns about potential multicollinearity. Multicollinearity is evaluated using the Variance Inflation Factor (VIF), in table 8 and a correlation heatmap.

Table 8: Multicollinearity Analysis: BMW

Variable	VIF
Selling and Market Expenses	68.405447
Unemployment	123.246606
GDPR compliance index	189.479597

Table 9: Correlation Heatmap for BMW



We employ a Lasso regression to address the issue of multicollinearity in our model. Our final results are as follows:

Table 10: Lasso Regression Results

Variable	Coefficient
Selling and Market Expenses	19054.69883
Unemployment	1868.279525
GDPR compliance index	9163.151317

The GDPR compliance index exhibits a strong positive impact on consumer demand, with a one-unit increase associated with approximately 9163 units higher demand. Selling and marketing expenses show a substantial positive association, indicating that a one-unit rise corresponds to a notable increase of around 19055 units in consumer demand. Surprisingly, higher unemployment is unexpectedly linked to increased consumer demand, with a one-unit rise associated with approximately 1868 units higher demand.

Accenture

Table 11: Summary Statistics: Accenture (Representative I.T. services)

	GDPR compliance index (on a scale of 10)	Consumer Demand (Measured by Sales Revenue) (in Million Euros)	Sales and Marketing Expenses (in Million Euros)	Unemployment (in %)
mean	8.15	48132.44	4933.34	5.37
std	0.53	8316.06	771.39	0.72
min	7.7	40992.5	4196.2	4.36
25%	7.8	43215	4448	4.95
50%	7.95	44327	4625.9	5.62
75%	8.3	50533.4	5288.2	5.74
max	9	61594.3	6108.4	6.19

This section employs advanced regression models to investigate the influence of Selling and Marketing Expenses, Unemployment, and the GDPR compliance index on Consumer Demand (Measured by Sales Revenue) for the services of Accenture (Ireland). Two distinct models, Ordinary Least Squares (OLS) Regression and Huber Regression, were applied to uncover insights into the relationships within the dataset.

Table 12: Ordinary Least Squares (OLS) Regression Results table:

Variable	Coefficient	Remarks
Selling and Marketing Expenses	10.225 [0.073] {1.174}}	Statistically significant
Unemployment	-1305.39 [0.496] {{1290.77}}	Not statistically significant
GDPR compliance index	-1.62E+02 [0.958] {{2453.13}}	Not statistically significant

Note: Value within square bracket depicts p-value
Value within curly bracket depicts t-value

The OLS model demonstrated exceptional explanatory power (R-squared: 0.996), indicating the robust influence of the considered variables. Notably, Selling and Marketing Expenses emerged as a significant positive contributor to Consumer Demand, while Unemployment exhibited a negative association. The GDPR compliance index, however, did not reach statistical significance, suggesting a limited role in explaining changes in Consumer Demand within the context of Accenture's analysis.

The identified issues included potential multicollinearity (large condition number) and presence of outliers. Employing a Lasso regression to mitigate the effects of multicollinearity in the model, would have severely compromised the interpretability of the GDPR compliance index coefficient. Hence, we have to account for the potential impact of multicollinearity in our final results.

The Huber Regression model was chosen for its robustness to outliers, making it particularly suitable for datasets where influential data points may exist. Unlike Ordinary Least Squares (OLS), Huber Regression incorporates a hybrid loss function that is less sensitive to extreme values, striking a balance between the resilience of robust regression methods and the efficiency of OLS in the absence of outliers. This choice was motivated by the desire to ensure the reliability of the analysis in the presence of potential influential data points, enhancing the model's stability and providing more accurate parameter estimates.

Table 13: Huber Regression Results: Accenture

Variable	Coefficient
Intercept	-538.88
Linear Term for GDPR compliance index	-41.04
Quadratic Term for GDPR compliance index	-3.21
Selling and Marketing Expenses	10.62
Log-transformed Unemployment	-2179.74

The Box-Cox transformation has been applied to the 'GDPR compliance index' variable to stabilize the variance of the variable across different levels and improve the linearity of its relationship with consumer demand. The unemployment variable has been converted to a logarithmic scale to address linearity concerns. We then combined the transformed variables with other independent variables to fit the Huber Regression model.

The negative coefficient for the quadratic term in GDPR Compliance Index (-3.21) suggests a diminishing effect on the response variable as GDPR Compliance increases, while the log-transformed Unemployment variable (-2179.74) indicates a negative impact on the response variable. Selling and Marketing Expenses, with a positive coefficient of 10.62, exhibits a positive association with the response variable.

***Note: In the methodology section of this paper, the Python software was deployed to analyse the implications of our research.*

Results

According to the final regression results obtained for Adidas, only Unemployment exhibits mild statistical significance in explaining variation in Consumer Demand. all The remaining variables appear statistically insignificant. In the case of BMW, the Lasso regression results suggest that GDPR compliance index and Selling and Marketing Expenses appear to exhibit higher explanatory power in addressing the change in consumer demand. In the final case of Accenture, Log-transformed Unemployment and the linear term for the GDPR compliance index explain most of the variation in consumer demand.

Selling and Marketing expenses are negatively related to consumer demand only in the case of Adidas whereas consumer demand increases positively with Selling and Marketing expenses for BMW and Accenture. Unemployment

depicts a surprisingly positive relation with consumer demand in the case of BMW, whereas it exhibits the usual negative relationship in case of the other two companies.

Although this suggests that GDPR compliance index does impact consumer demand to a certain degree, the fact that they are statistically not significant dampens our inference. Furthermore, GDPR compliance index was negatively correlated to consumer demand in case of Adidas (only the linear term for GDPR compliance index) and Accenture, whereas, there is literature that suggests the opposite (Fox, et al., 2022, Gong, et al., 2019). Thus, this result strongly contradicts our findings from primary research which clearly evidenced that adherence to data privacy and protection laws, positively enhanced consumer demand.

Further research over the years is imperative in order to arrive at a more definitive conclusion. Given that the GDPR law is a relatively recent phenomenon, this study was restricted to data from the last few years, 2018 to 2022. This smaller time frame might have contributed to the contradictory nature of our findings from the primary and secondary data analysed. We believe that this contradiction is likely to gradually disappear over the coming years, once consumers become more 'data-aware' and realise the extent of power companies can wield over their data privacy. They will then come to value companies that take necessary steps to protect customer data. It will then

not be too far-fetched to suggest that this enhanced perception of consumers towards such companies is likely to translate into increased consumer demand.

Limitations

Due to feasibility constraints, the majority of the respondents of our primary survey were residents of India. Furthermore, due to the novelty of the selected area of research, there was insufficient data availability, limited to five years, 2018 to 2022. In addition to this, the GDPR compliance index was constructed with a simple calculation which may not account for the latent complexities involved while analysing the extent of consumer data sensitivity of companies. While the statistical models employed throughout this analysis offer valuable insights, it is imperative to acknowledge their shortcomings. For instance, the models assume linear and polynomial relationships, which may not fully capture the complexity of real-world dynamics. Furthermore, other observed/unobserved factors may influence consumer demand that haven't been included in this study. The relatively small sample size (five observations) may affect the robustness of the findings as well. Lastly, this paper was also subject to time constraints, which may restrict the depth of analysis undertaken. Despite these limitations, this research lays the groundwork for further investigations into the multifaceted relationship between data regulatory compliance and consumer behaviour.

Conclusion

This study first employed a primary survey, to generically analyse the impact of ‘compliance with data privacy and protection laws’ on ‘consumer demand’ in a predominantly Indian context, with a sample size of 75. It then proceeds to take the rather specific case of a European data protection law, The General Data Protection and Regulation, (GDPR) and examines its impact on consumer demand in Europe. The sample covers data from the years 2018 to 2022.

The results of the primary survey exhibited a highly positive correlation between data privacy and protection laws, and consumer demand suggesting that companies should take immediate action to ensure active compliance with these laws, so as to improve their business via increased consumer demand.

The secondary research, however, displayed contradictory findings: GDPR compliance was insignificant in explaining consumer demand and it was negatively correlated to the same variable in two out of the three companies considered. This seems to suggest that it is difficult to draw any conclusive relationship between the extent of GDPR compliance of companies and their impact on consumer demand.

The paper seeks to reconcile the two contradictions with the following assertion regarding GDPR compliance and consumer demand: Given that consumers seem to be realising the necessity of data protection very slowly, it

may well be the case, that company efforts to be more data sensitive will yield positive results, in the form of enhanced customer demand, once consumer awareness regarding their data rights becomes more widespread.

Lastly, our findings suggest that governments and firms should certainly take requisite measures to boost consumer awareness regarding their data rights, while emphasising upon the need to have secure systems in place, to protect various kinds of customer data. The expected increase in consumer demand due to greater awareness, will incentivise companies to enact stringent data protection measures, to capitalise upon this hike in demand, and this will in turn ensure that consumers are safe, creating a mutually beneficial situation for both.

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Neoliberalism and the Indian Public Health Sector

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Introduction

Neoliberalism, a term popularized by the writings of Fredrich Hayek and Ludwig Von Mises, emerged through their influential works in the mid-20th century. Hayek's *The Road to Serfdom* and Mises' *Bureaucracy* laid the foundation for this ideology. Their ideas culminated in the establishment of the *Mont Pelerin Society* (1947), comprising millionaires and public figures who shared Hayes and Mises' *convictions* and perceived neoliberalism as an opportunity to free themselves from regulation and taxes. The philosophy gained traction in the mainstream through favourable political developments and lobbying by powerful industrialists. Today, it is closely associated with Economic Liberalism and Free-Market Capitalism. The philosophy advocates for free trade, deregulation, privatization and reduced governmental control, sharply contrasting with the Keynesian Economic Consensus or the Postwar Consensus which favoured nationalization.

India embraced neoliberalism via a slew of economic reforms aimed at enhancing productivity. Popular economist Jagdish N. Bhagwati of the *Sen v. Bhagwati* debate championed neoliberal policies in India, presenting neoliberalism as the primary tool to reduce poverty and increase growth and development in the country. The current

government's "minimum government and maximum governance" schemes and *Jan Dhan* initiatives are extensions of the neoliberal reforms introduced in the 1990s. The reforms initially had a very positive impact on the economy, with a UNDP report showing a nearly 50% reduction in multidimensional poverty. With liberalized policies, India lifted close to 271 million individuals from poverty in a short span (2000-2010).

Despite Dr. Bhagwati's favourable views and the government's increasingly liberalized economic agenda, the adoption of neoliberal policies has exacerbated inequality in India. According to a 2020 report by Oxfam, the richest 10% in India own more than 74.3% of the national wealth, whereas the bottom 90% own a meagre 25.7%. A 2005 survey conducted by *Bardhan* revealed that over 75% of those who had an opinion on neoliberalism called it an exploitative policy which primarily benefits the rich. David Harvey in *A Brief History of Neoliberalism* defined the concept as a restoration of class divide and the veiled reinforcement of class power. The core issue with Neoliberal policies is that they only consider prima facie ideas of growth, neglecting more essential aspects that require governmental support and regulation. They prioritize the economic stability of the already prosperous over the concerns of the marginalized. The rich attribute their success to merit and hard work, overlooking the role of unequal education and limited social mobility within the neoliberal structure. This divisive growth's impact is seen in essential social sectors like public health care. Many scholars, particularly in public health, argue that neoliberal capitalist economic forces worsen economic inequalities, ultimately endangering public health. Accordingly, the public healthcare sector of India provides extensive scope for analysis; however, before studying the impact of Neoliberal policies on Indian healthcare, it is essential to trace the growth of the said sector in the country through different phases of its economy.

Part I of the paper introduces neoliberalism and covers its contemporary existence in India. Part II traces the healthcare sector of pre-liberalization reforms in India. Part III analyses the shift towards market-oriented policies and compares government policies with the efficacies of a growing economy. Part IV covers the most recent National Health Policy in light of the prevailing discussion and provides certain recommendations for reform with respect to the research avenues. The final part summarizes and concludes the discussion.

Tracing healthcare- the post-independence and pre-liberalization phase

Healthcare is a critical aspect of a nation's economic and political agenda, and India has historically prioritized healthcare as a major policy issue. The country's commitment to healthcare dates back to the pre-independence era when The Health Survey and Development Committee, chaired by Sir Joseph Bhore, was established in 1943. In 1946, it submitted its first report and outlined certain short-term measures like health centres, supervised PHCs, and a long-term program known as the three million plan. The core recommendation of the committee was that universal access to basic healthcare must be provided regardless of their socio-economic status. Post-independence, India carried the same approach and established multiple committees like the Mudaliar Committee (1962) and the Srivastava Committee (1975) to formulate a more inclusive and stable healthcare sector. The establishment of the Indian Council of Social Science Research reflected a more state-interventionist approach to healthcare, treating it as a public good. Government involvement aimed to address the non-excludability principle, ensuring that medical benefits reached everyone and curbed inequality by discouraging rival consumption. A free-market approach was discouraged because it could result in uncontrolled healthcare prices

escalation, sustaining disparities in access and quality. The shift towards neoliberal policies and de-regulation has, unfortunately, contributed to increasing healthcare sector inequality.

Nevertheless, India originally established a three-tier integrated healthcare system with primary, secondary and tertiary-level distributions. This development mirrored the approaches adopted by most third-world countries grappling with wide scale diseases like malaria and diarrhoea, necessitating a reformed healthcare system.

In India's early healthcare deliberations, a pivotal debate centred on choosing between preventive and curative systems. The West favoured the curative approach, heavily investing in medical technology to cure diseases while downplaying prevention. The adoption of the curative format was hindered by multiple problems for India, however. Most diseases prevalent in developing countries, such as malaria, could easily be controlled by preventive practices. Developing nations opposed the Western model on five primary fronts as recorded in the World Health Organization's 1978 Kazakhstan summit. They argued that the Western approach neglected the social medicine aspect, the disease prevalence patterns in countries like India didn't align with those of Western nations, the model was financially burdensome and developing countries lacked adequate trained specialists for technical curative care, unlike the West.

Accordingly, India and other developing countries embraced the *Health for All* program, prioritizing state intervention for equitable and universal healthcare. India became a signatory to the *Health for All* vision in 1978 and based its first National Health Policy (1983) on essential HFL ideas. In the early post-independence years, India pursued

primary healthcare initiatives, striving for inclusive and state-supported health services.

The first National Health Plan (1983) marked significant progress in the public health sector. The government's goal was to provide healthcare for all by the early 21st century, leading to increased budgetary allocations relative to the Gross Domestic Product for this sector. The National Health Policy's core focus was ensuring healthcare access to all, leading to the establishment of a three-tier healthcare system. The three-tier system comprised of multiple healthcare institutions with three primary divisions:

a. Health Sub Centres: These served as the first point of contact between the citizens and the healthcare system, operating at the grassroots level to provide basic healthcare services. Their responsibilities included disseminating medical knowledge to combat communicable diseases and offering basic care to the rural population.
b. Primary Health Centres: The next tier in the structure, PHCs acted as the first point of contact between villages and medical officers. They provided curative facilities and covered a larger population than sub-centres. PHCs also offered specialized programs such as anti-epidemic programs, Pregnancy-related care and Infant Immunizations.
c. Community Health Centres: The biggest tier in the healthcare system, CHCs typically housed four healthcare professionals, including gynaecologists, paediatricians, surgeons and physicians, who were present at all times. These centres were initially designed to serve around 1,20,000 citizens in plains areas and over 80,000 citizens in hilly/mountainous regions.

The first national Health Policy showed increased government commitment to healthcare, but insufficient budgetary allocations hampered its impact. Public healthcare investment declined in the late 1980s, leading to a healthcare sector decline preceding the liberalization era.

Liberalization and privatized healthcare

India's liberalization phase in the 1990s aimed to open up the economy and create a service-oriented structure. A key aspect was the adoption of Structural Adjustment Programs (hereafter - SAPs) endorsed by the International Monetary Fund and World Bank. These programs provided loans contingent on implementing their recommendations to adjust the country's balance of payments, improve the economic structure and increase international competitiveness. The World Bank's policies influenced India's liberalized healthcare system, prompting the government to cut expenditures and restructure the entire framework. The primary goal of the SAPs was to decrease government expenditure and increase the stagnant Gross Domestic Product. This meant that government expenditure in healthcare was to be significantly curtailed. Dr. Hooda noted that after India's adoption of SAPs, health expenditure growth stalled, impacting even middle- and high-income states like Kerala, Karnataka and Gujarat.

In 1993, the World Bank released a report advocating for greater privatization to address perceived inefficiencies in government healthcare programs. The Bank outlined the growth in the public health sector and recorded the increase in mortality rates and life expectancy since the 1950s as reasons for reducing the government's role in healthcare. Dr. Milton Fisk criticized the World Bank for not recognizing health as a

public good and promulgating the idea that health should be a matter of individual choice, thereby encouraging private sector involvement. The World Bank argued that once a nation reaches a certain level of development, the government should step back from its primary roles and allow private organizations to play a larger role in the economic structure, this reasoning based on the assumption that as a country develops, its citizens acquire the means to afford healthcare, eliminating the need to view the health sector and its components as public goods.

Following the World Bank recommendations, the Indian government incorporated policies in its five-year plans and related Orders, that curtailed health expenditure. The 8th five-year plan (1992 – 1997) introduced the concept of *user fees* as part of its goal to inculcate sustained economic growth in a just, stable and equitable environment. Many states adopted the *user fees* principle i.e., a base charge for governmental health facilities in their health centres and hospitals. Although the fee was exempted for the economically weaker sections, the definition of "economically weak" was arbitrary, leading to limited relief for the most marginalized members of society. These measures, combined with the World Bank's suggestions, significantly reduced government expenditure in the healthcare sector, straying from the original goal of *Health for All*. The public sector's inability to provide healthcare services increased the demand for privatized care, eroding the government's role in the healthcare sector, and creating an inequitable framework where socio-economic capital became mandatory for guaranteed healthcare. The Indian government also permitted private players to enter the Health Insurance sector in 1999 to expand the healthcare market. Initially only the Central Government Health Schemes and State Government Health Schemes existed as insurance mechanisms. This further increased the privatization of healthcare as private

insurance providers began covering hospital visits and medical care. The Indian government also liberalized the pharmaceuticals markets, introducing the Drug Price Control Order of 1994. As per the DPCO, only a few (74/500) of the commonly used bulk drugs were to be kept under statutory price control. In the 2000s, further liberalization in the drug market reduced governmental control and gave way to private influence. These policies aligned with the World Bank and IMF recommendations, diminishing governmental control and promoting privatization of the healthcare sector.

The 21st century outlook: the neoliberal stronghold and ineffective implementation

The 90s set the route for privatized healthcare and the 2000s took the trend to its logical high. The beginning of the 21st century saw two important developments. Firstly, the much-awaited yet failed introduction of the National Health Policy, 2002 (hereafter – NHP). Secondly, the use of neoliberal ideas to create a private sector stronghold in the health market.

India announced its second National Health Policy in 2002. The policy was promoted as a revolutionary development for the Indian health sector; however, the *Bharatiya Janata Party* led government didn't incorporate the most essential ideas in the policy and failed to deliver on the ideas that they did promise. The 2002 policy was a significant departure from the 1983 agenda which promised *Health for all* through a universal provision of healthcare. The new policy's ignorance of the most fundamental ideas of equal healthcare provided a framework to dismantle the primary healthcare system systematically. The policy was essentially a critique of India's healthcare system and failed to give any effective guidelines to reform the sector. It did accept that a majority of the goals of the previous health policy had not been achieved and that there

was extensive inequality with respect to access to health in the urban and rural regions. It submitted that the spread of communicable diseases has been reduced significantly and mortality rates have decreased; however, equitable access to healthcare still remains a primary concern. Moreover, the burden of disease has been disproportionately shared by the poor, while the gap between the rich and the poor, and the urban and the rural has expanded exponentially. The report explained that aspects such as income disparities, rural-urban differences, inexperienced and insufficient number of medical professionals were the major causes behind the declining performance of the health care sector.

However, even though the government identified these drawbacks, it did very little to improve the status of the sector and further reduced public funding. The promotion of privatized healthcare was justified via the use of Neoliberal agendas of development and again through the World Bank's assertions. The Bank published a report specifically analysing the Indian healthcare sector and encouraged privatized care as the solution for the sector's stagnation. The report mentioned that India's ability to control communicable diseases, mortality rates, malnutrition etc., has been stretched as far as possible and the country will no longer be able to afford the *health for all* and similar initiatives. As per the World Bank, the Indian government would be unable to sustain its trends in the 21st century and it suggested that the healthcare sector should be privatized, allowing for better services for all regions in the country. The World Bank's report and similar assertions were the primary reasons behind the 2002 NHP's move towards an even more market-oriented set-up.

Herein, the ever-long argument made by most neoliberals, was adopted by the World Bank as well as the Indian government. The Bank suggested that since the public

system has largely been inefficient in meeting the population's healthcare needs, it would not be harmful to marketize the healthcare sector. This phase and the acceptance of this particular viewpoint by the government is what opened up the crisis sphere for Indian healthcare. It promulgated a chain of disinvestments followed by an increase in privatization. However, the perspective ignored by both the 2002 NHP and the World Bank was whether the public health system's efficacy was in question or if it merely needed more support. Should the Indian government prioritize the bolstering of the public health system and address its weaknesses or adopt an entirely different system where private players dominate?

A working paper published by the *Institute of Studies in Industrial Development* astutely dealt with this issue and analysed whether the move towards privatization was the only option or whether the government pushed for equal public health. The review conducted by the institute revealed that there had been a traceable growth in the public healthcare facilities of the country; however, the increase was nowhere near the required numbers. Moreover, the healthcare centres did not have the required facilities to treat their patients effectively. The centres lacked doctors, medicines, infrastructure and every other basic element that is necessary to create an effective medical health centre. This happened simply because capital expenditure—which is essential for physical infrastructure and to purchase new medical equipment—on health has seen a declining trend both at the centre and the state levels. As per the report, the declining share of capital expenditure; however, will not be problematic if state(s) fulfil the prescribed norms of basic health facilities. However, most Indian states struggled to meet the stipulated healthcare standards. The diminishing allocation of capital funds further constrained the growth of recurring (revenue) expenditures. Consequently, the

total public expenditure on health saw a discernible decline. In terms of its share in GDP, the institute revealed that public expenditure on health hovered around only 1 per cent of the GDP; falling significantly short of the required 2-3 percent of GDP necessary to ensure provision of essential health services. Lack of investment in the public healthcare sector hindered the expansion and modernization of healthcare services.

Instead of increasing investment in the public healthcare sector, however, the government chose to disinvest and hand over the rails to the private sector. The government increased the Healthcare FDI limit to 100% in the 2000s and allowed direct entry to foreign players. It also decreased the import duty for medical equipment and technology and allowed low-interest rate loans for private players in 2003 and onwards. The government became a facilitator for private organizations in an industry which deals with the lives of the country's citizens and dropped the *health for all* targets. This opened the door for private organizations which have profit as their central motive instead of providing healthcare. The National Health Policy, 2017 was meant to address these issues as well as change the healthcare sector and reduce inequalities. The policy has introduced certain significant changes; however, it still has much scope for improvement.

The 2017 policy and a need for change

The Indian government, after adhering to the 2002 policy for 15 years, introduced a new policy in 2017. This policy aimed to account for the changing healthcare landscape and incorporated terms like "fiscal capacity" and "catastrophic expenditure", reflecting a shift towards equal healthcare. However, the policy, which took more than two years to finally see the light of day since its introduction in 2014, reflects a conflict between

the equal health agenda and neoliberalism. The policy was meant to be a departure from the 2002 agenda, as articulated by Prime Minister Narendra Modi. He envisioned that the policy would provide healthcare in an “assured manner” to all and will address challenges arising from the ever-changing socio-economic, technological and epidemiological scenarios. Accordingly, the NHP incorporated the viewpoints of three major stakeholders- the health ministry, the Niti Aayog and the public via civil society associations.

However, the final outcome reflects a struggle between public health motives and neoliberal practices. Two core tensions have emerged:

a. The objective of achieving public health goals contradicts neoliberal aspects such as “Reduced governmental control” and “Fiscal Conservatism.”
b. The goal of universal health coverage relies on public health objectives but via minimal governmental control and a largely profit-driven private sector.

These contradictions led to compromises between the various stakeholders. The civil associations were promised improved healthcare access; the public health officials were guaranteed increased resources, and the private players were allocated provisions such as strategic purchasing and a largely unregulated medical sphere. Nevertheless, the dichotomies between the public health agenda and a privatized medical sector persisted, and the same can be analysed in a segregated format. The following analysis portrays three divisive segments where the scope of public health goals under the 2017 National Health Policy as well as beyond it, is scrutinized.

A Stronger Public Health System and the (lack of) Essentials

Three years after the policy's introduction, the healthcare sector has seen little change. The policy largely reiterates previous agendas, including subsidized healthcare, increased utilization of public facilities, free medical health support and increasing the health sector expenditure to 2.5% of the budget by 2025. Despite the increased post-COVID healthcare budget allocations, little tangible implementation has occurred. This reveals a neoliberal divide between policy promises and actual implementation. For instance, the government has set an ambitious goal to increase the utilization of public health facilities by 50% by 2025; however, it would require a concrete and decisive plan to even come near those particular figures. To achieve this, a realistic time-bound strategy is essential, focusing on substantial expansion of public health facilities – including personnel, infrastructure, and equipment, with the goal of prioritizing public provisioning in healthcare over the next decade. Such proposals will need to be formulated with population growth in mind, as well as addressing existing gaps while also assessing the financial consequences of each action item.

