



INDIA G20 PRESIDENCY

A Synthesis of Perspectives

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"No one can whistle a symphony. It takes a whole orchestra to play it"

- H.E. Luccock

Sir Syed Ahmed Khan

1817-1898



“The basis of all progress is that you should bring all treasure of knowledge under your control”

FOREWORD

In an era defined by unprecedented environmental challenges, calling the attention of governments the world over, on issues like global warming, climate change, social responsibility, sustainability, economic growth, financial stability, international trade, the Group of Twenty was formed to meticulously craft strategy to address them. The Group of Twenty (G20) was established in 1999 with the objective of bringing together member countries, the developed and developing economies, to undertake discussion and coordinate on issues of global concern. The G20 Summit is held every year with rotating presidency and it is a matter of great pride that India has been appointed the G20 president in December 2022.

As India holds the G20 Presidency for a specific period, it has a golden opportunity to use its leadership position to advance its priorities and advocate them in its interest and in the larger interest of member countries. The presidency involves laying down the agenda for G20, initiating dialogue among member countries, and put in all concerted efforts to achieve consensus on issues of global significance.

This year's theme 'One Earth One Family One Future' resonates with the principle of Vasudhaiva Kutumbakam where the whole world is considered as a whole family where everybody is equal. In this backdrop, learned academicians, executives from industry and researchers, have reflected on various issues of pertinent importance. They range from climate change to healthcare, adoption of electric vehicles for control of air pollution to climate finance, carbon border adjustment mechanism and its impact on trade to sustainable education, institution formation to circular economy, dealer management to supply chain resilience, digital technology to global production network, big data to significance of trust for international relations, impact

of online shopping to building of agricultural supply chain, and economic policies to Fintech for financial stability. All these issues have been considered, discussed, analysed and presented by scholars in the context of G20.

This compendium of papers/studies are in diverse area of management. The readers of this book will benefit by getting an insight into various issues which fall under the broad umbrella of G20. The book has been edited and written by eminent scholars in a very simple, lucid and reader friendly style. The book will be very useful for students, faculty, executives and other professionals.

Prof. Tariq Mansoor

Former Vice-Chancellor, Aligarh Muslim University

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First and foremost, I thank Almighty God for His countless blessings. I also thank Him for giving me wisdom and courage to embark on a journey of writing a book.

I extend my heartfelt gratitude to Prof. Tariq Mansoor, former Vice-Chancellor, Aligarh Muslim University for writing the foreword. I would be failing in my duty if I do not thank him for his continuous support and encouragement.

I thank my family and friends for always encouraging me to do something positive and meaningful.

Creating this Edited book was a challenge as it demanded working within a deadline. Therefore, I am highly grateful to all Professors, Associate Professors, Assistant Professors, executives from industry and research scholars for their valuable contribution.

I acknowledge the efforts of the office staff of Faculty of Management Studies and Research, Aligarh Muslim University, Sayeed Shansha, Azimuddin, Mohd Burhan and Saleem Ahmad as they provided extraordinary assistance and support.

I am falling short of words to thank my Co-editor, Dr. Zareen Husain Farooq and team of research scholars Sania, Tooba, Sundus, Ambreen, Mahdi, Zia, Sumit, Hassan, Tooba Ahmad, Azeem, Hera and Anusha, who stood by me through thick and thin, worked tirelessly, worked night and day, and worked their hearts out to see the book released in time. Being your mentor has been a source of joy and inspiration for me!

Prof. Salma Ahmed

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PREFACE

For the year 2023, India has been appointed the G20 President. Understanding the momentous intersection of India's leadership with this influential group is crucial for comprehending global affairs and addressing global challenges. This book has been compiled in the light of India's G20 Presidency, inspired by the strides made by its countries in their development since the group's inception. This book offers its readers historical references for future research and analysis, making it an essential resource for understanding the G20. There are numerous perspectives and interdisciplinary subjects which can be and have been discussed in this book. Exploring the crucial role of this diverse forum in global governance, this book unravels India's dynamic leadership, navigating through complex challenges and fostering collaboration among nations. Different concerns and developments surrounding G20 are also reflected. From economic policies to climate change, India's proactive engagement in shaping a sustainable and inclusive world has been witnessed.

This book carries two contributions discussing G20 in the context of health. As India assumes presidency, one study sheds light on the nation's healthcare challenges, emphasizing its innovative private-public partnership and digital health strategy. Another study highlights the role of traditional medicine in combating global health challenges, advocating for its accessibility, affordability, and availability to achieve a holistic healthcare. The post-pandemic world in the context of G20 is re-imagined by one of the contributors where India's presidency and its pivotal role in addressing post-pandemic challenges and climate finance for a sustainable future is explored.

Climate change has been taken up as an area of eminence by the G20. One of the submissions discuss the challenges faced and

collaborative efforts made in the extenuation of air pollution through adoption of EV vehicles. Also, EU's Carbon Border Adjustment Mechanism (CBAM) with impact of potential trade on G20 countries and financing sustainable businesses and combating climate change in G20 countries are explained.

As the G20 plays a vital role in global finance, contributions describing this aspect has also been included in this compilation. Potential of disruptive FinTech, like cryptocurrencies, for financial stability and sustainable development are delineated. Digital and technological aspects of G20 are also underlined. Digital technology adoption within G20 countries and its impact on businesses and economies has also been measured in a study. Issues like consequences and advantages of technology on employee engagement and benefits and challenges of big data and ways to ensure equitable access to data benefits are also discussed. Analysis of the digital aspect of G20 has also been undertaken where the role of digital economy in driving digital transformation, and global collaboration under India's presidency, is highlighted. One of the contributions emphasizes on educational inclusivity and acknowledge the importance of digital technology in education, with a focus on India's G20 and SDGs.

A study on supply chain features the need for resilient supply chains in order to tackle climate change, food security, and logistical uncertainties for sustainable energy and agricultural systems worldwide. The role of G20 in building resilient supply chains in the post-pandemic era has also been highlighted.

In an increasingly interconnected world, sustainability is a pressing global concern. One of the contributions explores the G20 countries' sustainability progress, challenges, and endeavours, presenting vital insights for shaping a sustainable future. In the quest for sustainable development, the circular economy offers a transformative approach. A study delves into its potential to reduce waste, emissions, and resource depletion while fostering innovation, economic growth, and social well-being. Also, Global Production Networks (GPN), suggesting G20 synergy for mutual gains of all member countries has been explored. Dealer management, a field rarely touched, but of immense relevance, has been described. It presents a

comparative analysis of dealership models in the automobile industry with a focus on G20 countries.

Running through the diverse subjects, authors have tapped G20 in the marketing context as well. The connection between programmatic advertising, online shopping attitudes, and the G20's economic policies has been investigated. Economic disparities had created limited assemblies, influencing decision-making. Hence, G7 and G20 emerged to address economic issues, becoming influential global institutions. 'International Relations' has also been presented as one of the contributions explores international institutions' formation, allowing countries to engage in global relations. Another study reviews people's perception of trustworthiness in international relations towards various G20 countries, while emphasizing its significance.

This book serves as a crucial resource for appreciating India's leadership in the G20, shedding light on its role in addressing pressing global issues, and providing valuable insights into the complexities of multilateral diplomacy. It offers a comprehensive analysis of India's presidency and policy priorities, and its effect on the global stage, making it an indispensable addition to the study of international relations and global governance.

The authors hope to take readers on a journey of diplomatic finesse, strategic vision, and the pursuit of collaborative solutions, leaving an indelible mark on the world stage

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Harnessing the Challenges of Healthcare: The G20 Agenda

Prof. Salma Ahmed, Prof. Syed Moied Ahmed &
Dr. Zareen Husain Farooq

Abstract

The Group of 20

“The G20” or “Group of 20” is an “intergovernmental forum” which consists of 19 countries and the European Union (EU). It was founded in the year 1999. Its summit takes place once in a year involving heads of government and other high ranking officials of each country. It focuses on issues like global economy, international financial stability, global warming, to name a few. G 20 countries have had a significant contribution on working of the global economy and attributes to more than 75 percent of global trade.

India took over the presidency of G 20 in December 2022 and the summit will take place in New Delhi. A major focus area of this summit is healthcare of citizens.

This paper focuses on the healthcare of citizens in India. It aims to address the various challenges the world in general and India in particular is facing. India adopted the private public partnership model and digital health strategy to combat these challenges. It made healthcare accessible as well as affordable to citizens which is depicted through cases. There are lessons to learn from these instances which other member countries could replicate.

Keywords: *Healthcare, Public Private Partnership, Digital Health, Medical Devices, Vaccine*

Introduction

The Group of 20

“The G20” or “Group of 20” is an assembly of 19 international countries and the “European Union” (EU). It focuses on issues like international financial stability, trade, finance, climate change, energy, poverty and various other pertinent issues which impact the global community. (Ramachandran, 2015)

It was the World Economic Crisis which led to the foundation of the G-20 in 1999. It was created in 1999 to promote international cooperation on significant economic and social issues. Since 2008 its summits take place yearly which involves head of government and top officials of each member country. The EU is represented by the “European Commission” and the “European Central Bank” (Global solution, 2023).

The Group of Twenty comprises of nineteen (19) countries which include “Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States of America and the European Union”. (World Economic Forum, 2023)

Approximately two-third of the world population reside in these twenty member countries. These member countries have a significant impact on global economy. The G20 members together represent 85 percent of the gross domestic product (GDP) of the world and higher than 75 percent of trade across the world.

G 20 Presidency in India

India took over the presidency of G 20 from December 1, 2022 (Jash and Jain, 2022) and the summit will be held in New Delhi.

The theme of this year’s summit is “Vasudhaiva Kutumbakam” or “One Earth • One Family • One Future”. This is a phrase in Sanskrit language the meaning of which is “The World Is One Family”.

India aims to address various challenges that the world is facing at the G 20 summit. (Konishi, 2023). Being the president of G 20, India is in a position to formulate and shape various policies to solve the challenges the world is facing.

Objectives of G20

There are three main objectives of this particular G 20 summit.

The first objective is concerned with financing cities of the future centers for growth. They contribute more than 80% of global gross domestic product (GDP) but because of its unplanned growth and also the fast pace of urbanization hinder it from utilising its full potential. To sustain their economic potential, cities have to be converted into places comfortable for living with the help of better infrastructure and supported by services, such as clean water, efficiency of power and transport to name a few. Further, cities are to be promoted as center for entrepreneurship, creation of jobs, and skill development. This demands huge capital.

The second objective, where India can achieve a leadership position is, in energy transition. It should lay down strategy for shift from carbon based energy to renewable energy. This would enable to mitigate the effect of climate change. It would further have spill over effect on economic productivity, lead to job creation, and also improve environmental outcomes, and reduce the health costs. It could tap on its strength of generating solar and wind energy.

The third objective is associated with health care of citizens.

The Covid-19 pandemic took one and all, all across the globe, unprepared and off-guard. The pandemic pointed to the necessity of adopting one approach across the different countries of the world and work hand in hand to create a defensive health architecture which will enable us to address and combat any emergency health crisis in the future.

India's G20 Presidency has health as a priority and can enable in building a more resilient, responsive and sustainable health system. G20 can help create a health architecture which is more universal, affordable, and accessible for one and all. G 20 focus is on enhancing health emergency prevention and preparedness, enabling cooperation in the pharmaceutical sector, and proving a boost to digital health innovations and finding avenues for a more universal health coverage.

On assuming G20 presidency, India's focus has been on giving an impetus to healthcare by encouraging public private partnerships in healthcare and promoting digital health

interventions. It can create a sustainable model which the other member countries could replicate.

But all these would depend upon multiple factors which would begin with clarity of objectives identification of all stakeholders involved and their role, laying down of plans for action, and creating a structure for governance and monitoring.

“Public-Private Partnership” (PPP) in Healthcare

“Public-private partnerships” (PPP) is a relationship wherein a government agency collaborates with a private-sector party with the objective of financing, building, and operating a project. These projects could be a road infrastructure or airport construction project, or any other. (Refer Box-1)

In India, the PPP model has provided an impetus many industries like infrastructure, airport construction and telecommunication. India has very successfully adopted the PPP model for infrastructure development, that of construction of airports, roads and highways, wherein the construction of Indira Gandhi International Airport (IGIA) is considered to be a benchmark. The government has put 25 airports to be constructed in a PPP format to give a fillip to tourism and also boost travel by air. PPP could be extended to the healthcare sector. With meticulous planning and well-crafted strategy, success of same magnitude could also be brought about in the healthcare sector, as PPP entails numerous benefits (Refer Box-2) In other words, the broad strategy would remain the same; only it would require minor modification would have to be brought in to suit the requirements of the healthcare industry.

India could also apply the concept of “public-private partnership” (PPP) in healthcare to accelerate the pace of development so that consumers get advantage, by utilising the capital, human resource, professionalism, and efficiency found in private companies. India’s model of healthcare, could be replicated by G20 member countries to bring about collaboration between government, or government agency, private company, academia institute, to name a few, to make best use of potential of each party.

PPP model could channelize the use of scarce available specialist doctors by sharing of resources and expertise. It would make healthcare more inclusive by introduction of various schemes

like Ayushman Bharat, and thereby increase accessibility for the masses. This would be an inclusive model and bring about benefits both for the governments and the public at large.

In PPP one can get benefit of more funds to develop infrastructure of hospital, better medical facilities, improved quality of services and improved patient-care.

In India, of all hospitals, 58 percent are in the private sector and of all doctors, 81 percent hail from the private sector. The favourable outcome found in the "Indian Healthcare Sector" is attributed to the PPP model.

"National Health Mission" (NHM) has been formulated and laid down by the government. The most common form of PPP model in "National Health Mission" (NHM), were the contracting-in and contracting-out models that was adopted. This meant outsourcing "Primary Health Centers" (PHCs) to a private entity, contracting-in a private provider at secondary or tertiary level to provide clinical or non-clinical services. This was a unique model implemented by the government to harness the benefits of PPP.

Financing of health cost is also a major concern which today is largely because of the role that insurance companies play. There are a large number of insurance companies with different insurance plans enabling one to take best medical facilities.

There are currently thirty health insurance companies in operation in India. They give different kinds of health insurance plans depending upon the health insurance needs of various categories or classes of population. (Refer Table-1)

Private sector participation has increased. It runs over 70 percent of hospitals. They have within their purview about two-fifths of the hospital beds. It also operates about 60% of dispensaries. They meet healthcare needs of 80% of outpatients and 46% of inpatients. This represents private sectors contribution.

India has many success stories to boast about. It is said to be the Pharmacy to the World as it ranks third for manufacture of medicine and manufactures maximum vaccines in the world. Further, in "Medical Tourism" it holds 10th rank while in "Medical Devices" it holds fourth place in Asia. (Refer Table-2)

India is an attractive destination for medical tourism majorly

because of low cost, availability of highly qualified and skilled doctors, good infrastructure and efficiency of services. Also the attractive medical visa policy which allows a patient to reside in India for a maximum period of 60 days and a close family member is given an option of a 'medical attendant visa' which permits him to accompany the patient, made it a hot bed medical destination. In fact, Chennai is called "India's Health Capital" as 45 percent of tourists from international countries and 40 percent of tourists came domestic country came for diagnosis to the city. These indicate that India has a significant position in the global healthcare map which cannot be over looked. India provides direction for other companies to follow. This has been achieved because of collaboration of public with private party.

For instance, medical devices segment grew as a result of PPP which improved health infrastructure in India, attractive medical insurance facility making health cost affordable to name a few.

Medical Devices Market in India-A Case

The largest medical devices market in the world is North America followed by Europe and Asia Pacific. (Refer Table-3) wherein Asia Pacific is the fastest growing market. India is ranked among the top twenty "medical devices market" in the world and fourth in Asia Pacific. Further, China and India are rank second and fifth position when seen with respect to revenue generated.

It is reported that the medical devices market in India is fast growing and would reach Rs 4358.64 billion by the financial year 2027 increasing at a compound annual growth rate (CAGR) of 41.93% during the period 2023to 2027. (Source: PNRNewswire). The significant increase in this sector is majorly because of increase in healthcare expenditure boost to healthcare infrastructure, thrust on better patient outcome, and attractive reimbursement policies. Based on end user, hospital and ambulance services and clinics, followed by diagnostic centers was responsible for pushing the "medical devices market" in the year 2021. The segment of hospitals and clinics is further expected to grow in future because of mushroom growth of regional and super-specialty hospitals, further giving an impetus to this demand for medical devices. Also there is increase in investment made by

hospitals and clinics in medical technology for better and more accurate diagnosis. Hospitals use “medical devices” for better result in diagnosis of patient and reduce cost. Wearable devices help to monitor patient status while telemedicine help diagnose patient from a distance. All these are giving a push to “devices market”.

The government has also taken initiative to further give an impetus to this demand. “Production Linked Incentive (PLI) Scheme” for “Medical Devices 2020” and creation of medical parks are such instances.

In July 2022, the government drafted a policy for new Drugs, passed a “Medical Devices and Cosmetics Bill 2022”, extend legal protection for medical devices which were selling in India. This was to ensure that the item sold were of genuine quality and standard. This was yet another move in this direction.

Further, in November 2021, the “Indian Council of Medical Research (ICMR)” tied with “Indian Institutes of Technology (IITs)” to set up “ICMR at IITs” by creating “Centres of Excellence (CoE)” for “Make-in-India” product development and commercialisation in the area of “medical devices”. The government has also allowed “Foreign Direct Investment (FDI)” in this segment and as such FDI in this sector got a boost. In the Financial Year 2020, FDI in the medical devices sector rose by 98% Year on Year. It reached to Rs 2196 Cr (US\$ 301.01 million) while it was only Rs. 1,108 crore (US\$ 151.87 million) in the Financial Year 2019. And Foreign Investment in the “medical and surgical appliances sector” was US\$ 2.74 billion from April 2000-September 2022.