Strengthening Rights and Increasing Public Participation

Transitioning to a more public-oriented healthcare structure must prioritize public needs over profit-oriented tactics which create inequality. This necessitates a fundamental shift in parliament's notions to empower the public systematically. The substitution of the National Health Rights Act commitment with the ambiguous 'incremental assurance-based approach,' in the NHP 2017 is a huge setback for the medical sector's growth. While increasing ground-level public spending is vital, the

neoliberal agenda cannot be dropped unless the right to healthcare is adopted by the government first. Reforms should focus on institutional changes that reduce inequality and extend beyond budgetary allocations and NHP targets. Strengthening communal accountability, institutionalizing patient rights in clinical establishments and creating medical tribunals to address patient complaints are a few steps in the right direction. Moreover, incorporating global accountability norms and independent monitoring systems will foster health and an egalitarian social sphere. An effectual change in the policies of the government cannot be introduced unless a change in the idea of rights for medical health is institutionalized first.

Conclusion

The healthcare sector of India has gone through certain significant developments ever since Independence. The initial goal was to provide healthcare to all citizens regardless of their socio-economic status. However, the equalitarian agenda was sidetracked post-liberalization and even a few years before it while the sector was increasingly privatized. The various neoliberal policies of the government decreased public control and increased the role of private players, thereby sidelining the *health for all* agenda. The brunt of the less regulated sector was faced by the disabled, who lacked representation as well as support. The government abandoned the egalitarian approach and allowed profit-making entities to seep into the healthcare sector, weakening its core effaces. Moreover, the neoliberal change, over the years, has only increased inequality and hasn't allowed any structural growth for the sector. In order for the government to make a dramatic change, it will have to incorporate some essential features like increased control over private entities beyond the registration stage,

adopt a public rights approach to healthcare and incorporate global norms to increase accountability. The status of the healthcare sector will have to be completely revamped, otherwise the inequalities in the social sphere will continue to increase and access to healthcare would become even more dependent one one's socio-economic status.

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INDIAN DIGITAL PAYMENTS: AN EMPIRICAL EXPLORATION

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Abstract

In the contemporary landscape of digital transactions in India, various methods, such as mobile wallets, Unified Payments Interface (UPI), and digital banking platforms, have gained widespread adoption. While these avenues offer unprecedented financial inclusion, operational efficiency, speed, and user convenience, their proliferation has been accompanied by notable challenges. This research explores the multifaceted aspects of these digital transaction mechanisms, shedding light on their benefits and shortcomings. A critical analysis reveals inherent issues, including concerns related to privacy, security vulnerabilities, and the potential for fraudulent activities. Information security emerges as a pivotal focal point, encompassing data breaches, identity theft, and cyber threats that pose significant risks to users and the financial ecosystem. The study paves the way for nuanced recommendations and solutions to fortify the security infrastructure. The ultimate goal is to contribute to the ongoing discourse on shaping a safer, more efficient, and universally accessible digital transaction landscape in India.

Keywords: Digital transactions, financial inclusion, information security, security vulnerabilities

1 Introduction

The policy of demonetization in India had a profound impact on the nation's economy, driving the substantial growth of digital payments. Preceding demonetization, digital transactions constituted around 10% of the total, a figure that has more than doubled to over 20% in the years following the policy. This surge is attributed to various factors, including government initiatives like Digital India, Make in India, and Startup India, fostering a conducive environment for the development of startups and digitization across diverse sectors.

The surge in internet and smartphone usage has been instrumental in expanding the digital ecosystem. Government encouragement and increased internet and smartphone penetration have accelerated the adoption of digital technologies. Projections from the Internet and Mobile Association of India anticipate that the number of Internet users in the country will reach 800 million by 2023, contributing to a substantial increase in mobile wallet users, projected to reach 900 million by 2025.

In the 2017-18 Union Budget, the Indian government aimed to achieve 2,500 crore digital transactions, emphasizing the use of UPI, USSD, Aadhar Pay, IMPS, and debit cards. This initiative sought to propel the adoption of digital payments and reduce reliance on cash transactions, aligning with the government's broader digitization agenda. However, this surge in digitization has also brought about challenges, notably a rise in cyber fraud and data security breaches. As the country embraces digital

payments, addressing these cybersecurity concerns has become imperative. This study aims to delve into the benefits and potential vulnerabilities posed by current online transaction media, exploring existing official guidelines, policies, and best practices while proposing practical solutions to enhance cybersecurity.

2 Literature review

2.1 Digital Payment Methods

The developments in technology have significantly impacted multiple spheres of life. The onset of digital payments has completely revolutionized banking in our country. Digital Payments were encouraged by the Government of India after the announcement of demonetization on 8th November 2016 the basic objective behind the initiative of Digital Payments was to achieve a cashless economy in the long run."[1] The government also launched the Digital India campaign to accelerate digitization. Some of the various methods of digital payments available in India currently are as follows:

1. Digital wallet payment system: this technique uses e-wallets to help facilitate transactions with only one limitation of transferring funds to the same service provider wallet. Mobile wallets in India are a fairly new mode of payment, it initially started in the last decade, when the Oxigen wallet was launched in 2004. Subsequently, other more popular wallets like PayTM were launched, currently, it has a subscriber base of almost 20 million users.

2. USSD code payments system: stands for Unstructured Supplementary Service Data where transactions take place through messages in the absence of an internet facility. It is a voice-era cellular technology with primitive security features in today's digital age.

3. Mobile Money Identifier: Usage of a seven-digit unique number issued by banks based on your phone numbers, mainly used for facilitating small interbank funds transfer.

4. UPI App-based payments platform: Unified Payments Interface (UPI) is a digital payment system through which a user can both send and receive money through a Virtual Payment Address (VPA)[2] that works on a real-time basis and facilitates transfers instantaneously and is in turn connected to all banking apps. This system effectively merges bank accounts into a simple mobile application, merging several features into one provisional system.

2.2 Financial Inclusivity

Digital finance plays a pivotal role in driving business innovations and reshaping the lives and economic landscape of individuals in emerging economies. By enhancing transparency and generating user information through digital payments, it lays the groundwork for novel financial services. Although awareness of digital finance services remains low, the government is actively implementing initiatives to educate rural Indian populations about the advantages of electronic transactions. Financial inclusion has evolved beyond being solely a social responsibility for banks; it is now seen as a lucrative business opportunity. Leveraging digital products, financial institutions are prioritizing the goal of expanding financial inclusion. To maximize the impact of these efforts, regulators and banks must collaborate seamlessly with local government agencies to conduct large-scale education campaigns for the masses.[3]

2.3 Cyber Security Concerns

Quality characteristics often play a crucial role in retaining customers to choose the

mobile wallet payment method for online transactions. Zhou[4]reported that “structural assurance and information quality are the main factors affecting initial trust, whereas information quality and system quality significantly affect perceived usefulness”. Shah et al.[5] depicted that in an online environment, a website design’s features significantly affect the website’s data protection, integrity, and confidentiality. Flavi´an and Guinal´ıu,[6]have written that “trust in the internet is particularly influenced by the security perceived by consumers regarding the handling of their private data”. According to the 2018 Thales data threat report, data breaches occur more often in India than the global average.[7] The following are some incidents and trends that reinforce our apprehensions. Some payment systems in India suffer from vulnerabilities because they were not prospectively designed based on the ’privacy by design’ principle.[8]

2.3.1 Data Breach

One of the most recurrent cyber security concerns is those of data breaches that often stem from bad data practices. Such poor practices often negatively impact multiple stakeholders ranging from consumers, markets, and even countries to unleash utter chaos. From a privacy perspective, bad practices include non consensual or excessive data collection, sharing, storage, and use; unchecked data brokerage; and failure to de-identify data.[9] Reality is filled with horror stories of such data breaches; the 2016 security breach of Hitachi’s system which officially compromised 2.9 million debit cards across various bank accounts. is just one of many such stories.

2.3.2 Identity Theft

In India, “cyber fraud” in digital payments rose by around 25 percent (to 16,468 cases) in

FY 2015–16.17 moreover, during March–December 2017, the number of such cases for credit card, debit card, atm, and net-banking transactions rose to 22,740.18.[10]

2.3.3 Existing Regulatory Frameworks

Finally, India needs a strong market regulator to shape the creation of a vibrant DFS sector focused on innovation and growth, and to protect the interests of consumers and the national economy.[11]

3 Data and Methodology

Executing a systematic review, we adhere to the literature review methodologies outlined in.[12] Our research methodology consists of five sequential steps, guided by established practices. Firstly, we clearly define the scope of the review to facilitate the convergence of search outcomes. Subsequently, we systematically search literature databases using carefully crafted search strings comprising relevant keywords. After the search phase, a meticulous screening process is employed to refine the selection of articles for a more focused review. Following the screening, the chosen research articles are visually represented to clarify the core review questions. Ultimately, we undertake a comprehensive analysis and discussion of the results.

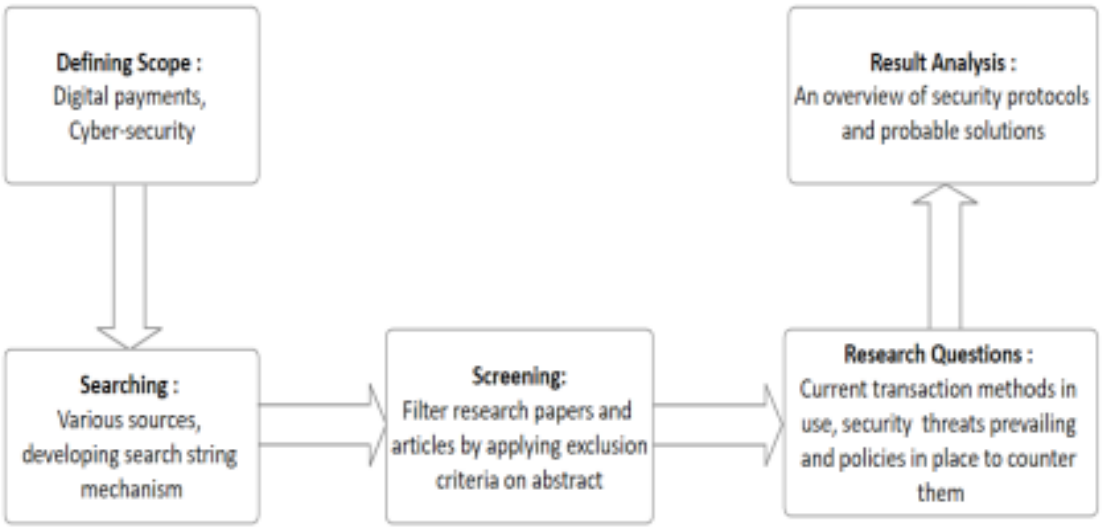

Figure 1: Research Methodology for systematic research methodology

3.1 Payment Methods in Use

3.1.1 Unified Payments Interface (UPI)

Unified Payments Interface (UPI) is a real-time payment system in India that facilitates seamless and instant fund transfers between different banks through mobile devices. UPI-enabled payments occur throughout the day and all 365 days a year. UPI allows users to transfer money between bank accounts using a UPI ID, which acts as an identifier for transactions. This eliminates the need to share sensitive bank account or IFSC code details. Users can link multiple bank accounts to a single UPI-enabled app and initiate transactions using a smartphone or feature phone. Payment can be done using a Virtual Payment Address (VPA). To use UPI services one must have a bank account and a mobile number registered with that bank account. It also caters to the "Peer to Peer" (P2P) collection request which can be scheduled and paid as per requirement and convenience.[13] UPI has gained huge popularity among the masses for its user-friendly and safe interface and its adoption rates are growing as shown in Fig.

2.

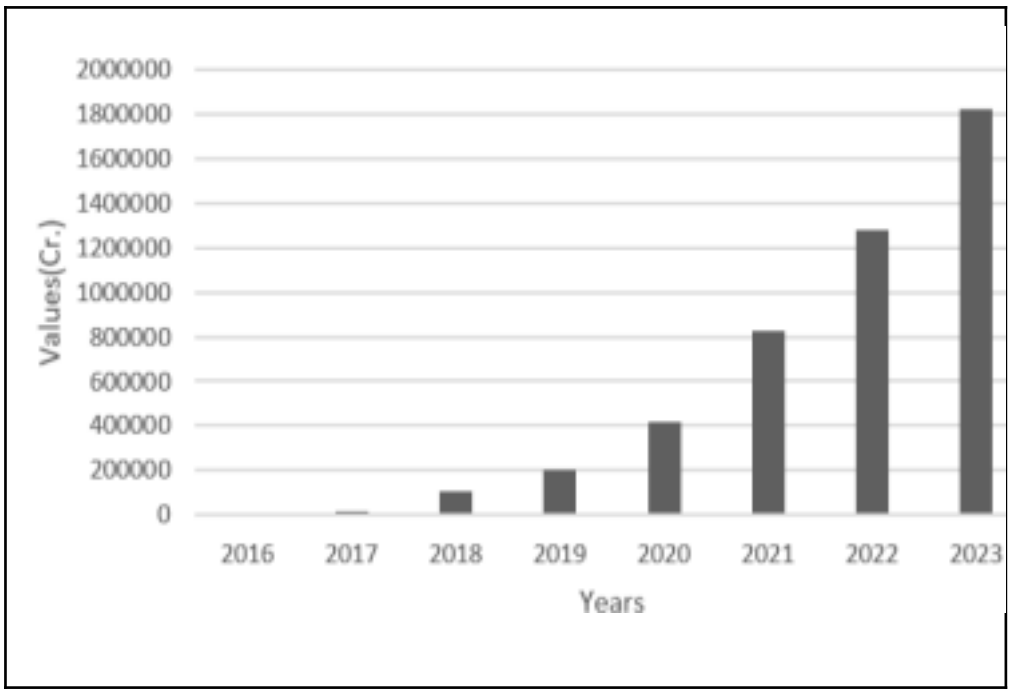

Figure 2: Total Value of Transactions via UPI (NPCI Website)

Benefits of UPI :

1. Intuitive User Interface: UPI applications boast a user-friendly design, ensuring effortless navigation and transaction completion for users.
2. QR Code Enabled Payments: UPI facilitates contactless transactions through QR code payments, providing a convenient method for users at diverse merchant locations.
3. Interbank Transactions: UPI offers seamless transactions between different banks and platforms, offering greater interoperability compared to mobile wallets with network restrictions.
4. Wallet-Free Transactions: UPI transactions are directly linked to users' bank accounts, eliminating the necessity to load or manage a separate wallet balance, a

feature distinct from mobile wallets.

5. Versatile Acceptance: With widespread acceptance among various merchants and platforms, UPI stands out as a versatile payment option, enhancing user convenience.

3.1.2 Aadhaar Enabled Payment Systems (AePS)

Aadhaar Enabled Payment System (AePS) is a secure and convenient method of financial transactions introduced by the Government of India. It leverages the unique 12-digit Aadhaar number, which is a biometric and demographic database, to enable individuals to make financial transactions through micro-ATMs.

Key features of AePS:

1. Biometric Authentication: AePS relies on biometric authentication using fingerprint or iris scans linked to the Aadhaar database. This ensures a secure and reliable method of verifying the identity of individuals.
2. Financial Inclusion: AePS plays a crucial role in promoting financial inclusion by providing basic banking services to individuals in remote and rural areas who may not have access to traditional banking infrastructure.
3. Transactions: Users can perform various banking transactions such as cash withdrawals, balance inquiries, and fund transfers using AePS. It acts as a bridge between banks and customers, facilitating transactions through Business Correspondents.
4. No Need for ATM Cards: AePS eliminates the need for traditional ATM cards and PINs, making it easier for individuals to access banking services, especially in

areas where physical infrastructure is limited.

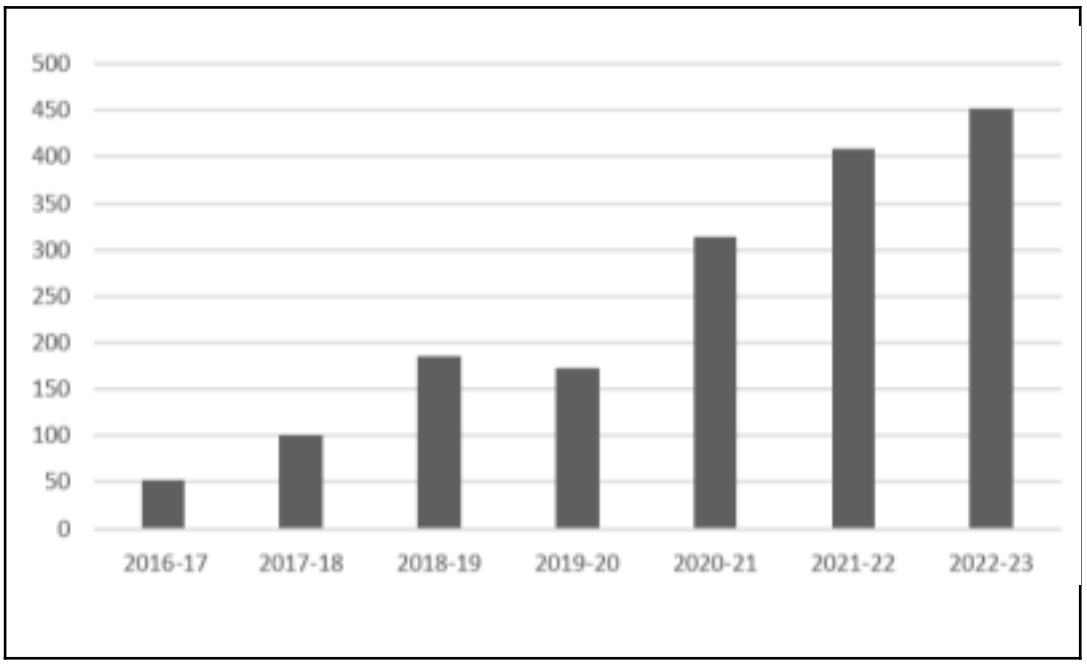

Figure 3: Total Value of Approved Transactions (NPCI Records)

AePS is steadily growing in popularity gaining traction among various banking sectors as well as commercial users. the percentage of inter-bank transactions (as shown in Table 2) (also known as off-us transactions) has risen from 7.49% in 2016-17 to 51.9% in 2022-23. Fig. 3 gives a clear picture of the growing potential of this faster and easier mode of transaction.

3.1.3 USSD

USSD (Unstructured Supplementary Service Data) based online payments refer to a mobile technology that allows users to perform financial transactions through text-based codes on their mobile devices. Unlike smartphone apps or internet connectivity-dependent services, USSD works on basic mobile phones with or without internet access. In the context of payments, users can dial a specific code, often starting with ”*99#,” to access a menu and perform various financial transactions.[14]

USSD-based payments gained traction in India as they provide a simple and accessible platform for financial transactions, especially in areas where smartphone penetration and internet connectivity are limited. The Indian government introduced the National Unified USSD Platform (NUUP) to facilitate mobile banking and payments. This initiative, along with various USSD-based services offered by banks and financial institutions, has contributed to the growth of USSD-based payments, making them a popular choice for basic financial transactions, balance inquiries, fund transfers, and more.

Benefits of USSD:

1. Does not require an internet connection or data to work.

2. Reduces operating costs when it works as a self-service application for your customers. 3. Enhanced customer satisfaction when you give them the ability to serve themselves. 4. Works globally & economical.

5. Two-way communication is up to seven times faster than SMS.

3.1.4 Point of Sale (PoS)

Point of Sale (PoS) terminals are electronic devices used in retail and other businesses to facilitate transactions between customers and merchants. These terminals are commonly found at the checkout counter in retail stores, restaurants, and various service establishments. The primary function of a PoS terminal is to securely process payments, including credit card and debit card transactions.

Advantages of PoS Terminals:

1. Convenience: PoS terminals provide a quick and efficient way to process payments,

reducing transaction times and improving the overall customer experience.

2. Payment Options: They support various payment methods, including credit cards, debit cards, contactless payments, and mobile wallets, offering customers flexibility in how they pay.

3. Record-keeping and Reporting: PoS terminals automate record-keeping and generate detailed reports, helping businesses manage inventory, track sales, and analyze customer preferences.

4. Reduced Cash Handling: The use of PoS terminals can reduce the reliance on cash transactions, minimizing the risks associated with cash handling and theft.

5. Integration with Business Systems: PoS systems can integrate with other business management tools, such as inventory management and accounting software, streamlining overall business operations.

According to the data from the Reserve Bank of India (RBI), as of May 2022, there were 61.69 lakh PoS terminals in operation. The demand for contactless payments surged during the COVID-19 pandemic, leading to an increased requirement for POS terminals equipped with NFC, RFID, and other technologies capable of accepting payments from contactless chip cards or digital interface cards. The estimated size of the India PoS Terminals Market will be USD 33.26 billion in 2024, with a projected growth of USD 63.17 billion by 2029. This growth is attributed to the rising number of retail stores in India, driven by increased consumer purchases. The expansion of retail outlets has created a heightened demand for machines capable of processing payments.[15]

3.1.5 Internet Banking

Internet banking, also known as online banking, is a digital service that allows users to perform various financial transactions and banking activities over the Internet. Through secure online platforms provided by banks, customers can access their accounts, manage funds, and conduct financial transactions without the need to visit physical bank branches.

Advantages of Internet Banking

1. Availability: Banking services are accessible 24/7, year-round. Most services are not bound by time constraints, allowing you to check your account balance or transfer funds without waiting for the bank to open.
2. User-Friendly: Utilizing online banking services is straightforward and uncomplicated. Many individuals find online transactions more convenient than visiting a physical branch for the same services.
3. Convenience: There's no need to interrupt your daily tasks or stand in line at a bank branch. You can conduct transactions from any location, whether it's paying bills, managing recurring deposit instalments, or handling other financial activities via online banking.
4. Time Efficiency: Internet banking allows you to complete transactions swiftly, with funds transfer or opening a fixed deposit-taking only a few minutes. Transactions can be conducted promptly within the country using online platforms.
5. Transaction Monitoring: Unlike paper receipts from in-branch transactions that can be lost, all activities performed on a bank's internet banking portal are systematically recorded. This serves as a reliable record for transactions, including details like the payee's name, account number, transaction amount, date and time,

and any remarks, providing proof if necessary.

4 Security Issues and Vulnerabilities

The following table gives a systematic overview of various vulnerabilities that are prone to a threat to the currently active digital payment methods in India as discussed in the above section and their implications.

Payment Method	Vulnerability	Attack Method	Implication
UPI	•User biometric data •Centralized data storage •Lack of updated software for interfacing •Patch update downtime	•DDoS attack •Man in the middle attack •Internal network sniffer •Malware Injection	•Identity theft •Fraud & economic loss •Doxing(leak of personal sensitive and financial data) •Data Breach
AePS	•Inadequate identity verification or authentication processes •Centralized data storage •Insecure biometric information •Lack of user awareness	•DDoS attack •Man in the middle attack •Internal network sniffer •Malware Injection	•Identity theft & loss of reputation •Fraud & economic loss •Doxing(leak of personal sensitive and financial data) •Data Breach

USSD	•Insecure network & communication •Deficient cyber hygiene •Lack of user awareness and discretion •Outdated hardware and software	•DDoS & phishing attacks •Man in the middle attack •Internal network sniffer •Malware Injection	•Identity theft •Fraud & economic loss •Doxing(leak of personal sensitive and financial data) •Data Breach
PoS	•Card cloning •Insufficient encryption •Insecure network configurations •Lack of user awareness (weak passwords)	•DDoS & phishing •Man in the middle attack •Internal network sniffer •Malware Injection	•Identity theft •Fraud & economic loss •Doxing •Data Breach
Internet Banking	•Absence of 2-Factor Authentication •Lack of patched servers •Lack of sufficient encryption •Social Engineering & insider threat[16]	•Malware attacks •Phishing •SQL Injection •Distributed Denial of Service(DDoS)	•Identity theft & loss of reputation •Fraud & economic loss •Doxing(leak of personal sensitive and financial data) •Data Breach & disruption of service

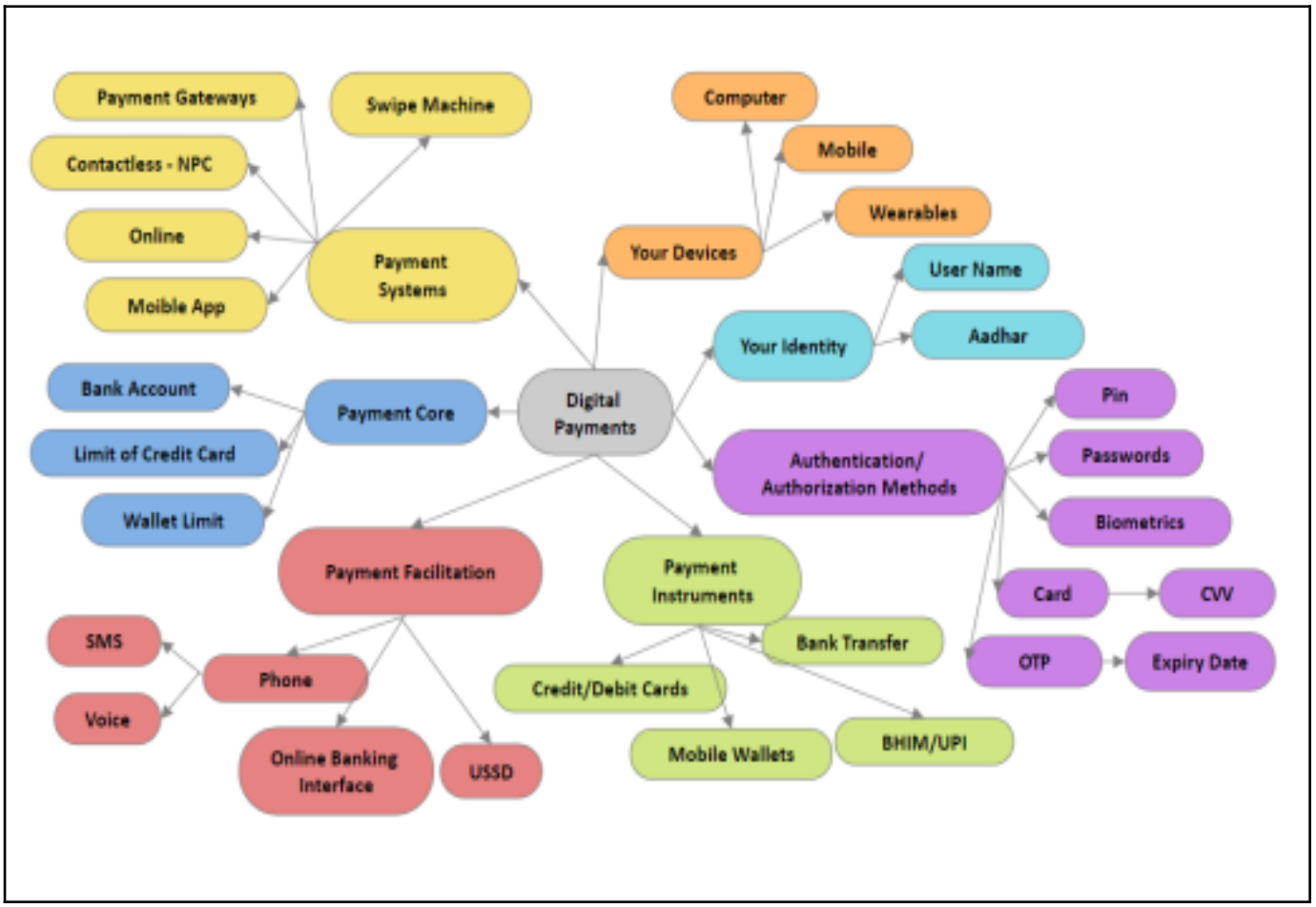

Figure 4: Indian Digital Payments Ecosystem

4.1 Current Government Policies in Place

India has been actively working on enhancing its cybersecurity framework, and several regulatory rules and guidelines are in place to address various aspects of cybersecurity. It's important to note that regulatory frameworks are subject to updates, amendments, and new introductions. Here is an overview of some key regulatory rules related to cybersecurity in India:

1. Information Technology (IT) Act, 2000: The Information Technology Act, 2000, is a

foundational legislation that legally recognizes electronic transactions and addresses cybersecurity concerns. It includes provisions related to unauthorized access, hacking, data protection, and penalties for cybercrime.

2. National Cyber Security Policy, 2013: The National Cyber Security Policy aims to create a secure and resilient cyberspace environment in India. It outlines strategies for enhancing the security posture of the country, including the protection of critical information infrastructure and the promotion of research and development in cybersecurity.

3. Data Protection Laws: India has been working on comprehensive data protection legislation, and the Personal Data Protection Bill, 2019, is under consideration. The bill outlines principles for the processing of personal data and includes provisions for the protection of sensitive personal data.

4. Reserve Bank of India (RBI) Guidelines: The RBI issues guidelines and circulars related to cybersecurity for banks and financial institutions. These guidelines cover areas such as cybersecurity risk management, cyber incident reporting, and the implementation of security measures for digital transactions.

5. Indian Computer Emergency Response Team (CERT-In): CERT-In, under the Ministry of Electronics and Information Technology, serves as the national nodal agency for responding to cybersecurity incidents. It issues advisories, alerts, and guidelines to enhance cybersecurity resilience across sectors.

6. Sector-Specific Regulations: Various sectors, such as telecommunications, energy, and healthcare, have specific regulations and guidelines addressing cybersecurity concerns. For example, the Telecom Regulatory Authority of India (TRAI) issues

recommendations on the security of telecommunication infrastructure.

7. National Cyber Coordination Centre (NCCC): The NCCC is responsible for providing real-time situational awareness and coordinating responses to cyber threats. It plays a crucial role in enhancing the overall cybersecurity posture of the nation.

4.2 Additional Methods to Secure Digital Transactions

In the dynamic realm of digital transactions, securing sensitive information is paramount. To fortify cybersecurity, organizations should adhere to key guidelines. Multi-factor authentication (MFA) adds an extra layer of security, deterring unauthorized access. Regular software updates patch known vulnerabilities, reducing the risk of exploitation. User education is crucial; comprehensive training on cybersecurity, recognizing phishing attempts, and maintaining strong passwords enhance the security posture. Encryption safeguards sensitive data during transmission and storage. Implementing secure network configurations and encrypted connections prevents unauthorized access. Proactive monitoring for anomalies detects potential threats. Regular security audits identify and address vulnerabilities. Ongoing user awareness programs cultivate a cybersecurity-conscious culture. An incident response plan is essential for effective security incident management. Collaboration with cybersecurity authorities and organizations ensures awareness of emerging threats. These guidelines collectively establish a resilient foundation for secure digital transactions in the ever-evolving digital landscape.

5 Conclusion

In summary, this paper has outlined security vulnerabilities in commonly used digital transaction methods in India. Despite challenges, it's crucial to recognize the significant benefits these methods offer. Digital transactions have revolutionized financial interactions, providing unparalleled convenience and accessibility. From the user-friendly UPI to the inclusive AePS, these methods extend banking services to remote areas. USSD-based payments cater to users without smartphones, while PoS systems streamline retail transactions. Internet Banking empowers individuals to manage finances remotely. Addressing security vulnerabilities requires ongoing improvement. Recommended measures, including Multi-Factor Authentication and regulatory compliance, strengthen these methods. Future efforts should focus on innovation, collaboration, and user awareness to foster a secure digital financial landscape. In essence, the advantages of digital transactions outweigh challenges. As we navigate this evolving landscape, collective efforts to address vulnerabilities will unlock the full potential, ensuring a secure, efficient, and inclusive financial future in India.

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Common currency's impact on European Union

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Abstract

Common Currency is the term used when two or more countries share a standard currency/monetary system in their day-to-day functioning. This paper aims to study the effects of Common Currency on The European Union with respect to multiple regards. This study seeks to show the positive and the adverse effects of the Common Currency used in The European Union, i.e., the Euro. Various aspects like trade, economic convergence, financial integration, foreign investments etc. are taken into consideration while evaluating the effects of the common currency. It also intends to analyze if events that have affected specific countries in the union have affected the currency, other countries in the union or have been affected themselves due to the common currency itself. This paper intends to recognize the research gaps present and further attempts to suggest the scope for future research as well as the overall impact on the European Union.

Introduction

The Euro, as a common currency for the European Union made spectators believe that it will open the paths to growth, employment, and trade. A national currency is a

symbol of the state's sovereignty. It acts as an emblem of the country's identity and cultural heritage. The common currency, Euro, looked promising enough for the countries in the European Union to give up their national currencies. What were the reasons that the countries were willing to give up their independent instruments of monetary policy to choose a common currency that would be controlled by a central institution?

The grounds for the European Monetary Union come from the 1960's long before the formation of the European Union in 1991. The volatility in exchange rates in the 1960's and the demise of the Bretton Woods system in 1971 showcased the ill effects of currency volatility and the damage due to it on growth and trade. The need for a shift to a credible and consistent currency started becoming visible henceforth. It would help in integrating the European countries and give a boost to their growth.

The European Single Market was formed, which was the first big step towards economic integration. It has 15 member states currently and has freedom of movement of individuals, capital, goods, and services. This led to the removal of trade barriers which resulted in better market prices for the consumers. This led to an increase in employment and added up to 1.5% of the European Union's growth.

The Euro as a common currency removes the variability of exchange rates, thus making investments and trade decisions more consistent and predictable. This increases profitability as financing trade and investments becomes easier. Thus, further leads to greater development and increase in employment. It also reduces transaction costs as currency conversion and cross-border transfer costs are eliminated. Euro promotes

healthy competition by creating a transparent market as all commodities are easily comparable in a common currency and the consumer would be able to easily recognize the cheapest products. This would also increase trade between European Union members.

Other than its economic and financial benefits, the common currency also promotes travel as traveling to foreign countries with the same currency would not involve the hassle of currency exchange and increase in travel would also lead to cultural integration which would help in acceptance of others' opinions and perspectives creating a more open and accepting environment.

This paper will analyse, if the common currency, Euro, has helped the European Union grow and progress and in detail assess a few components that are affected due to the Euro. It will talk about the introduction of the Euro, its aim to converge the economies, the impact of common currency on trade, FDI and financial markets. The aim is to put forth a holistic view of the effects and identify areas for further research.

Launching the Euro

Kurt Juul (1999) in his paper describes the preparations to introduce the Euro. It began in 1998 and a list of countries was decided which would be allowed to take on the Euro as their currency from 1st January,1990. These countries were Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxembourg, Netherlands, Portugal, and Spain. The United Kingdom, Denmark and Sweden qualified for the membership but postponed their entry due to asynchronous business cycles and political considerations. He mentions the criteria laid down for smooth operation of the

monetary union also known as the ‘convergence criteria’ which the potential eurozone members had to conform to. The criteria included factors like Price Stability, Budget Deficit, Public Debt, long term interest rates, and exchange rate stability. Greece on the other hand could not join as it did not qualify the criteria which was sustainable economic convergence. The European Central Bank was established, and it was to take all decisions for the behavior of single monetary policy and exchange rate policy for the Euro. Before the launch, there was a preparatory period to ensure smooth transition. Private companies made a significant investment with expectations during the launch of Euro. The ‘outsider’ countries had a major impact as they also had to prepare for the coming of the Euro as postponing it indefinitely could cost them exchange costs and put them at a competitive disadvantage compared to the members of European Monetary Union. The UK also announced a “national changeover” plan. Greece prepared to qualify for the EMU criteria. On 1st January 1999, the national currencies of the Euro adoption countries fixed an exchange rate to 1 Euro till January 2002 from when they would cease to exist. From January 2002 the third and final phase of launching the Euro began and Euro notes and coins began being circulated as legal tender to replace previous national currencies. According to the author, the launch of the Euro was a success. Europeans believed that a unified Europe is more valuable than the combined total of individual nations and the Euro acted as a depiction of this credence.

Pierre Weiss (1998) suggests governments to use a policy mix to eventually solve the structural difficulties they’ll face. In the long run both their monetary and budgetary policy would be influenced by the monetary union. He also goes on to state that the stabilization from the currency should promote growth and employment in the long

run. It could also result in negotiations of wage rate in the labour market due to the transparency between the

nations and a common comparable currency. In the banking, financial and insurance sectors there will be merging and restructuring of operations. The aim of converging economies could be affected as less developed member nations would have to rely on their own resources because of the weak impact of the EMU budget.

Aligning the Economies

Dr. Ognian Hishow (2007), discusses how common currency has been detrimental to the European goals of growth, job creation, and achieving a balanced budget. Since the introduction of the Euro, The European Monetary Union region has been reporting relatively less than its competitors worldwide like the US. The inflation rates in the member nations sometimes tend to differ a lot resulting in diverging wage costs. This brings it back to the same problem of whether one monetary policy works for all countries or not.

According to Andrew Moravcsik (2012), the long-term goal of the European countries was to make the economies of the European countries converge. This meant assuring that their individual macroeconomic behavior is similar enough to one and another such that a single economic policy can be implemented to fulfill the demand focused upon in a similar manner. For this to happen smoothly, countries must align their public spending, inflation, competitiveness, and other similar trends affecting these decisions. Applying a single policy and exchange rate to such a diverse range of countries is the cause of fundamental disequilibrium. He also states that a common

currency came along with high levels of risk for individual European nations because countries like Greece and Italy were in deficit and if they couldn't persuade Germany to change it then it would be very difficult for them to converge to similar economies. These goals were also considered to be very ambitious as the member nations of the European Monetary Union were required to give up on certain tools without which it is very difficult to offset their difference with Germany.

In the paper written by Periklis Gogas (2012), he has assessed the effectiveness of the procedures and policies that worked towards the economic convergence of the nations participating in the European Monetary Union. He does an empirical analysis by using the estimation of correlation coefficient, linear regression, and a sign concordance index. He aims to analyze whether the business cycles have synchronized or not with the implementation of Euro in the European Monetary Union. He has used quarterly data for Gross Domestic Product from Quarter 1, 1992 to Quarter 4, 1997. Data for 14 countries was used and was sourced from the Organization of Economic Cooperation and Development database. The analysis has been divided into two sub time periods i.e., 1992-2001 which is before the Euro was adopted and 2002-2007 which is post the adoption of the Euro. He also mentions that research and study to assess the same aim has been done by a few others and also pose to have contradicting results because the methodology used in the calculations were different and secondly, there is no consensus on the amount of correlation to determine the synchronization of business cycles. The results of the empirical analysis show that the synchronization of the business cycles among the individual national economies in the European Union became weaker post the adoption of Euro as a common currency. According to the author, it did not live up to the vision of a strong political and economic union.

Impact on Trade

Mcallum (1995) states that the size of intra-national trade is biased by a ratio of 20:1 in case the countries share, the result was corroborated by Helliwell (1996). These links are empirically verified using the gravity model which is a very dependable framework.

According to Andrew Rose (2000), Common Currency has a large impact on trade. Lower exchange rate volatility tends to increase trade, so with an elimination in exchange rate volatility due to common currency trade can be 3 times higher if compared to being otherwise. EMU sceptic, Feldstein (1997) agrees that substituting a single common currency in place of multiple national currencies reduces transaction costs to a great extent. This makes trade relatively cheaper compared to countries with their own national currencies.

Andrew Rose's (2000) journal also states that increased trade will have important repercussions. Increase in volume of trade will increase the number of trade disputes. An increase in competition could lead to layoffs and may pressurize the labour market, which would call for greater social safety measures. Increased level of trade will lead to greater economic integration which may further lead to greater political integration. Other non-member countries may form their own currency unions which will increase global integration. Lastly, an increase in trade results in a gain for the consumers inside the currency union.

Rose and Glick (2002) found that bilateral trade approximately doubles/halves when a

pair of countries form/dissolve a currency union, ceteris paribus. Frankel (2003) explains in his paper three factors which would affect the desirability of choosing a common currency with an increase in trade among the member nations. The first factor is growth in the long run as it increases openness which further leads to an increase in real income. The second factor are derived from the theory of optimum currency areas. It considers the benefits of fixed exchange rates alongside the advantages of floating exchange rates. The third factor accounts for cyclical fluctuations. It accounts for the biggest advantage of a floating exchange rate which is to respond to deflation and inflation using monetary policy.

According to the papers by Nitsch (2002,2004), Berger and Nitsch (2005) they are very sceptical of the data and conclusions from research within currency union research. They argue that minor manipulations of the data decrease the effect of common currency on trade by about half. He also goes on to mention challenging Rose's data set as it mainly comprises small countries or islands who have accepted the currency of a larger nation, but the outcome won't be as beneficial as they look for the larger nation.

Naik Alakbarov (2012) used a gravity model in his paper to evaluate the effects of currency unions and exchange rate volatility on trade. According to his findings, countries that operate in the same currency have greater trade volumes but the effect of the currency union on trade is not huge. Their effect is not as large as mentioned in Rose (2000) and Glick and Rose (2002).

Naik Alakbarov also believes that the suitability of the member nations among EMU cannot be judged based on historical data as the setting of these economies will have a complete change with the monetary union.

Impact on FDI Flows

Aristotelous (2005) tested the effect of Euro on US FDI flows into the Eurozone using data from a panel of 15 countries between 1966 and 2003. The model consisted of supply and demand related determinants of FDI. The findings of the paper were that common currency had a positive and statistically significant impact on US FDI flows into the Eurozone. However there was no FDI Diversion which meant that there wasn't any decrease of US FDI in the three countries (UK, Denmark and Sweden).

De Sousa and Lochard (2006) used a gravity model to test the estimate of the impact of the European Monetary Union on FDI flows and stocks. They used data from 22 OECD countries between 1982 to 2002. They have taken market size, exchange rate volatility, exchange rates, production and transaction costs, merger and acquisition determinants and skilled labor endowments as their factors to estimate the results. Their findings were that the common currency led to an increase in FDI in the EMU countries.

Kyriacos Aristotelous and Stilianos Fountas (2012) investigated the effect of the Euro and European Monetary Union on FDI Inflows by using panel data from 22 OECD countries between 1973 and 2006. A common currency can affect FDI inflows positively for numerous reasons, the primary reason being elimination of exchange rate risks, it also makes prices comparable and transparent along with profitable mergers and international acquisitions. The paper also suggests that majorly empirical work focuses on currency union's effect on trade; however trade may be indirectly increasing due to an increase in FDI. In this the author uses a Fixed Effect regression model. Their findings show that real GDP and real GDP growth rate have a statistically significant

effect on inward FDI. The effect of exchange rate volatility and effective exchange rate also have a positive impact on the FDI.

Impact on Financial Markets

Prati and Schinasi (1997), specify that the eurozone private bond market would also become more attractive for borrowers and investors due to reduction in transaction costs and elimination of currency risks. It would result in direct investment in the markets by investors removing intermediaries and would also contribute to securitization in Europe.

Bordo et al. (2001) documented that with rising banking and currency crises in recent times due to the globalization of investment, trade, and financial flows the scope of the domino effect increases from a country to another in case of a crisis in a particular country. This means that common currency can be a major factor to strengthen or weaken the domestic financial system.

Liliane Karlinger (2002) in her paper assesses the degree of financial integration in the eurozone. To assess financial market integration, there are two tests. The first test is to assess the price convergence of financial assets. The second test measures the intensity of cross border financial flows which includes testing for independence of domestic investment from domestic savings. The report's findings indicate retail bank interest rates have declined which implies growing integration of retail banking in the Eurozone. The European Commission (2001) also reported that the stock markets in the Eurozone except the Dutch had higher explanatory powers of foreign returns post the formation of the European Union by 57%. The author expects EMU to stimulate

financial stability because the adoption of Euro eliminates all prospects of exchange rate adjustments or collapses among the member countries as well as promotes diversification of portfolios across borders which allows them to distribute their risk carefully as the risk return trade off improves. This paper also describes the effect on the banking sector in Europe. The banks charged transition costs and earned revenue from foreign exchange which was eliminated. The introduction of Euro was also expected to increase the competition in the Banking sector. He also mentions that such an effect should also lead to elimination of banks as intermediaries and result in direct investments in the capital market. The paper also suggests a few methods in which banks could follow to get in line with the new situation.

Contagious Events

A paper by Michael G. Arghyrou and Alexandros Kontonikas (2011) discusses the European Economy. The paper talks about how a Global Financial Crisis led to the Greek Debt Crisis right after. The Greek Debt Crisis soon turned into the European Sovereign Debt Crisis. It highlights how the withdrawal of Greece from the international bonds market has put pressure on the bonds of other countries in the union like Ireland, Portugal, and Spain. It also considers how the Monetary Union is a major reason for Greece not being able to get out of such a situation even after rescue packages because a lot of short run responses regarding monetary and fiscal decisions specific to the country could not be implemented. The researchers also perform a variety of empirical analysis and conclude that Credit Default Swap (CDS) was not the reason for the spread of this debt crisis rather it was the intra-macroeconomic

equations within the monetary union that one after the other led to the contagion of this debt crisis.

Another paper by Joao Carlos Graca, Joao Carlos Lopes and Rafael Marques analyzing the Portuguese Debt Crisis, also talks about how macroeconomic balances created due to the common currency affected their economic situation as had it been their separate currency, they could have gone through a series of devaluations which might have saved the situation at hand. It is very similar to the Greek Debt Crisis and such restrictions may be one of the possible reasons as to why a country's debt crisis turned into the European Sovereign Debt Crisis.

Joudi Majbour (2022) in his paper discusses how Brexit affected the EMU. The UK's exit affected the Euro adversely causing it to decline by 2%. This also caused some of the countries to face a recession as they tried to cope up with Brexit. The conclusion from his paper also supports our previous evidence of how the EMU affects trade and FDI. It reduces the free market area of the European Union thus reducing trade in that region. Countries previously dependent on free trade with the UK now have to deal with trade regulations or deal with other alternatives which are also going to have some regulations hence making it impossible to cover up for that loss of trade. The paper also states that there was a decline in FDI outflows from the UK towards the EU. This shows that a monetary union increases FDI flows within the Union.

Michele Chang (2017) in her paper talks about how the UK held a major stake in the European Union and how its probable exit has impacted the Euro as well as the union as a whole. The UK was also the major contributor to the budget of the EMU and its exit

would take a hit on the investments in the union and leave a budget gap. It highlights the dependence of the Union on a single country and how multiple countries get majorly affected by the independent decisions of a major stakeholder. The UK previously had also proposed the idea of a multi currency financial framework. Now the EU is trying to adopt measures with greater cooperation to reduce macroeconomic imbalances and make frequent decisions regarding their monetary policies.

Methodology

In the paper we regress the gravity model. The gravity model is a widely used economic model that aims to explain the patterns of trade between countries. It is based on the assumption that the trade flows between two countries are directly proportional to their economic size (measured by population and GDP) and inversely proportional to the distance between them.

In its simplest form, the gravity model assumes that the bilateral trade or migration flows between two countries can be modelled as the product of the economic sizes of the two countries and an inverse function of the distance between them. The model can be represented mathematically as:

$$T_{ij} = A \times (Y_i \times Y_j)/D_{ij}$$

where T_{ij} represents the volume of trade flows between countries i and j, Y_i and Y_j represent the economic sizes of the two countries, and D_{ij} represents the distance between them. A is a constant that represents the overall level of trade or migration

between countries, and it is estimated empirically.

The model in this research is an advanced form of simple gravity model which includes more variables that determine trade.

$$Trade_{ij} = \beta_0 \times Pop_i^{\alpha 1} \times Pop_j^{\alpha 2} \times GDP_i^{\alpha 3} \times GDP_j^{\alpha 4} \times Lang_{ij}^{\alpha 5} / Dist_{ij}^{\alpha 6}$$

$Trade_{ij}$: represents the volume of trade between country i and country j (Imports + Exports in US $)

Pop_i and Pop_j: represent the population of country i and j, respectively.

GDP_i and GDP_j: represent the GDP of country i and j, respectively (In US$) $Lang_{ij}$: is a dummy variable that takes the value 1 if country i and j share a common language and 0 otherwise

$Dist_{ij}$: represents the distance between country i and j

β_0: is a constant or intercept term

α1, α2, α3, α4, and α5: are coefficients that represent the impact of each variable on trade flows, and are estimated through regression analysis.

Through this analysis we see if the gravity model holds true and analyze the regression output.

We also check the trade data for a structural break to analyse if the formation of EMU has generated any impact on trade.

The top 5 EMU countries (by GDP) have been chosen as a proxy to represent the entire monetary union which are France, Germany, Italy, Netherlands and Spain.

Data

In the above model, the dependent variable used is trade and the data has been extracted from the WITS website. The independent variables in the model are the population of the two countries trading, both their GDP, the distance between the two countries and the data has been extracted from the World Bank database. Common Language has been used as a dummy variable where it takes the value 1 if the countries share a common official language otherwise it takes the value 0. The language data has been manually coded by cross referencing the common languages for each country.

Results and Discussions

The OLS output was:

```
Call:
lm(formula = TRADE ~ Language + log(Distance) + log(Pop1) + log(Pop2) +
    log(GDP1) + log(GDP2))

Residuals:
      Min        1Q    Median        3Q       Max
-54896875 -15908077  -4242034  11182788  86488741

Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)   -2.514e+09  7.263e+07 -34.615  < 2e-16 ***
Language       7.889e+07  4.013e+06  19.659  < 2e-16 ***
log(Distance) -1.957e+07  2.942e+06  -6.654 7.35e-11 ***
log(Pop1)      9.071e+06  4.296e+06   2.111 0.035236 *
log(Pop2)      1.503e+07  4.296e+06   3.499 0.000508 ***
log(GDP1)      4.178e+07  4.116e+06  10.149  < 2e-16 ***
log(GDP2)      4.000e+07  4.116e+06   9.716  < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 23940000 on 513 degrees of freedom
Multiple R-squared:  0.8054,   Adjusted R-squared:  0.8031
F-statistic: 353.8 on 6 and 513 DF,  p-value: < 2.2e-16
```

The output is the result of a linear regression model using ordinary least squares (OLS) to estimate the relationship between trade (dependent variable) and language, log of distance, log of population of country 1 and country 2, and log of GDP of country 1 and country 2 (independent variables).

The coefficients for each independent variable represent the estimated impact on trade, holding other variables constant.

- Language: For countries that share a common language (Language=1), the model estimates an increase in trade of approximately 78.9 million units, holding all other variables constant.
- Distance: A one percent increase in distance between two countries is associated with an estimated decrease in trade of approximately 19.57 million units, holding all other variables constant.

- Population: A one percent increase in the population of country 1 (or country 2) is associated with an estimated increase in trade of approximately 9.07 million (or 15.03 million) units, holding all other variables constant.
- GDP: A one percent increase in the GDP of country 1 (or country 2) is associated with an estimated increase in trade of approximately 41.78 million (or 40 million) units, holding all other variables constant.

The intercept of -2.514e+09 represents the estimated trade when all independent variables are equal to zero. However, since all countries have non-zero populations and GDPs, this intercept value does not have a practical interpretation.