Another success story is that of malaria eradication.

“Malaria Elimination by 2030” Program

Malaria has been a global concern and there has been a global response to eradicate it and control its transmission. It is an epidemic particularly in densely populated tropical regions. The “Malaria Elimination by 2030” program focussed on its eradication and attained success. Under the program, a concentrated effort was taken to eliminate malaria and control its transmission. (Refer Table- 4). The success of the “Malaria Elimination by 2030” program in India is attributed to PPP.

Similar success was found in the “TB eradication programmes”. A pan-India initiative and consequent success is attributed to the support of private players. This model can be replicated by other member countries.

Malaria, is quoted to be a big threat and a deadly disease all across the globe. In 1935, estimates were that India had 100 million cases of malaria and one million deaths. Success was achieved with the introduction of the “National Malaria Eradication Programme” of 1958. In 2015, India coordinated with 17 countries of Asia Pacific to lay down a plan and guideline to ensure that the disease is eradicated by 2030. Over the years, India has indeed made progress in reducing the burden of malaria.

Majorly five states contribute to make 70 per cent cases of malaria. They are Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh and Maharashtra. (Refer Table-5). Meghalaya, Mizoram and Nagaland together make up for majority of cases of Malaria.

Seen from perspective of “transmission intensity”, cases of malaria are categorised into four. (Refer Table- 6) distinct categories:

India occupies a significant position for elimination of Malaria. (Refer Box-3) This is because India ranks third position with respect to number of cases of Malaria in the world (89%) and deaths (90%) in the South-East Asian region.

The objective of elimination of Malaria in Asia or the world could not have been achieved without wholehearted for the same.

“The Government of India” has laid down a “National Framework for Malaria Elimination” (2016-2030) and a “National Strategic Plan” (NSP), 2017-2022. The objective of these were to wipe off Malaria “(zero indigenous cases)” in all Category 1 and 2 districts by 2022. In Category 3 where transmission is maximum, the objective was to get it down under a pre-elimination and elimination programme by 2022.

To get this objective fulfilled by 2027, it first laid down a Programme planning and management. The programme targeted all districts. Targets were made and assessment was made of degree of progress at end year. The “National Vector-Borne Disease Control Programme (NVBDCP)”, which looks

into implementation of programme in India also had a role to play. It provided technical and supervisory support, looked into logistic issues and organized review meeting in each districts and also exchanged their learnings. The project also saw that the areas that were able to achieve elimination resorted to maintain it.

Second, was transforming “malaria surveillance”. “Surveillance” is the core of any “malaria elimination programme”. This is because it is necessary to assess the “transmission intensity” prevalent in every area and therefore categorize it for intervention and assess if the intervention are having an impact.

Third, was to speed up pace of access. It was ensured that every aspect of the elimination program was meticulously executed.

Fourth, it was essential to ensure that government put in financial resources for the same.

The goal of elimination needed commitment from all stakeholders involved. It also meant government commitment in terms of policy and commitment for financial resources. Requirement was also for human resources. This disease most frequently is found in villages and communities and therefore needs to be monitored by human resource at that level. Therefore, “trained public health specialist” was needed at every level- community, village and district. It also needed “community participation”. A continuous awareness program was needed to mobilize the general public at large. A two-way communication and feedback system was set up at community, village and district level. And technology was an enabler.

Two distinct cases were that of “Malaria Elimination Demonstration Project” (MEDP) of Madhya Pradesh and that of “Comprehensive Case Management Project (CCMP)” of Odisha. Both were PPP projects.

In the “Malaria Elimination Demonstration Project (MEDP)”, of the state of Madhya Pradesh, “Sun Pharmaceutical Industries Limited”, (a pharma company), “National Institute of Research in Tribal Health (NIRTH)” and the “Government of Madhya Pradesh” were the major parties. The project used ‘Four Ts’; “Track, Test, Treat, and Track”. (a modification of the WHO’s ‘Three Ts’-“Track, Test, Treat”. It covered 1, 233 villages and achieved success.

The “Comprehensive Case Management Project (CCMP)” of the state of Odisha, was also implemented using PPP model. The parties were the “Government of Odisha”, “ICMR-National Institute of Malaria Research” and “Medicines for Malaria Venture (MMV)”. (Refer Box-4)

The G 20 conclave these cases need to be highlighted as there are lessons to be learnt from India and could act as a role model for elimination of malaria in the tropical forest countries. India has many success stories of PPP in the healthcare industry.

Digital Health

“Digital Health” or “Digital Healthcare” refers to a multi-disciplinary concept which is of recent origin. This concept combines technology and healthcare. Digital health applies digital transformation to the healthcare field, incorporating software, hardware and services. In simple words, it is the use of digital technology to improve health and healthcare. Digital health can help make health systems more efficient and sustainable, enabling them to deliver good quality, affordable and equitable care. The broad area of “digital health” includes categories such as mobile health (mHealth), electronic health record (EHRs), electronic medical record (EMR), wearable devices, and telehealth and telemedicine.

Mobile health (mHealth): Mobile Health is used for the usage of mobile phones and other wireless technology in medical care. A application of mHealth is using mobile devices to create awareness among public about preventive health care services. However, mHealth is also used for disease surveillance, treatment support, epidemic outbreak tracking and chronic disease management. mHealth has taken a prominent position in those areas where there is a large population and there is immense use of mobile phone. Many non profit organizations are advocating for increased use of mHealth in the developing countries.

Electronic Health Record (EHRs) and Electronic Medical Record (EMRs): An “electronic health record” is the systematic compilation of health information of patient which has been stored electronically. In simple words, “electronic health record (EHR)” is a “digital version of a patient’s paper chart”. EHRs are

real-time, patient-centered records which may be shared with authorized users, that is with doctors and patients. It can include a “patient’s medical history, diagnoses, medications, treatment plans, immunization dates, allergies, radiology images, and laboratory and test result”.

Wearable devices: Wearable healthcare technology are health monitoring devices which a person wear on his body, like on wrist, to monitor wearer’s health data. Such gadgets use biosensors to compile health information of a patient, like heart rate, blood pressure, sleep patterns, and activity. Some such devices are also made to prevent disease from occurring to the wearer, to maintain health like controlling increase of weight. Some also monitor wearer’s physical activity. Wearable devices are also used for patient management and disease management and affects doctor’s decision. These help to boost patient care and at the same time reduce cost of such care- as patient is being monitored without he being present in hospital.

Telehealth and Telemedicine: “Tele” is a Greek word which means “distance” and “mederi” is a Latin word which means “to heal”. Telehealth is the “distribution of health-related services and information via electronic information and telecommunication technologies. It allows long-distance patient and clinician contact, care, advice, reminders, education, intervention, monitoring, and remote admissions”. “Telemedicine” is the “provision of remote clinical service via real-time two-way communication between the patient and healthcare provider, using electronic audio and visual means”.

The major stakeholders in digital healthcare space are the doctors, the patients, researchers, application developers, “medical device” manufacturers and also the distributors. Digital healthcare plays an increasing important role today.

Many countries faced challenges during the Covid-19 pandemic. The USA was one such instance. It had limited vaccine supply of vaccine and also faced hurdles in its distribution. It was a supply chain management problem. However, technology also came to their help to create mass vaccination sites, for scheduling appointments and tracking of doses of vaccine which had been administered. Many low income countries also faced obstacle in execution of their immunisation programs during covid19.

These hurdles were majorly because of scarcity of resources, an existing weak health system. They also faced problems in distribution.

CoWIN-COVID- “Vaccine Intelligence Network”- Case

India has a large population residing in rural areas. In 2021, it had 909,384,771 persons residing in rural areas which represented 64.61 percent of total population which was an increase of 0.08 percent from the previous year. (Refer Table-7) The number of residents in rural India was 908,684,959 in 2020. But India had a well-established immunization program to fulfil their requirements. It was observed that during the pandemic India made extensive use of technology to reach the huge masses in rural areas. It used its CoWIN platform. This was used for registration, identification verification, for scheduling Covid-19, vaccinations for eligible individuals, certificate for vaccinated members and tracking of vaccination status. The immunisation program of India, of magnanimous scale was executed efficiently and effectively. India could achieve applaudable success during Covid-19 pandemic which took one and all off guard as it used technology an enabler.

How they worked: The Indian example is said to be unique because the scale of the program was large. It created a CoWIN platform and effectively utilised it. It made use of mobile phones and initiated outreach programs to reach very remote and underserved areas. In spite of many hurdles like limited infrastructure, India could successfully administer vaccination to the large population during the covid-19 pandemic.

CoWIN-The Details

CoWIN is the world’s largest vaccination program. This was a project of Government of India. Its objective was to reduce chances of deaths by administration of vaccine. In a couple of months’ time, the CoWIN platform was developed. There were many stakeholders who contributed to development of this platform-government officials, programmers, software developers, to name a few.

There were four sub-components of the platform:

- “Electronic Vaccine Intelligence Network (eVIN)” which was a “supply chain solution”
- “Digital Infrastructure for Vaccination Open Credentialing (DIVOC)” which “digitally verified certificates”
- “Digilocker” which was “a cloud based platform for storing, sharing, and verifying certificates and documents”
- “Surveillance & Action for Events Following Vaccination (SAFE-VAC)” which “tracked adverse events following vaccination”

It adapted existing technology and architecture for integration and scalability. Further, it adopted the concept of modular design, to enable in further modification if needed. It also trained users, administrators, and others for easy and efficient execution. This was also meticulously planned and executed as there were multiple and different category of people involved, who needed to be trained. (Refer Table-7 and 8)

Further, a “National Expert Group on Vaccine Administration” was created which laid down method of vaccine administration. It had to co-ordinate with nineteen ministries at the national level, twenty-three at department and at the state and level, n number of development partners, so that work could be executed efficiently.

The CoWIN was launched on January 16, 2021 for frontline workers and healthcare workers and in March 2021 for citizens.

India had large base of internet users (800 million subscribers) and smart phone users (600 million). As such the program could be executed with ease. It could vaccinate ninety percent of population with at least one dose from January 2021 to December 2021.

India was successful in use of technology-A Digital Health Intervention successfully achieved.

Other major reason for success, which should not be overlooked and which play a critical role are- setting objectives, identifying the major stakeholders, laying down clear plans for action, and governance mechanisms. It could further be attributed to technology use, proactive leadership-who responded quickly to the advent of pandemic, and collaborative decision making,

that is team work, which involved the government and multiple stakeholders. The Digital Health initiatives was based on a robust strategy that integrated financial, organizational, human and with most important technological resources.

G20 member countries can learn from India's experience in digital health. This knowledge sharing would be beneficial for all member countries.

At the second "G20 health working group" meeting at Panaji in Goa, Dr Kiran Muzumdar said "India's success in digital health can be attributed to a well-defined digital health strategy that aligns with the country's health priorities. Other countries can replicate this approach by developing their own comprehensive digital health strategies that align with their specific health needs and goals."

"It's important to learn from India's successes and challenges in digital health implementation and leverage those insights to inform the design and implementation of similar programs in other countries," she further added.

India has now extended the scope of "CoWIN platform" to cover services for children and pregnant woman which is called U-win.

It is pertinent to learn from India's Success and challenges in "digital health" implantation and make use of the learning to lay down plans for similar projects in other member countries.

Conclusion

On assuming G20 presidency, one focus area for India has been healthcare. India could boost healthcare incentivising public private partnerships in healthcare to make best use of a PPP model. It could draw instances from malaria elimination program. And by promoting digital health interventions wherein it could learn from CoWIN program. G 20 countries can learn on how PPP can be effectively utilised to get benefit for all stakeholders and how technology came to ones rescue during COVID-19. It helped access distant areas for vaccination and helped immunize almost all. By using similar strategies, member countries can give a push to its health initiatives and improve health outcomes.

Annexure

Table-1: List of Insurance Companies in India

1.	Care Health Insurance
2	Niva Bupa Health Insurance
3	Aditya Birla Health Insurance
4	Star Health Insurance
5	ICICI Lombard Health Insurance
6	Reliance General Health Insurance
7	HDFC Ergo Health Insurance
8	Manipal Cigna Health Insurance

Source: Prepared by Researcher

Table-2: Medical Tourism

Rank	Country
1	Canada
2	Singapore
3	Japan
4	Spain
5	United Kingdom
6	Dubai
7	Costa Rica
8	Israel
9	Abu Dhabi
10	India

Source: statista.com and godigit.com

Table-3: Medical Devices market in the World (By region)

Rank	Region
1	North America
2	Europe
3	Asia Pacific
4	Latin America
5	Middle East & Africa

Source: www.precedenceresearch.com

Table-4: Global Technical Strategy for Malaria

Goals	Targets
Reduce Malaria mortality rate	90%
Reduce Malaria case incidence globally	90%
Eliminate malaria from countries in which malaria was transmitted	30 countries
Prevent re-establishment of malaria in all countries which were malaria free	Re-establishment prevented

Source: *Who.int. com*

Table-5: Malaria Cases (Statewise)

1	Odisha	36%
2	Chhattisgarh	12%
3	Jharkhand	09%
3	Madhya Pradesh	09%
5	Maharashtra	05%

Source: *ncbi.nlm.nih.gov*

Table-6: Transmission Category in Malaria

Category	Transmission
Category 0	No malaria transmission
Category 1	Limited transmission
Category 2	Moderate transmission
Category 3	High transmission

Source: *thelancet.com*

Table-7: Population in rural areas

Year	Population	% increase
2018	903,131,481	0.44%
2019	906,325,664	0.35%
2020	908,684,959	0.26%
2021	909,384,771	0.08%

Source: *Prepared by Researcher*

Table-8: CoWIN Platform Usage Training

Group	Employees
1	Cold chain handler
2	Data entry operator
3	Medical officers
4	Program managers

Source: Prepared by researcher

Table-9: Vaccination Organisation Training

Category	Individuals	Task
Vaccination Officer-1	Police, homeguards	ID verification before entry
Vaccination Officer-2	Other staff	Authentication & verification of document in CoWIN system
Vaccination Officer-3 & 4	Support staff	Crowd management, management in waiting area
Vaccination Officer-1	Doctors & nurses	Administer vaccine
Supervisor		Supervise vaccination sites, logistics, supply

Source: *ibef.org* and *www.policyx.com*

Box-1: PPP Model

The PPP model was initiated in India in 1997. The term PPP was coined in 2011. There have been 257 road infrastructure sector, which represents the maximum number of PPP in any sector. The models of PPPs are Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), Build-Operate-Lease-Transfer (BOLT), Design-Build-Operate-Transfer (DBFOT), Lease-Develop-Operate (LDO), Operate-Maintain-Transfer (OMT), to name a few.

Source: Prepared by Researcher

Box-2: Benefits of PPP Model

The PPP model has numerous benefits. It gives benefit of huge capital, speed of implementation, effectiveness, efficiency, and also higher quality of service.

Box-3: Malaria Elimination Defined

“Elimination is defined by the WHO as interruption of local transmission or reduction to zero incidence of indigenous cases of malaria parasite species in a defined geographic area”.

Box-4: Medicines for Malaria Venture (MMV)

“Medicines for Malaria Venture” (MMV) is a not for profit public private partnership establishment as a foundation in Switzerland in 1999 to reduce the burden of malaria in endemic countries.

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2

Healing the ‘Natural’ Way

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Abstract

“The G20” or “Group of 20” is an intergovernmental forum. It has various objectives. Health is a priority area. Being the president of G20, India is in a position to formulate and shape policies to solve the challenges the world is facing.

It has been reported that all across the globe Non Communicable Disease is rampant. It is seen as a global threat which needs to be monitored and controlled. The reasons for the spread of NCDs is common across the different countries. This study advocates the use of traditional medicine to control the spread. Traditional medicine is fast gaining acceptance. India has been advocating the use of traditional medicine for centuries. And it has been a large manufacturer of traditional medicine too. And Ministry of Ayush is giving it a push.

“G20”'s theme of ‘One World, One Health’ means that the whole world is considered as a whole family in which everyone is equal. Such medicine bring about holistic healthcare to all. Therefore, it implies that everyone all across the globe should have ‘accessibility’, ‘affordability’, ‘availability’ to traditional medicine too. The study explores ways in which traditional medicine is brought within reach of consumer all across the globe.

Keywords: *Non-communicable Disease, Traditional Medicine, Accessibility, Affordability, Availability*

Introduction

“The G20” or “Group of 20” is an intergovernmental forum. It was founded in the year1999. The European Union (EU) and

19 countries are its members. It aims to address the various challenges that the world is facing. Being the president of G 20, India is in a position to lay down and define various policies to mitigate the challenges the world is facing.

India took over the presidency of G 20 from December 1, 2022. (Jash and Jain, 2022). The theme of India's G20 Presidency is "Vasudhaiva Kutumbakam" or "One Earth · One Family · One Future".

There are three main priority areas of this particular G 20 summit.

The first is concerned with financing cities of the future as places for driving growth. The second objective is focuses on energy transition. The third objective where India can achieve a leadership position is associated with health care of citizens.

"Non Communicable Disease" (NCDs)-A Global Threat

Instances of death is reported every day. Deaths resulting from "Non Communicable Disease" (NCDs) has surpassed all deaths from communicable disease combined. Today, NCD is an emerging global health threat.