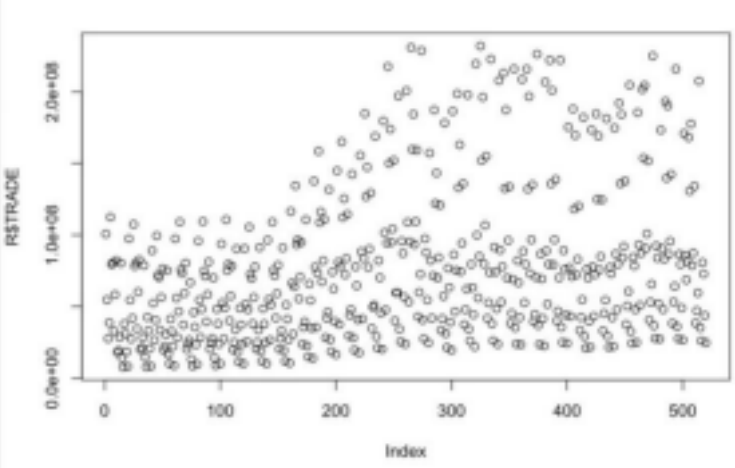
The p-values for all coefficients are less than 0.05, indicating that all independent variables are statistically significant in explaining the variation in trade.

The multiple R-squared value of 0.8054 indicates that the model explains approximately 80.5% of the variation in the dependent variable, while the adjusted R-squared of 0.8031 suggests that the model may be slightly overfitting.

The F-statistic of 353.8 and p-value of < 2.2e-16 indicate that the overall model is statistically significant in explaining the variation in trade.

Thus, we understand that the gravity model holds true for EMU.

Now we analyze the structural break test results:



This test indicates there was a break around the 190th observation which is in the year 2004. So a few years after the formation of EMU we notice an increase in trade between countries and with the gravity model holding true throughout we can say that it was the formation of the EMU that triggered this increase in trade rather than any other factor during the time frame.

Limitations

There are a few limitations in the research conducted above:

Only the top 5 countries were used as a proxy for the EMU because the data set for 20 countries was too large to be analyzed in the research time frame. Analysis was only conducted for trade. There is further scope to work on FDI Inflows and Financial Markets. It involves a degree of complexity that requires time and data to conduct an analysis on the same.

Conclusion

The impact of the common currency on the European Union was difficult to consolidate into a single stance on the basis of the literature available. While the launch of the Euro was smooth and had public support, research has produced contradicting results on its impact. However, trade has undoubtedly benefited due to increased volumes and decreased transaction costs, leading to greater integration. The elimination of exchange rate risks has also led to a diversification of portfolios and an increase in Foreign Direct Investment inflows. However, the integration also comes with the potential negative consequences of decreased autonomy for countries and banks, and a lack of short-term monetary and fiscal decision-making power.

However, the results of above tests and analysis give a definitive conclusion that the impact of the Common Currency which led to the formation of EMU has been positive and has significantly impacted trade. The Common currency had several factors like reduced transaction costs and greater policy integration which led to an increase in trade volumes soon after common currency was introduced.

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articles

The Gujarat Cap-and-Trade System: Understanding Externalities

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Abstract

This research essay endeavours to reconcile the disparities between classical and contemporary literature regarding the strategies employed for internalising externalities. It initiates by grounding its comprehension in the theoretical foundations established by luminaries like Pigou and Arrow, and subsequently integrates modern intricacies into the discourse on externalities, delving into aspects such as context, attributes, and measurements. Furthermore, the study explores the variations in internalisation techniques, contingent upon the entity responsible for implementation, owing to their distinctive motivations. While the private sector seeks to internalize externalities to gain economic advantages, the public sector is driven by the aspiration to enhance societal well-being. We then evaluate the cap-and-trade policy implemented as an experimental project in the fight against climate change in Gujarat in 2019 by the government of India.

Keywords: externality, market failure, welfare economics, Pigouvian tax, Pigouvian subsidy

Introduction

A lot of the net zero goals of institutions today are partly met by internalising their externalities. A simple example is a company that has a negative spillover such as pollution, can now enter into carbon markets and trade carbon dioxide (which becomes the commodity in this market) to offset emissions. Economic externalities are much easier to contextualize as compared to those that find their roots in social domains, thereby affecting other domains of life.

Our interactions and engagement in the social sphere are in fact filled with externalities that, if not identified, remain unnoticed; these are often termed social externalities. If we look at the market for education, often called low-hanging fruit, there is a creation of long-term effects on quality of life, academic achievement, and improved awareness among different sections of the population. On the flip side, there are international spillovers like brain drains and migrations that have since had a significant impact. Even online social networks can be a source of true support by helping provide connection to those who are isolated or can be used as a platform for malicious abuse, bullying, and misinformation. Defining the true value of these 'services' and 'disservices' and accounting for their impact seems like a nearly impossible task. This immediately leads us to the question of what set of mechanisms can lead to the convergence of private and social benefits across a vast variety of spheres. Therefore, the institutional role drastically changes due to contextual differences in arising externalities.

To a great extent, "public goods can be referred to as a particular type of externality" (Moşteanu and Iacob 2009). It is very difficult to draw the distinction between an

externality and a public good. If society at large is benefitting then it is categorised as a public good, but if only a part of society benefits, it is often termed an externality. One might argue that this is still quite a vague classification.

Attributes of an Externality

After contextualization of an externality, we must be able to define an externality for which we shall create categories of attributes. According to Gupta and Prakash (1993), this was done by grouping ten attributes under five categories: occurrence, polluter, spatial, time, and technological. This shall be useful for the policymaker to devise appropriate policies for internalizing externalities (Gupta Anil and Aseem 1993). Firstly, on the basis of occurrence (certain/uncertain). Uncertain externalities are difficult to measure due to their varying distributions. Secondly, the source (identifiable/unidentifiable) and the number of sources (single/multiple). Thirdly, spatial factors (localised/non-localised). Fourthly, the time intervals (sporadic/regular). Fifthly, technological factors (preventable/ non-preventable, unidirectional/reciprocal, insulable/ non-insulable).

Measuring Externalities

Broadly, we can focus on two measures to evaluate an externality. The first is the cost-of-damages approach to understand the extent of damage being caused by the externality. This method brings to the surface the underlying extent of repair required. Second is the cost of control method. This method is famously accepted by various private institutions when there is widespread acceptance of the inability to correct for the externality in itself. Using this method, we see the interplay of preemptive and

preventive steps taken towards the externality. This aligns with the cost-cutting motive of firms today.

For example, emissions that are a negative production externality (contextualising the externality) can be defined using multiple attributes (like multiple sources, regular by-products of the production process of the said polluter, preventable using technological improvements, etc.) and measured using the cost-of-damage method. Depending on the extent of damage done due to the emissions, firms can often be met with abatement costs. Abatement costs are those undertaken by the firm to remove/reduce the negative by-products of their respective production processes. This often has a very negative impact on company earnings and brand value as people demand better and greener practices.

How to Internalise?

Understanding internalisation can be done from an institutional point of view; as in the institution in charge of the externality itself. We start by assuming that all externalities are economic in nature (see Table 1). The public (e.g., government) and the private (e.g., business enterprises) often undertake multiple internalisation techniques that align with their incentives for the same, facilitating interaction in the commonplace like that of markets. This paper analyses academic scholarship in this field through the binary institutional dichotomy of the market versus the state.

Table 1: Example of different types of externalities (Moşteanu and Iacob 2009)

Types of externality	External costs	External benefits
Pure production externalities (generated and received in production)	Acid rain pollution discharged by a power station harming a nearby commercially run forest	A farmer benefiting from drainage undertaken by a neighbouring farmer
Mixed production externalities (generated in production but received in consumption)	Dust polluting discharged by brickwork, breathed by asthmatic children living nearby	Commercially owned bees pollinating fruit trees in neighbouring gardens
Pure consumption externalities (generated and received in consumption)	Noisy music at a party disturbing neighbouring households	Households benefiting from the beauty of neighbouring gardens
Mixed consumption externalities (generated in consumption but received in production)	Congestion caused by private motorists increasing firms' transport and delivery costs	Commercial bee keepers benefiting from private gardens of nearby houses

Private Sector Remedies

The private sector accounts for only small-scale/ localised externalities where the sources have been well defined. They choose the route of internalising whereby total costs can be minimised to gain some economic advantage. Total costs include costs of technology, transaction costs, and the cost of management. The cost of technology includes the cost of purchasing the technology and the cost of using that technology. The transaction costs are those that are associated with property rights such as conflict resolution, contract creation, negotiations, informational distribution, etc. Finally, the cost of management, as the name suggests, is incurred depending on the internal organisation of the firm such as the cost of labour, factory units, inputs, etc.

Public Sector Remedies

According to Wolf, the existence of externalities in a given exchange situation is neither necessary nor sufficient justification for governmental intervention (Wolf Jr 1979). The public sector intervenes only when the said externality is detrimental to society at large or is negatively impacting welfare. They push for more 'centralised, cooperative decision-making' (Fleurbaey, Kanbur, and Viney 2021). The government uses mechanisms like:

a) Pigouvian subsidy given to those who are impacted by the negative externality.

b) Pigouvian tax: imposed on those causing negative impact activities like pollution.

c) Legal regulations that set a system of cap and trade.

d) The subsidy paid to agents responsible for positive externalities.

e) Quantity regulation through trading permits.

For most of these solutions, mathematically, the government must maximise the social welfare function with its respective constraints. The first part of the Coase theorem put forward by Ronald Coase states that “when property rights are adequately defined, negotiations between the parties creating externality and the party affected by it determine reaching social equilibrium” (Coase 1960). The second part of the theorem states that “the efficient solution doesn’t depend on which party receives the property rights, as long as these are given to one party.” The distribution of ownership ensures some sense of convergence between private and social costs, thereby reducing the impacts of externalities. However, Coase’s work has been met with much criticism simply because in macro-level situations, the assignment of property rights is in itself challenging. The Pigouvian tax is a corrective tax that charges a price on externality-producing commodities until it is equivalent to the social marginal cost of production. Subsidies, on the other hand, function like a negative tax. Subsidies can be given for those activities that have positive externalities, thereby shifting out the supply curve of such productive enterprises. They are also given to passengers, like subsidised train passes, to promote public transport. Regulations are mainly done through a limits system during a specific period of time and often involve negotiable components.

Case Study: Gujarat’s Cap-and-Trade Policy

The cap-and-trade system is one of the three flexible Emission Trading Schemes (ETS) as suggested by the Kyoto Protocol, which has proven to be successful across many regions of the world to fight global warming. ETS has different advantages like certainty in emission reduction, flexibility in the selection of different alternatives, etc.

On the other hand, ETS also has different disadvantages like high transaction costs, complexity of the scheme, free rider problems (Hazra 2023). As the name suggests, it puts a cap to regulate pollution from industries and, in return, issues permits. Plants that are able to curb pollution are then able to sell permits to other plants that cross the cap. Thus by facilitating exchange through permits, pollution is curbed and firms earn profits while ensuring that the total costs of regulation are systematically reduced. This system thereby encourages firms to also invest in environmentally friendly technology to further reap the benefits of raising profits through the effective sale of permits.

As per the National Ambient Air Quality Standards (NAAQS) 2009, three states– Gujarat, Tamil Nadu, and Maharashtra– have higher concentrations of particulate matter than the standard norms in the air (2023). The Surat cap-and-trade market was the first ETS for India, launched as a large-scale pilot program on July 15, 2019, in Surat, Gujarat. It was launched by the Gujarat Pollution Control Board (GPCB) in collaboration with Energy Policy Institute of Chicago (EPIC), Evidence for Policy Design (EPoD), the Economic Center at Yale University, and the Abdul Latif Jameel Poverty Action Lab (J-PAL) and is directed to curb particulate pollution[1] to 280 tonnes per month, which was a reduction of about 29 percent in pollution (see Figure 1) of the total amount all the plants were emitting prior to the implementation of the policy. A high portion of the industries qualify for this program and more than 50 percent that registered were textile manufacturing plants, which covers a significant proportion of the emitting industry in Surat. Therefore, the target industry of this cap-and-trade is high-polluting, thereby addressing the issue head-on.

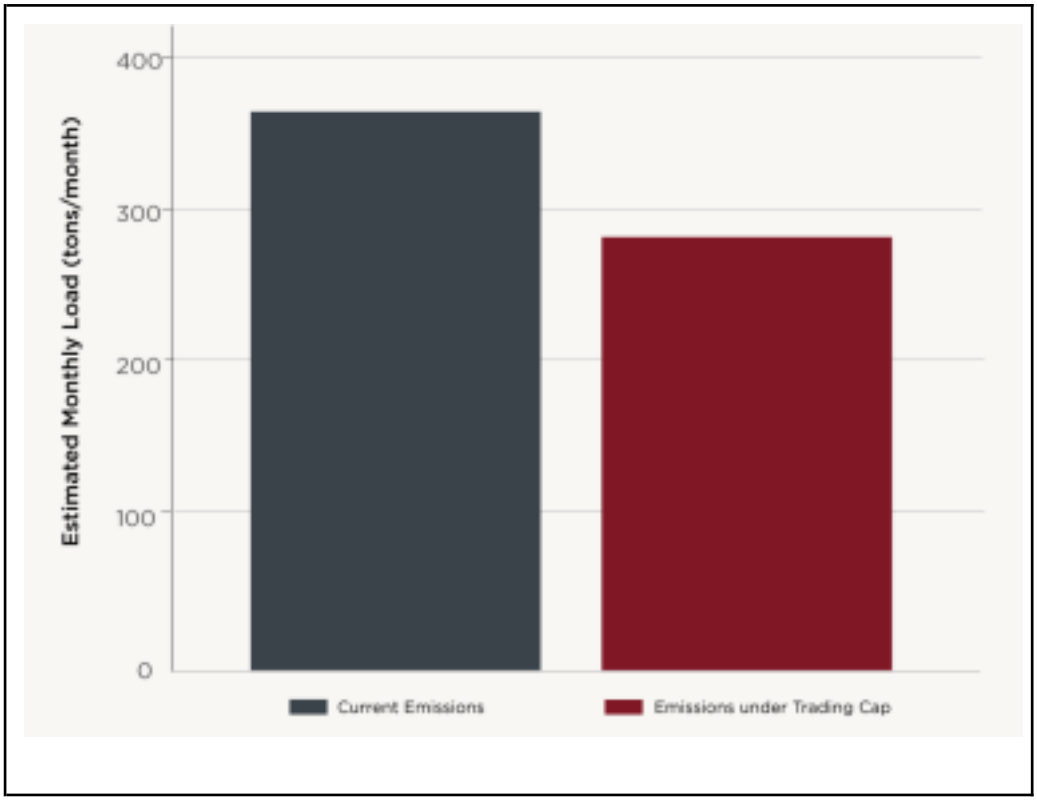

Figure 1: The ETS is projected to reduce particulate emissions by 29 percent (Greenstone et al. 2019)

The most significant advantage of this system was the certainty in emission reduction since the maximum amount of emission is fixed by the central authority and is aimed to keep declining over the years. Since the target of the scheme is the total pollution and not just the dirt released into the atmosphere, this was a significant improvement from the previous policies implemented in India. Due to the gradual decline in the cap, there was not a lot of immediate pressure on plants to incur significant costs and seek alternate methods of technologies; hence, abatement costs were also lower.

The drawbacks of the scheme involved high amounts of costs incurred by the central authority to determine the effective cap and thereby issue permits. The complexity of the system was another reason why there was a lot of asymmetric information in the market, making some players worse off than the others. Many also argued that the system should not lose its stringency, that is, multiple ETS systems implemented in

other countries have been criticised for issuing excessive permits, thereby allowing firms to emit more. This destroys the purpose of implementing the ETS in the first place. Hence, while setting future caps, it is important that policymakers strive for a balance between setting the right cap (and thereby permits) and ensuring enough incentive for growth to not discourage firms from actively taking part in the ETS.

Conclusion

One can still say that we are nowhere close to completely accounting for externalities. However, many economists and policymakers are plagued with questions on how much of the externalities of today will actually be internalised. Will non-market mechanisms still hold onto their true essence once markets for such phenomena have been created? Much debate encompasses how non-economic externalities like that of education could flow into economic spheres thereby leading to virtuous cycles due to their positive
spillovers. In such oversimplified cases of feedback loops, how does one even account for an externality?

The case of translating our theoretical foundations into the policy domain is not always easy due to the multiple drawbacks that can exist due to the contextual differences in which externalities can arise. The Surat cap-and-trade policy, despite its drawbacks, still plays a crucial first in India's battle against emissions. But only time can tell whether it is a policy of true stringency and compliance.

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Economics, Colonialism, and AI: A Saga of Yesteryears, Today, and Tomorrow

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The intricate interplay of economics, colonialism, and the annals of India's history isn't a mere relic of the past; it's an enlightening journey through time, unravelling the intertwined narratives that can illuminate our path in the era of Artificial Intelligence (AI).

The Epoch of Imperialism's Economic Quest

In the 18th century, the British East India Company embarked on a formidable mission, driven by insatiable economic ambition. India, a treasure trove of opulent resources—spices, textiles, and precious metals—stood as a beacon, irresistibly luring the British like celestial bodies drawn to a brilliant star. Their singular purpose? To appropriate India's riches for their own aggrandizement.

And thus, they proceeded, introducing economic policies that altered the course of wealth, directing it from India's heartland to the coffers of Britain. The dual system enabled the British to levy taxes directly on the impoverished Indian peasantry, rendering them unwitting conduits of prosperity. The implementation of land revenue settlements, exemplified by the Permanent Settlement in Bengal, sowed the seeds of economic inequality by giving rise to a landlord class that ruthlessly exploited tenant

farmers. Simultaneously, the cultivation of cash crops such as indigo and opium eclipsed the focus on food production, leading to cyclical famines.

Yet, amidst the tempestuous seas of economic turmoil, glimmers of hope appeared. The British heralded a monumental railway network, a testament to engineering prowess that connected goods, people, and economies, nurturing a sense of unification. Moreover, the British legal system sowed the seeds of modern economic structures through the introduction of property rights and contract law.

Resilience and Evolution in India

India did not passively endure the winds of colonial rule; instead, it showcased remarkable adaptability and resilience. Indian entrepreneurs and merchants astutely seized emerging trade opportunities, while the age-old artisan and handicraft industries continued to flourish in the backdrop. The economic tapestry was a unique fusion of traditional systems and evolving economic paradigms.

The colonial epoch bore witness to the emergence of a new echelon of Indian industrialists, luminaries like Jamsetji Tata and the Birla family, who ventured into diverse industrial domains, ranging from textiles to steel and banking. They, in effect, laid the foundation for India's post-independence industrial renaissance.

British policies fundamentally reshaped India's trade dynamics. The trade surplus with Britain metamorphosed India into a source of raw materials for British industries, serving as a catalyst for India's gradual deindustrialization. The infamous opium trade

with China, colloquially known as the "Opium Wars," underscored how India's economy remained intricately interwoven with global events, manipulated by British colonial interests.

Independence and Economic Resurgence

The struggle for Indian independence wasn't a solitary battle for political autonomy; it was inextricably bound to the aspiration for economic self-reliance. The economic exploitation inflicted by the British kindled the fervor for self-rule. Visionary leaders like Mahatma Gandhi and Jawaharlal Nehru ardently comprehended the paramount significance of economic autonomy in their pursuit of political emancipation.

Following India's attainment of independence in 1947, the nation embarked on a transformative voyage of economic recovery and development. Under the stewardship of Prime Minister Nehru, the Five-Year Plans were meticulously devised to expedite industrialization and ameliorate poverty. The public sector assumed a pivotal role in this renaissance, channeling investments into infrastructure, education, and healthcare.

Parallels in the Age of AI

Fast-forward to our contemporary epoch, we find ourselves standing on the precipice of an unparalleled revolution: the Age of Artificial Intelligence. Revisiting India's historical narrative reveals uncanny parallels resonating with the challenges and opportunities posed by AI and economics in the present day.

Just as the British Empire was propelled by economic ambition, the contemporary nations and corporate behemoths are embroiled in a fervent race to dominate the AI landscape, which stands as the modern-day El Dorado. The promise of harnessing AI's potential beckons with abundant rewards.

Akin to the era of colonialism, the transformative impact of AI on conventional industries mirrors the perturbation of cash crops displacing food production. Industries, spanning from manufacturing to finance, are undergoing seismic transformations, necessitating agility to remain relevant.

The historical journey of India underscores the quintessential importance of resilience and adaptability—qualities that are equally indispensable in the AI-driven terrain of the present. Entrepreneurs, both seasoned and nascent, are leveraging AI to sculpt innovative solutions, akin to the pioneering industrialists of India who illuminated the path of the nation's economic renaissance.

The global economic landscape is undergoing rapid metamorphosis, propelled by AI as the fulcrum of change. The lessons drawn from India's colonial economic history serve as a cautionary parable, emphasizing the perils of undue reliance on AI giants. Much like India's deindustrialization exemplified, unwavering dependence on external entities can yield far-reaching consequences.

The Epilogue: A Blueprint for the AI Era

In conclusion, India's post-independence blueprint for development emerges as a beacon for the AI epoch. Nations are urged to invest assiduously in education,

infrastructure, and healthcare, thereby empowering their citizenry in a world increasingly shaped by the omnipresence of AI. The collaborative nexus between the public and private sectors is imperative to ensure equitable access and shared benefits.

The saga of Economics , Colonialism , and the March towards AI is a narrative of tenacity, adaptability, and the transformative might of Economics in shaping a nation's destiny. As we tread into the AI-driven future, the past beckons with sagacious lessons. By unriddling the intricate relationship between economics and colonial rule, we can conjure a more equitable and prosperous future, one where AI catalyzes advancement and shared prosperity, echoing the dreams of a free India following the demise of colonial rule. The echoes of history summon us to be the architects of an era where AI fuels progress and well-being for all.

Oceans and AI: Path towards a sustainable earth

Sivapriya C B | Miranda House, Delhi University

"We are living on this planet as if we have another one to go to." - Terri Swearingen

Life on Earth would not be sustainable if it weren't for the major contribution of the oceans. They cover over 70% of the planet's surface and are home to countless marine species, many of which are undiscovered. The oceans play a critical role in our lives, providing us with food and resources, regulating our climate, producing oxygen, and absorbing carbon dioxide. Protecting them from their slow deaths should be our foremost concern.

Focusing on a few of the challenges that have been slowly costing the lives of marine species and the slow but steady disintegration of the oceans' ecosystem would help us traverse through the process of leaving behind a sustainable earth. The challenges primarily include Marine Spatial Planning (MSP), which deals with the sustainable management of ocean resources; ocean carbon capture planning, which involves removing carbon dioxide from seawater and making space for it to absorb more to tackle climate change; and Ocean pollution, which involves littering the ocean's surface with plastics, events of oil spills, industrial runoff, untreated sewage, etc.

This is where AI comes into the picture by helping combat the aforementioned challenges to preserve the ocean's economy as there are roughly three billion people depending on it for their livelihood. There are other primary methods that mankind has

been using to save the oceans. However, manually picking up litter from the oceans is not feasible and is highly time-consuming, along with other measures that are needed to conserve them. As long as the disintegration moves at a faster pace, the sustainability plans need to move at an even faster pace. AI helps in designing these much-demanded solutions by using image processing algorithms, machine learning, sensors, drones, satellite data, etc.

AI applications can be developed and explored for planning and optimizing ocean-based carbon capture initiatives. It involves processes of analyzing ocean currents, economic feasibility, and carbon sequestration potential. Using AI for marine spatial planning includes optimizing MSP, and considering factors like shipping routes, offshore energy installations, and conservation areas. This can help balance economic activities with the conservation of marine ecosystems. There are AI systems implemented to monitor ocean health, including water quality, temperature, and biodiversity. This data can inform economic decisions related to industries dependent on a healthy ocean ecosystem.

Marine spatial planning

As the population continues to grow, so does the demand for resources from the ocean. The Blue economy has been sustaining human life with various activities for a very long time, and it has around 40% of the population depending on it. Marine Spatial Planning is the process of managing human activities in the ocean in a way that maximizes the benefits of marine resources. MSP is a concept primarily based on scarcity. It involves efficient allocation of the resources available and minimizing conflict by extension.

Marine resources and services are difficult to measure. The properties of marine systems are complex and poorly understood (Groenevald 2020). MSP helps in tackling these issues to some extent. It often includes services for exploring areas of deep seas and offers a practical way to create and establish a more rational use of marine space and the interactions among its uses.

AI-driven marine spatial planning can also help in identifying areas suitable for renewable energy production. It might be used to check the viability of offshore wind farms from satellite imagery and oceanographic surveys. It can also help in monitoring the ocean's health by assessing the quality of coral reefs, and intensity in case of oil spills. One of the prominent tools is the Seahawk Flying Submersibles. These are drones that can go both airborne and underwater. It has the ability to survey areas from both above and below the surface. It has the ability to process data in real-time information which implies that it can collect better data, cheaper, and faster than existing tools. Another promising one with exemplary results is the drones by Apium Swarm Technologies founded by Tyler MacCready, a former engineer and scientist for AeroVironment. The company has created underlying software that enables control of multiple autonomous surface vehicles or even diving vehicles at any time. It makes data collection more effective because it can take area snapshots coordinated with other vehicles when everything is constantly moving because of tides, sea floor changes, and differences in water makeup.

Global Fishing Watch uses satellite-based monitoring to track all fishing vessels in real-time to protect fisheries around the world. It collects satellite imagery and analyzes vessel movements with special machine learning to detect whether they are

fishing or sea-fearing. It helps to keep an eye on key trends, such as frequency, and monitor if any fishing boats venture into protected waters.