It is noted that NCDs kill 41 million people each year which is equivalent to 74 percent of all deaths globally. (www.who.int). Further each year 17 million die from NCD between 30 to 69 years, (pre mature deaths). And 86 percent of these premature deaths are in low and middle income countries. Further, 77 percent of all NCD deaths are in low and middle income countries. And it has been reported that four distinct disease-cardio vascular disease, chronic respiratory disease, cancer and diabetes account for more than 80 percent of all premature deaths. (Refer Table-1)

Case-South East Asia

Even in South Asia the burden of NCD is very high. It was 38 percent in 1990 and rose to as high as 74 percent in 2017 accounting for 5.87 million deaths, that is sixty percent of all deaths is a result of NCD. (www.ncbi.nlm.nih.gov). Fifty percent of these deaths are pre mature mortality occurred between 30 to 69 years of age). 25 percent suffer from hypertension and 1 in every 12 suffer from diabetes. Disability adjusted life years

from diabetes increased more than 80 percent between 2000 to 2019. 2.3 million diagnosed with cancer in SEARS each year and 1.4 million die. CVDs are a major cause of pre mature deaths and contribute to 25 percent of all deaths. The NCDs include cardio vascular disease (24%), chronic respiratory disease, cancer and diabetes. These four make up 82 percent of all NCDs. (WHO,2014)

Case-India: CVDs are the major cause of deaths. 52 percent of CVDs is prevalent amongst those below the age of 70 compared with 23 percent in countries with established market economy.

Deaths from coronary heart disease increased substantially from 1990 to 2010. (Refer Table-2) Stroke is a major cause of mortality and amounts to a large proportion of disability adjusted life years (DALYs)lost. It was notably higher in adults in urban areas (20-40 percent) compared to rural (12-17 percent).

India has record of the highest cases of diabetes. It is said to be the diabetes capital of the world. The number of persons diagnosed with diabetes is increasing by leaps and bounds. (Refer Table-3) Chronic respiratory disease is yet a major cause. Morbidity from 65 milion cases and 5,80,000 deaths in India

Heath is an issue covered by the states. The “Department of Health & Family Welfare”, “Government of India”, initiated a program called “National Programme” for “Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke” (NPCDCS). Financial and technical support is provided under this scheme. This program is a part of “National Health Mission” (NHM). This project aims to boost infrastructure, human resource development, give impetus to health promotion & awareness activities, enable early diagnosis and management of disease and its reference to the appropriate level of health center for timely treatment. (Refer Table-4)

Initiatives of Government of India: Preventive aspect of NCDs is strengthened under “Comprehensive Primary Health Care” through “Ayushman Bharat Health Wellness Centre Scheme”. This is achieved by promoting wellness activities and focussed communication at the community level. Other initiatives for increasing public awareness about NCDs and for promotion of healthy lifestyle includes observation of “National & International Health Days” and use of print, electronic and

social media for creating awareness amongst the community on a sustained manner. Furthermore, healthy eating is also promoted through Food Safety and Standards Authority of India (FSSAI). "Fit India" movement is implemented by Ministry of Youth Affairs and Sports, and various Yoga related activities are carried out by "Ministry of AYUSH". In addition, NPCDCS gives financial support under NHM for awareness generation (IEC) activities for NCDs to be undertaken by the States/UTs as per their "Programme Implementation Plans" (PIPs).

Case-Indonesia

For the year 2000, it was reported that the NCDs accounted for major death. It included cardio vascular disease (31.7%), chronic respiratory disease (2.5%), cancer (7.4%) and diabetes (1.1%) as percentage of all deaths. (www.ncbi.nlm.nih.gov). Herein, the major causes were that more than 50 percent of people were living below the poverty line and limited access to healthcare. Increasing percentage of aging population was yet another cause.

Case USA

In USA, NCDs resulted in 5.8 million deaths and 81 percent of all deaths resulted in loss of 226 million in DALYs and 121 million life years due to premature deaths and 105 years of life lived with disability or ill health. (www.paho.org).

Case European Union

Non communicable diseases (NCDs) represent a major challenge for public health in Europe, where they cause 90 percent of all deaths. Most NCD deaths are caused by a handful of main causes, including cardiovascular diseases, cancers, chronic respiratory diseases and diabetes.

The "European Commission" in December 2021 laid down the "Healthier together" – "EU non-communicable diseases" (NCD) initiative with the objective of helping EU countries to help identify and execute policies and actions in order to decrease the burden of major NCDs. In this way they would contribute to better health of the population. This covers the five years beginning from 2022. It includes 5 strands: they being, health determinants, cardiovascular diseases, diabetes,

chronic respiratory diseases and mental health and neurological disorders. All strands include a health equity dimension. In this manner, it is helping in decreasing the health inequalities

Case-Brazil

This country also has high NCD rates. NCDs made up 72 percent of all deaths in 2007. Neuro psychiatric disorder was the single largest contributor. (pubmed) NCD deaths increased by 5 percent from 1996 to 2007. (pubmed)

Case-Russia

NCD is a cause of mortality and disability and makes up 87 percent of all deaths. A person on an average, has 25 percent risk of dying pre maturely because of any NCD. (www.int)

In 2016, 16,35,000 people died of NCD. NCD cost Russia 3.9 percent of GDP and 86 percent of all costs stemming from indirect losses to pre mature death and decreased productivity of worker. They introduced cost effective prevention package. (www.int)

Case-China

In China, in the population, there are more number of over weight than underweight. And more adults die as compared to children. 82 percent disease burden is because of NCD.(www.cdc.gov) In over 15 years of age, 52 percent smoke. In their diet, there is high salt sodium intake and tobacco intake This also lead to hypertension.

Analysis

It is observed that Non communicable diseases (NCDs) represent a major challenge for public health all across the globe. It is a global threat which results in pre mature deaths at an alarming rate. It also leads to productivity of workers lost through disability adjusted life years (DALYs), years lived with disability (YLWD), and years of life lost (YLLs). Hence it paints a very gloomy picture all across the world. Cases of a few G20 countries presented suggests that NCDs is prevalent in these countries as well and needs immediate redressal.

The major contributors were disease-cardio vascular disease, chronic respiratory disease, cancer and diabetes. Further, the major reason for these epidemiological transition are social,

economic, and structural factors. Changes in social strata, rising income and rising propensity to spend, increasing urbanisation, sedentary lifestyles, dietary changes like increase in fat and sodium intake, decrease in fruit and vegetable consumption, increase intake of tobacco and alcohol, has pushed NCDs to such high levels. It is reported that 15 million pre-mature deaths occur every year people (deaths before the age of 70). (WHO) This leads to high burden of NCDs among population in working age group which limits one's ability to work. It also contributes to increasing the healthcare costs which bets individuals, with stress and financial insecurity. More important, it makes one more susceptible to the risks of hospitalization and deaths, if any outbreak (like Covid-19) chance to occur. Therefore, it has become a global health concern which need to be addressed immediately. Addressing NCDs would also lead to attainable of the United Nations' Sustainable Development Goals (SDGs).

A careless and hurried approach would not be advisable. Therefore, a preventive and promotive approach would be more in the fit of things. It would be intelligent to provide a more holistic solution to the global problem which is emerging. One approach would be that of advocating the use of traditional medicine. Nature based solutions are getting acceptance all across the globe. India has been propagating the use of traditional medicine for centuries. And it has been a large manufacturer of traditional medicine too. Further, the "Ministry of Ayush" is giving it a push. In its G20 Presidency, India could promote and propagate use of traditional medicines.

G-20 theme, "One World, One Health" means that the whole world is considered as a whole family in which everyone is equal. It implies, one and all, all across the G-20 countries, should have 'accessibility', 'affordability', 'availability' to these traditional medicines too. Being the president of G 20, India is in a position to formulate and shape policies to solve this particular health challenges that the world is facing.

Global Market for Herbal Medicines

Traditional and complementary medicine has wide acceptance throughout the world. Approximately 80% of the population in some Asian and African countries depend on traditional medicine for primary healthcare purposes. It is noted that the

market size of global herbal medicine is assessed to be of the value of USD151.91 in 2021. This increased to a reach USD 168.86 billion in the year 2022 and is expected to touch USD 437.59 billion by 2030. This is indicative of a very high growth rate of 11.16 percent (CAGR) in the period from 2023-2030.

Further, the "European Union" quoted to be is the biggest market holding a market share 45% of total herbal market. North America has a share of 11%, Japan 16%, ASEAN countries 19% and rest of European Union 4.1%.

Market Size in India

In India, Currently the market size is ₹4.2 billion. It is expected to reach ₹14 billion by 2026. India has to gear up to meet the domestic market demand and take benefit of increase in demand the world over. Therefore, it has a large market to capture. So it has to be equipped for meeting the demand. Further, its raw materials which are herbs and shrubs, can be grown and harvested in a period of one year. India should focus on that too. It is important for India to lay down a detailed strategy for the same.

First Step: The first step, of the strategy, is it could create awareness. In its G20 Presidency, India should begin by creating awareness and it has rightly done by highlighting the use of traditional medicine in all health working group meetings of the G20. Traditional medicine, therefore, should be at the forefront of any discussion on health. They should highlight the role traditional medicine could play in the "Global Social Wellness" and contribute in advancing new methods of treatment. It is a must to stress that traditional medicine brings with it holistic treatment and it considers the whole person approach. Sessions on "Integrated Holistic Health" should be undertaken and was undertaken in these meetings. This is in lines with the goal of G20 which is "to ensure healthy lives and promote well-being for all at all ages" which is also the Sustainable Development Goal 3 (SDG3) of the United Nation.

Dr. Bhavana Prasher who holds the position of "Senior Principal Scientist", "CSIR- IGIB" highlighted Ayush engagement with G20 engagement groups. These engagement groups were "Think20", "Science20", "Startup20", "Civil20", "Women20",

“Youth20” and “Agriculture20”. Chair of engagement groups functioning within the purview of India’s G20 presidency focussed on adopting a coordinated effort to make use of the G20 platform and to project India as driver of “Global Traditional Medicine” and gave suggestions on how to achieve this goal.

The first meeting of “Health Working Group” was held at Thiruvananthapuram, in the State of Kerala. The focus of the meeting was on how to achieve “Holistic Wellbeing through Integrated Healthcare”.

Indicators of Healthy Life and Healthy Life Style

Under the SDG3 goals, there are 13 targets and 28 indicators. These cover and focus on various aspects of a healthy life and healthy life style.

A healthy life style has two components-Preventive Health care and Promotive Healthcare.

Preventive Healthcare deals with disease management to lifecycle management; and focus is on both the individual level and the community level.

Promotive healthcare is a collaborative patient centered approach that promotes trust and recognizes a patient roles and responsibilities.

It enables a virtuous cycle of good health and well-being. It would involve good appetite, wholesome diet, good metabolism, peaceful sleep, clear excretion, positive disposition and so on; where one leads to the other. This would promote a dynamic balance in an individual- which would involve the physical, mental, as well as spiritual component, as again, each of these are inter related and dependent upon each other.

Traditional medicine addresses both these components-of “preventive healthcare” as well as “promotive healthcare”. Hence this integrated approach should be the order of the day.

Second Step: Under the G20 Presidency, India could also introduce policy change. This would be the second step. It could encourage start up to move into manufacture of traditional medicine by providing various incentives.

Third Step: Also it could provide incentives to boost exports.

The total export of India has increased from US\$ 1.09 billion (INR 9,000 Crore as per current INR-Dollar rate) in 2014 to US\$ 1.54 billion (INR 12,715 Crore as per current INR-Dollar rate) in 2020. (“Research and Information System for Developing Countries” (RIS); “Ayush Sector in India: Prospects & Challenges”)

Right set of incentives could further give an impetus to exports. All this could be supported by the right supply chain network could also be created to ensure India is able to meet demand of different countries.

The Ministry initiated a “Central Sector Scheme” for “Promotion of International Co-operation in Ayush” (IC Scheme). In this, the Ministry of Ayush extends help to Indian Ayush Manufacturers/ Ayush Service providers to give impetus to export of Ayush products & services. It enables international promotion, development and recognition of Ayush system of medicine; enable interaction of stakeholders and market development of a market for Ayush at international level. It also encourages academics and research. It does so by having created a “Ayush Academic Chairs” in different international countries. It also holds with the objective of creating awareness in order to give a promotional push to “Ayush Systems of Medicine” in foreign lands.

The Ministry of Ayush has cooperated with Ministry of Commerce and Industry and established a “Ayush Export Promotion Council” for medicines and products of Ayush systems.

The “Ministry of Ayush” has taken initiatives to give a push to exports. They are”

- Ministry has signed “Memorandum of Understanding” with 24 countries for “Cooperation in Traditional Medicine and Homoeopathy”
- Ministry has signed “Memorandum of Understanding” with 40 international institutes for research in “Collaborative Research / Academic collaboration”.
- Ministry has signed “Memorandum of Understanding” with international institutes for setting up of “Ayush Academic Chairs” in their countries.

- Ministry of Ayush has extended help for creation of 39 “Ayush Information Cells”. These will be set up in 35 different.
- The “Ayush Export Promotion Council” has been registered under section 8(4) of the Companies Act 2013 on 04.01.2022 under the “Ministry of Ayush” in support of the “Ministry of Corporate Affairs” to handle any hindrance which may come in the way of procuring registration of Ayush products abroad, undertaking of market studies and research activities abroad.

Fourth Step: under its presidency it should lay down policy to promote research.

- It has signed “Memorandum of Understanding” between “London School of Hygiene & Tropical Medicine” (LSH&TM), UK and “Frankfurter Innovationszentrum Biotechnologie” GmbH (FIZ), Frankfurt Germany for undertaking clinical research studies on mitigation of Covid-19 through Ayurveda.
- WHO-GMP (COPP) has been given to 31 Ayurvedic Drug manufacturers to enable export of Ayurveda, Siddha, and Unani & Homoeopathy Drugs.
- The “World Health Organisation” has also set up a dedicated “WHO Global Centre for Traditional Medicine” (WHOGCTM) in India, to capture the strength of Traditional Medicine.

Fifth Step: Create efficient supply chain to ensure traditional medicine reach nook and corner of member countries.

Sixth Step: Promote medical tourism. Under its presidency, it should promote India as a nature based tourist destination. And Kerala is one such destination in India.

Today is the day of ‘holistic health’ in terms of approaching all the health challenges. Traditional medicine of late is being accepted to play a major role in health sector”.

In the words of Shri Rahul Sharma, Joint Secretary, “Ministry of Ayush”, highlighted the role of Ministry of Ayush “it is imperative to contemplate the pivotal role Traditional Medicine can play in Global social wellness, and contributing in advancing Medical Knowledge and developing new Treatments.

Conclusion

In days of 'holistic healthcare', traditional medicine has come to play a significant role. In the words of Shri Amitabh Kant, "I greatly appreciate Ministry of Ayush for being at the forefront of actively collaborating with all engagement and working groups. We need to amplify the importance of Ayush practices in achieving Holistic health and Wellbeing." Traditional medicine has been an integral source of health for centuries in India. For centuries, millions have relied on it. And, of late, an increasing acceptance of traditional medicine is noted. The market size of AYUSH industry was US \$ 2.85 billion in 2014-15 while it rose to US \$ 18.1 billion in 2020. This strength of traditional medicine is being leveraged. One must take benefit of this opportunity and harness the potential of traditional medicines. (FITM-Forum of Indian Traditional Medicine)

'One World, One Health' means that the whole world is considered as a whole family in everyone is equal. Therefore, it implies that everyone all across the globe should have 'accessibility', 'affordability', 'availability'. This is possible if products and services of one country is available to all member countries. And this includes traditional medicines too. Therefore, through this presidency, one must meet this objective. This would be possible when all stakeholders work co-ordinately to achieve this single objective of 'One World, One Health'.

Annexure

Table-1: Major NCDs

Disease	Million
Cardio Vascular Disease	17.9
Cancer	9.3
Respiratory Diseases	4.1
Diabetes	2.0

Source: Prepared by researcher

Table-2: Deaths from CVDs

Year	Million
1990	1.17
2000	1.59
2010	2.03

Source: Prepared by researcher

Table-3: Case of Diabetes

Year	Million	%
1995	19.4	-----
2000	32.7	068.56
2025	57.2	195.00

Source: Prepared by researcher

Table-4: Health Centers

Level	Clinics
District	677*
District CCUs	187
District DCCUs*	266
Community level	5392

*District Day Care Centres

Source: www.pib.gov.in

BOX-1

The overall burden of disease is assessed making use of certain terms. They are disability-adjusted life year (DALY). This refers to a time-based measure that combines years of life lost due to premature mortality (YLLs) and years of life lost due to time lived in states of less than full health, or years of healthy life lost due to disability (YLDs). One DALY represents the loss of the equivalent of one year of full health. Using DALYs, the burden of diseases that cause premature death but little disability (such as drowning or measles) can be compared to that of diseases that do not cause death but do cause disability (such as cataract causing blindness).

*The burden of NCD is measured using deaths, disability adjusted life years (DALYs), years lived with disability (YLDs) and years of life lost (YLLs) due to premature deaths.

Source: www.who.int

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3

Extenuating Air Pollution through EV Adoption

Prof. Salma Ahmed & Sania Khan

Abstract

It can be said that pollution is the order of the day the world over. Air pollution is one great contributor to pollution. It is noted that air pollution is the greatest environmental threat of recent times which influences climate change and has immense health hazards. It is affecting the health of millions of people all across the world. It results in chronic pulmonary disease, lower respiratory infections, stroke, ischemic heart disease, to name a few. It results in 7 million pre mature deaths per annum. (www.unep.org)

The G20 platform has climate change as a major focus area. It is a global challenge. It needs to be arrested and controlled. A major contributor to air pollution is the transport sector. This paper focuses on climate change and health hazards associated with air pollution and advocates that if a country gradually adopts electric vehicles, much air pollution could be controlled. It also highlights the challenges adoption of e-vehicles faces and advocates that a collaborative effort of various stake holders could incentivize acceptance of e-vehicles. These efforts would help to arrest air pollution, control climate change, check health hazards and achieve a major objective of the G20 agenda.

Keywords: *Air Pollution, Climate Change, Health Hazards, E Vehicles, Transport Industry*

Introduction

Air pollution is a well-known environmental health concern. When a brown haze blankets a city, exhaust billows down a busy

roadway, or a plume burst off a chimney, one is fully cognizant of what they are witnessing. Though most air pollution is not visible, its powerful fragrance serves as a warning.