MSP integrates stakeholders and scientific knowledge from marine conservation, climate change, and regional development into the planning and decision-making process on how we use our oceans. AI helps to identify the best strategies for managing marine ecosystems, identify areas of high ecological value, like habitat for endangered species, and monitor the effects of development activities on the marine environment. The tools already in action include AI-powered sensors that can detect changes in water temperature, salinity, the presence of pollutants, and oxygen levels. It also helps in making informed decisions on how to manage developmental activities in order to minimise their impacts on marine life.

Conservation of marine species

The sound of whales has been evident in calming down human beings and helping with anxiety. These could not be recorded without the help of underwater microphones and AI which has been programmed to separate the noise of these mammals. The most prominent recording of the voices of whales by Roger S. Payne titled, “Songs of the Humpback Whale”

is credited with generating a vast emotional response and one of the greatest mammal conservation movements, per The New York Times.

Underwater microphones have been used to record the sound of healthy coral reefs to restore the dying ones. These have been very helpful in restoring habitats that had been destroyed by climate change earlier. Recently, marine scientists on Goa's coral reef in India recorded a reef and plugged the sounds into an algorithm that immediately identified the species. Researchers have used AI to map the movements of pink dolphins in the Amazon River by recognizing the animal's unique clicks and whistles. Acoustic tracking technologies have helped widely in the conservation of this species.

Also, Google has teamed up with Queensland University to create a detector powered by machine learning, which can automatically identify sea cows in ocean images. This detector can save time, energy, and resources to spot the animal easily instead of going through thousands of aerial photos.

These are some of the ways in which AI has been helpful in restoring the marine ecosystem. Saving these marine animals from going extinct plays an important role in the cycle of nature, and the preservation of their habitat will ensure a sustainable earth for us to live on.

Ocean carbon capture planning

Although this field is currently under development and not very prominent, it plays a chief role in the marine environment. This carbon capturing actually provides us with a way to rectify our mistakes due to the impacts caused by excessive climate change. In this particular field, AI helps by assisting in carbon tracking. Image processing algorithms are used to detect the carbon output of factories and power plants. Knowing the carbon output would help in calculating the impact of the damage caused. Satellite data is used to monitor and track these carbon emissions globally. Apart from this, it

also helps in predicting future emissions through machine learning. This helps government policymakers plan emission output targets to reduce future output. Scientifically, AI helps in carbon separation. Methods to separate the molecules are being developed. Though this seems to be in its rudimentary stage, AI has been moving at a faster pace than others and will soon result in making this a globally feasible method to combat climate change.

In partnership with Microsoft, The Nature Conservancy has combined traditional academic research with cloud and AI technologies to map, in high resolution, ocean wealth. By evaluating the economic value of ocean ecosystem services, such as carbon storage and fishing activity, it will make better conservation and planning decisions possible.

Ocean pollution

Ocean pollution is a combination of chemicals and trash, most of which comes from land resources and is washed or blown into the ocean. There are numerous incidents of whales washing up on the shores because they have died of swallowing the microplastic that litters the surface of the ocean. Apart from plastic littering and debris, marine life also faces threats due to untreated sewage, industrial runoff, and events of oil spills. Processes like offshore drilling cause severe harm to the animals due to the excessive noise it releases and also the extraction of fossil fuels. These are often fueled by urbanization and development and cannot be stopped completely. The only way to keep sustaining the shoreline community with their livelihood is to clean the debris collected everywhere and this will have a serious impact because as already mentioned, all of human life depends on the ocean in one way or the other.

Ocean Cleanup is a non-profit organization that uses AI to track and identify plastic pollution in the Great Pacific Garbage Patch. This organization has come up with machine learning and drone technology that can detect plastic waste hotspots, quantify marine litter and detect tiny plastic pieces floating in the ocean. It has powered machine learning to identify pollution in rivers and simulate how it moves in the ocean. It powers passive cleanup systems to help remove plastic.

Autonomous Surface Vehicles (AUVs) and Unmanned Surface Vehicles (USVs) are some of the mainly developed cleanup technologies with the help of AI. USVs collect commercial ocean data on the surface and map the seabed for environmental monitoring. AUVs collect data from specific parts of deep oceans while scientists conduct research on board a ship or on land. These vehicles are cost-effective to some extent and help in marine litter detection.

Sustainable Coastlines from New Zealand have created a national litter database to track the impact of cleanup efforts and generate accurate, scientifically valid data and insights for further use. Their main focus has been to identify sources, causes, and solutions to coastal pollution, along with community empowerment.

Scientists at the Plymouth Marine Laboratory used satellite data to detect patches of tiny plastic pieces down to 5 millimeters in size. They observed that materials can be distinguished using light signals based on the wavelengths of light they reflect. The algorithm was trained to detect these wavelengths along with distinguishing them from natural materials like seaweed, seafoam, and driftwood.

Similarly, at the University of Barcelona, researchers have developed an aerial imagery algorithm for detecting marine litter. The algorithm was trained to analyze 3800 aerial images of the Mediterranean Sea and used networks to improve its accuracy over time.

Marine waste cleaning startup ClearBot has designed robots that leverage AI-powered computer vision to identify marine waste and retrieve it to responsibly dispose of it. ClearBot is a marine trash-collecting drone that is solar-powered and self-navigating with AI vision that uses machine learning to optimize its capability over time.

We have a long way to go before the oceans are free from plastic and debris collection. But these AI tools can definitely help us get there faster to ensure a sustainable earth.

Conclusion

For life to continue on Earth, we must take preserving the oceans very seriously. And with the time crunch we are facing and a growing population, AI can definitely help us control the amount of damage we are inflicting on the oceans. The article has discussed various AI tools that are being used and are under development to help save the ocean.

But the main point lies in whether we are ready to be responsible for our actions and help save marine life. Oceans have always been connected to humans since the dawn of time. We have discovered continents, survived two World Wars, and now the global pandemic! Throughout all of man's inquisitiveness, the oceans have been with us. And it is only fair to leave it the same way we found it for future generations to come. We can definitely find more sophisticated AI tools in the future. But being responsible is the only way forward to a sustainable earth, because we're not sure of Planet B either. Technologically, AI will help us, but the responsibility comes from within!

Exalting AAPOORTI: the Citadel of Economic Acumen, and the Illustrious Academia of Miranda House

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In the venerable halls of academia, where intellect and sagacity converge, Aapoorti, the annual economics journal of Miranda House, holds a paramount position in the heart of a final year student who is on the brink of bidding adieu to the esteemed Economics department. This department has served as an intellectual haven, a sanctuary away from home, a place where profound scholarly connections were cultivated, and enduring friendships were nurtured.

Aapoorti, with its treasury of erudition in Economics, replete with intricate charts, comprehensive articles, and analytical insights, has been an unwavering companion throughout their academic odyssey. The journal's pages have served as a wellspring of enlightenment, adeptly steering them through the labyrinthine complexities of economic discourse.

Miranda House, ensconced in the heart of Delhi, has been a citadel of erudition and enlightenment. The Economics department, with its distinguished faculty and a vibrant milieu teeming with intellectual ferment, has been a wellspring of inspiration and enlightenment. The departing student shall yearn for the invigorating lectures, stimulating colloquies, and the scholarly ambiance that has been instrumental in shaping their profound comprehension of Economics.

As we approach the culmination of this pivotal chapter in their academic sojourn, we fondly reminisce about the myriad cherished memories, the rigorous intellectual debates, and the profound insights we've accrued. Aapoorti, Miranda House, and the Economics department have indelibly woven into the tapestry of our academic narrative. In the years ahead, we shall carry the indelible lessons and the enduring relationships fostered here as they venture forth into the vast expanse of the world, profoundly grateful for the intellectual and emotional maturation nurtured within this sanctum away from home.

articles

in collaboration with Ashoka University

This is a trilogy of collaborative articles between Miranda House and Ashoka University, based on the G20 summit, held in India, in September 2023.

This initiative was successful owing to the collective and collaborative efforts of editors and writers from both the institutions.

Editors-in-Chief, Aapoorti, Miranda House:
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G20 and Gender Equality: A Roadmap to Women's Economic Empowerment

By Kuhuo Bajaj and Shreya Srikoti

Introduction

Gender equality has been a key focus of international discourse and policy-making for several decades. In the realm of global economic policies, the G20, composed of the world's major economies, has made significant commitments to reduce gender

disparities in labour force participation, employment quality, and overall economic empowerment. However, despite these commitments, disparities persist in various forms across G20 nations. In this article we delve into comparative analysis of women's labour, review key G20 declarations and initiatives related to gender equality, and suggest ways in which the G20 can further advance women's rights in employment, social protection, and fiscal policies.

Significance of G20

The G20, representing a significant global economic forum, comprises nations contributing to 85% of the world's GDP, 75% of global commerce, and approximately two-thirds of the world's population. This positions the G20 uniquely to lead initiatives that advance female labour force participation, reduce gender disparities, and drive economic growth. Efforts have been made within the G20 to bridge the gender gap in labour force participation, setting a goal to reduce it by 25% by 2025 during the Brisbane summit in 2014. Additional commitments were made during the Riyadh summit in 2020 to further enhance women's employment standards. Several G20 nations have since implemented policies like lenient parental leave, pay transparency, increased minimum wages, and measures to combat workplace harassment against women. However, the pandemic response has largely been gender-neutral, necessitating targeted interventions to meet the Brisbane objective and improve job quality for women.

Key G20 Declarations and Initiatives

The inclusion of women centric policies and agendas in G20 started with the monumental Brisbane Summit in 2014 where G20 leaders pledged to reduce the gap in labour force participation rates between men and women by 25% by 2025, with the aim of bringing 100 million women into the labour market, increasing global and inclusive growth, and reducing poverty and inequality. The idea of developing a roadmap to achieve this goal was introduced in 2020, Riyadh Summit and the actual roadmap was developed in 2021, Italy Summit.

The roadmap was to build upon the G20 Policy Priorities for Boosting Female Participation, Quality of Employment and Gender Equity (Australia, 2014) and the G20 Policy Recommendations to Reduce Gender Gaps in Labour Force Participation and Pay by Improving Women's Job Quality (Germany, 2017). It encompassed agendas like increasing the quantity and quality of women's employment, ensuring equal opportunities and achieving better outcomes in the labour market, promoting a more even distribution of women and men across sectors and occupations, tackling the gender pay gap, promoting a more balanced distribution of paid and unpaid work between women and men and addressing discrimination and gender stereotypes in the labour market. Targeted and executable policy suggestions were detailed in the roadmap so that the local policies of Member States could easily draw from them.

Another key initiative is the Antalya Youth Goal declared in the Turkey Summit in 2015. G20 Leaders agreed to the aim of reducing the share of young people who are most at risk of being permanently left behind in the labour market by 15% by 2025 in G20 countries. Across G20 economies, the gender gap is higher for the age group 25-29,

which is related to caring responsibilities for young mothers and greater responsibilities more generally for household duties for young women than for young men. This was also reflected during the COVID-19 Pandemic in the healthcare sector where women are over-represented as frontline health workers, in the most vulnerable sectors of the informal economy, and they also continue to undertake the majority of unpaid work. In 2019, due to the impact of the COVID-19 pandemic on the global economy, the process of reducing gender inequalities slowed down. Evidence from many countries shows a disproportionate impact on women, especially those who are younger, low-skilled, or from ethnic minorities. The Antalya Youth Goal aims at addressing this issue.

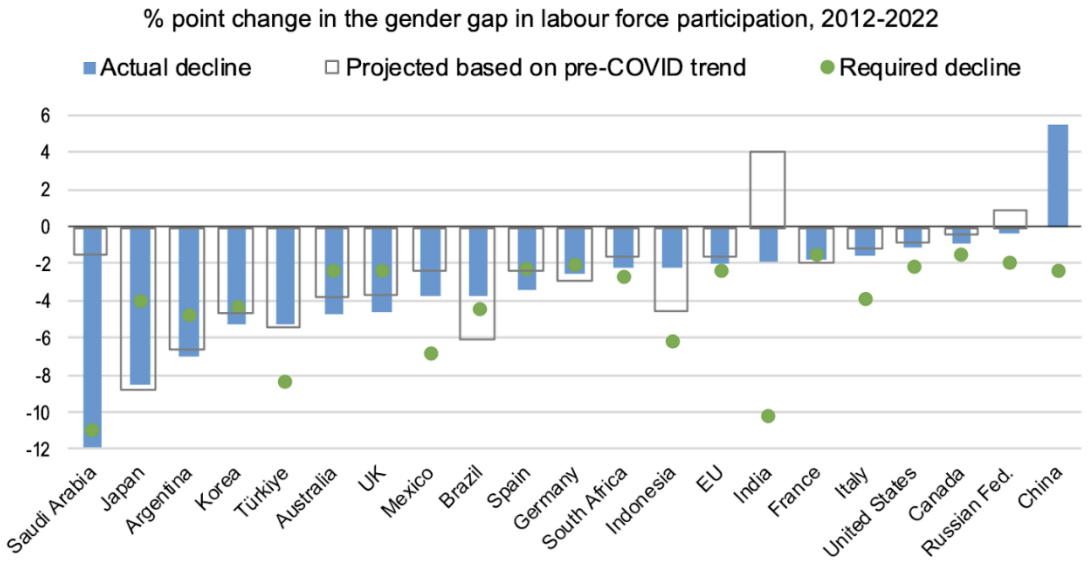
In 2019, during the Japan Summit, the EMPOWER Alliance also emerged as an important milestone declaration. The G20 Alliance for the Empowerment and Progression of Women's Economic Representation (G20 EMPOWER) is accelerating women's leadership and empowerment in the private sector. It does so by leveraging its inclusive and action-orientated vision and its unique partnership model, as G20 EMPOWER is the sole G20 entity that brings together over 60 business leaders and governmental representatives to advance a common goal. It focuses on 3 key areas: monitoring trends in the advancement of women in leadership roles; formulating diversity-centric, inclusion-centric and equity-centric policies and enablers to address systemic barriers surrounding the advancement of women; and addressing gaps in the availability, adoption and implementation of programs aimed at providing women with the skills and qualifications needed to meet and lead the technological, digitalization and sustainability challenges of the future.

India's G20 presidency coincides with a critical period of global economic recovery post the COVID-19 pandemic, necessitating increased female participation in the workforce. Collaborative G20 policy initiatives can address the unique challenges faced by women, including those related to childcare, pandemic-affected industries, mental health, and abuse. Enhancing women's workforce engagement and improving job quality are crucial for sustainable economic growth and achieving the UN's Sustainable Development Goals. The G20 nations have a vital role in leading international efforts in this domain.

Comparative Analysis of Women's Labor Market Participation

Promoting women's empowerment and ensuring equal opportunities in a diverse and inclusive workplace environment are essential for fostering sustainable economic growth. Currently, the global labour force participation rate for women stands at just below 47 percent, while for men, it is notably higher at 72 percent. Women’s labour force participation rate in some G20 countries is alarmingly low. For instance, India’s rate is 23 percent, Saudi Arabia’s is 28 percent, Turkey's is 33 percent, and Italy’s is 40 percent. From an economic perspective, addressing gender disparities in labour force participation has the potential to make a substantial positive impact on global GDP. The limited representation of women in the workforce can be attributed to a complex interplay of societal and cultural factors that influence and restrict opportunities for women's economic involvement. Nevertheless, several significant challenges persist across numerous G20 countries in this regard.

Figure 4. Progress in reaching G20 Brisbane goal has been set back by the COVID-19 pandemic



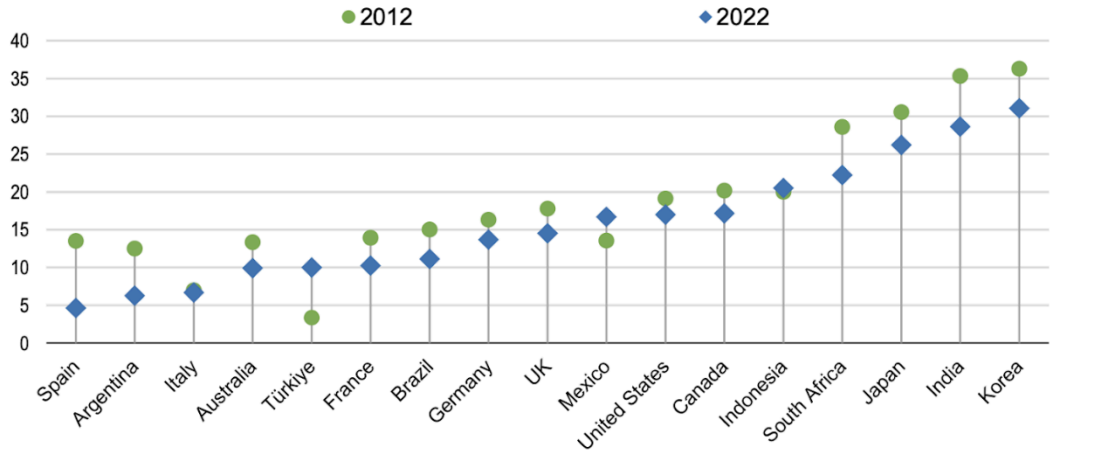
Unequal pay: Across all G20 economies, women consistently earn less than men on average. When we consider the median earnings of full-time workers, it becomes evident that women earn approximately 30-35 percent less than their male counterparts in countries like India and Korea. However, in France, Turkey, and Italy, the disparity is much smaller, with a pay gap of 10 percent or less. Furthermore, in many nations, the wage difference between men and women becomes even more pronounced when accounting for gender-related variations in paid employment, such as differences in educational attainment. This poses a significant barrier to encouraging women's active participation in the workforce. Reducing the pay gap is crucial for improving female participation in the workforce as it would provide women with greater economic security and incentivise them to participate more actively. It would also foster gender equality, leading to a more diverse and inclusive workforce.

Gender disparity in employment: Gender disparity in employment refers to the difference in employment rates between men and women. Barriers to entry and

progress are more likely to affect women. Women who want to work often struggle more than men to find gainful employment. The unemployment rate for women is still higher than the rate for men in about half the G20 economies. The gender gap in employment rate is at 4.2 percent in Argentina, 5.8 percent in Brazil, 2.5 percent in Italy, 3.9 percent in South Africa, 3.3 percent in Turkey and a whopping 17.9 percent in Saudi Arabia.

Figure A1. Gender pay gaps remain substantial

Difference in median full-time earnings between men and women as a % of the level for men, 2012 and 2022



Impact of COVID-19 crisis: Significant strides had been made in increasing women's workforce participation across G20 countries prior to the outbreak of the COVID-19 pandemic. However, the pandemic exacerbated gender disparities within the workforce. Women's jobs were seen to be 1.8 times more vulnerable during this crisis as compared to men. They accounted for 54 percent of all job losses during the COVID-19 crisis. Globally, women lost 64 million jobs in 2020, a 5 percent loss in employment as compared to 3.9 percent for men. Even in most G20 nations, women were disproportionately hit by job and working-time losses. In countries like Canada, Mexico, Spain, and the UK, employment of women in the workforce in 2021 remained well below pre pandemic levels. Similarly, in terms of the number of hours worked, women faced a greater shortfall than men in many G20 nations, especially in Canada,

Mexico and Spain. These alarming statistics reflect that the economic fallout of the pandemic is harsher on women than men. Women are majorly employed in informal and precarious sectors like retail, tourism, and food services and often receive much lower salaries. These sectors were disproportionately affected by the pandemic's impact, resulting in not only job losses but also reduced working hours and income for women.

Way forward

The G20 significantly influences economic and associated policies of member countries — notably those driving (or failing) SDGs. However, the G20 track record on implementing these commitments is weak, contributing to the slow progress and declines in equality; compared to 71 percent compliance for all issues, compliance for gender commitments averaged at only 62 percent. Moreover, follow-through is inconsistent among G20 nations, which reduces the coherence and integrity of the G20 and weakens overall influence on advancing the SDGs. Nations need to internalise G20 policies and embed them in their existing national policies. Merely agreeing to declarations on paper and not implementing them is doing more harm than gain. The gap between planning and execution needs to be bridged using some kind of checks and balances. Implementation of policies can have monitoring or accountability systems
which push Member States to act upon the declarations.

G20 nations should acknowledge and attribute value to unpaid care and domestic labour within their economies, concurrently introducing incentives and systems aimed

at mitigating the disparities linked to unpaid work. This can be achieved by developing or enhancing national and subnational accounting systems that more accurately acknowledge the contributions made by care and domestic work. Furthermore, it is crucial for all G20 countries to consistently invest in the care economy, which encompasses affordable and high-quality childcare, targeted social benefits for single-parent households (emulating the practices of Germany and Japan), the provision of paid paternity leave (following the examples of Italy and Turkey), and the reinforcement of labour laws that encourage men's participation in care work.

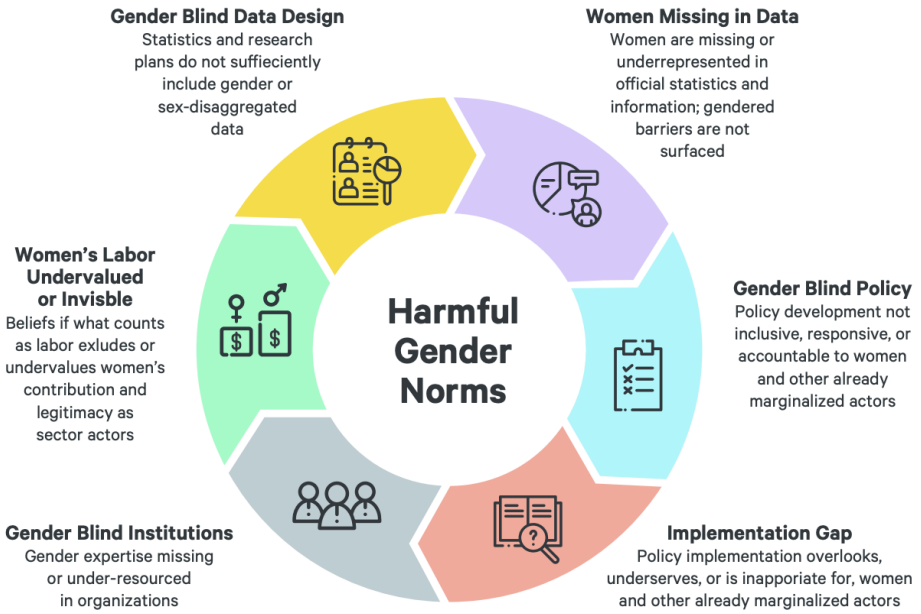
Figure 4: Gaps in gender budgeting practice in G20 nations

Source: Adapted from Alonso-Albarran et al., 2021,17

Gender budgeting is an essential strategy that recognizes the differential impact of government budgets on men and women. It incorporates a gender perspective into the budgetary process to ensure that governments are fully aware of how their financial choices affect gender outcomes. Facilitation and adoption of more systematic gender budgeting at both the national and subnational levels should be consistently institutionalised and applied.

It is important to engage with the informal sector and capitalize on pandemic innovations. These actions should be based on lessons learned regarding effective strategies to support favourable aspects of informal work, such as flexibility, while simultaneously mitigating risks associated with it. Special attention should be given to indigenous and young women, who are disproportionately exposed to the vulnerabilities and disparities associated with informal employment. Policy initiatives in this regard should include the protection of vulnerable workers, such as domestic workers in Argentina and self-employed individuals in Italy, measures to combat false subcontracting arrangements, as seen in Turkey, and the establishment of insurance provisions for home-based workers, as demonstrated in Indonesia. Additionally, it is essential to capitalize on innovations inspired by the pandemic, particularly by strengthening, adapting, and extending social protection systems to encompass informal employment.

Figure 3: Cycle of invisibility



Source: Adapted from McDougall et al. 2021, 4.43

Further, we need to break the 'cycle of invisibility' via data systems. G20 nations can demonstrate global leadership by accelerating the closing of pernicious gender data gaps. Global, national, and subnational statistical systems need to be assessed and updated to break the 'cycle of invisibility', ensuring that sex- or gender-disaggregated data are consistently generated—otherwise inequalities remain masked. Women are missing or underrepresented in social statistics and information thus gendered barriers do not surface. This leads to exclusive and unresponsive policy development. In response, policy implementation overlooks, underserves, or is inappropriate for, women and other already marginalised actors.

Conclusion

While the G20 has made significant strides in addressing gender inequality in global economic policies, challenges persist in achieving full gender equality in labour force

participation, employment quality, and economic empowerment. The declarations and initiatives outlined in this article demonstrate a commitment to advancing women's rights, but concerted efforts are needed to translate these commitments into concrete actions. By coordinating policies, investing in skills development, and addressing systemic barriers, the G20 can play a pivotal role in fostering a more equitable future for women in the global domain.

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An Analysis Of The Economic Impact Of India's G20 Presidency

By Prisha Visveswaran and Ekanshi Makheja

Introduction:

The 2023 G20 New Delhi summit was the eighteenth meeting of the G20. It was held at Bharat Mandapam International Exhibition-Convention Centre, Pragati Maidan, New Delhi on 9–10 September 2023. It was the first G20 summit held in India. The G20 presidency has historically been one of the main channels of boosting the export and development of a country via improving its soft power. This article analyzes the effect of the presidency on the domestic and geopolitical scale with the help of the Indonesian case study of the 2022 G20 held in Nusa Dua, Bali.

This article will analyze India's own USP with regards to the G20 presidency with special emphasis on the handicraft and tourism industry. We will also attempt to predict India's economic boost post the G20 using a case study of Indonesia's presidency in Bali.

Past history of Indian trade ties within the G20:

India boasts of a diverse multilateral treaty with several countries participating in the G20 summit. The main focus of talks like these is to diversify existing trade portfolios,

for which it is important to understand the current trade dynamics of India within the meet.

Japan:

India and Japan share a close friendship with a long history of spiritual and cultural affinity. Their civilization ties go back to the visit of the Indian monk Bodhisena in 752 AD. India and Japan established diplomatic relations in 1952. Since then, the relationship has transformed into a partnership of great substance and purpose. Today, Japan is regarded as a significant partner in India's economic transformation.

In recent years, the economic relationship between the two countries has expanded and deepened steadily. The trade volume has increased, with India being Japan's 18th largest trading partner whereas Japan was the 12th largest trading partner for India in 2020.

Major exported items from India to Japan include mineral fuels, mineral oils & products, bituminous substances, mineral waxes, and organic chemicals in FY21. Major exported items from India to Japan include marine products and petroleum products during April-November 2022.

Indonesia:

Indonesia is the 2nd largest trading partner of India in the ASEAN region. The bilateral trade between India and Indonesia increased from US$ 6.9 billion in 2007 to US$ 38.84 billion in 2023. Indonesia occupies the 33rd position in FDI equity inflows into India with a cumulative FDI of US$ 648.39 million (April 2000-March 2023).

Major exported items from India to Indonesia include petroleum products, motor vehicles/cars, sugar, ships, boats, floating structures, along with iron and steel in FY23. Major items imported by India from Indonesia include coal, coke, briquettes, vegetable oils, iron and steel, bulk minerals and ores, and cosmetics and toiletries, etc. in FY23. India and Indonesia are soon going to have real-time settlement and trading in local currencies, Senior Government Officials said on the sideline of the G20 Finance Minister Central Bank Governors' (FMCBG) meeting under India's presidency.

South Korea:

The Republic of Korea is the 13th largest FDI investor in India from April 2000 – September 2022. Metallurgy, automobiles, electronics, prime movers, machine tools, hospitals, and diagnostic centers are the top sectors that have attracted investment. As India's economic ties continue to grow with South Korea, the bilateral trade is likely to reach $50 billion by 2030. It was US$ 23.7 billion in 2021, up 40% from the preceding year. Major exported items from India to Korea include mineral fuels, mineral oils & products, bituminous substances, mineral waxes, aluminium & articles thereof in FY 2021-22. The period, April-November 2022, witnessed major exports of petroleum products, aluminium, and products of aluminium, etc, from India to South Korea. India's imports from Korea include electrical machinery & equipment & parts thereof; sound and TV recorders, reproducers and parts thereof, and Iron and steel in FY 2021-22.

To improve bilateral economic relations, India and South Korea are seeking to expand a Comprehensive Economic Partnership Agreement (CEPA), with an ambition to increase bilateral trade to US$ 50 billion before 2030. India is Korea's 16th most significant source of imports and 7th biggest export market as of 2021. The emerging strategic alignment between India and Korea is creating a new convergence of capabilities and closer synergy in new areas of economic cooperation such as public health, green growth, digital connectivity, and trade, among others.

Representation of traditional and handicraft sector in G20:

The G20 presidency for India presented opportunities to improve these existing ties and perhaps even form new ones due to the option of showcasing its art and culture and improving the country's geopolitical image. The summit itself presented several opportunities for local manufacturers and hospitality centers, which have the potential to increase future foreign interaction, primarily via tourism.

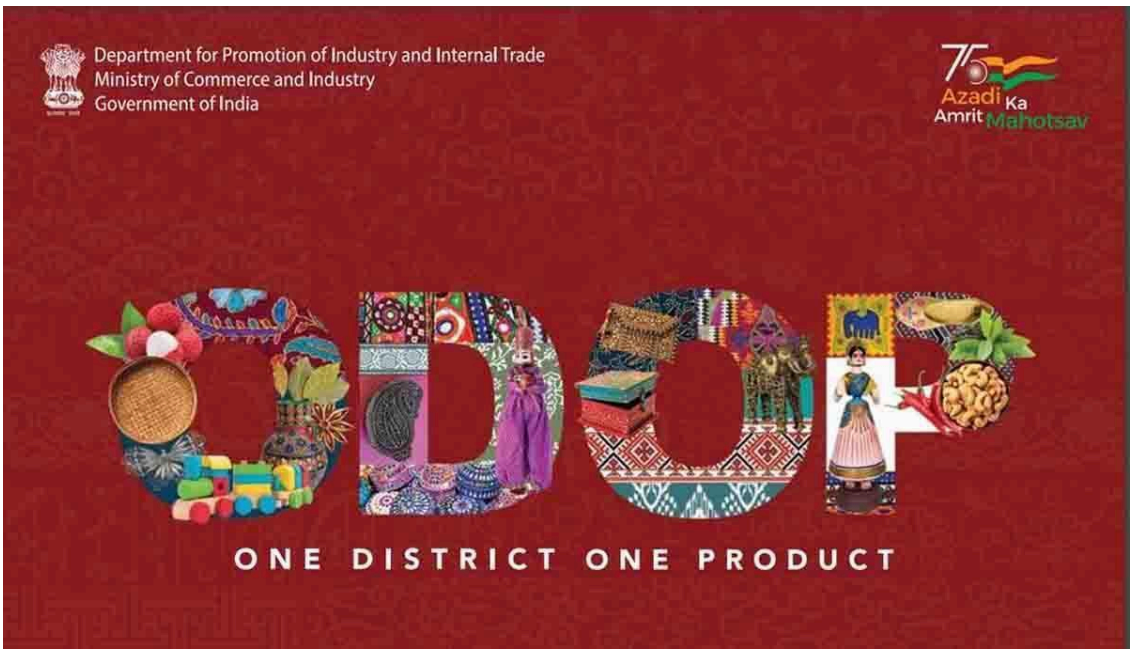
Local manufacturers:

The initiative under which all the locally produced goods were given a chance to be highlighted at the global level is One District One Product (ODOP), which led to the setting up of a Craft Bazaar. This Crafts Bazaar in Bharat Mandapam, Pragati Maidan, showcased handicraft products from different parts of India with a special focus on ODOP, GI-tagged items, and products crafted by women & tribal artisans. Delegates and international media participating in the Summit had the opportunity to visit this Crafts Bazaar and purchase locally sourced products. The Bazaar not only promoted

made-in-India products on a global stage but also opened up new economic and market opportunities for local artisans. To demonstrate the skills and exquisite workmanship of Indian artisans to international delegates, special live demonstrations by master craftsmen were also planned as part of the Crafts Bazaar. The exhibition was organized by the G20 Secretariat in coordination with the Ministry of Textiles and State/UT Governments. Around 30 States and UTs as well as Central agencies like Khadi Village & Industries Commission, TRIFED, and Saras Ajeevika participated in the Crafts Bazaar.

The ODOP (One District – One Product) Initiative is aimed at manifesting the vision of the Prime Minister of India to foster balanced regional development across all districts of the country. The idea is to select, brand, and promote One Product from each District of the country to enable holistic socioeconomic growth across all regions. The range of the chosen products varies across the length and breadth of the country while also touching upon multiple sectors with existing clusters and communities that have already created a niche identity for themselves. The ODOP Team at Invest India is working towards realizing this dream of New India for all its 761 districts.

Additionally, the National Gallery of Modern Art in Delhi hosted an art exhibition titled 'Roots and Routes' for the spouses of the delegates. This exhibition showcases Indian textiles, decorative items, and artifacts, offering a glimpse into the rich tapestry of Indian culture.



The Ministry of Tourism put its best foot forward and showcased the cultural heritage and culinary delights of India. As part of this, G20 delegates were shown live demonstrations of the making of local art and crafts by artisans. Self-reliant villages, community empowerment, encouraging youth entrepreneurship, success stories and models, opportunities, and issues in rural tourism were a few key points deliberated during a panel hosted on day 1 of the G20 Tourism Working Group Meeting in Gujarat. The Union Tourism Minister GK Reddy also emphasized that travel and tourism must be looked upon as a lever to enable, empower, and employ.

Case study: Indonesian G20 presidency and its economic impact

The G20 meeting in Indonesia hosted thousands of delegates from G20 member countries and invited guests who regularly attended meetings in various cities, fresh out of the COVID-19 pandemic. The Minister of Finance, Sri Mulyani Indrawati, estimated that the G20 event will create a contribution of US$530 million or around US$7.4 trillion to Indonesia's GDP, increasing domestic consumption by up to US$1.7

trillion. The Minister of Tourism and the Creative Economy, Sandiaga Uno, said that the soccer schedule event would contribute to the projected increase in foreign tourists fromUS$1.8 million to US$3.6 million and 600,000 to 700,000 new jobs supported by good performance in the culinary, fashion, and tourism sectors. The series of G20 activities in Indonesia itself involved MSMEs and absorbed a workforce of around 33,000 people. It encouraged investment in domestic MSMEs, considering that currently, 80% of global investors come from countries that are members of the G20. Demonstrating the success of structural reforms potentially increased global investor confidence.

The impact of the G20 on Indonesian MSMEs

The G20 presidency in Indonesia was an opportunity for Indonesian Micro Small Medium Enterprises to showcase their quality and promote themselves so that they get adequate recognition and successfully penetrate the global market. The Ministry of Cooperatives and SMEs curated superior products through a number of promotions for many G20 side events in order to improve their fictitious “revealed comparative advantage” and boost exports. This event had a positive impact that was felt by MSME business agents as well.

Firstly, the G20 presidency had a direct impact on the economy by increasing the country's currency revenue. More than 20,000 international delegates including previous experiences of presidencies under Turkey, Argentina, China, and Japan showed positive effects for their respective countries. The number of visits by international delegations was recorded at more than thirteen thousand. It is also estimated that each G20 summit generates more than US$100 million in revenue for

the host country. Secondly, as President of the G20, Indonesia was able to encourage cooperation and achieve concrete results in three priority areas that are strategically important for recovery. This helped Indonesia gain global credibility and trust. In diplomacy and foreign policy, credibility is a very valuable asset. Lastly, in the field of sustainable economic and social development, the G20 presidency indicated that "Indonesia is open for business". The various exhibitions and events showed the growth and potential of Indonesian investment in Indonesia.

Lessons for India and conclusion:

As seen in the Indonesian case, an impact assessment of the G20's direct boost to the domestic economy in the short term would not be a farsighted way to estimate its effects on economic development. Development is an intricately linked process that is dependent on several factors, one of them being a country's soft power and potential to trade. Inviting foreign dignitaries to the host country could not have any potential

negative impact, but the way the host country utilizes this opportunity could have massive effects on the growth in trade and multilateral ties. Having the crafts bazaar and hospitality industry showcasing one of India's best service and manufacturing sectors, has the potential to boost India's current soft power. The image that it presents to other countries, with potential investors, is crucial to the geopolitical growth and development of each sector. A growth trajectory akin to that of Indonesia can be statistically mapped out with the availability of data in the future.

Thus, the G20 New Delhi summit 2023, showcased India's growing influence and economic prowess on the global stage. It provided a platform to strengthen diplomatic ties, diversify trade relationships, and promote India's rich cultural heritage. The success of the Indonesian G20 presidency serves as an encouraging case study, emphasizing the potential for economic growth, global recognition, and enhanced diplomatic relations that hosting an international summit can bring to a nation.

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The India-Middle East-Europe Economic Corridor: Prospect and Developmental Impact

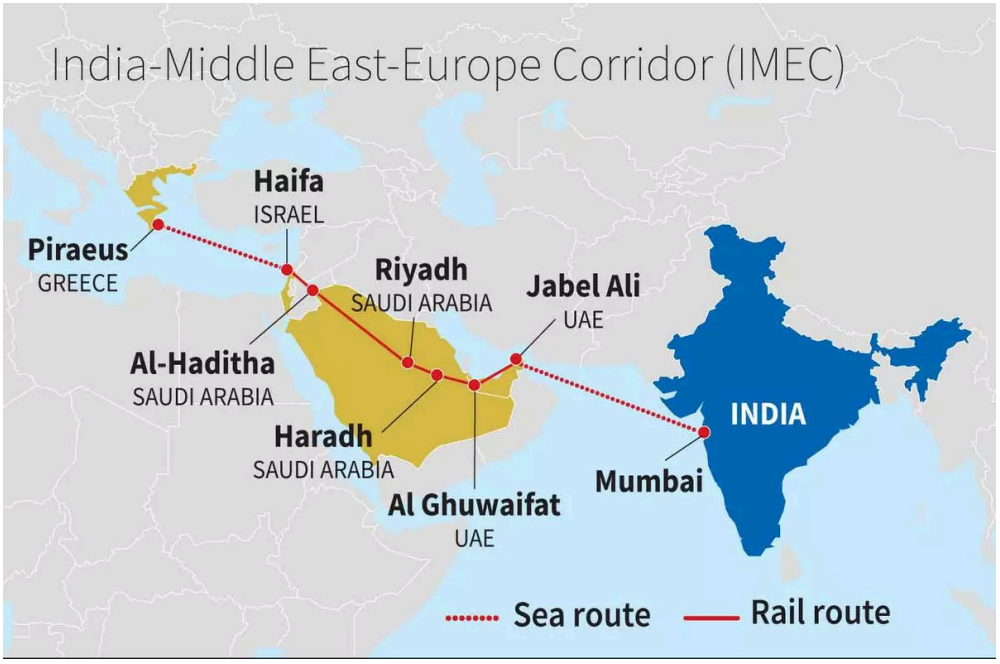
By Raunaq Bawa and M. Tharuni

India's diplomatic milestone, the G20 Summit 2023, has been able to successfully achieve consensus over several climate change, green development, digital public infrastructure, taxation etc. However, a significant outcome that envisioned a network transportation route encompassing railways and sea-lanes, is remarkable. Well, delving deep into this, and understanding the objective between the initiation of such a trade route, implications for India, and exploring how would one compare with a similar major initiative undertaken by China, is indeed, an intriguing endeavour!

Background and the Objectives of the IMEC

The IMEC, or The India-Middle East-Europe Economic Corridor, was announced at the sidelines of the G20 summit in September 2023. This project is officially under the Partnership for Global Infrastructure Investment (PGII), a G7 initiative that seeks to fund infrastructural development in the developing world. The corridor will include extensive linkages across the three regions (including India, Saudi Arabia, Israel, and Europe, among others), including a rail link, an electricity cable, a hydrogen pipeline, and a high-speed data cable. This historic economic trade route was agreed upon by the world leaders, the signatories to which involved India, Saudi Arabia, the UAE, Israel, Jordan, and the European Union. Not only will linking Europe, the Middle East and India

make it the most direct connection between these countries, but this corridor will also stimulate economic development through enhanced connectivity and economic integration between these regions.



Source: *The Hindu Business Line*

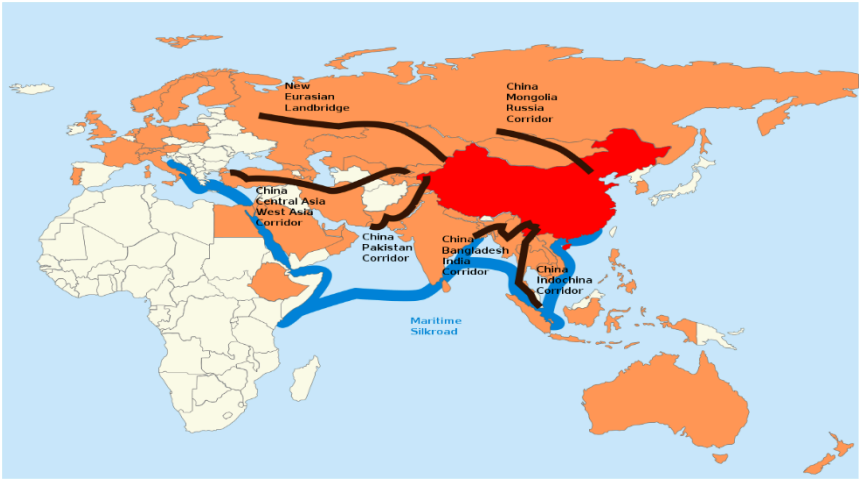
This an immensely ambitious project in terms of its scale, geographical coverage, and multiple modes of connectivity. Why is it being proposed, and what do the participating states hope to get out of it?

US President Joe Biden's adviser, Jon Finer, outlined three major reasons for the attractiveness of this deal:

1. Benefits arising out of faster energy and digital communication flows
2. Addressing the infrastructural needs of developing countries
3. Mitigating the socio-political turbulence in the Middle East

In the meanwhile, US and EU officials are hailing the deal claiming that it will allow India and Europe to cut their trade time by 40%, thus reducing costs, saving energy, increasing trade, and energising economic development. Furthermore, Saudi Arabia's state news agency emphasised the project's utility in strengthening energy security internationally.

Finally, an unstated but widely recognised purpose of this project is to act as a counterweight to China's Belt and Road Initiative, also a global infrastructure connectivity project:



Source

In 2013, China unveiled the Belt and Road Initiative (BRI) to the world as a massive infrastructure plan, inviting over 100 nations to participate and act on it. The People's Republic of China's Belt and Road Initiative, or BRI, is a strategy that aspires to connect Asia with Africa and Europe via land and sea networks in order to strengthen regional integration, increase commerce, and stimulate economic growth.

As the initiative progressed, the negative consequences became apparent. Volumes of Chinese state-led BRI lending has been declining since 2019. Many of the developing

countries that took part in the initiative encountered a lack of resources and saw their debt grow as a result of the massive investment in this initiative. For instance, it has countries like Pakistan, Bangladesh, Congo and Sri Lanka in debt.

So far, the Chinese have made the project unsustainable and then demanded political concessions in exchange for financial aid. Several countries have either abandoned or stopped certain projects in association with the BRI For instance, investments under the project required the use of China's firms which inflated costs, making it infeasible for the countries. Those countries who were unable to repay their loans were forced to make strategic compromises, which led countries like Pakistan to secure a deal with the International Monetary Fund, in order to move away from the brink of economic collapse. Zambia has already cancelled its foreign loans with China, to stop aggravating its debt distress. As a result, 14 projects under the BRI were withdrawn.

The IMEC is a new opponent and a counter to China's BRI.

Developmental Implications for Indians

An essential question that must be addressed regarding such a project–with obvious geopolitical motives behind it is: can we be sure it economically benefits the partnering states, and more importantly, their populations? Such criticisms have been levelled at China's BRI in the past, wherein the project has been characterised as being an instrument to ensnare lower income countries into a Chinese 'debt trap'. However, there may be reasons to feel optimistic about the IMEC project, given the nature of the interconnecting infrastructure being proposed.

For starters, the rail link is likely to speed up trade between India and the countries of the Middle East and Europe. One can be hopeful that this link increases export demand in the country, leading to much-needed creation of jobs and businesses, big and small. The Indian government will have to of course make conscious efforts to ensure these new export opportunities not only serve the interests of large producers, but also those of medium and small enterprises, entrepreneurs, farmers, and cooperatives. Internal initiatives for upskilling, credit creation, and internal infrastructural connectivity will go a long way in complementing the benefits of the IMEC rail link. European and Middle Eastern trade is a largely untapped market for India, given a historical denial of land connectivity in the West due to India's tensions with Pakistan. The sudden opening of this land-based link will be economically unprecedented, and all sectors of the Indian economy should be prepared to leverage this opportunity. Similarly, the IMEC's electricity cable will also act as a capacity booster for Indian industry, considering the high demand strain on India's electricity grid by consumers and producers.

Secondly, and very significant to India's sustainability efforts, is the hydrogen pipeline. The Indian government recently announced the National Green Hydrogen Mission, as per which it envisions the country's hydrogen production capacity to reach 5 million megatons (MMT) by 2030. The mission places a clear emphasis on generating demand through domestic consumption and exports of green hydrogen. To this end, the IMEC's proposed hydrogen pipeline will be invaluable in further aiding India's efforts to scale down fossil fuel usage and promote renewable and clean energy in the form of hydrogen. This is essential if India is to reach its climate change commitments and will

also benefit the economy by giving rise to a completely new sector, with countless opportunities for agriculture, manufacturing, and services.

The completion of the railway line under this deal will create a dependable and cost-effective cross-border transit network to supplement the current multi-modal transport routes, while also improving the transshipment of products and services between Southeast Asia and creating employment opportunities within the manufacturing sector in India.

Thus, in a nutshell, the IMEC takes a very different strategy compared to China's BRI. The significance of IMEC, if perfectly implemented, is nothing short of monumental. This effort is supported by some of the world's most powerful governments, and it has the potential to expand connectivity to other nations through effective partnership. The BRI is intended to serve China's interests, but the IMEC is intended to benefit everyone in the region. While the BRI aspires to create jobs primarily for Chinese enterprises, the IMEC focuses on creating jobs for the local community.

However, there are a host of questions that this project still raises, with respect to its feasibility, efficacy, impact, and development path. Firstly, and most significantly, looming over the project is the spectre of the freshly outbroken Hamas-Israel war. This full-fledged conflict has now taken precedence in Israeli priorities, and its participation in the IMEC will be contingent on the time and outcome of the war. Further, the Hamas attack has the overt objective of destabilising the ongoing normalisation process between Saudi Arabia and Israel, of which the IMEC is an important part. As Saudi

Arabia faces pressures from its domestic population for standing by the Palestinians, its commitment to normalisation with Israel, as well as to the IMEC will be tested.

Secondly, even controlling for the effect of the Israel war, the feasibility of the IMEC cannot be taken for granted. After all, even the much-touted BRI saw its own share of difficulties, as any large project would. To what extent is executing such a multi-regional, multi-partner project possible, especially with disparities in economies, polities, and regulatory regimes? Will the required investments–economic, social, and political–be forthcoming from all sides? Or was the declaration of the IMEC merely a short-term political ploy for election-bound US and India? Without discounting the merits of this ambitious project, it is unlikely to know what the future holds.

Finally, on a more optimistic note, it is encouraging to imagine the new and heretofore unprecedented possibilities arising from the successful implementation of such a project. For one, the economic opportunities arising for individuals and businesses of all scales in the participating countries look bright. Further, the potential success of such a project, and even the initial declaration of its intent, is a positive sign of multilateral and multiregional cooperation in an otherwise fraught and fragmented world. The IMEC is an expression of some much-needed pragmatism, where formerly bitter relationships (Israel and India, Israel and Saudi Arabia, and Saudi Arabia and India), have given way to peaceable and mutually-beneficial cooperation, promoting economic, technological, sustainable, and peaceful growth.

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IN CONVERSATION WITH:

MS. ADITI ROY BHOWMICK

Aditi is an accomplished first-year PhD student in Public Policy at Harvard Kennedy School, specializing in Economics. Previously, she served as the India Director for Development Data Lab, where she co-authored several research studies and spearheaded the development of a gender research agenda.

Aditi's interest in development economics research was piqued during her work on education and childhood development programs in India.

Editor: In India, we observe a trend of increasing centralisation of social sector schemes. This is parallel to the increasing emphasis on collecting disaggregated data and going down to the district level. What implications does this have for policy makers given that data provides a more effective source for evidence backed and targeted policy making, however the schemes are being increasingly formulated with the centre in mind?

Aditi Roy Bhowmick: I think the response to this question would be amiss without talking about the political economy first. We talk a lot about evidence-based policy but that's actually not how policy is formulated. Policy is not made based on a neat assessment, or some study that happens based on a census or a sample survey. That's not how it happens, irrespective of which government party is in power, it is broadly aligned on development priorities. There should be a minimum standard of health and education services so there is no kind of disagreement of facts, but the disagreement comes in terms of how much budget is going to go to specific priorities and ultimately it comes down to how much finance or revenue is available to individual departments to implement their objectives.

No one disagrees that all of the things they want to do are important but then there's a limited budget in the economy. And those decisions get made less in terms of data and more in terms of relationships between secretaries of specific departments and the minister associated with a particular department say, rural development, that’s how money gets allotted, that decision will invariably happen at the central level, and it has

always been so and I don't think it happens the other way around anywhere in the world. Where data does come in is after the political economy decision has been made that in a particular year, say, we are going to focus on say increasing foundational literacy to some level across the country, or we want to make sure that every kid in the 5th grade is able to read a 4th grade level copy, or say the Government goes into mission mode about that or say the Government goes into mission mode about vaccine delivery,etc then in the implementation phase is where the expanding data collection, that's where it actually comes in.

A lot also goes wrong in implementation. Oftentimes, there is granular data; say you have a poverty targeted programme and you give an unconditional amount of money based on your income, if it is below a particular threshold and that money you get a sense of how much to give each district based on your understanding of poverty distribution at the district level. But if the data is in poverty and consumption measures even to the government department can only be readily available at the state level you are not able to do targeting at the district level. That's where implementation can go away, you don't know if your policy was actually successful because you wanted the resources to be targeted to certain areas but you didn't have the data to direct you even when sending out the resources and you also don't have the data that directs you to see whether its reached those places and what the long run outcome seems. So to your question about schemes being decided at central level, that's always the case and that will remain the case. I think why data has a lot of potential in changing things is in the ability to continue to do the things that the Government has been doing much better and to enable them to stop missing the mark so ridiculously.

But I personally think data is a necessary, not sufficient condition to have these things work more efficiently because what is the incentive of the district level officer? If I can tie whether those outcomes are changing, how are incentives currently, he will not get into trouble if he has shown that some form has been uploaded and I have shown that the money has reached the account, he is not going to get into trouble based on some very cleverly designed reporting showing that targeting was actually on point showing that the outcome you wanted to move, actually moved. So, the incentive system is also not there so I think it's great that there is a lot of geographically disaggregated data available but there is a lot of room for innovation in the sphere of how policy is then implemented and monitored across levels of government setting and that's not just for the responsibility of the Government, that's also the responsibility of policy researchers and think tanks of society. If the Minister of Health comes to you and says we are trying to implement a program and I want you to do outcome-based accountability taxing of how well this programme is working, what are your suggestions as an expert? What program design should I incorporate to make that happen? Then as the civil society expert you need to be informed about what will work well and you need to be ready with renovation based on the resources available. That's how I think about the nexus of data. I think data has a much larger role to play in making sure that once the policies are decided and implemented, they are on mark, as to what policies are getting decided because that will always be a political economy question. Anyone who thinks the other way that policy gets made on the basis of research and evidence is wrong because that's not how power works and that is the fact of life.