It is a severe threat to worldwide health and prosperity. More than 6.5 million individuals die yearly due to air pollution-related causes throughout the world, a figure that has risen over the last 20 years (Fuller *et. al.*, 2022). Air pollution today has become a global concern. It leads to climate change as well as health hazards. So it has negative implications for the environment as well as health of population. It results in various problems like asthma and breathlessness, TB and lung infection, general health problems, skin infection, eye infection to name a few (Refer Table-1). Therefore, it is a great concern which should not be overlooked anymore. Further, it also impacts climate change leading to global warming and decrease in life span (Refer Table 2).

A study conducted by Harvard University found “a striking association between long-term exposure to harmful fine particulate matter and COVID-19 mortality in the United States,” according to scientist Rashmi Joglekar who works for “Earthjustice’s Toxic Exposure & Health Programme”. The combusting process of diesel and gasoline engines in automobiles is a major source of fine particulate air pollution (PM2.5).

Another Duke University research emphasised the health expenses. According to the report, each gallon of petrol costs up to \$3.80 in health and environmental expenses. Therefore, there is a social cost involved as it affects our health as well as climate.

In 2019, 99% of world population was residing in countries where the air quality as per WHO’s guidelines were not met and the major causes of air pollution were found to be fuel and biomass combustion, fuel adulteration, traffic congestion, and greenhouse gas emission. (www.unep.org)

Also, among the major contributors to air pollution, vehicle on the road is a major contributor. Carbon emission from transport sector is a significant contributor. In India too, this is a significant contributor to air pollution. This is because car ownership in India has increased at a very fast pace, particularly in the metros and cities. (Refer Table-3). The emission from vehicles is “carbon

monoxide”, “hydrocarbons”, “nitrogen oxide and particulate matter (PM 2.5 and PM 10)”. In India, the contribution to air pollution is by industrial pollution (51 %), vehicle pollution by vehicles (27%), from burning of crops (17%) and other sources (5%). The air pollution also creates health hazards in India resulting in 2 million premature deaths per year.

In India, the level of air pollution is very high, the highest being in land locked capital city of Delhi. The states/ cities which are close at heels are Patna, Gwalior, Raipur to name a few (Refer Table-4). In India, capital city of Delhi has low car ownership compared to Goa, but has high level of air pollution because compared to Goa as it is a landlocked state. (Refer Table -5). For the fourth time in a row, New Delhi has been named the world’s most polluted city. In 2021, it recorded a 14.6 percent increase in PM2.5 concentrations. What is notable and appalling is that, 63 of Indian cities figure in 100 most populated cities in the world. This is a matter of grave concern.

Therefore, it goes without saying that this has immense negative health implications. Approximately 35 percent of population of India are vulnerable to emission levels which are defined to be much higher than those laid down by WHO. This results in 1.24 million deaths per year. (zeenews). The situation is further aggravated after covid-19 wherein; more population have shifted to adoption of personal car for transport. (Refer Box-1). And passenger travel contributed to 62 percent of emission to road transport. (zeenews)

One solution to control and arrest air pollution resulting from vehicles is the introduction of e-vehicles in India.

Adoption of E Vehicles: The adoption of electric vehicles (EVs) has gained significant momentum globally as a crucial step towards achieving sustainability and reducing greenhouse gas emissions. In India too, the EV market is growing and there is a perceptible shift in purchase of EVs from the purchase of conventional vehicles.

Electric Vehicles: A vehicle powered by a number of electric motors is known as an electric vehicle (EV). It can be fueled by a collection system, extravehicular energy, or an energy source on its own. EVs encompass both road and rail vehicles. EVs are a component of the Connected, Autonomous, Shared, and Electric

(CASE) Mobility vision for the future of mobility.

EVs fall in three categories:

- **Battery Electric Vehicles:** These use batteries which are charged with electricity
- **Plug-in Hybrid:** These combine a petrol or diesel engine with an electric motor and are powered by a big battery that could be recharged.
- **Fuel Cell Vehicles:** These create energy by separating electrons from hydrogen molecules.

EVs do not produce exhaust when its running and in operation, and thus prevent pollution from engine emissions. Further, they also do not add to pollution from tyres and brakes.

India is slowly but steadily gearing up for acceptance of EVs. As awareness increases and purchasing capacity increases, consumers are gradually moving to purchase of EVs. Yet it is not the preferred mode.

The percentage of EVs on the road is very low as compared to total number of cars on the road. It is as low as 0.15 percent of the total number of cars registered between the time period of April 2019 to March 2020. Though there is a perceptible shift from internal combustion engine (ICE) to EVs, the level of acceptance is very low. This is because there are many hurdles to its adoption.

Hurdles to EV Adoption: Major hurdles to widespread acceptance to EV adoption are many. One major hurdle is the high cost of EVs and the high cost of components, which are majorly imported at huge cost and heavy import duties.

- **High Price:** India is a very “price sensitive market”. The EVs capital cost is very high and this acts as an entry barrier. The EVs cost almost 50 percent more than the cost of internal combustion engine (ICE). This price differential makes EVs less affordable for many consumers, especially in a price-sensitive market such as India. Though the cost of operation (running cost of EVs) is much lower than the capital cost (purchase price), (the operational cost is 90 percent less) it is the purchase price which is found to play a significant role in a consumer’s decision to buy. For some years, there were no EVs that were available in the sub-lakh segment.

However, of late, Tata and MG have brought sub lakh cars in 2023. This may motivate and drive other OEMs also to make their offer of EVs affordable.

- **High import duty on its components:** Many components for the manufacture of EVs are being imported. There is a heavy duty imposed on such imports. For instance, batteries are imported. Furthermore, the cost of batteries, which accounts for a considerable amount of the cost of an EV, remains relatively high and adds to increase the cost of the final assembled product-the EV. This acts as a hindrance for manufacturers to manufacture EVs.
- **Limited Options:** Consumers are also faced with only a few options being available to consumers for purchase. Therefore, consumers either do not purchase or postpone their purchase decision for an EV. In the Indian market, the number of models of EVs available is limited viz a viz to conventional vehicles. Consumers, when purchasing a vehicle, often have a preference for a specific vehicle type, which could either be a sedans or a hatchback or even an SUV. EVs do not offer such options. The lack of variety and limited choice of models also acts as a deterrent for purchase of EVs. Customised EV models to cater to travel programs of consumers. For example, different EV models who need to travel within cities in a certain range of distances (regular office goers) and a different design for those who travel intercity.

One of India's major auto OEMs Maruti has yet to launch an EV variant. Mahindra just launched XUV400 a couple of months back. Other players also have limited options only and brand loyalty, which means a consumer has preference to buy only from a select company. This is acting as an entry barrier for many consumers.

- **Infrastructure a Constraint:** Lack of infrastructure for charging is also a great obstacle in purchase and adoption of EVs. If a charging station is not readily available, users are scared of being stranded on road side. This has been termed as 'range anxiety'. At present, India has only one public charger for every 25 EVs while it is one charger for every eight EVs across the globe. Further, the charging stations

often cater to a particular vehicle type and therefore lack inter-operability.

- **New charging solutions should be worked out.** The availability of charging infrastructure plays a critical role in the widespread adoption of EVs. In India, the charging infrastructure is not only low, but also insufficient, to fulfil the requirements of consumers particularly in non-metro cities and rural areas. The lack of a well-established and accessible charging network makes potential EV buyers concerned about the availability of charging points and the time required for recharging. This acts as a major hurdle.

More public charging locations like at shopping centers, banks, parking garages, at workplace, at store where one is shopping to name a few should be set up. And these provisions should be increased not at a slow but at an aggressive pace. These kinds of infrastructure investments will become increasingly important for public transit agencies, businesses, and people who want to purchase an electric car but are unable to install a charger at home.

Utility companies should come forward to set up such charging centers. In fact, every state and city should lay down an EV charging plan for its state.

Tata Power, other discoms and OMCs along with new age tech startups are also setting up charging infrastructure. But requirement of capital for setting up infrastructure is huge or substantial. Therefore, the required pace is missing and creating a big entry barrier for new consumers to move to EVs. In 2/3 Wheeler segments, some companies are taking the lead in providing battery swapping stations but these are at a very nascent stage. But such initiatives can improve consumer interest and drive for purchasing EVs.

- **Lack of consumer awareness and education:** In general, consumers in India have scanty knowledge about electric vehicles. They have limited knowledge about their benefits, the requirements of charging, and also their overall performance. The lack of awareness and education hampers the willingness to switch to EVs. Awareness campaigns and educational initiatives could be taken up by manufacturers and the government, to play a vital role in addressing this

barrier. Many 2-wheeler OEMs have taken interest to create this awareness and hence 2-wheeler in passenger segments is seeing better growth than 4-wheelers. It is also quoted that two-wheeler and three-wheeler sale dominate in the EV sale. (KPMG and CII report)

- **Range anxiety:** Range anxiety refers to worry or uncertainty over running out of battery power while driving. EVs run on battery and the battery offers service up to a limited range of EVs. Consumers are worried that they might find charging stations when in a journey. Although the range of EVs has been improving, it still is a major concern for consumers, especially in a country like India where distances are large and travel between cities is increasing at an accelerated pace because of improved Highway Infrastructure.
- **Charging time:** The 'range anxiety' is closely associated with the charging time, and this charging time determines the driving range. If one is using a slow charger, the EV can take up to 8 h to be charged to its full capacity (from the empty state) using a 7-kW charging point. The size of the battery determines the charging time. The bigger the size of car batteries, the longer the time it takes to recharge the battery from empty to full state. When one compares the charging time of an EV with the time required for re-fuelling ICE vehicle in a petrol station; it is a huge difference. This acts as the biggest barriers in people's minds towards EV adoption. Though better technologies are evolving to reduce the charging time, deployment of such vehicles and charging stations demands huge capital. Therefore, the speed of such deployments across India is slow and low.
- **Battery technology and infrastructure challenges:** It has become a must that technology for manufacturing battery develops fast. This would improve the performance of EVs and make EVs more affordable. However, India's capabilities for manufacturing are limited. There is no indigenously manufacturer of batteries. OEMs therefore depend upon imports. Building a robust battery manufacturing ecosystem and charging infrastructure are vital for overcoming these challenges.

- **Standardization:** Standardization is lacking in charging infrastructure which have so far been set up. Quite a possibility that one's vehicle cannot be charged at the next nearby charging station. Thus, the so called 'interoperability' between different charging networks acts as a big hindrance and acts as a deterrent for purchase of EVs. The government must collaborate with infrastructure providers and auto OEMs, should emphasize on establishing standardization protocols, which ensure interoperability, and promote the development of charging technologies. For example, LEV DC have been introduced for charging 2-wheelers, but all OEMs have not agreed to move to this standard. The Government has taken the right and necessary steps in standardizing the battery swapping stations. Initiative has been taken by the government of India to increase acceptance and adoption of ECs but the adoption is yet not at a pace which would have been desirable.
- **Safety Challenges:** Safety of EVs is also an area of concern and plays a significant role in earning the trust of consumers. In adoption of EVs. There are risks associated with use of battery technology, which could be in the form of thermal runaways and fire incidents, and therefore needs to be addressed. The government should establish stringent safety standards and regulations for EVs, charging infrastructure, and battery manufacturing. Collaboration with international organizations and research institutions can help develop comprehensive safety guidelines and establish best practices to mitigate these risks effectively.
- **Manufacturer Constraints:** As technology is new automobile manufacturers are also cautious of their move. Adoption is still slow because of high price. Further, they are dependent on import of components which involves heavy import duty and raises the price of final product. Also, a critical component, the battery, which is also imported adds to the woe of high cost. As such, they have been cautious about developing capabilities – players have chosen to operate adjacent to their core capabilities, that of manufacturing ICE automobiles. Manufacturers have not whole heartedly adopted EVs manufacturing.

- **Suppliers and Relationships:** It is obvious that the introduction of EVs involves immense technological transformation. The engine in typical ICEs has been replaced with a battery, which necessitates the installation of a Battery Management System (BMS). The transmission in an ICE has been replaced with a motor and a controller. Technology plays a significant role as percentage of electronic component in EVs has increased from a mere 16 percent to 55 percent. These are new technological components which over years may become standard components; nevertheless, they are novel and unique today.

“Technology is playing a key role in driving the EV landscape in India. While many of the current innovations are going to become standard offerings in the future, addition of newer features/ development of new technology is going to be a continuous process. And with India becoming a tech hub for the world, we are at a significant advantage,” stated Jeffry Jacob, Partner and Lead, Automotive, KPMG in India.

Technology change also implies lookout for supplier of these components. This means a search for new suppliers for technologically sophisticated components or mobilising old suppliers to graduate or shift to manufacture of these components. This further means new relationship with these suppliers or extending help to these suppliers to enable them to bring about this transition. (KPMG)

- **Provision of Support Infrastructure:** Manufacturers, in order to give boost to adoption and sale of their EVs also need to create the support infrastructure needed. This is an additional investment they are not very willing to work on, as it is beyond their core competency.
- **Financers:** As technology is new and adoption is at a very slow pace, investors are also cautious of investment decisions.

Government Initiatives

The Government of India has taken many regulatory and policy measures to address these issues. To address the issue of high capital cost of EVs, The Government of India has implemented adopted special policy which includes cutting the GST on EVs to

5% against 28% for internal combustion engines (ICE) and debt forgiveness for EV purchases. This move is basically because India is a very price sensitive market. This would address the issue of high price.

To address the issue of high price components, the Government has proposed to exempt custom duty on certain EV parts. Some of these parts are “electric drive assembly, on-board charger, e-compressor, charging gun”. Many states have also either already adopted or proposed adoption of schemes for increasing acceptance of EVs.

Further to push acceptance of green mobility, “Department of Heavy Industry” formulated a Scheme which was called “Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme”. This was established in 2015 with the goal of encouraging the manufacturing of electric and hybrid vehicle technologies and ensuring its long-term growth.

The Scheme was first established over a two-year term (Phase I of the Scheme). This commenced from 1st April 2015 and extended to 31st March 2019. Phase 1 of the “FAME India Scheme” was implemented, focusing on four key areas: demand generation, technology platform development, the pilot project, and charging infrastructure development. Demand was to be generated in all vehicle sectors, including “two-wheelers”, “three-wheelers”, “autos, passenger four-wheelers”, “light commercial vehicles”, and “buses”. The focus was on reduction of price of capital cost. Funds were set aside for each year, and they were also used in Phase I of the FAME India Scheme. (Refer Table 6).

The “Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME) India” initiative began on April 1, 2019, for a three-year time period that was then stretched for another two years till March 31, 2024.

The entire investment for ‘FAME Scheme Phase II’ is Rs 10,000 crore to give incentives to customers (end users) of electric cars to foster greater adoption, which may be encouraged as a purchase price. The concept is only for public and commercial transportation in the form of electric three-wheelers (e-3W), electric four-wheelers (e-4W) and electric buses.

Only privately owned and licenced electric two-wheelers (e-2W) are eligible for the incentive.

Under the FAME 2 plan, the government established an incentive of Rs 10,000 per kWh of battery capacity, with at most a ceiling of 20% of the vehicle cost, to encourage adoption of electric cars. However, this incentive was eventually extended to Rs 15,000 per kWh with a maximum ceiling of 40% of the vehicle cost.

However, with regard to two-wheelers, the government reduced the offered the subsidy under the “FAME-II (Faster Adoption of Manufacturing of Electric Vehicles in India)” plan for electric two-wheelers registered on or after June 1, 2023. The adjustment was announced. The demand incentive would be Rs 10,000 per kWh for electric two-wheelers whereas incentives for electric two-wheelers will be limited to 15% of the ex-factory price, down from 40% currently.

The FAME Scheme has set a specific target for EV market penetration for automobiles, commercial vehicles, buses, and two- and three-wheelers, which it hopes to accomplish by 2030. (Refer Table-7)

In FEMA-II, the budget has been increased substantially. It was Rs 800 crore in 2022 while it is pegged at Rs 2,908 crore in 2023. According to the budget statement, the subsidy under the FAME plan is expected to be Rs 5,172 crore in fiscal 2024, up from Rs 2,897 crore in the present fiscal year.

Government Initiative-Improved Sales

With government push, sale of EVs have increased in the last two fiscal for all categories of vehicles, be it four wheelers, two wheelers or three wheelers. (Refer Table-8). The EV adoption is expected to grow at 49 percent compounded annual growth rate with 10 million EVs sold annually by 2020. And in December 2022, 16.8 percent of all vehicles sale in Delhi at 86 percent year on year growth.

Other Measures

Other measures that could be adopted are a stringent scrapping policy of the Government of India. Initiation of ‘Consumer Awareness Program’ by Government and also by OEMs. Under the FAME Scheme 10 percent of the budget is allocated for creation of infrastructure. And 1 percent is allocated for creation of awareness. Government policies both at the Central and State level in a coordinated way are required. Designing and offering

easy finance schemes by banks in collaboration with OEMs would go a long way to boost sales.

Initiative by OEMs

With gradual adoption of EVs in India the automobile manufacturers have also taken initiative in this regard. Mahindra has introduced EVs both in the passenger as well as in the commercial vehicles segments. It has launched e-Verito, e-KUV100, Atom, e2oPlus, XUV300 and Treo. It is also making investments in the infrastructure and technological advancement of electric vehicles. (Refer Table-9)

Tata Motors, well known for launch of Indica, Indigo and Nano, the indigenously designed cars, has introduced Tigor EV, Nexon EV, Tata Nano (Electra), Tata Avinya, Tata Concept Curvv and Ultra Electric Bus.

Indian two-wheeler manufacturer Hero Electric has offered electric bikes and scooters, like Electric Hero Splender, Optima, Photon, and Flash.

Okinawa Autotech is another electric two-wheeler producer in India, having released the Ridge, Praise, iPraise+, Okhi 90, and Dual.

Lohia Auto is an Indian electric car company that has introduced electric vehicles in the three-wheeler market such as the Comfort Plus, Comfort E Auto, and Comfort DLX.

Revolt Motors also is in the sector of electric motor bikes and scooters and its main product is RV400.

Bajaj has offering like Baja Blade, Chetak Electric and Chetak Chic Electric in the EV segment.

Others Suggestions

Promote usage of electric trucks, electric sanitation trucks, electric garbage collection trucks, electric postal trucks, electric package carrying trucks from warehouses to stores should become the order of the day. And make provision for affordable transportation for one and all. Making electric vehicles available to everyone is a significant step towards that aim. For example, Delhi State Corporation (DTC) should guarantee that it has a full fleet of zero-emission electric buses. (Refer Box-3) So that every DTC bus one boards is an EV.

Conclusion

Initiative of government, both at central and state level, collaborations between the government, industry stakeholders, banks and utility companies could be instrumental in boosting sale of EVs at large and ultimately contribute to control climate change and control health hazards. A coordinated and concerted effort of all stakeholders is needed to give acceptance and adoption of EVs the much needed boost. These efforts would go a long way to arrest air pollution, control climate change, check health hazards and help fulfil a major objective of G20 countries.

Annexures

Table-1: Diseases Caused

Disease	%
Asthma & Breathlessness	57
TB & Lung infection	24
General Health problem	17
Skin infection	14
Eye infection	12
Cancer	12
Decrease in life span	3

Source: Prepared by researcher

Table-2: Other Concerns

Impact on weather	10
Global warming	4
No response	4
Decrease in life span	3

Source: Prepared by researcher

**Table-3: Registered number of private cars in Delhi
(in millions)**

Year	In millions
1990	0.38
2000	0.92
2010	2.01
2020	3.31

Source: Prepared by researcher

Table-4: Top 13 Cities in India with highest level of PM 2.5

Cities	PM 2.5 Levels
Delhi	153
Patna	149
Gwalior	144
Raipur	134
Ahmedabad	100
Lucknow	96
Firozabad	96
Kanpur	93
Amritsar	92
Ludhiana	91
Prayagraj	88
Agra	88
Khanna	88

Source: Prepared by researcher

Table-5: Car ownership per household (Statewise)

State	% age
Goa	45.2
Kerela	24.2
J & K	23.7
Himachal Pradesh	22.1
Punjab	21.9
Nagaland	21.3
Sikkim	20.9
Delhi	19.4
Arunachal Pradesh	19.3
Manipur	17.0
Mizoram	15.5
Haryana	15.3
Meghalaya	12.9
Uttar Khand	12.7
Gujarat	10.9

Source: Prepared by researcher

Table-6: FAME Scheme

S. No.	Financial Year	Fund Allocated	Fund Utilization
1	2015-16	Rs. 75 Crore	Rs. 75 Crore
2	2016-17	Rs. 144 Crore	Rs. 144 Crore
3	2017-18	Rs. 165 Crore	Rs. 165 Crore
4	2018-19	Rs. 145 Crore	Rs.145 Crore
TOTAL		Rs. 529 Crore	Rs. 529 Crore

Source: Prepared by researcher

Table-7: EV sales penetration

Category of Vehicles	Sales
Cars	30%
Commercial vehicles	70%
Buses	40%
Two & three-wheelers	80%

Source: Prepared by researcher

Table-8: Sale of EVs

Category	2022	2023
Four Wheeler	10,23,735	11,71,994
Two Wheeler	2,52,539	7,20,733
Three Wheeler	1,88,447	3,99,540

Source: www.autocarp.in

Table-9: Initiatives by OEMs

Company Name	Year Estb	Location
Mahindra Electric	2010	Bengaluru
Tata Motors	1945	Mumbai
Hero Electric	2007	New Delhi
Okinawa Autotech	2015	Gurugran
Lohia Auto Industries	2008	Noida
Revolt Motors	2019	Gurugram
Bajaj Auto	1945	Pune

Source: Prepared by researcher

Box-1

From March 2020- May 2020, the level of nitrogen dioxide was recorded the lowest in 20 years nationally. And pollution is majorly caused by vehicles, power plants and other industrial processes due to burning of fuel.

Box-2: Loan Forgiveness

Loan forgiveness means *“a debt (or part of a debt) is eliminated or forgiven”*. In simple words, it means relieving the borrower of the obligation to repay it.

Box-3: Zero Emission

Zero emissions means that *“a vehicle emits no pollutants to disrupt the climate or dirty our air”*. It is a broader category that *“describes electric vehicles, hydrogen fuel cell vehicles, and other emerging types of technology”*. In other words, *“zero emissions”* refers to technology that does not depend upon combustion to power vehicles.

Box-4: FEMA Scheme

“The National Electric Mobility Mission Plan (NEMMP) 2020 is a “National Mission document”. For faster adoption of electric vehicles and their manufacturing in the country this lays down the vision and a guideline. As part of the NEMMP 2020, Department of Heavy Industry formulated a Scheme viz. “Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme” in the year 2015. This objective of this scheme was to give an impetus to manufacturing of electric and hybrid vehicle technology. It also ensures sustainable growth.

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4

India's G20 Presidency: Reimagining a Post-Pandemic World

Prof. K M Baharul Islam

Abstract

India's G20 Presidency is crucial in shaping global responses to post-pandemic challenges, particularly in climate finance. Key issues include climate funding commitments, ensuring developed countries fulfill their commitments to provide financial assistance to developing countries, and promoting private sector investments in climate-resilient and low-carbon projects. To mobilize climate finance, the G20 can explore ways to facilitate the implementation of carbon pricing and emissions trading systems, integrate climate finance into post-pandemic recovery efforts, and align economic recovery packages with climate goals. Encouraging regional collaboration and partnerships can facilitate the pooling of resources and the development of regional climate finance initiatives. Coordination of monetary policies among G-20 economies is crucial for global economic governance and stability. By coordinating monetary policies, G-20 members can align their approaches to monetary management, interest rates, and inflation targeting, fostering balanced global growth. Strategies include fiscal discipline, prudent spending practices, debt restructuring, and promoting economic growth and revenue generation. Governments can also explore selling or leasing public assets to generate revenue and reduce debt. In this paper we discuss how under India's leadership the G20 can create conducive environments for private investment and identify opportunities in clean energy, sustainable infrastructure, and other climate-friendly sectors.

Data for development is essential for India's digital development efforts. Integrating biological data into sustainable development agendas, such as the United Nations' Sustainable Development Goals, can

guide efforts towards a more sustainable and biodiverse planet. India's G20 Presidency would shape the global economic agenda and foster international cooperation on economic and financial challenges. The theme of Vasudhaiva Kutumbakam, promoting universal kinship and shared responsibility, can lead to more inclusive and compassionate approaches to global issues. India's G20 Presidency would shape the global economic agenda and foster international cooperation on economic and financial challenges. The theme of Vasudhaiva Kutumbakam, promoting universal kinship and shared responsibility, can lead to more inclusive and compassionate approaches to global issues.

Keywords: *Climate Finance, Economy, Development, Governance, Cooperation*

Introduction

The Group of Twenty (G20) was established in 1999 to bring together major advanced and emerging economies to discuss and coordinate global economic issues. It is the premier forum for international economic cooperation. It plays an important role in shaping and strengthening global architecture and governance on all major international economic issues. The G20 holds annual summits where leaders from member countries come together to address various global economic and financial challenges (Payne, 2008). These challenges include global economic growth, financial stability, international trade, climate change, and other pressing issues.

India holds the Presidency of the G20 from 1 December 2022 to 30 November 2023. During this time, India is crucial in leading and shaping international economic cooperation and discussions on various global economic issues. As the G20 Presidency holder, India is responsible for organising and hosting the G20 Summit and related meetings, where leaders and representatives from the member countries come together to discuss and coordinate key economic and financial matters. The G20 Summit allows participating nations to address pressing challenges and promote economic growth, financial stability, and sustainable development on a global scale. As India holds the G20 Presidency for this specific period, it can use its influence and leadership to advance its priorities and advocate for the interests of its nation and the broader international community (Kim & Chung, 2012).

The presidency typically involves setting the agenda for G20 meetings, fostering dialogue among member countries, and striving to achieve consensus on critical global economic issues.

India's G20 Presidency this year offers a unique chance for the nation to lead a group effort to address numerous, complex, and interlinked concerns while putting the ambitions and needs of the developing world front and centre. The COVID-19 epidemic, supply-chain problems, climate change, threats to the security of food and energy, geopolitical unrest, inflation, and an impending debt crisis are just a few of the factors that have slowed down the economy and raised doubt about future global economic growth.

India has chosen "*Vasudhaiva Kutumbakam*" or "One Earth - One Family - One Future" as the theme for its G20 Presidency, correctly intending to foster the sense of unanimity necessary for tackling major global challenges jointly and successfully. The G20 agenda for India, according to Prime Minister Narendra Modi, should be "inclusive, ambitious, action-oriented, and decisive." The achievements and experiences of India are essential for shaping global solutions.

"*Vasudhaiva Kutumbakam*" is a Sanskrit phrase that translates to "the world is one family." It is an ancient Indian philosophy that emphasises the interconnectedness and unity of all human beings and the world (Hall, 2019). This concept is deeply rooted in Indian culture and reflects the belief that all living beings are interconnected and part of a larger cosmic family. The idea of *Vasudhaiva Kutumbakam* promotes a sense of global brotherhood, compassion, and universal responsibility. It encourages people to transcend narrow boundaries of nationality, ethnicity, and religion and to treat every individual with respect and kindness, recognising the inherent oneness that binds humanity.

Emerging Issues in Post-pandemic Scenario

On 16 November 2022, the president of Indonesia symbolically delivered the G20 gavel to the prime minister of India. After that, India is leading all efforts to forge agreements between rich and developing nations on problems of global significance during the coming year as it takes over the G20 presidency on 1

December 2022. India has a great chance to demonstrate global leadership. This presidency has taken place during a period of crisis when the world is dealing with the aftermath of disruptive conflicts, a once-in-a-century pandemic, and significant economic instability (Steger, 2023). The European Union and 19 of the most powerful nations in the world make up the G20. They are responsible for 66% of the world's population, 75% of global trade, and 85% of the world's GDP. Today, the G20 Summit discusses some of these important global issues.

As the Prime Minister of India has correctly stated, India must set the agenda to speak for the developing world even though the G20 is a mix of developed and developing nations. Historically, the developed world has decided what is best for the developing world; thus, this is significant (Tosun, 2001). This is one of those moments when India sets the global agenda, influences other nations, and fosters agreement on various topics. India's current challenge is ensuring that the G20 presidency is inclusive, ambitious, definite, and action-oriented. A challenge will be to quicken the SDGs' pace, given that 2030 is almost upon us. India has developed a distinctive digital transformation model. India has developed a digital identity based on digital public goods and encouraged commercial sector innovation (Mann, 2018). It has developed quick payments and a digital empowerment protection infrastructure for citizens. Technology breakthroughs often originate in the developed world, but this is the first time they are being created in an emerging market like India (Iyer, 2018).

As India holds the G20 Presidency, it has an opportunity to shape discussions and initiatives to address the challenges posed by the post-pandemic world and promote a sustainable and resilient global recovery. The COVID-19 pandemic has had far-reaching economic, social, and environmental impacts, and the G20 can play a crucial role in charting a path forward. Some key themes and priorities that India's G20 Presidency could focus on for a post-pandemic planet include:

Global Health and Vaccination: Ensuring equitable access to vaccines and healthcare resources for all countries remains a pressing issue. India could work to promote international cooperation in vaccine distribution, production, and

development to combat the pandemic and prevent future health crises.

Economic Recovery and Inclusive Growth: Coordinating efforts to foster an inclusive and sustainable economic recovery will be vital. This could involve policies to stimulate economic growth, create jobs, and support vulnerable populations severely impacted by the pandemic.

Climate Action and Sustainability: Given India's commitment to climate change mitigation and sustainable development, its G20 Presidency can advocate for collective action on climate issues. This might include promoting renewable energy investments, enhancing climate finance, and encouraging green infrastructure projects.

Digital Transformation and Technological Innovation: The pandemic has accelerated digital transformation across sectors. India's leadership could emphasise the need to harness technology for sustainable development, digital inclusion, and data privacy.

Education and Skills Development: India may prioritise initiatives to bridge the digital divide and promote access to quality education and skill development, recognising the importance of human capital for post-pandemic recovery.

Trade and Investment: Facilitating open and fair trade while addressing supply chain disruptions could be an area of focus. India could support efforts to enhance global economic integration and resilience.

Social Protection and Healthcare Infrastructure: Enhancing social protection systems and healthcare infrastructure could ensure countries are better prepared to cope with future health emergencies.

Debt Relief and Financial Stability: The G20 could continue to address debt relief for vulnerable countries and work towards financial stability in the wake of the pandemic.

Biodiversity Conservation and Nature-based Solutions: Recognising the importance of biodiversity and ecosystem health, India could advocate for nature-based solutions to address environmental challenges.

Women's Empowerment and Gender Equality: India may seek to advance gender equality and women's empowerment as part of its G20 agenda.

India's unique position as a rapidly growing economy and a leading voice in climate diplomacy makes its G20 Presidency significant in shaping global responses to post-pandemic challenges. By fostering international cooperation and consensus on these critical issues, India's leadership can contribute to building a more sustainable, inclusive, and resilient planet for the future.

New Agenda for Sustainable Development

Climate finance has been a significant topic of deliberation within the G20, and it will likely continue to be a crucial issue during India's Presidency from December 2022 to November 2023 (Ray et al., 2023). Climate finance refers to the financial resources and investments needed to support climate-related projects, mitigation efforts, and adaptation measures in developing countries.

Key issues related to climate finance for deliberation within the G20 could include climate funding commitments of member nations (Sinha et al., 2023). Ensuring that developed countries fulfil their commitments to provide financial assistance to developing countries to support their climate actions. This includes meeting the \$100 billion per year target, as agreed upon in the United Nations Framework Convention on Climate Change (UNFCCC), to support developing countries' climate efforts. Finding ways to mobilise and scale up private sector investments in climate-resilient and low-carbon projects (Leggett, 2020). The G20 can be crucial in creating conducive environments for private investment and identifying opportunities in clean energy, sustainable infrastructure, and other climate-friendly sectors.

Exploring mechanisms to link climate considerations with debt relief and restructuring efforts, especially for countries heavily impacted by climate change. This might involve incentivising green finance practices and aligning debt relief measures with climate goals. Addressing vulnerable countries' needs to adapt to climate change's impacts. This could involve providing

financial support for infrastructure projects, agriculture, water management, and other initiatives to build resilience in the face of climate-related challenges (Dastgerdi, 2023). Ensuring transparency and accountability in climate finance flows, reporting, and tracking. Establishing robust mechanisms to monitor the effectiveness and impact of climate finance contributions is essential for building trust among nations and ensuring that funds are used effectively.

In terms of carbon pricing and market dynamics, to mobilise climate finance, the G20 can explore ways to facilitate the implementation of carbon pricing and emissions trading systems, which can generate revenue for climate projects. Integrating climate finance into post-pandemic recovery efforts, promoting sustainable and green development pathways (Foley et al., 2022). Aligning economic recovery packages with climate goals can lead to more resilient and sustainable economies. Addressing the financial risks associated with climate change and encouraging businesses and financial institutions to disclose their climate-related risks and opportunities. This can enable better-informed decision-making and promote climate-conscious investments. These issues are complex and require international cooperation and commitment. The G20 provides a platform for major economies to collectively address these challenges and work towards a more sustainable and climate-resilient future. India's Presidency during this period could provide an opportunity for advancing discussions on climate finance and promoting climate actions globally (Calzada, 2023). Making climate finance available to all is a critical aspect of addressing the global climate crisis and ensuring that all countries, especially those with fewer resources, can participate in climate actions and adapt to the impacts of climate change. Achieving this goal involves several key approaches, which can be discussed briefly here.

Approaches to Climate Funding

Developed countries must meet their commitments to provide climate finance to developing nations, as agreed upon in international agreements like the UNFCCC. Timely and adequate funding is essential for enabling developing

countries to undertake climate mitigation and adaptation measures. Improving access to climate finance for developing countries is crucial. This can be achieved through capacity-building initiatives that help countries develop the necessary expertise and institutions to access and manage climate funds effectively (Nautiyal & Klinsky, 2022). Technical assistance and knowledge transfer can empower countries to identify, design, and implement climate projects that align with their unique circumstances and needs.

Exploring and implementing innovative financing mechanisms can augment traditional sources of climate finance. This includes leveraging private sector investments through blended finance models, promoting green bonds, and exploring the potential of carbon pricing and emissions trading systems to generate revenue for climate projects. Ensuring climate finance reaches vulnerable communities, including remote and marginalised areas, is vital (Anantharajah & Setyowati, 2022). Targeted funding can support projects that benefit the most vulnerable populations, such as investments in clean energy access, climate-resilient agriculture, and climate-proof infrastructure.

Encouraging regional cooperation among countries facing similar climate challenges can facilitate the pooling of resources and the development of regional climate finance initiatives. International collaboration and partnerships can also foster greater efficiency and effectiveness in climate finance allocation (Prasad et al., 2022). Engaging the private sector in climate finance initiatives can unlock additional resources and expertise. Public-private partnerships can lead to more substantial investments in sustainable projects and technologies. Facilitating the transfer of environmentally friendly technologies to developing nations can accelerate their climate actions (Jiakui et al, 2023). This may involve reducing technology barriers, encouraging cooperation between countries, and providing financial and technical support for technology adoption. By implementing these strategies, the international community can work towards making climate finance more accessible and equitable, enabling all countries to contribute to the global effort in combating climate change and building a sustainable future. Transitioning to a low-carbon global economic order is a complex and multifaceted challenge,

but addressing climate change effectively and creating a sustainable future is essential.