Editor: Thank you so much ma'am for the answer, it was really insightful.

Editor: This question will sound a little convoluted but so far in discussions about open data for development, it is often pointed out that Government should fear public opinion being swayed by data because in essence, for the general public facts don't change their mind, figures, numbers on those screens won't change their mind. Therefore, do you think that digital literacy for the masses (to the point where these published figures and data available online) does change their mind? Can this be used to push for more progressive policy initiatives, once all of us collectively understand what is going on with data?

Aditi Roy Bhowmick: There is some nice literature in the Political Economy space. I think there is a paper by Abhijeet Banerjee where prior to Delhi Municipal level elections they put out the report cards of current incoming candidates, what their performance record was and from what I recall of the paper, that did influence how people ended up voting. I remember from my time in undergrad in Economics and Political Science, in the Political Science classes we used to read a lot about under what circumstances do people vote in terms of Identity vs Policy and one of the papers we used to study in the Indian context, had a general takeaway that in the absence of clarity, identity was kind of a heuristic. There's a lot of confusion about what your manifesto is and it's not even a part of your campaign that strongly, so in the absence of all of this information, I think identity is a pretty fair bet. If we align on both things, I think in that sense there's a lot of room for us to get very sophisticated around elections in India.

For instance, I don't know if you've looked at '538', it's a platform led by Nate Silver that looks at this in the US context. If you look at election campaign videos in the US whether at primary elections or at all levels of governance, they talk about the specific

policy issue they are going to look into, but that is not to say that people still use heuristics to vote in the US. So that being said, there is credit given to the fact that people do have a sense that X senator is going to focus on A, B, and C and I guess the current government did say that they were going to do something about Section 370, and they did that, so in some sense they stuck to their manifesto, and people who voted for them probably kept that in mind. Talking about data and how it can sway people's political opinions and preferences, I think there is a lot more to be done at lower levels of elections. I don't even know how aware people are. I am personally ignorant about the statistics about participation in local elections, urban local body elections, for instance. I don't know how politically savvy we are; maybe we don't see the full feedback.

I do see data playing some pretty interesting role, in just one example over the past three-four years. I don't know if you have noticed, but a lot of leading news houses in India now have a data team, and they might still be figuring out what exactly to do with the data team. It is a little bit weary, but it wasn't a thing, and now it is, and around state-level elections, you do now see reports and little data corners in the news section with constituency-level demographics shown, and people are getting more savvy. To what extent does that influence how people vote? I'd be very surprised if that connection is already being made, but I think they are just getting started. Like I mentioned in the municipal elections study from Delhi, I think there are instances and pretty controlled experiments where it has been shown that when you arm people with information on policy, they are likely to incorporate that.

I don't know if any of you want to adopt research as your career, but there's so much to be thought about. I've just raised a bunch of questions that I don't have answers to. I'm

sure a lot of research has been targeting it, but this question is really interesting to me: If women's voter turnout has increased over the past two general elections, what are the issues they are voting on? You know, prohibition is the big thing that they have, and both are hugely interesting questions and how can data lead to it? It's not a question of whether politicians will fear it or not; it's something that's going to happen. I think of data as an alternative language that's already showing up in how we communicate with each other.

Editor: Thank you for that answer, ma'am. One of your previous answers which took into account the power play which goes into policy making. That point brings us back to a root problem which I believe a lot of economists have faced, that statistics in any country is not free from corruption or vested interests of the organisation that's actually collecting them. So, my question is, what are the aspects of India's official statistics machinery that constrain the formulation of policies for well-being and development, and how can these pitfalls be amended?

Aditi Roy Bhowmick: The co-founders of Development Data Lab, my colleagues and I, we put together a paper called Big Open Data Vision for Development in India where we were assessing India's performance with respect to its data and statistical capacity over time, when India actually used to be pretty ahead of the curve in the times of PC Mahalanobis, when he was leading the charge at ISI and setting up the NSS. It was really ahead of the curve after accounting for its level of development, but over time I think we have fallen way behind. We don't have a sense of what has happened to consumption. NSS used to be a pretty reliable source overtime to track consumption, but with the 2017 one being reformed, it resulted in a lot of confusion about what happened to poverty.

And the World Bank and the IMF cannot agree on whether poverty has declined or not since 2012. This confusion breeds ill-informed debates, and it gets all personal and political and the reason I'm pretty attached to data is that it's neutral in a way that's refreshing. I often go in with my personal priors when I'm doing some analysis in the data, and I know that I can be surprised and then you just have to take it as it is. The thing that has been really frustrating in trying to work with publicly available data in India over the past decade, is poor temporal resolution in that we don't have granular information about what happened to consumption poverty since 2012 and that's a big gap. But also, to take stock, India is still better off than a lot of countries.

I forget when the last census in Pakistan was, it was definitely not 2011 and in many West African nations where friends of mine work in the policy space, the data is even worse. But that's not to pat ourselves on our backs and say, 'Oh look, there are still countries and systems where that's how it works' because that's the race to the bottom, especially because that country (India) was pretty ahead of the curve for a long period of time. So I think the need of the hour is definitely plugging that gap, the consumption data gap that is widening. The new census may still happen as soon as possible. But that is also tied to politics in all sorts of interesting ways. And to your broader point about if the production of data is invariably and maybe increasingly political, how do you get your information from? As researchers, the beauty for us is that there are multiple levels and sources of data. You have the 2011-12 census data and then you have separate researchers and sample surveys, such as the IIT's and so on.

They may be representative at the district level, but the way to check whether things are in order is to take the census data, aggregate it at the district level and then see if things speak to each other. And then you also have other researcher generated surveys,

sample surveys, as well as satellite data. So, we are in a good place where we are able to triangulate. If you're trying to uncover some kernel of truth about a question you care about, suppose you care about the relationship between availability of childcare in the form of more Anganwadi centres in urban areas and female labour force participation. You have multiple sources to track that from, and that should ideally allow you to give some sort of a convergent answer. If not, then that is also pretty informative, so there's enough to still be thorough. We can always do better.

The thing that's frustrating is typically publicly available data is not disaggregated beyond the district level, there's that time component and things probably don't speak to each other, but that is some of the work we were trying to do while developing Data Lab and Niti Aayog came out with a platform called the National Data Analytics Platform, which I think is a great resource for students in the economic department. You have a government data platform where you have multiple data sources that can actually be merged on the platform itself. So, you can take, say, the annual survey of industries, collapse it at the district level, and merge it at the district level to something else that you're interested in, say School enrolment data, I don't have the thing populated in my head. I don't know why exactly you need that, but you can actually do it, now that you can visualise and create output on the platform itself and integrate it into whatever term paper or blog piece that you're writing.

So, for the curious mind, I think there's plenty of resources. The non-government sector is also stepping in a big way, so there's a Development Data Lab, but there's also a lot of organisations in the same space. You have PRS Legislative research which produces a lot of very important statistics about the parliament, what goes on in the parliament, how long does it take to pass each bill, what is the attendance like during

elections, how does it break down education levels of parliamentarians? All those kinds of analyses are possible. But then they also do a lot on breaking down bills and legislation that are passed in parliament. Separately, there's Civic Data Lab which produces something called Open budget Portal or something similar, with the budget documents typically in the form of PDFs and it takes a lot of work to actually pass them and turn them into something that you can readily pull in, analyse and create the charts from. So, they've done that work into all those PDFs, making them into readily usable data sets. The beauty of being in India is that we have so many problems and the scale is so large, but there's also a lot of information being generated, and things are changing rapidly. So, for the curious mind and for people who are interested in working with data, it's a pretty exciting time and place to be.

Editor: Thank you, Ms.Bhowmick. You said that India has a lot of challenges as a country in itself. So, could you tell us what were the unique challenges that you faced as a researcher while you were handling data sets unique to our country?

Aditi Roy Bhowmick: I have only gotten started in my research career. So just a backdrop, after college, I worked at J-PAL South Asia and I was doing primary data collection and that was a pretty unique experience for me because most of us have grown up in urban India or at best, a Tier 2 town, but I have lived a pretty sheltered life and then I went abroad for college and as soon as college was done I was just helicoptered to Madhya Pradesh. Suddenly, I was working in districts such as Jhabua and Alirajpur that have the lowest adult illiteracy rates in the country and that was such an eye-opening experience. There is so much inequality of experience in India and our life, like a kind of silo to such a great degree, depending on whether you're born in urban or rural India, what caste you were born into and what the income and education

background of your parents are, that your lives just don't intersect. If not for that experience, I would have never been in any of those places. So that was a pretty eye-opening experience for me, being at the helm of data collection.

I've actually implemented a survey whereI've been the surveyor sitting in the household, piloting the surveys that I've then trained the enumerators to go and do. So, I've seen the end of the data selection, and it is really hard. At times to get to school, in the monsoon season, there's a brook that is overflowing and you have to wait for a boat to come and get you to the school to conduct the survey. And by the time you reach, it may be too late, and the school may have shut and there are many other things as well. You know, going through the jungle, half of your enumerators are getting scared of wildlife and things like that. So, I have seen that, I have seen the millions of ways in which surveys go wrong so I understand what a massive exercise primary data collection is and that was hugely educational for me. So, I have worked with primary data collection there, and then I also interacted with government officials at the block and district levels, and I saw them actually filling up the little forms that get uploaded and aggregated, which we then do our analysis from. They are typically working in one-room offices and really far from any thriving urban centre. I am just trying to help you visualise what it looks like when the data is being generated and when it reaches where it does. So, it is a pretty crazy feat to pull off and I see them do it.

I saw primary data collection both by doing it for our survey and seeing other government officials collecting it first-hand. And I have seen cheating and funding of educational data, one of my principal investigators actually has a paper on this- on "Pratibha Parv", which is an annual exam that happens in Madhya Pradesh. You should go and look it up. Then, during my master's I was working with a lot of secondary data

and the Data Lab and so I have had exposure to the whole of what is available. My honest take is that there is a lot more available. There are many many issues with administrative data production, yet things come together- best example, during covid, daily infection bulletins, in some places someone has a table that has all the data in it and putting it all together is a nightmare and we saw that.

During Covid-19, India had got a whole lot of people who were really overworked, had their day jobs and were running it all at the end, trying to make sense of all the mess but somehow it worked, maybe it was coordinated at the back end but it wasn't coordinated on the front end. But when they wanted to, they got it done. They got it done with the vaccination platform, right? So, I am not saying that it's an issue. Thankfully in my experience as a researcher, I have felt more overwhelmed by taking what is there, and I constantly wonder "What should I do with this?". You know there is so much and there are so many interesting questions I want to ask and discuss.

Editor: Thank you so much for sharing that with us, Aditi. It was an eye-opening experience for all of us as well. This question deals with the nature of data- whether it is collected in India or elsewhere, data sometimes tends to tell an incomplete story. An index such as participation of women in the labour force does not show the entire truth of women's economic empowerment because it doesn't consider factors such as the autonomy that women have over the income that they earn, so my question to you was how can these aspects of ground reality be considered when you are analysing ground level issues and coming up with policy recommendations for them?

Aditi Roy Bhowmick: I am trained as a researcher, so my job is to produce research which is unbiased from the data and is very clear on what it is coming to. I am not concerned with other aspects such as how do I, sitting here, look at the whole set of

research with respect to a particular policy area and then how do I condense it into action icons for policy makers. I think that part is really difficult and is definitely not the training I have had as much as from a research aspect. So that's one thing. I haven't seen much research translating into policy aspects.

When you are doing an analysis, you need to be very clear about the parameter that you are measuring and what question you are looking to answer. I think where one ends up making a mistake is using one outcome and one metric to be a catch-all. There are so many that you are not actually considering. This is something that I am just beginning to learn, so research is all about precision. This is the data set that I have and out of all these interesting things that are going on that are related to the question I am asking, this is the specific channel I am being able to identify and answer. So female labour force participation is one channel, okay? And what does female labour force participation mean?

Some countries will define it as whether you are working in your own field as female labour force participation while some surveys might not do that. And that is telling you different things about female labour force participation. You define it broadly as getting paid in terms of cash. Do you classify only that as female labour force participation? Then maybe not cultivation in your own farm because here you are not getting cash payment. But then what do you do? Do you then count sitting in a shop that is attached to your house for half of the day as labour force participation? So, it is kind of tricky and there is measurement error. I am saying that even within calculating female labour force participation there are so many nuances and you have to be so clear about,read all of the survey documentation if you are working with the ICS data. You need to go through the documentation and see exactly what information it is that you are

providing and that your analysis is only saying something about that. So, when someone is taking that data point and is carelessly comparing it to the labour force participation measure from some other survey, that's wrong, right? So, there is precision and in itself, these things are very important. Therefore, even if I am only counting labour force participation where I am getting paid, how that has moved over time is important.

My mother just stopped working after ten years of working as a preschool teacher and she wasn't making a lot of money, it was a paid job but just stepping out of the house, going to the marketplace, having a trade associated with her name is already a huge thing and that changes her identity and how she engages with the society and the economy and now that she is retired out of it like, you know, we kind of have conversations about that. So labour force participation alone is telling a lot but again as you rightly pointed out, if you use that metric to then say all sorts of things like, “Oh women are better off” and all that- we don't know if they are getting enough economic autonomy by bringing in more money, We don’t know if they’re actually having to do a lot more work to compromise for the fact that their husbands allowed them to go and work. So, as good researchers we should aim to be precise and know the limit of what we should be able to say to be as informed as possible about every little outcome that you are putting out into the words. We don’t have measures to collect the nuanced things you are alluding to and for some questions the only way to get there is by asking people using very cleverly designed surveys; surveys that depend not only on the concerns of economics but also of psychology and anthropology and so on.

Editor: You have worked largely with extensive datasets and one such important data set in India is the National Family Health Survey. It is widely referenced and is

considered reliable, especially in the development sector. But, if we look at the total number of households according to the census, we have 300 million households. However, the sample accounts for only 3 lakh households which results in a sampling variation of less than 0.5 percent. Does this make the findings of the survey less reliable? And if so, then how do we ascertain for a sampling ratio that might be ideal?

Aditi Roy Bhowmick: When we work with data, we start with documentation as it ensures that the samples drawn, and different sample surveys represent different levels. What I mean by representatives is, say you have the ISPF survey. If we assume the survey says that it is represented at the district level, what that means is that the set of output was drawn into the sample within a particular district. If you compute the average consumption per capita for that set of output at the district level, it won't be far off from the average household consumption if you had truly considered all of the households in that particular district.

I am asked if it is true that the X dataset is representative at the district level. It is very interesting that based on the sample of X thousand households you are saying these average numbers when mapped on the full distribution at X levels should hold true and that is something to keep in mind. The NSS, perhaps, represents the state level and that needs to be checked. So, when you make policy recommendations based on something, say education outcomes at district levels have a different trajectory compared to district B. If your sample is not representative at the district level, then your analysis is true for the sample, but the sample might not be true for the underlying distribution entirely. That is very important to realise. It is particularly important when comparing conclusions based on different surveys and data. So, if you produce data, document it. These things are complicated, no matter how many times you get trained in the

collection, sampling and representativeness, it always takes a minute to recall these things- every time you are on the job and working with data, just refresh because it is not intuitive.

Editor: Thank you for your answer. We have come to the last question now. From what we have heard about the work that you have done and as a Master's Student you have learned so much about working in this field. Are there any tips that you would give to an undergraduate student who wants to work on their data skills and build their foundation in this field? What advice would you give to them?

Aditi Roy Bhowmick: I can only give advice that worked for me, and the blueprint is different for everyone, so keep that in mind. What I have always enjoyed is writing and once I started to move into research work as part of academically large research-based projects, I was constantly taking pre-notes and then incorporating those notes into little thin pieces that I would like. One principle that I have always followed is that I would always have side projects on the burner irrespective of what I was doing.

I wrote on a bunch of issues I was always interested in, but I was getting a lot more context on during my time in the field. I would also read associated papers on that and do a lot of writing. During my Master's programme specifically I had side research papers with the purpose of "If I'm learning something in class, I want to apply it." During my undergrad I was slightly confused regarding what I wanted to do. I had no idea that there is an actual career in research. I wanted to do Consulting and Finance as everyone else was doing but that wasn't working out and I wasn't feeling it. I didn't know what else one would do; I was very curious about Development Economics but how does that career happen and that was very confusing because there was no clear blueprint like a consulting job.

But if you realise that is not what you want then it is a little scary. And then data happened to me and all of that worked out, but I came a little late to the research game because I didn't know what I wanted to do but it ended up well. Like I said I always enjoyed writing and found that I like numbers to an extent that I like grounding my writing in quantitative work. So, when all these boys were doing coding and data analysis, I also wanted to do that. It was never a conscious thing but that is how people talk to each other and I just wanted to do that. I was not inherently interested in data analysis. But don't do things in life just because the boys are doing it, I just got interested in that and I got pretty good at it.

Now I genuinely enjoy it. If I go an entire week without doing data analysis I kind of get really empty. Sometimes I just need some blog posts, like outside my research work. I do some descriptive analysis and I enjoy that and just to keep the mindset that do not let things go rut but one thing that I have noticed is that none of these side adventures have ever gone waste. So, if you are going down a rabbit hole, you have an interesting question and you want to write something on it, sometimes you may reach a point thinking why are we doing this and you realise that actually what I learnt from that fed into me.

A lot of these side adventures, what I thought were nonsense adventures, I see coming together now. I knew certain things about myself, and I enjoyed writing, data analysis came along the way. I had a sense of general issues that I cared about and like thinking about and I started putting them together and just kept practising. Oftentimes I do things on my own when it is not part of my job and I think that ends up making a lot of difference. And you just repeat this over and over again and forget about the outcome. People may read some of my work now but that is sort of fleeting, most people who

have engaged with my work in the past three years are on Twitter (now X) and if X shuts down tomorrow, all of my work is just gone and that's fine, do not attach too much worth to anything like that and remain true to your core work. Readership will happen either in the traditional way or other ways. So that's the principle and here we are.

Editor: Thank you so much. You have no idea how inspirational you were, especially to the upcoming graduates who want to go into research. Thank you for this interview, it was really lovely talking to you.

Aditi Roy Bhowmick: Thank you for having me.

IN CONVERSATION WITH:

DR. ABHIROOP MUKHOPADHYAY

Dr. Abhiroop Mukhopadhyay is an esteemed Indian economist, currently serving as a professor in the Economics and Planning Unit at the Indian Statistical Institute in New Delhi.

He received his master's degree in economics from Delhi School of Economics in 1997 and his doctorate from Pennsylvania State University in 2004.

Dr. Abhiroop Mukhopadhyay has held various esteemed positions throughout his career, including the Sir Ratan Tata Senior Fellow at the Institute of Economic Growth and a visiting researcher at various institutions around the world. He was awarded the Mahalanobis Medal by The Indian Econometric Society in 2018.

Editor: Sir, with reference to your paper, ‘Mass education or a minority well educated elite in the process of development: The case of India’, how can policies be formulated to ensure that those with primary education or lower aren't excluded due to their limited access to tertiary education?

Dr. Abhiroop Mukhopadhyay: It is important to understand that lower education is an important aspect of the education system that feeds into higher education. So the main point of the paper that you referred to is that, if lower levels of education are such that you get stuck in that lower level and cannot move up, then what is the worth of such an education? And the answer in the paper that you allude to is, that this kind of education is not very useful, so just to clarify, it isn’t that a lower level of education is not useful, it’s just that a lower level of education that leads to not moving up, is of no use.

In India, levels of education at the primary level especially for young children are quite abysmal. If you look at other loopholes, the quality of education is not very high, so one of the ways that you can connect and contribute is by improving the quality of primary education in India in terms of learning levels, basic math competency, language proficiency, etc.

It has been extremely tough, in the last 20 to 30 years to achieve the same, especially trying to balance increasing numbers because we want higher enrolment while simultaneously maintaining good quality education. In every institution, as we increase the numbers, quality dips, especially in fields like teaching and infrastructure which don't catch up to the increasing numbers. While this is expected, this is also something

that requires us to have some serious conversation. The second answer which is less obvious, is to think about the nature of growth that we have incentivised this economy to pursue. Back in the 50s and 60s there was a lot of push on agriculture. Lower levels of education are more suited to contribute to growth through agriculture. But agriculture is not a very productive sector, and it does not really contribute as much to the value added in terms of growth. So it's hard to think of very low levels of education such as primary or less than primary education to really have any sizeable impact on the economy.

There was a time when people moved from illiteracy to some levels of education and you may have expected that to contribute to growth, but now, we know that everybody knows a little bit of letters, a little bit of math, so it's harder to think of how they would contribute to growth if they were to remain at the primary level. At slightly higher levels, say secondary education there is a possibility that this is the level of education that corresponds to what you require from the labour force in manufacturing. China for example got a lot out of its upper primary or middle school education. They used their assembly lines, they needed to understand the basic designs. So, this is the level at which you could expect some contribution towards growth. Unfortunately, India does not have a very vibrant manufacturing sector, so in terms of future policies and existing ones such as Make in India and so and so forth, we could actually boost manufacturing output. Then at least upper primary or secondary level educated people could contribute to the manufacturing sector and that would connect to growth any day. So, this is a tough one, since a lot of people are stuck in primary education, so the only solution is either we get the primary sector going which is really hard or we find some way of graduating people to higher levels and then have the right sector for them.

The countervailing force that should also be pointed out is that if there are not enough jobs for people who are tertiary educated, higher secondary educated, diploma educated, etc, then as it has happened in many developed countries, people will move down the quality ladder of jobs. So it could well be the case that if good jobs are not there for university educated people, you will find them working in manufacturing factories. And you can imagine, that as the owner of a manufacturing factory, though you know secondary or middle school education is enough you still want to hire, if possible, someone with a university education even though that's overqualified for that level. And that's the crux; If you don't take care of the top, it affects the other rungs too. You cannot think of any one level in isolation. Given that youth unemployment rates are quite high now, this is a genuine fear. I don't have a very simple answer for you. It is such that there are clear indications of what will help but one can't be certain of whether they will evolve or not.

Editor: Thank you for your answer, sir!

Editor: What specific policy measures can be adopted to make tertiary education more accessible to the economically disadvantaged; how can the cost and barriers to entry be reduced to enable broader participation.

Dr. Abhiroop Mukhopadhyay: There seems to be this implicit notion, that tertiary education or university education largely, is an urban phenomenon. You'll be surprised to know that if you look at the age group 25-34, tertiary education rates of people living in villages of India, have moved on from about 5% to about 12.5 percent, implying that 12.5 percent of rural youth are actually tertiary educated. So, it's not as urban as you think it is. In fact, if you look at all university educated people in India, a large portion

of this tertiary educated youth is in rural India because rural India is huge. So, even if it is a small proportion, it's a large number, in absolute terms.

Rural-Urban categories are becoming increasingly hard to define. It is a thorny issue, and it is not always easy to make out whether these categories make a lot of sense beyond the most desolate villages. So, I think there are barriers which are less geographical in nature and more in terms of social categories, economic categories, linguistic challenges and so on and so forth. Higher education rates are lower among the scheduled caste and scheduled tribes of India, as also among the other backward classes. Some of it is addressed already through affirmative action policies which have been successful and will increasingly be more successful in the future. This is because essentially, we are still not seeing the full-fledged impact of the wave of reform, such as the Right to Education. Thanks to these efforts, enrolment certainly went up, so there will be a lot more people from backward and disadvantaged communities like SCs, STs and OBCs. So, affirmative action will take care of requirements on that margin. But less so, on the margin of economic deprivation.

If I say poor, we don't have a quota as such. It's very hard to classify who is poor in contrast to social categorisation, which is stable. So, if you categorise one person as scheduled caste, that person falls under the category of a scheduled caste for as long as they live. However, it's hard to classify someone as poor, because in 10 years that person might not be poor anymore. Therefore, it's very dynamic and the only way out is public education. But as you know, one of the biggest things that everyone is talking about is private education picking up, especially in the university space which is always thought to be elitist. That is, it is the creamy layer that tends to go to private

universities. There is less thought on the fact that, if private institutions are the way that higher education is given, then this will be a real problem.

Now having said that, private institutions are still small players in higher education. Higher education institutions are still largely governmental in nature, central universities make up a very small proportion. Given the state universities with their provisions and low fees are low, the main constraint binding them, in my opinion, is whether to give quality to education. The market will decide on private institutions and central universities will continue to have the best resources because they're offering better jobs. In reality, the state government institutions are the institutions that are in very poor shape in India. Therefore, while we will have a large proportion of people who are disadvantaged, joining state government institutions, it's not clear whether quality of education is actually enough for it to make a difference. I think that there are many aspects in the new education policy that try to address the quality of education in terms of recruitment, in terms of having rankings and so on and so forth to at least bring out the fact that some of these institutions are not doing well. I think beyond that, it's very hard to think about ways to reform institutions at the top.

You just hope that state government institutions get reformed through political pressure. As more and more disadvantaged groups come in and observe that the quality of these institutions warrants improvement, they will start demanding that these universities become better. That's the only way politicians will react and put more resources into it.