Low-Carbon Economy

One of the most critical steps is reducing reliance on fossil fuels and transitioning to renewable energy sources. Governments and businesses can support this shift through incentives, subsidies, and policies that promote the development and adoption of clean energy technologies like solar, wind, hydropower, and geothermal (Mamchur & Peksa, 2023). Improving energy efficiency across various sectors, from transportation to buildings and industries, can significantly reduce carbon emissions. Encouraging energy-efficient technologies and practices can lead to substantial energy savings and greenhouse gas reductions. Transitioning to low-carbon transportation systems, such as electric vehicles and public transit, is vital. Governments can invest in green infrastructure and promote sustainable mobility options to reduce emissions from the transport sector.

Sustainable Urban Development: Promoting sustainable urban planning and design can lead to more energy-efficient cities and communities. This includes creating pedestrian-friendly neighbourhoods, investing in public transport, and incorporating green spaces to mitigate the urban heat island effect. Shifting towards a circular economy model, where resources are reused, recycled, and waste is minimised, can reduce the environmental impact of production and consumption (Ncube et al., 2023). Implementing carbon pricing through carbon taxes or emissions trading systems can incentivise businesses to reduce emissions and invest in low-carbon technologies. This creates economic incentives for transitioning to a low-carbon economy. Encouraging investments in sustainable and climate-friendly projects through green finance initiatives can direct capital towards low-carbon opportunities.

Investing in research and developing new technologies and innovations is crucial for finding more efficient and cleaner ways to produce energy, goods, and services (Martínez et al., 2023). Raising public awareness and promoting climate education can foster a greater understanding of the importance of transitioning to a low-carbon economy and encourage individual and collective actions. Climate change is a global challenge that

requires collaboration among nations. International agreements and coordinated policies can ensure a level playing field and facilitate the global transition to a low-carbon economy. Providing financial and technical assistance to developing countries can help them adopt low-carbon technologies and build climate resilience (Weko & Goldthau, 2022). Alongside mitigation efforts, countries need to invest in adapting to the impacts of climate change to minimise disruptions to economies and communities. After all, transitioning to a low-carbon global economic order is challenging. Still, with commitment, innovation, and collective action, achieving a more sustainable, resilient, and climate-friendly future for generations to come is possible.

Monetary Policies Coordination

Coordination of monetary policies among G-20 economies is important to global economic governance and stability. As the G-20 includes major advanced and emerging economies, their monetary policies can significantly impact the international financial system and economic conditions worldwide (Alola et al, 2022). Coordinating these policies helps address common challenges and promotes collective efforts to achieve shared economic goals. G-20 economies aim to avoid excessive exchange rate volatility and maintain currency stability. Coordinating monetary policies can help prevent competitive devaluations and minimise disruptions to international trade and capital flows.

G-20 members strive to achieve sustainable economic growth and financial stability. By coordinating monetary policies, they can align their approaches to monetary management, interest rates, and inflation targeting to foster balanced global growth. Many central banks within the G-20 set inflation targets as part of their monetary policy framework. Coordinating inflation targeting helps anchor inflation expectations and promotes price stability across countries. Managing global liquidity is crucial to prevent excessive capital flows that may lead to financial imbalances or crises. Monetary policy coordination can help ensure liquidity conditions are appropriate for the global economy. G-20 economies coordinate on financial stability policies and regulatory frameworks to mitigate systemic risks and enhance

the resilience of the international financial system (Lessambo, 2023). Some central banks may implement unconventional monetary policies in economic challenges, such as quantitative easing. Coordination can help avoid unintended consequences and enhance the effectiveness of such measures (Shao & Wang, 2022). Effective communication and transparency about monetary policy decisions among G-20 members are essential. Clear communication can reduce uncertainty and enhance market confidence. Coordinated monetary policy responses can be essential during global economic shocks like the 2008 financial crisis or the COVID-19 pandemic. Joint actions can amplify the impact of individual policy measures and contribute to a more effective global response.

It's important to note that while coordination of monetary policies can be beneficial, countries also have unique domestic economic conditions and policy objectives. Thus, coordination does not necessarily mean complete alignment of policies but rather finding areas of convergence and mutual understanding. The G-20 meetings, including those of central bank governors and finance ministers, serve as platforms for discussing these issues and fostering cooperation on monetary policy matters. G-20 economies can contribute to a more stable and prosperous global economic environment by working together.

Issues of Public Debt

Dealing with a legacy of public debt can be complex and challenging for governments. High levels of public debt can result from various factors, including deficit spending, economic downturns, and the need for emergency measures during crises like the COVID-19 pandemic (Chang et al., 2023). There are some strategies that governments can consider when dealing with a legacy of public debt. Governments must exercise fiscal discipline by adopting prudent spending practices and responsible fiscal policies. This may involve reducing non-essential expenditures, prioritising critical projects, and avoiding waste. Governments can also explore debt restructuring options to reduce the burden of debt payments. This may include negotiating with creditors for more favourable terms, extending debt maturities, or refinancing at lower interest rates.

Economic growth and revenue generation are inherently interlinked. Hence, promoting economic growth is essential

for increasing tax revenues and reducing the relative size of the debt burden. Governments can implement policies that support investment, entrepreneurship, and job creation to spur economic expansion (Singh, 2022). Ensuring an efficient and fair tax system is critical for maximising revenue collection. Governments can consider reforms that close loopholes, combat tax evasion, and promote tax compliance. Governments can explore selling or leasing certain public assets to generate revenue and reduce debt. Careful consideration should be given to maintaining essential services and ensuring that such transactions are in the public interest.

Conducting a comprehensive review of public expenditures can also help us identify areas where efficiencies can be achieved, and non-essential spending can be curtailed. Central banks can play a role in managing debt by implementing appropriate monetary policies. However, using monetary policy solely to address debt concerns may have broader economic implications and needs to be balanced with other considerations. Developing a long-term debt management strategy can provide a roadmap for gradually reducing debt levels while ensuring financial stability (Lee et al, 2022). Maintaining transparency in debt management practices and communicating with the public about the measures to address debt concerns can foster trust and confidence.

In international cooperation against the backdrop of G20 and concerning the countries with external debt, international cooperation and support from creditors and multilateral institutions can be instrumental in easing debt burdens. It's important to note that there is no one-size-fits-all approach to managing public debt, and the appropriate mix of strategies will depend on each country's unique economic and fiscal circumstances. Governments must carefully balance addressing debt concerns with supporting economic growth and meeting essential public needs. Long-term planning and sound financial management are key to effectively dealing with a legacy of public debt.

Data for Development

As an emerging leader in the digital world, India would need to focus on its robust data sources and identify their use for a development agenda. Data for development refers to using

data and information to drive and inform various aspects of development initiatives and policies (Chatzistamoulou & Tyllianakis, 2022). Data plays a crucial role in understanding the challenges and opportunities within societies and economies, allowing policymakers, governments, and development organisations to make informed decisions and design effective interventions. Engaging with evidence-based policy planning data helps design and implement evidence-based policies and programs (Fitsilis et al, 2022). It provides insights into a region's social, economic, and environmental conditions, enabling policymakers to identify priorities and develop targeted interventions. Data is also essential for monitoring and evaluating the impact of development projects and programs. It allows stakeholders to assess progress, identify successes and challenges, and adjust to improve outcomes. Data is used to measure and analyse poverty rates, understand their underlying causes, and develop poverty reduction strategies. This helps in targeting resources and assistance to the most vulnerable populations. For instance, education and healthcare outcomes data help plan and improve education and healthcare systems. It can guide resource allocation, identify improvement areas, and track progress over time.

Economic data is crucial for understanding economic trends, identifying sectors with growth potential, and formulating strategies for economic development and job creation (Atstāja et al., 2022). Data on agriculture and rural communities inform policies and programs to improve agricultural productivity, enhance food security, and promote rural development. Data helps in analysing and addressing gender disparities and social inequalities. It supports promoting gender equality, social inclusion, and human rights. Data on climate change and environmental indicators helps develop climate resilience strategies, mitigate environmental risks, and promote sustainable development practices (Fahad e al., 2023). Hence, data is a key component of digital development efforts, such as expanding access to information and communication technologies (ICTs) and leveraging technology for social and economic progress. It informs urban planning and infrastructure development, supporting sustainable and inclusive urbanisation. Data-driven research and innovation support the development of new

technologies, products, and services that can address specific development challenges.

Data for development will, therefore, require reliable data collection, robust data management systems, and the capacity to analyse and interpret data effectively. It also necessitates transparency, data privacy protections, and ethical considerations to ensure data is used responsibly and for the public good. International cooperation and partnerships are often vital for sharing data, building capacity, and addressing global development challenges collaboratively.

Biological Data Issues

At the same time, a global understanding of biological data will need a coordinated and inclusive dialogue among various stakeholders on the collection, sharing, management, and use of biological data globally. Biological data encompasses a wide range of information related to living organisms, including genetic sequences, species occurrences, ecological data, biodiversity records, and more. Such a conversation is crucial to address global challenges related to biodiversity conservation, sustainable development, and scientific research. Promoting open access to biological data is essential for fostering scientific collaboration and maximising the potential of research efforts. Establishing common data standards and formats helps ensure that biological data from different sources can be integrated and analysed effectively (Sheffield et al, 2022). Interoperability enables researchers and policymakers to access and combine data from diverse datasets and sources. Balancing the benefits of open data with the need to protect individual privacy and sensitive information is critical (Hotz et al., 2022). A global conversation must address data ethics, consent, and data anonymisation to safeguard the rights of individuals and indigenous communities. Involving citizens in data collection through citizen science initiatives can broaden data availability and enhance public awareness and engagement in biodiversity conservation efforts.

Supporting developing countries and institutions with limited resources in building technical and analytical capacity for data collection, management, and analysis is essential for promoting equitable participation in global efforts. Investing in robust

data infrastructure and advanced technologies, such as cloud computing and machine learning, can facilitate the storage, processing, and analysis of large-scale biological datasets. A successful global conversation on biological data requires collaborative partnerships among governments, scientific institutions, NGOs, and international organisations (Nadarajah et al., 2022). Multilateral efforts can pool resources and expertise to address global challenges. Ensuring that biological data effectively inform policy decisions is vital for creating evidence-based conservation and environmental policies.

Identifying and addressing data gaps and biases in biodiversity data can improve our understanding of species distributions, ecological trends, and conservation needs. Integrating biological data into sustainable development agendas, such as the United Nations' Sustainable Development Goals (SDGs), can help guide efforts to achieve a more sustainable and biodiverse planet. It can also facilitate collaboration among researchers, institutions, and policymakers worldwide, promoting a more holistic and coordinated approach to address the pressing challenges of biodiversity loss and ecological sustainability.

Conclusion

As the G20 Presidency holder, India would significantly shape the global economic agenda and foster international cooperation on various economic and financial challenges. During its Presidency, India would have the opportunity to lead discussions and initiatives on critical issues such as economic recovery from the COVID-19 pandemic, sustainable development, climate change, trade, investment, and financial stability. The G20 provides a platform for major advanced and emerging economies to collaborate, coordinate policies, and address pressing global issues. India's G20 Presidency would offer the country an important forum to advocate for its national interests and priorities while contributing to global efforts to address shared challenges.

As one of the major emerging economies and a representative of the developing world, India often plays a crucial role in representing the interests and concerns of developing countries in international forums, including the G20. Given its large

population, diverse economy, and significant influence in global affairs, India's voice carries weight in discussions on various issues affecting developing nations. During its G20 Presidency, India would have an opportunity to emphasise the priorities and challenges developing countries face. India's position as a representative of the developing world within the G20 provides an opportunity to advocate for more inclusive and equitable global policies and actions. By leveraging its influence and diplomatic skills, India can work towards finding common ground and collaborative solutions that benefit both developing and developed nations and contribute to sustainable and inclusive global development.

In international relations and diplomacy, the theme *Vasudhaiva Kutumbakam* can be a powerful and relevant guiding principle. It calls for fostering understanding, cooperation, and harmony among nations while acknowledging the shared challenges and responsibilities faced by all countries in today's interconnected world. Embracing the philosophy of *Vasudhaiva Kutumbakam* can lead to more inclusive and compassionate approaches to global issues, such as climate change, poverty alleviation, and humanitarian crises. It encourages collaboration and collective action to address common challenges that transcend borders and impact people across the globe. By promoting the idea of the world as one family, the theme of *Vasudhaiva Kutumbakam* encourages a shift towards more sustainable and equitable global development, where the well-being of all beings is considered and the welfare of the planet is safeguarded for future generations. It embodies the spirit of universal kinship and the shared responsibility to care for one another and the Earth we call home.

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5

Sustainable Finance for Climate Change in G20 Countries

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Abstract

This article gives a bird's eye view of the options available for financing sustainable businesses to limit climate change. Building up supply chains (often through cross-sector partnerships) is imperative to preventing global warming and achieving net zero targets. Other urgent needs include proactively addressing a skills gap that is developing and looking into various financing and investment options for green business and the circular economy. The net zero economy index of PwC with respect to key G20 countries has been discussed and compared with India (PWC, 2022). The issues with which India has grappled with in sticking to emission control along with methods for sustainable financing used globally and in India has also been discussed.

Keywords: Sustainable Finance, Climate Change, G20 Countries, Net Zero Economy Index (Nzei), Investment Options

Introduction

The G20 countries' efforts and initiatives to direct financial resources and investments towards environmentally sound projects and activities that support the transition to a low-carbon and robust economy are referred to as "sustainable finance for climate change." The G20 is an association of 19 nations, including the European Union, that serve as the leading economies of the globe. Since climate change poses serious threats to public health, global economic stability, and overall social well-being, sustainable financing has become crucial in

G20 nations. Transitioning towards a more sustainable financial system is seen as a critical step in addressing climate change, as it can unlock large-scale investments in renewable energy, energy efficiency, sustainable infrastructure, and other climate-friendly initiatives. (Khan et al, 2022)

Several key strategies and actions have been pursued by G20 countries to promote sustainable finance for climate change like Green Finance Initiatives, Climate Risk Assessment and Disclosure, Integration of Environmental Criteria, Regulatory Measures, Promotion of Renewable Energy and Low-Carbon Technologies, Public-Private Partnerships, Support for Developing Countries and Research and Innovation. (Force, 2020)

In Green Finance Initiatives, many G20 countries have established green finance initiatives to support and promote sustainable investments. This includes the development of green bond markets, where issuers raise funds for environmentally friendly projects. Governments and financial regulators may provide incentives or preferential treatment for green bonds to attract more investment in sustainable projects. In Climate Risk Assessment and Disclosure, G20 countries have been encouraging financial institutions and corporations to assess and disclose climate-related risks and opportunities in their operations and portfolios. This information helps investors make more informed decisions and encourages businesses to adopt climate-friendly practices.

G20 nations have been incorporating environmental, social, and governance (ESG) factors into the processes used to decide which investments to make as part of the Integration of Environmental Criteria initiative. This entails taking into account investments' social and environmental responsibility in addition to their financial returns. Some G20 nations have put policies in place—or have explored doing so—that encourage or compel financial institutions to take climate-related risks into account and declare their exposure to related dangers. Stress tests are another type of regulatory assessment that can be used to evaluate how resilient financial institutions are to climate threats. The G20 countries frequently offer subsidies, tax incentives, or other types of support to promote renewable

energy and low-carbon technologies. These actions are intended to hasten the switch from dirty energy sources to cleaner ones. (D’Orazio & Dirks, 2022).

In Public-Private Partnerships, collaboration between governments, private sectors, and international organizations is crucial to mobilize sufficient funding for sustainable projects. Public-private partnerships can leverage expertise and financial resources from both sectors to scale up sustainable finance initiatives. In support for developing countries, many G20 countries have pledged financial support to assist developing nations in their efforts to mitigate and adapt to climate change. This includes funding for climate-resilient infrastructure, technology transfer, and capacity building. In research and innovation: Encouraging research and innovation in sustainable finance is essential to develop new financial instruments, tools, and methodologies that promote investments in climate solutions.

It’s important to note that the approaches and progress in sustainable finance for climate change can vary among G20 countries based on their individual policy priorities, economic contexts, and political commitments. Nonetheless, collective efforts within the G20 are vital for achieving global climate goals and addressing the challenges posed by climate change.

Sustainable Finance

According to Vinod Consultants (May 2023), when it comes to making investment decisions in the financial sector, sustainable finance refers to the process of taking environmental, social, and governance (ESG) factors into account. This ultimately leads to greater long-term investments in sustainable economic activities and projects. Environmental issues encompass both the prevention of climate change and its adaptation, as well as other aspects of the environment in general, such as the protection of biological diversity, the avoidance of pollution, and the promotion of a circular economy. When we talk about social considerations, we’re talking about topics like inequality and inclusivity, as well as labour relations, investments in human capital and communities, and issues pertaining to human rights. The term “Governance Considerations” refers to

the management structures, employee relations, and executive remuneration that play a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process. This term is used in a broad sense to refer to the governance of public and private institutions. Sustainable finance has many dimensions (Refer Figure 1). It informs investors of broader impact of individual investments, provides a common means to compare ESG products, improves investor confidence, transparency and market fragmentation. It also offers investors with a standard concept of sustainability, lowers the danger of greenwashing, and helps investors to coordinate and monitor their investment activities against environmental objectives.

According to Teo, R. (21 November, 2022), the transition to net zero is well under way and although it is occurring, it is not happening as quickly as it should be. Sustainable finance has become an important feature for both states and corporations. Even though the development of critical climate technologies, such as wind and solar power as well as electric vehicles (EVs), has helped accelerate decarbonization efforts around the world. In addition, there are now available solutions that, if implemented on a larger scale, might reduce global emissions by an even greater amount. Some examples of these solutions include green hydrogen and long-duration energy storage (LDES). However, the rate at which these technologies are being scaled up has not kept up with estimates for the planet's continued warming.

There are three major priorities for policy makers and businesses to focus on in order to ensure that the timetables for lowering greenhouse gases and accomplishing targets for global warming and net zero are met. These priorities are as follows:

Establishing and strengthening supply chains (often through cross-sector alliances),

Taking preventative measures to combat a widening skills gap, and

Investigating various routes for finance and investments.

Scaling up Green Business necessitates significant capital expenditures on physical assets (in comparison to creating digital firms) as well as higher short-term costs. Many

sustainable products require customer education to reduce adoption hurdles. The priority, however, is to ensure that all green enterprises have access to capital. In many markets, the urgency to achieve net-zero targets has increased, and the industrial sector is being redesigned around a lower-carbon energy system, circular economy practices, and other developing models. Organisations that can innovate and scale in these fast-paced, uncertain times can position themselves for exponential development. According to one study, rising demand for net-zero services may produce \$9 trillion to \$12 trillion in yearly sales across 11 value pools by 2030, including transportation, power, and consumer goods.

More than 4,000 corporations globally have committed to reducing emissions, and more than 70 countries have set net-zero targets. Wind, solar electricity, and battery car sales would need to rise six to fourteen times quicker to stay on pace for a 1.5° route by 2030. (Source: McKinsey, 2023).

The Net Zero Concept the Net Zero Economy Index and performance of G20 Countries

According to PWC (2022), by cutting emissions and putting strategies in place to absorb carbon dioxide from the atmosphere, it will be possible to reach the goal of “net zero,” which calls for totally offsetting the amount of greenhouse gases produced by human activity. (The decarbonization rate reached its lowest point in 2021). A Net Zero Economy Index (NZEI) has been developed by famous consulting company Price Water House Coopers (PwC) (Refer Figure 2). With the following components, NZEI tracks the pace of change required to keep global warming to 1.5°C and calculates national and global carbon intensity (CO₂ / GDP):

- i The amount of carbon dioxide emitted per million dollars of GDP is measured by carbon intensity (tCO₂ / \$m GDP).
- ii The fuel factor (tCO₂ / TJ energy) calculates the amount of CO₂ released per unit of energy used. just the amount of environmentally friendly energy used.
- iii Energy intensity (TJ energy / \$m GDP) calculates how much energy is used for every dollar of GDP produced.

Net Zero Economy Index (PwC)

The NZEI of USA, EU, Germany, China and India is being shown in Figure 3,4,5,6 and 7.

The NZEI scores of India as compared to world is shown in Table 1. state of India (smaller numbers are better).

According to (Ooulookindia, 2023) India had pledged the following in November 2021 at the UN Climate Change Conference in Scotland:

- i. It would increase its capacity for non-fossil energy to 500 GW by 2030.
- ii By then, renewable energy would provide 50% of the country's energy needs.
- iii By 2030, India is expected to cut its overall carbon emissions by one billion tonnes.
- iv By the same year, India would also lower the carbon intensity of its economy by more than 45%.

The deadline for achieving net-zero emissions was set at 2070.

However, by April 2022, we were compelled to reopen more than 100 coal mines that were once thought to be financially unviable in order to supply the nation's power plants due to economic and social factors, a severe heatwave, and strong demand for electricity. According to the administration, by reopening the closed mines, the nation intends to raise coal output by up to 100 million tonnes over the course of the next three years. India would need to install an additional 700 GW of renewable energy sources if it wants to achieve 50% of its electricity needs from renewable sources by 2030. India will need to raise new renewable capacity to 630 GW if hydroelectricity is included in renewables.

Methods of Sustainable Finance

Therefore, the question is: How can we finance sustainable enterprises to lessen the effects of climate change? Significant upfront expenditures in physical assets, such as expansive buildings and infrastructure, are necessary to finance the scale-up of climate technologies. Investor risk is significantly higher for technologies that have not yet attained technical maturity or commercialization. At the most fundamental level, we can

negotiate green energy purchase agreements and ask clients to make upfront investments in the company. Inflation may be a major problem for suppliers and purchasers in purchase agreements. Customers may be given contracts with inflation-adjustable price formulas by green business builders Teo, R. (21 November, 2022).

Equity capital, mezzanine financing, investment loans, project financing, financing through leasing, supplier investment financing, green bonds, and grants for critical projects are some of the financing strategies now employed globally for sustainable enterprises (Thompson, 2021). According to Peterson, O (20 September, 2021), a tax-based incentive known as accelerated depreciation (AD), which is applied to the tax returns of project developers, is employed in India. By reducing its tax liability on the transaction, AD offers financial incentives to investors. According to the most recent data, solar installations can deduct around 40% of their investment. Per kWh of grid-interactive solar and wind energy generation, generation-based incentive mechanisms (GBI) provide an incentive. This incentive system's primary objective was to enlist a range of independent power producers with an emphasis on promoting generation rather than just putting up projects. It is also common to employ viability gap funding (VGF) to support financially unviable infrastructure projects that are economically justified. This is typically a one-time grant given by the government to help make initiatives profitable. The Solar Energy Corporation of India (SECI) has promoted solar energy production throughout the nation by utilising the VGF plan.

The most popular method for green business developers to reduce the risks associated with expensive infrastructure projects is project finance. The liability of project company shareholders is restricted to their equity investment under a nonrecourse or limited-recourse structure known as project finance, and the project lenders depend primarily on the cash flow from the project for repayment, which means principal repayment typically starts after the project is operational. The Swedish battery manufacturer Northvolt intends to build at least a third gigafactory manufacturing facility in the near future using project funding (Timermann, 2017)

Grants are utilised in blended finance models, which use a combination of private capital and public or charitable funding in addition to public funding pools, to lower debt and reduce risk. For instance, these blended finance models have considered multinational climate funds like the Green Climate Fund.

Another strategy involves funding partnerships and joint ventures between regional start-ups and international technology giants to multi-stakeholder-funded research, development, and demonstration (RD&D) programmes that offer early-stage and growth-stage equity capital for risky initial deployment initiatives. These RD&D programmes are especially prevalent in developing nations to encourage private investment in companies that cater to underserved communities that are most negatively impacted by climate change. Teo, R. (21 November, 2022)

Factors Influencing Sustainable Finance in India

India, like many other countries, has been gradually moving towards adopting sustainable finance practices to address environmental, social, and governance (ESG) issues. The future of sustainable finance in India may be influenced by several factors like government initiatives, corporate responsibility, investor demand, issuance of green bonds and finance, Sustainable Development Goals (SDGs) and technology and innovation. The Indian government has shown an increasing interest in promoting sustainable practices and green finance. They may introduce policies and regulations that encourage businesses and financial institutions to integrate sustainability into their operations. (Agarwal, 2022)

Awareness about climate change and social issues continues to grow, more Indian companies may adopt sustainable practices voluntarily as part of their corporate social responsibility (CSR) initiatives. Institutional and retail investors are increasingly considering ESG factors when making investment decisions. As this trend continues, financial institutions may respond by offering more sustainable investment products and services.

The issuance of green bonds and sustainable finance products has been gaining momentum in India. These financial instruments are specifically used to fund environmentally friendly projects

and initiatives. The market for green finance may expand further in the future. India is devoted to seeing the Sustainable Development Goals of the UN accomplished by 2030. To reach these goals, the country may prioritize sustainable finance as a means to mobilize funding for relevant projects. Advancements in financial technology (fintech) may also play a significant role in promoting sustainable finance in India. Fintech solutions can improve transparency, data analysis, and reporting on ESG metrics, making it easier for investors to identify sustainable opportunities. There may also be challenges to the adoption of sustainable finance in India, such as the need for capacity building, raising awareness among businesses and investors, and ensuring effective regulation and enforcement.

The future is inherently uncertain, and the actual path of sustainable finance adoption in India will depend on a complex interplay of various economic, political, and social factors. Nonetheless, the global momentum towards sustainability and the efforts made by various stakeholders suggest that sustainable finance is likely to become increasingly prominent in India's financial landscape in the years to come.

Much needed step...

The G20 countries, representing some of the largest economies around the globe, have a very important role in shaping the future of sustainable finance. There are some potential developments that may influence the adoption of sustainable finance within the G20 nations. G20 governments may continue to introduce policies and regulations that encourage sustainable finance practices. This could include measures like mandating ESG disclosures, offering tax incentives for sustainable investments, and aligning financial systems with climate-related objectives. (Popescu, 2020).

G20 countries often collaborate on global economic issues. They may work together to establish common standards for sustainable finance, facilitate cross-border sustainable investments, and coordinate efforts to address climate change and other ESG challenges. The investors increasingly recognize the importance of ESG factors in investment decisions, financial institutions in G20 countries may respond by offering more sustainable investment products. This demand could drive the

growth of sustainable finance in the region. (Sheraz et al, 2021)

The enhancement in transparency and reporting on ESG metrics could become a priority for G20 countries. Investors and regulators may push for standardized ESG reporting frameworks, making it easier to assess the sustainability performance of companies and financial institutions (Raha et al, 2023). The issuance of green bonds and other sustainable debt instruments has been on the rise globally. G20 countries may further develop their green bond markets and explore innovative financing mechanisms to fund environmentally friendly projects. The advancements in financial technology may have a significant part in advancing sustainable finance in the G20 nations. Fintech solutions can facilitate impact measurement, improve risk assessment for sustainable investments, and increase accessibility to sustainable finance products. (Cunha et al, 2021)

The G20 countries may strengthen their commitments to climate action and environmental protection. This could translate into more investments in renewable energy, clean technologies, and projects that promote climate resilience. The sustainable finance is not solely focused on environmental factors but also includes social and governance aspects. G20 nations may explore ways to promote financial inclusion, support social projects, and enhance corporate governance practices (Ferri, 2019). The collaboration between governments, private sector entities, and civil society organizations could lead to the development of large-scale sustainable projects, especially in infrastructure and other critical sectors. (Zadek & Kharas, 2018).

It's important to recognize that the future is uncertain, and the adoption of sustainable finance in the G20 countries will depend on a variety of complex and interconnected factors. However, the global push towards sustainability, increasing investor awareness, and the growing importance of ESG considerations suggest that sustainable finance is likely to remain a significant focus for the G20 economies in the years ahead. (Berensmann et al, 2017)

Conclusion

G20 nations may not commit enough money to appropriately address climate change and environmental concerns if sustainable financing is not widely adopted. This may result in increasingly frequent and severe climate-related events, including extreme weather, rising sea levels, and ecosystem changes that affect the security of food and water. We have discussed the importance of sustainable finance in this post, as well as the pressing need to expand sustainable enterprises. Additionally, we have offered a fundamental grasp of climate financing strategies in both the global and Indian contexts. Through the PwC NZEI Index, we have also shown where various G20 countries stand in their efforts to achieve net zero economies. There could be a number of negative effects on the global economy and the environment if G20 nations do not implement sustainable finance.

Annexure

	India	World
Carbon Intensity	273.7	265.6
Fuel Factor	79.0	69.5
Energy Intensity	3.5	4.1

Table 1 Source: PwC (2022)



Figure 1: Source: Deloitte (2022)

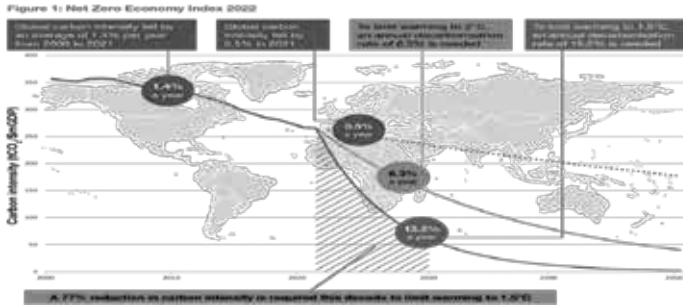


Figure 2. Source: PwC (2022)

NZEI-USA



Figure 3 Source: PwC (2022)

NZEI-EU



Figure 4. Source: PwC (2022)

NZEI-Germany



Figure 5: Source: PwC (2022)

NZEI-China



Figure 6. Source: PwC (2022)

NZEI-India



Figure 7. Source: PwC (2022)

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6

EU Carbon Border Adjustment Mechanism and Trade in G20 Countries

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Abstract

A very relevant area of debate nowadays is examining the impact of the European Union's (EU's) Carbon Border Adjustment Mechanism (CBAM) on trade in G20 countries. The EU CBAM in its first phase will target imports of carbon-intensive products such as aluminum, iron and steel, fertilizers, cement, hydrogen and electricity into the European Union (EU) from the non-European Union countries. Although it will be too early to predict the impact of CBAM on trade, however, this paper tries to investigate some of the probable impacts of CBAM on trade in G20 countries. The study found that among G20 countries Brazil, India, China, South Korea, Russia, South Africa, and Turkey will be the most adversely affected economies by the implementation of CBAM while the least affected economy will be Argentina. Among the probable beneficiaries of CBAM is Japan. In the long run, CBAM can cause a threat to the employment scenario also, particularly in the labor-intensive export-oriented industries in G20 countries which may be exacerbated by a shift from labor to capital/technology-intensive productions. These adverse consequences can be overcome by using environmentally friendly methods of production in the manufacturing of carbon-intensive products and developing a strong domestic carbon pricing mechanism.

***Keywords:** CBAM, EUETS, G20 Countries, Carbon Emissions, Trade*

Introduction

Climate change has become a matter of discussion in almost all the prominent environmental forums in the world. Many steps

were taken by several countries including European Union (EU) to counter climate change by implementing stringent environmental policies, however, it led to carbon leakages. Carbon Border Adjustment Mechanism (CBAM) is aimed at solving this problem of carbon leakages and encouraging green production. Its three-year transition phase will begin in October 2023. It will be fully implemented from 2026 onwards. CBAM is a part of the European Green Deal whose target is to make Europe climate neutral by 2050. It is interesting to note that some more countries have proposed to introduce CBAM soon. The common goal of EU and G20 countries to combat climate change can strengthen the process of sustainability on planet Earth. However, there is also a substantial trade relationship between G20 countries and the EU, therefore, it will be interesting to analyze the impact of CBAM on imports from G20 countries in the EU in the light of carbon-intensive imports. G20 is known as Group of 20 which is a group of 19 countries and EU while EU is union of 27 countries mainly located in Europe.

EU (Emission Trading System or ETS) is the world's first carbon market, developed to counter the rising emissions in the EU. Carbon-intensive sectors in EU are prime reasons behind GHG emissions and to counter this EU (ETS) was developed. However, high prices of EU (ETS) led to carbon leakages. A direct relationship between severe environmental policies and carbon leakages can't be ignored in the EU. The high prices of EU (ETS) forced companies in the countries under the EU to shift to countries with less stringent policies causing carbon leakages and continued environmental degradation. To counter this crisis, European Commission in the EU developed CBAM. EU has set its goal of a Fit for 55 packages in which CBAM will play an essential role. Fit for 55 package aims at reducing the EU's greenhouse gas emissions (GHGs emissions) by at least 55% by 2030 and CBAM is also expected to accelerate clean energy imports thereby, assisting the EU in achieving this target of Fit for 55 packages. If this trial from October 2023 is successful, then the EU plans to include more items such as automobiles, etc also under CBAM. After using CBAM from October 2023 onwards, all EU importers will have to report their emissions and then from the year 2026, all EU importers will have to purchase carbon certificates corresponding to their carbon prices. The

higher the carbon-intensive exports of a country to the EU, the higher the adverse consequences of CBAM will be on the trade balance of the exporting country.

CBAM is often blamed as a tool for protecting, in future, the domestic market of Europe by reducing the competition imposed by the low priced-highly carbon-intensive imports in the EU. Not all top trading partners (Refer to Appendix, Fig.1) need to be adversely affected by CBAM, it depends on the composition of carbon-intensive products in the export basket of non-EU countries to EU.

EU's main goal is to align its economic policies with the desirable climate goals and among the most important is to reduce carbon emissions in the EU for which the EU has developed a strong Emission Trading System (ETS). The main purpose of the EU for introducing ETS is to become carbon neutral by 2050 (Refer to Appendix, Fig.2). Among other reasons, trade is also considered as a significant source of carbon emissions.

Therefore, it will be interesting to observe the impact of CBAM on the trade of G20 countries in which the EU is also included. The EU represents a group of powerful countries in the world while G20 is a group of prominent economies developed as well as developing to solve major global issues and accelerate the process of global economic growth. Climate change is one of the major important issues and an impediment in the growth process of G20 countries therefore, it will be interesting to observe the impact of CBAM on the growth process of G20 countries.

Literature Review

The effect of the European Green Deal on the economy of Turkey is investigated by Acar, Asici, and Yeldan (2022) and they found an adverse impact of CBAM on the Turkish economy. Their analysis found that CBAM would lead to a 2.7% and 3.6% loss of the Gross Domestic Product (GDP) of Turkey by 2030. CBAM will also raise the carbon bill in Turkey in addition to reducing exports to the EU. The authors said that among sectors, the cement and electricity sectors in Turkey will be the most unpleasantly affected sectors from CBAM. The authors suggested that this condition can be reversed by implementing environmentally friendly policies in Turkey. The analysis of

Lazaryan and Sudarkov (2022) shows that CBAM will have a considerable adverse impact on 58% of exports from the Eurasian Economic Union (EAEU) to the EU in which Russia will be the major bearer of the burden. The effect of CBAM on the Republic of Korea is analyzed by Lee (2022) in which the author has studied the impact of the introduction of CBAM on steel exports from the Republic of Korea to the EU and found an unfavorable impact of CBAM. However, in the comparative analysis with China and Turkey, the author places the Republic of Korea in a better place by arguing that the Republic of Korea will be able to absorb the high cost with its effective domestic policies related to Emission Trading System (ETS) and carbon price score which is already high in the Republic of Korea.