The sad thing is that there will be a demand for admissions into good central universities and more so, in private universities through subsidies etc, but these universities can only accommodate so much. There's no reason why private institutions

should necessarily accommodate the poor beyond some corporate social responsibility kind of idea. So political pressure is one feasible solution. If 12% of the rural poor are in university education, then there will be a demand at some point from their children and upcoming generations, for better education. But I'm guessing it will be something in the long run.

I just want to add one more thing pertaining to linguistics which is the current debate. As you know, one interesting feature of Indian education is that you start with the predominantly vernacular base education to university education. By the undergraduate/postgraduate level, you're predominantly English speaking and this is a barrier for many children. The new education policy also talks about that but it's not very clear that there is a concerted strategy to deal with it, but the fact is that it is being talked about and whenever it's talked about, it means that something will hopefully happen to reduce that risk.

Editor: Thank you so much sir for this insight. This question has been around for ages, but it hasn't been able to translate into something concrete, but your insights were really helpful.

Editor: Can policies incentivize tertiary level-educated individuals, who are mostly concentrated in cities, to contribute to growth in less-developed regions?

Dr. Abhiroop Mukhopadhyay: I think this is connected to the previous question, no? This idea that it's an urban phenomenon is not true anymore. There's been a large expansion of universities and state-run government colleges in India. Largely because, higher education was something that gave very large returns, and it was increasing in

the nineties, while the relative supply of university graduates was low. So as a reaction, between 2000 and 2010, there has been a large expansion in universities all over India.

The distance to university for people, even in villages, has fallen. Some results show that this has aided women to attend universities in some of these areas, since people are apprehensive of sending girls long distances away from home to study. Now that universities are closer, higher education is more attainable for women. It's not perfect (higher education rate), only 12% among the youth, but it's a large number.

The overall higher education rate among the labour force in India around 2001, was just 5%, and much lower in rural areas. This rapid development in 20 years is because of the increasing penetration of colleges in rural areas. But we must be careful here, because although attending universities enhances knowledge, it more importantly, adds to many other components as well. You step out into a new environment, interact, learn how to deal with your peers, all these have huge impacts on production processes.

Getting a university education is not just about what you're learning in class but also, what you're learning about yourself, how to argue in big spaces, and you're not as protected by your teachers anymore. All this contributes to your development as an economic worker. When you join firms, they're not looking at demand, supply, price and quantity. They are looking for a way of thinking, and many other non-cognitive things that you pick up in universities, that contribute to economic returns. However, you would also want people to pick up knowledge and skills at these institutions, and that has proven to be more difficult.

It's not just about access to higher education, but also about access to quality. Earlier, only a select group of people went to universities, so they were already likely to be very

good. As this margin grows, you'll see many people at all levels, at all kinds of institutions, and then the concern will be how to improve the quality. It will depend a lot on the political economy and on where this higher education is used. If it is used more in service-sector driven jobs, it's not very clear whether that will lead to growth. For example, many UBER drivers in India are university-educated. That requires you to be confident in transacting and the basic skill of driving, however it is not very clear that the university education itself has contributed a lot in the way they do their job. So, you require the production process also to change at the same time, so that the industry requires skills that these institutions may provide. If not, people will not get any returns from their university-education. Then, through political-economic processes, they will force these institutions to improve. So it's a gradual process. But it's a great thing.

You know, this is a country which had 12% literacy at independence. As I said, in 2001, only 5% of the labour force actually had a university education. So, these are great steps for education. We have a great opportunity because we have a full buy-in for the concept of education. And it is important for economic mobility and economic remuneration. We just have to figure out how to give the right kind and quality of education, for it to actually make a difference to the economy. It's connected to my previous answer, so I don't want to say more about it.

Editor: Thank you so much sir.

Editor: Your paper 'Does access to secondary education affect primary schooling? Evidence from India', analyses the impact of geographic proximity to secondary schools and primary schooling outcomes. How would you suggest policy makers use this information to optimize schooling location and infrastructure planning to enhance

access to both primary as well as secondary education, particularly in remote or underserved areas?

Dr. Abhiroop Mukhopadhyay: That's a good question. I want you to step away from the paper and its focus on ‘primary’ and ‘secondary’. The general message of the paper is that you cannot think about any level of education in isolation. The reason is, India has a very convex return to education. If you have a linear return, it means that at every level, one more year of education will get you 8% income. A convex return to education means that as you go to higher levels of education, an additional year gets you much more than one. So going from class 4 to class 5 might increase your income by 8%, but going from, let's say, class 11 to class 12 will increase your return by 15%. So, the returns all accrue, and the marginal returns are much larger at the top.

Everyone has an opportunity cost to study, right? And when you are at lower levels of education, you have some other things to do. Now, if you think that your highest level of education is a very low level, then education doesn't make sense because you are giving up something to get educated. And the fact is that the real returns will come at a much higher level, but you have to survive through all the education system to reach class 11 and class 12. Now, you might have your own circumstances which make you drop out. But institutional supply will be an important factor, for sure.

So, if you are in a region where there is no possibility of continuation, then you don't see class 11. You feel you will never reach there. But then it doesn't make sense to be just a class 5th pass. You're dropping out of many activities that you can otherwise do like labour activities, working in shops, working on the farm etc. It wouldn't make sense for you. In that sense, the policy advice is, don't just think about primary education, about primary and co-ed. Don't just think about middle school education, about middle

school and co-ed. Think about whether the different levels of education are synchronized so that everyone has a shot at a level of education that makes all investment worth it. If you think like that, then there are a few things that you could do. One of the things that happened due to political economy reasons, especially in the 70s, and which had a very important role at that point in time, was the expansion of primary schooling in India. In a large number of Indian villages, typically, medium-sized villages, you will see that there will be a small school, manned by one teacher. These are typically these isolated primary schools that we worry about. The next level of education is maybe 10 kilometres away, the next level even further. So, in that respect, it is harder for people to see the whole continuation. Now, of course, policy makers haven't thought of it like that.

But what policy makers have realized is that these small schools are not functioning. And they require a distribution of resources. As a student of economics, you should immediately see that if there are economies of scale involved, then small primary schools don't make sense. You should have large schools where you can share infrastructure and fixed costs. So, on the cost angle, now, in India there's a big move towards what is called ‘school rationalization’. Instead of having lots of schools, we are going to have a few schools which are large, which will cater right from primary all the way to the secondary level. Sometimes, even higher secondary. By rationalization policies, officially we say till middle school, but a lot of middle schools are already housed in schools which have secondary and higher secondary.

If you look back, in many parts of India, the district schools which were set up during the British times, are actually very good schools. A lot of people from non-metro cities, you’ll hear, often come from some Zilla school, which is of very good quality. And these

are the schools which go all the way from primary to the higher secondary. So, we will have to move back to that model of having all the levels in one school, but these schools will have to be optimally placed so that despite not being in every village, they are not too far. Rajasthan, for example, has implemented this already. The Rajasthan government has set distance limits, I think it's five kilometres, nothing can be more than five kilometres to these schools, so that children still go. These are not only more functional schools but also schools which provide, what's called, K-12 education. If you see classes from nursery all the way to the top, you will be able to internalize. You will see your seniors graduate and do well, and that will make you want to study more.

Universities are slightly different because it's obviously not possible to have a university for every cluster of villages. But India earlier had a model where it tried to place public universities in particular places which were not so developed. Think about IIT Kharagpur. Kharagpur is not a very developed place. This is the US model, by the way. If you look at US universities, many of them are in godforsaken places. They are in the middle of farm areas, which cater to the local economy. Where you see a lot of people coming from many of these rural households to study. This is being done with an explicit policy in mind that this will lead to development of that area, and also lead to this land use, which is easy to expand. It's good because when people in, for example, smaller towns, see universities and see students from universities, it raises a certain aspiration for them to study in a university.

There's a very interesting paper based on a private university in UP. I don't want to name it, but it's a prominent one, something that you've heard of. You can see immediately that people around the university have started studying more, private schooling has gone up, there seems to be more investments, because it's a visual thing,

right? You see a big university, you see students, you see all that and you feel that maybe I can reach there. And that has a big knock-on effect, in the sense that all levels look accessible to the mind and as well as the individual.

Editor: Thank you so much, sir, for that answer. It certainly offers a much better perspective to things.

Editor: Building on the multidimensional framework in your paper “Is India better off today than 15 years ago? A robust multidimensional answer”, and the integration of mental health in the paper titled "Integrating mental health in welfare evaluation: An empirical application", is there potential to develop a more comprehensive index that reflects India's betterment more accurately by considering mental health along with other dimensions like individual consumption, literacy rate, crime rate, etc.?

Dr. Abhiroop Mukhopadhyay: In principle, I am very much against the index. I will tell you why, because an index basically is a combination of everything, right? It requires weighing in normative calls on what you think is important. So, let’s say you have consumption and mental health, you have to decide on the weights of each parameter. What weights will you put? And if you look at all indexes, like all the ones in the world, the biggest controversy is about the weights. Who is deciding these weights? Who said health is two times, education is three times something else? It's arbitrary. This has always been a problem. If your question is, should we look at more components while making policy? Sure, I think that given the mental health issues that are popping up everywhere, at least recognition, I don’t know if mental health issues are increasing, it could well be that people are more conscious of those issues right now. But, it is now important. I think that there should be multiple indicators of development.

You should not be economically naive to think that GDP is the only notion of development. One of the things that you learn, for example when you do statistics is multivariate distribution right? Multivariate distributions actually look at a different kind of problem. Let's say you have two attributes. Thinking about a person, say, the two attributes are their wealth and education. You are comparing two time periods in India; half of the people are poor, and half of the people are illiterate in both time periods. Now, to you if you are looking at individual indicators, these two time periods look exactly similar because half of the people are illiterate and half of the people are poor. What progress have we made then? But let's suppose, in the first period the rich are actually the ones who are literate, and the illiterates are all poor. Let's say now, because of lots of formative policies and so and so forth, we find that the rich are actually less educated, and the people who are poor are actually more educated. This can happen due to public policies, targeting them with particular policies and so on. Notice, if you look at each indicator, you will still get the same answer, that there is no change. But if you think about who's literate and who's illiterate in terms of the other attribute then you might actually say that we are doing better now. There's compensation; the poor are being compensated with education which has implications for their long-term mobility.

When you do statistics, this is captured by correlation, and I am essentially talking about the correlation between the two indicators. When you have things like this, especially when there's public policy involved, it makes sense to look at a full joint distribution instead of looking at multiple univariate distributions. If I just look at the poverty rate and literacy rate, these are just two univariate distributions. But when I look at the joint distribution because I want to also capture the correlation, now I am

looking at a bivariate distribution and it tells me something more than what you would get by looking at just one distribution at a time. So instead of making indexes you can actually do that, and it requires knowledge of statistics and things like stochastic dominance.

Since India has been growing and there are many compensating policies, you might find that there are many interesting things like this, where it looks like nothing has changed but actually the profiles have changed and therefore, actually the country has evolved without your realizing. So don't make arbitrary indexes for sure but take into account multiple indicators.

Editor: Thank you, sir.

Editor: Sir, your paper titled "Income Guarantees and Borrowing in Risky Environments: Evidence from India's Rural Employment Guarantee Scheme" considers the potential crowding-out effects of income guarantees on informal credit markets. Could you please shed light on its implications for informal lenders (and borrowers) in regions with higher NREGS (National Rural Employment Guarantee Scheme) coverage, and how might policymakers address any adverse effects on these financial systems?

Dr. Abhiroop Mukhopadhyay: The first thing I must tell is, that in India if the informal sector for credit disappears, we will be the happiest people ever. Think about Premchand's stories, this has been the bane of the Indian economy, right? That you have these money lenders who are basically buying people through these loans and so and so forth. On that, the argument is rather unambiguous. The smaller the informal sector, the more you get the formal sector, the less extortionary it is and the better it

is. But I want to highlight something else that people actually talked about, which I think is important for us to understand when we are doing simplistic analysis.

When we are looking at credit markets, what is the way that a policy maker would look at it? It would say well, you are giving some income support, conditional on work but still an income support, people should be less indebted. That's some sort of notion that we have that there is welfare improving, there are less people indebted in the economy, and therefore, indebtedness has gone down. It's a great thing that people don't borrow money. But actually, this paper that you mentioned pointed out two kinds of things, that you can take loans for multiple objectives, especially in rural economies. You can take loans for things like shops, you have some death in the family, widowhood, ill health things like that. You don't want people to take loans for these, you want people to be rich enough to be able to afford these kinds of expenditures. So, if your lens was these kinds of expenditures, for sure you should be very happy that people are less indebted. However, some of these income supports are not small, I mean, if you have many people working in the household, you know it's a government scheme so it's kind of a guarantee that you will be earning a certain amount of money if these analogies work.

Of course, there are issues of payments and so and so forth but there were eras in India when the payments were actually more assured, so you would know that you can earn this amount of money later. But when you can do this, you can take in a lot of risky investment. Typically, investment in agriculture is fairly risky. You are very hesitant to take loans and you will not get loans, because what collateral do you have? If you have no income guarantee later, if your harvest fails, then both, the lender will not get the money and you basically lose something as part of that extortion. However, if you have

some guaranteed income possibility then this might make you take more loans because then, you can buy some seeds, some fertilizers, some new technology and invest into a more productive but slightly riskier province. Then what would happen is, particular schemes like this would see a rise of indebtedness because people would take loans.

Now in a rural economy, both are growing. In fact, loans are supposed to be fundable, so it is very difficult to find out what purpose people take loans for. If there are both of these effects happening at the same time, then you should see no effect. But no effect is really hiding a lot of things. In our paper, when it looks at Orissa, we see that there are people who have bad health shocks and so on and so forth. And we actually see loans falling. That's a good thing. But for some slightly more landed households we actually see an increase in seeds and fertilizers, not fertilizers but actually seeds, given that the seeds have more nuances. There are some seeds that are riskier than others but have higher yield. So, we see that in those households, the loans go up.

So, when you ask, did indebtedness rise or fall in the short run, this question is nonsensical if you think about all these forces at play. So, you need to think about them slightly differently, and think about the market, long term incentive, productivity and investments plus this consumption smoothing, to be able to understand what exactly is happening.

Editor: Thank you so much sir, will certainly bear this in mind, going forward.

Editor: “In the area of medical diagnostics, India is currently under-equipped with medical devices and advanced technologies with respect to treating cancer”. Having worked on issues specifically related to the economic effects of HIV-AIDS and Cancer,

what policy initiatives do you think the government should undertake to foster the health sector in India?

Dr. Abhiroop Mukhopadhyay: I will actually expand your question because it is obviously based on HIV and cancer that I've worked on, but in India now the scourge is diabetes and hypertension which are very high. So, it's also lots of other things. All these require at some point, hospitalization, and access to hospitals. It's harder to address this question with a primary health centre, though you would expect that the initial diagnosis should be made in primary care. But it's even harder to deal with these because advanced cancer cannot be treated in primary health care. On these fronts, some progress has been made.

For cancer, you see AIIMS opening up in various parts. There are a lot more cancer hospitals that have opened up. Earlier, there were very few places for cancer treatment. Now even in districts you have cancer hospitals that are available for tertiary care. It's a little fuzzy for conditions like diabetes or hypertension because initially they start off as nothing, you have a headache, you are feeling a little dizzy, things like that. Actually, we are kind of lost, as there is no real government policy to look at these kinds of issues. These would require a better primary health centre than tertiary hospitals. The government has responded to it by relabelling them as wellness clinics, but relabelling is not enough, you will actually need people to be able to detect these things.

That's important but notice that I left HIV-AIDS out. I talked so far about diabetes, cancer, and hypertension, these are called non-communicable diseases, NCDs. They have a peculiarity; in that they are largely focused on themselves. There are cancer patients, of course your household economically can get impoverished but it's ultimately your disease. This is not true when it comes to diseases like HIV-AIDS,

anything communicable like COVID, infections like that. We are also lagging behind when it comes to illnesses like malaria, which still has a high mortality effect in India. On the HIV-AIDS front, India has not done too badly, because of the presence of what is called the National AIDS Control Organisation. There has been monitoring and there have been surveillance centres to catch where HIV-AIDS incidence go up. But that's because in India, HIV-AIDS is thought to be concentrated in a particular population. So, it's easier to do surveillance.

Therefore, it's not an economy, society wide phenomena, hence it's easier to do. But infections like COVID and so and so forth, the only way out is actually a good primary health centre. The problem in a good primary health centre is to send doctors there. I mean which one of you wants to go and teach economics in a middle school in a village, as a career? Probably, none of you. It's not worth the investment you put in. It's the same thing with doctors. They don't want to go there and practice in these areas. One of the newer developments in healthcare and public health has been in recognising local health providers, sometimes of traditional medicine like ayurveda. There has been a move towards legalizing para-doctors. You can even think that nurses, people who have some basic education in healthcare, are good to man these places. For example, do you need a MBBS doctor for delivery? You don't. Only in case of an emergency you need an MBBS doctor to deliver. So, it can be done by a trained midwife. That's an easier healthcare provider to give and the government has recognised it, and you can see over the years there is more and more legalization.

Now with AYUSH there is this idea of recognizing Ayurveda doctors who are actually, in many parts of India. I will tell you an interesting story. I once surveyed a village in UP, where the primary healthcare provider was a guy who came from the district of Malda.

He used to be a pharmacy shop owner in Malda. He roamed into this village, these kinds of doctors, ironically are called Bengali doctors. Because there are a lot of people from Bengal who came and of course in English they are called quacks. But one of the interesting things was that he was providing healthcare. For many small things, you can go to the local pharmacy shops in Delhi as well, and if you are suffering from something and you say “bhaiyya kya lein” (What should we consume?), he will offer his suggestions. Sometimes he is telling you very standard things. If you go to a doctor, they will also tell you very similar things. I don’t recommend compounders and pharmacists to become doctors but it’s possible for people with some basic knowledge of healthcare, to provide this service instead of full-fledged MBBS doctors. I think there is recognition of that and that is the direction healthcare is moving and hopefully it has been instructed to them that anything that looks a little bit serious, should be recommended, to a district hospital. So, if they follow that, then there is no reason why this model of healthcare may not work in addressing many of these diseases that are coming in.

Editor: Thank you, sir.

Editor: Sir, I have one last question for you. The government of India has currently instituted a Standing Committee on Statistics to discuss the methodology of survey in India. Having worked extensively with survey data, what are the limitations therein from your perspective?

Dr. Abhiroop Mukhopadhyay: That’s a very good question. I think that is a very burning question right now. See, it is well known that as a country develops and grows, survey data becomes progressively less reliable, especially when it comes to descriptive data like poverty rates and averages. Basically, anything that’s an average.

For example: an average number of air conditioners people own, how many proportions of people are vaccinated etc. Imagine there was an NSS enumerator coming to your house; ask yourself, how many of you would allow a random person to come in and ask you three hours of questions about your life. I'm sure, none of you would. This is standard, you are not different, people all over the world do this. This is besides the fact that you do not have 3 hours to give, right? You have lots of assignments, classes, you don't have three hours to answer questions. So, as countries develop, survey statistics become less reliable, when you want to describe the whole population. Now, to be honest, this was recognised back in the 60s and 70s already, but the population was largely poor and we were not interested in the average number of air conditioners in Delhi, we were interested in how many people do not get a meal in Delhi, i.e. the required 2,000 calories.

We were interested in rather specific things, which we know people would definitely answer. So, as far as survey data is concerned, it's well known that you are capturing 80% of the population. It may still be permissible to overestimate certain indicators like how many people dropped out of school, how many people didn't get a meal, because, if anything you will still provide more services and that's good.

The problem is when you want to measure something related to income. Whenever you want to look at income, of course, income is concentrated at the top, and increasingly more as societies are becoming more and more unequal. Now, if you want to say India is doing better, but actually India is doing better on an average, that's driven by people at the top. The fact that you don't survey wealth at the top, basically means that it will give you a very perverse result that you know, India is not doing well. That's where all statistics based on surveys fail. So I think that the first point to acknowledge is why

were these surveys set up? To identify things about the bottom. We must understand that politics aside, they will tend to exaggerate a little bit, some of the problems of India, but that is fine. We will just put in more resources, so we ensure that there are people who are just above the threshold to define. Think about some income category or consumption expenditure which defines who's poor and who's not. Of course, the people who are just above them are not that rich either, so if more money goes into the system, it's fine we don't care that much.

Of course, it may create this problem that, if a government is responsible to show you that they are doing better over time and these statistics come out and show that there is no change. They may not be happy because they may believe that they have generated wealth but that does not show up in your survey and that's the nature of the argument that is happening today. We are not pointing out the improvement that is happening, but of course, if you notice, implicit in this argument, we are saying that a lot of changes that happened at the top and you might as a social scientist, put more weight at the bottom but it's okay, its fine, but we don't care about that. Now, of course that is a completely normative judgment, you might also say that I don't care so much about the bottom, I want to care about the top because I want India to get rich first and then we will redistribute. In which case you care about the top and then the surveys are just completely off when it comes to the top.

Now secondly, we put a lot of resources as a proportion of what we had, when we started surveys. That investment, as a share, has slightly dropped over the years. But that's also dropped, because in India, the government generally collects data for their own running. For running particular schemes, for knowing where to target, but now the government has administrative data, which means that it has a lot of data to run

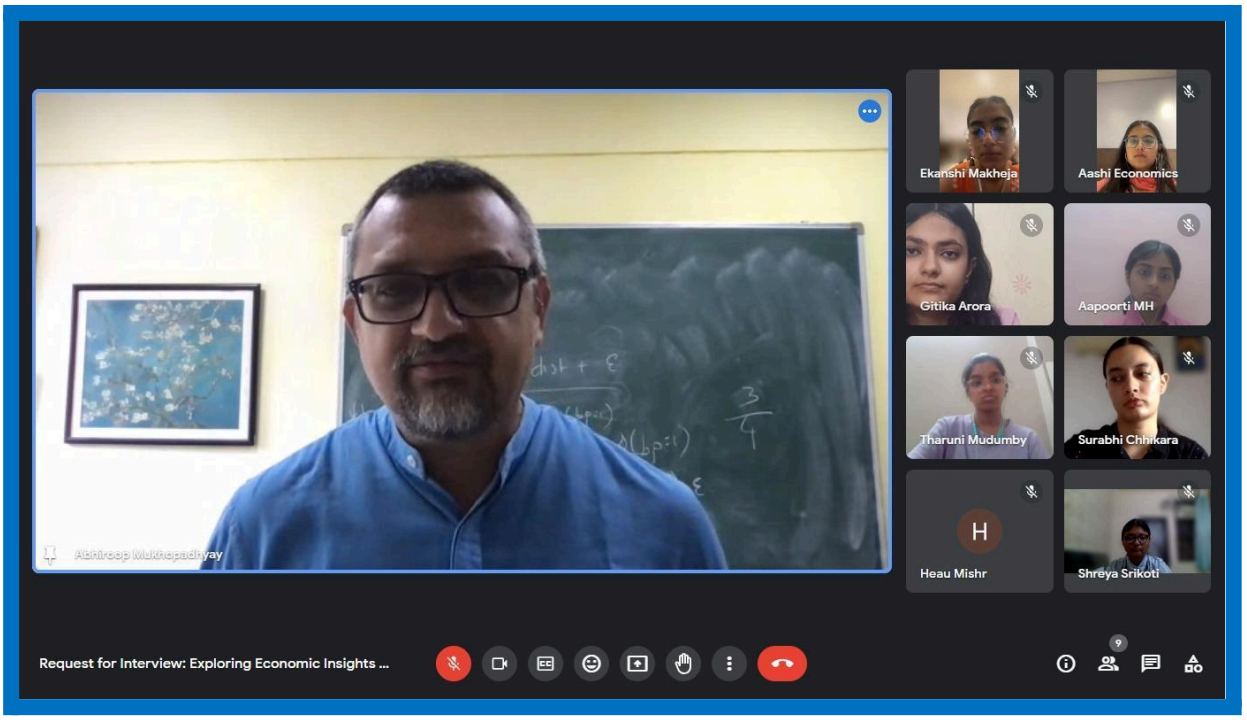
programs, it will see your Aadhar card, right from your birth to your vaccinations, you will be completely tracked. Of course there are serious privacy issues here, it has a way of tracking everyone in many areas of this country. This data is not there for you and me to analyse. So, we may not be aware of these datasets, but they are there and often the government formulates policies using these datasets. Now, why these are not always enough, is because, when you run a program, you care about whether you are delivering particular services or not. So, when you are delivering iron tablets, you would want to know where the tablets were distributed and how many tablets were distributed, but ultimately you want to know if people took them or not. That's what we care about when we think about welfare and on those fronts, we have very poor data because that would require an independent data collection from surveys that we look at.

However, these are only for descriptives, there is another aspect that people use surveys for and that is to basically draw correlations, that is the association between numerous variables. These associations are equally valid even now, in all the datasets. So, for example: if you were to run a regression of education on income, you could still run it, there is no problem in this as long as there are a few people captured of all types, that will tell you if you were more educated, would you get higher income or not. So, these are two different, distinct jobs of survey. One, to provide indicators which are descriptive, for instance. And second, is to draw associations between variables.

In research, typically we are interested in associations. So, we are often fine with all the surveys we see. But, if you were in the government or you wanted to make arguments based on just descriptive indicators, then this is a serious problem because these indicators may not reflect where improvements are for particular sections of the

society at the top. So, the moral of the story is next time when someone comes to your house and shows the NSS badge, please answer the questions so that you will get better data later. The Standing Committee on Statistics is looking at some of these issues on how to sample better, how to capture the top and is thinking of how to make a case for a higher number of resources. Hopefully they will get there.

Editor: That was really enlightening, sir! Thank you for your time and patience for the conversation today.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