Lin and Zhaou (2022) have studied the existence of the green paradox in China in light of EU CBAM. The study found that CBAM will have a substantial adverse impact on the imports of energy-intensive items in the EU from China. Qi, Zhu, and Yang (2022) in their study have also found that CBAM will be disadvantageous for China. CBAM will reduce cost efficiency in China. The authors asserted that the negative impact can be absorbed by raising carbon prices in the domestic markets of China. Studying the reaction of countries towards CBAM, Overland, and Sabyrbekov (2022) have used a multidimensional index and found that the USA, Iran, Ukraine, Egypt, Russia, Belarus, United Arab Emirates (UAE), China, Kazakhstan, and India are perhaps the key opponents of CBAM. The authors have also studied the various causes for the opposition of CBAM such as the carbon intensity of countries, weak innovation capacity, etc. The authors viewed that the coordination between China and USA will play a significant role in the implementation of EU CBAM. Schott and Hogan (2022) in their study have asserted that domestic measures in South Korea like Emission Trading System (ETS) etc. to combat greenhouse gas emissions will not protect South Korea from the unfavorable consequences of CBAM.

An interesting study by Ren, Liu, and Shi (2023) on the impact of CBAM on plastic trade found that economic carbon inequality will increase post-CBAM because the EU is the second largest importer of plastics in the world. The study asserts that the

revenues from plastic trading for developing countries are expected to fall with a significant impact on China, however, Russia will experience a major unpleasant impact of CBAM. Rossetto (2023) in a study found that steel recycling will assist in reducing greenhouse gas (GHG) emissions. However, while analyzing the impact of CBAM on steel recycling the author found that steel recycling faces a major challenge from green steel production methods. Bellora and Fontagne (2023) found that CBAM will be successful in achieving the target of the EU of reducing carbon leakages. Tarr, et al (2023) in their analysis found that EU CBAM will be ineffective in reducing carbon emissions at the global levels however, it will reduce carbon leakages but will not be able to eliminate carbon leakages.

G20 Countries, European Union (EU) CBAM and Trade

G20 countries represent 75 percent of international trade and 85 percent of global Gross Domestic Product (GDP). Among other G20 countries, India has a major role to play as it's one of the most vibrant and fastest-growing economies in the world. The impact of CBAM on G20 countries can be analyzed in multiple ways from both the point of view of consumers as well as producers. The CBAM will raise the cost of production and hence, the prices of products entering EU markets. Undoubtedly, if implemented fully CBAM will restructure the international market with demand moving away from high-cost to low-cost industries thereby, negatively affecting largely the carbon-intensive imports from high-cost industries from non-EU countries. When global trade will witness a restructuring on the supply side, then employment aspects will also be affected in the countries exporting carbon-intensive products in the EU markets.

To offset the extra emissions, importing countries will have to submit CBAM certificates. The prices of the certificates will be decided by the European Trading System (ETS) equivalent to emissions. ETS puts a price on emissions, particularly greenhouse gases (GHGs). This 'cap and trade' method aims at reducing non-green production practices in non-EU countries exporting products in the EU markets. However, somewhere this CBAM is also expected to increase greenhouse gas (GHG) emissions by the rich corporate houses/economies who can easily absorb

the cost of CBAM certificates in their cost of production and thereby, maintain the same or higher supply of carbon-intensive exports to the EU.

The impact of CBAM will be different on different G20 countries depending on their intensity of exports of carbon-intensive products to the EU. The exact impact on these countries will be observable once CBAM is implemented completely however, an assessment about its application will provide an idea about the probable consequences of CBAM for G20 countries. It is given in the following section:

Argentina: CBAM is likely to have the least impact on Argentina since its major export items to the EU are fish and seafood, agricultural items, and chemical items. Its main trading partner is Brazil. Argentina is a member of the Mercosur and is also associated with EU-Mercosur Association Agreement. EU is already the third largest export market for Argentina but due to the exports of largely non-carbon-intensive products, Argentina's export market is expected to be largely unaffected by CBAM. Agricultural products are the main source of export income for Argentina.

Brazil: CBAM will have a major impact on Brazil's economy which is a noticeable exporter of carbon-intensive products to the EU. Exports of items such as cement, steel and iron, fertilizers, and aluminum are likely to be the major sufferer whose demand in the international market may diminish due to high prices. If any reforms are not introduced, then Brazil's exports of around 2 billion EUR are expected to experience a major fall.

India: The implementation of CBAM is expected to hurt the mainly the steel exports from India to the EU. For India CBAM poses the main threat to its exports of aluminum, iron, and steel products. India's goal of becoming a 5 trillion-dollar economy seems to be at risk after the implementation of CBAM in its current structure. There is a need to introduce reforms in CBAM otherwise it will unpleasantly affect most of the developing economies like India. In India, most of the industries exporting to the EU are also a main source of employment for unskilled and skilled laborers. Undoubtedly, CBAM will adversely affect the employment statistics in India along with reducing the export competitiveness of India.

Canada: There are substantial trade relations between Canada and the EU with the EU as the second largest trading partner of Canada. Further the creation of Canada-European Union Comprehensive Economic and Trade Agreement (CETA) has strengthened these trade relations. Canada's around 8% of exports are directed towards the EU which mainly includes services, chemical products, machinery, rubber products, mineral products, aluminum, and fish and seafood. However, Canada will experience a moderate impact of CBAM.

Germany: Germany, also part of the EU, has a substantial share of trade with other EU countries which is around 55 percent of its total exports. CBAM is also threatening Germany's export competitiveness however, it will not be much affected by CBAM if it continues with its current trading partners. However, in future if its direction of trade changes and becomes more intra EU then the effects of CBAM may be significantly observable.

Italy: The analysis of Italy's trade shows that in the initial stages of CBAM, Italy will remain unaffected. The composition and direction of Italy's international trade are providing a shield to Italy from the undesirable impacts of CBAM.

France: France's intra-EU trade is interesting to analyze. It accounts for 54% of France's export (Refer to Appendix, Fig.3) mainly directed towards Germany, Italy, Spain and Belgium. France has always been a supporter of CBAM. France is expected to experience a minor impact of CBAM.

China: China's exports of aluminum, iron, and steel production will face a substantial decline however, experts feel that little management skills can absorb these shocks in the Chinese economy. Most of the imports from China in the EU are covered in CBAM and if this list is expanded then in the future China's exports to the EU can witness a drastic decline. The carbon-intensive production practices in China will be the main reason behind this fall.

Japan: Japan due to its low carbon intensity exports to the EU is the only G20 country that is expected to gain from CBAM by increasing its exports to the EU. The composition of trade and the low carbon intensity of these products will benefit Japan in multiple ways by not only raising exports to the EU but also enhancing employment opportunities and accelerating the

economic growth of the Japanese economy.

Republic of Korea (South Korea): A significant unpleasant impact of CBAM will be observed on South Korea which is an exporter of high carbon-intensive products to the EU such as steel which accounts for around 90 percent of exports to the EU. However, there is a scope for South Korea to counter it by further strengthening its ETS since it already has a sound ETS system, but it may raise South Korea's cost of production of steel and prices in the international market. In the future, South Korean exports of steel to the EU and the USA are expected to suffer a major decline due to EU-CBAM and CCA (Clean Competition Act) both. This may also adversely affect the South Korean economy's progress if they do not change their direction of trade. Indeed, the Republic of Korea seems to be one of the major sufferers of this EU CBAM.

Mexico: CBAM will have a significant negative impact on Mexico by increasing the prices of its products entering EU markets. A strong domestic carbon pricing system can help Mexico in protecting its EU market share. EU was the second-largest export market for Mexican products in 2020. The main exports of Mexico to the EU include transport equipment, machinery, various appliances, mineral products, and photographic instruments.

Russia: Russia will be one of the major bearers of CBAM. Russia's export of iron and steel, aluminum, electricity and fertilizers to the EU may face a massive decline after CBAM since around 18% of products covered in CBAM are from Russia.

Saudi Arabia: The top exports from Saudi Arabia to European Union (EU) are mineral fuels, oil, distillation products, organic chemicals, plastics, pearls & precious stones, aluminum, rubber, iron & steel, inorganic chemicals, machinery, etc, however, the export basket of Saudi Arabia for EU is largely dominated by petroleum products (Eurostat, 2021). The impact of CBAM will be minor and not significant on Saudi Arabia because it is not a major trading partner of the EU and a substantial number of items exported to the EU from Saudi Arabia are not covered by CBAM (Refer to Appendix, Fig.4). Among organic chemicals, ammonia imports in the EU may decline after CBAM. Saudi Arabia is known for having a lower cost and carbon intensity

in addition to hydrocarbon production process compared with international averages (Masnadi et al. 2018). So, if in future CBAM includes energy imports, this will build a favorable position for the exports-basket of Saudi Arabia.

South Africa: The first study concentrating on the effects of the EU CBAM on Africa has been released by the African Climate Foundation (ACF) and the Firoz Lalji Institute for Africa at London School of Economics (LSE), London and found that CBAM is likely to hit the exports competitiveness of Africa. Among sectors, exports from industrial sector will be the worst affected in Africa if CBAM widen its product coverage over time. This study also highlighted the administrative constraints which Africa will experience in finding place in EU markets for its products post-CBAM. The report pointed out that in the past also Africa has faced lot of difficulties in finding markets for its product. (Luke and Aggad, 2023)

The economy of South Africa will be adversely affected by CBAM due to its high carbon intensity exports to the EU which amounts to around \$1.5 billion as the EU is an important export destination for South African products. According to Trade and Industrial Policies Strategies (TIPS), the future of South African exports to the EU is wobbly if EU CBAM further expands its domain to include other items in the future.

United Kingdom (UK): The economy of the UK will be significantly affected by the CBAM because the majority of exports of the UK are directed towards the EU and the composition of these exports is highly carbon-intensive. The UK is now not a member of the EU which increases its challenges in absorbing the effects of CBAM. CBAM will increase the prices of exports of steel, chemicals, cement, etc from the UK in the EU markets. However, the UK can protect its economy by strengthening the domestic carbon pricing mechanism. The high purchasing power in the UK can make use of green technologies in the production process affordable and effective in reducing carbon emissions in the UK and thereby, minimizing the impact of CBAM.

Turkey: Turkey having the 6th largest economy in Europe, will be another most affected country by CBAM. The prices of exports of steel, cement, and aluminum from Turkey are expected

to increase in EU markets which will shrink their demand in EU markets. According to the Turkish Industry and Business Association (TUSIAD, 2023), the CBAM is expected to add an extra cost of EUR 1.08 billion to the manufacturing sector of Turkey. The data given in Appendix, Table 1, reveals that Turkey is exporting 40.5% of its total exports to the EU.

United States (US): US will not be significantly affected by CBAM mainly because of the use of energy-efficient technologies in the production process and its exports of only 0.3 percent of its total exports to the EU.

Australia: CBAM will have a minor impact on exports from Australia to the EU because only 1 percent of the total amount of emission-intensive exports are directed towards the EU.

Indonesia: The Indonesian Ministry of Trade informed that EU CBAM could led to an increase of 16.8% in the tariff rate for the exports of iron and steel although already 27 categories of steel products face 25 percent of tariff quota rate. Currently this amount is considered as insignificant in comparison to Indonesia's total exports, the introduction of CBAM will place Indonesia's exports of iron and steel in a relatively troublesome position by increasing the prices and potentially reducing the chances of further export-led development in the country. (Xu and Dolay, 2023)

Conclusion

The essence of CBAM is factual with a target of reducing GHG emissions in the EU. However, its implementation methods are likely to have negligible impact on reduction of GHG emissions levels in the atmosphere, or in some cases, GHG emissions may be enhanced particularly by the rich corporate houses/economies due to their affordability capacity for the certificates. CBAM till now seems to be the transfer of emissions in monetary terms through ETS rather than the overall reduction of emissions in the environment at global levels. The provision of ETS has given an escape to the rich polluters thereby, dismantling the motive of CBAM on the one hand and squeezing the growth prospects of developing countries on the other. The implementation of CBAM by the EU will affect different countries in G20 differently. The worst sufferer will be Brazil, India, China, South Korea, Russia,

South Africa, and Turkey while the least affected economy will be Argentina while the probable beneficiaries of CBAM is Japan. CBAM is undoubtedly a step towards protectionism, particularly in the view of developing countries like India. In the case of India, exports of steel to the EU will be the most affected. After the complete implementation of CBAM, it may subsequently lead to changes in the structure of international markets with most of the imports of the EU coming from rich/developed countries. If CBAM is adopted by other countries also then a clear trade divide between a developed and developing world will be visible in the long run where developing countries will trade with developing countries and developed countries among themselves.

However, with some modifications, CBAM can do wonders in promoting clean production. CBAM may accelerate green imports in the EU. To avoid the adverse effects of CBAM, exporting countries must develop effective carbon trading/counting systems domestically in addition to using cost-effective environmentally friendly methods of production. Investment in clean technologies by the G20 countries will also minimize the impact of CBAM, however, such steps will also increase the cost of production in developing countries thereby, raising the prices of their products in EU markets which may shrink their demand. CBAM in its current structure seems to be another way of transferring the burden of climate change on developing countries which will be the main losers from CBAM. The developed world can bear the cost of CBAM and hence, will be able to sustain itself in the international market, however, developing country's share in the international market will decline in the long run.

The EU's impressive goals of reducing GHG emissions by 55 percent by 2030 and then becoming carbon neutral by 2050 are worthy of appreciation. However, an important question is on whom cost the EU is going to achieve this target? With EU CBAM it seems to be that cost will be borne by developing countries who have scarce environmentally friendly resources/green technologies and low purchasing power. In addition to reducing exports to the EU, CBAM may also shrink the GDP of developing countries thereby, hindering their chances of

entering the league of developed countries. The development of strong domestic carbon markets in non-EU countries/developing countries can protect them to a large extent from the unpleasant consequences of EU CBAM.

Appendix

Tables

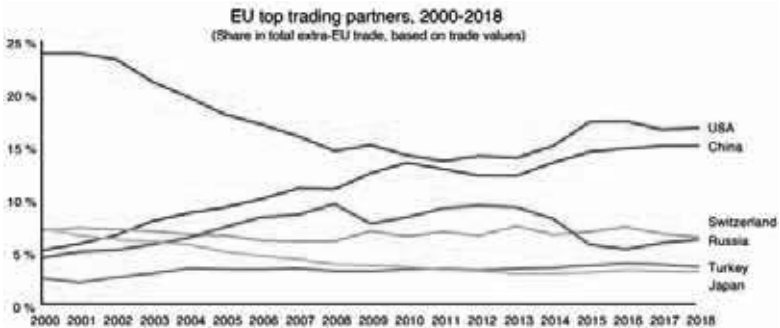
Table 1: Share of Exports from Turkey to the European Union (EU) as a percentage of Total Exports (2013-2022)

Year	Share of Exports (in percentage)
2013	36.1
2014	37.3
2015	37.4
2016	40.2
2017	41.3
2018	43.7
2019	42.4
2020	41.3
2021	41.3
2022	40.5

Source: Statistica 2023.

Figures

Fig.1



Source: European Commission, 2021.

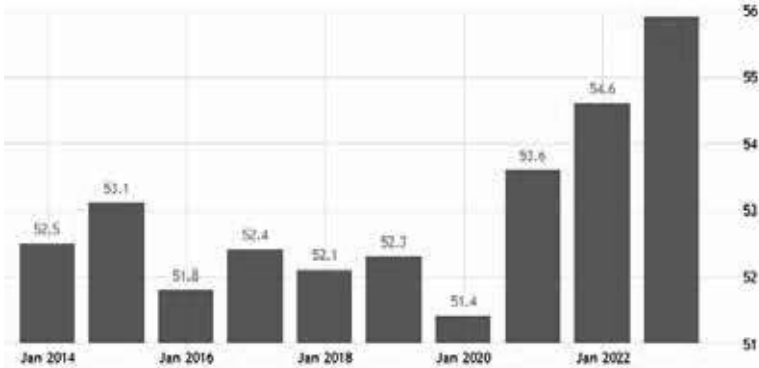
Fig.2: Various Stages of EU ETS

Carbon Neutral Target - Net Zero Position by the Year 2050



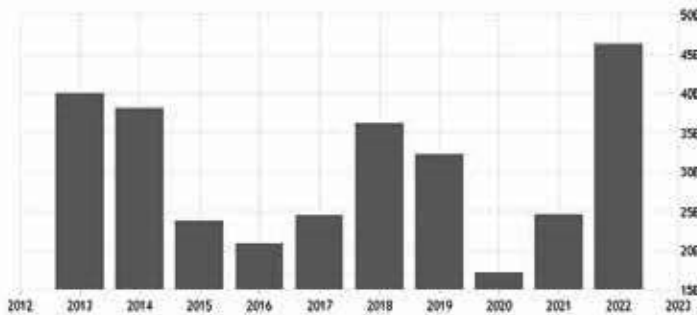
Source: Oxera analysis.

Fig.3: Share of Exports of France to EU



Source: Trading Economics, France, 2023.

Fig.4: Saudi Arabia Exports to EU (2012-2023)



Source: UN Comtrade, 2023.

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7

Aligning G20 and Digital Assets in Financial Technology Payment Solutions for Financial Stability and Sustainable Economic Growth

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Abstract

The G20 is an international forum consisting of 19 individual countries and the European Union (EU). The G20 was established in 1999, and it comprises the world's major advanced and emerging economies, representing about two-thirds of the global population and more than 80% of the global GDP. The advent of disruptive technologies in the financial arena has brought scope of vast potential in bringing financial stability and sustainable developing day by day. Investors, venture capitalists, and industrialists are keeping an eagle view over the global acceptance of the usage of Crypto Currencies to make a profit share. This study is focusing the basic conceptualization of the digital assets associated with Financial Technology payment solutions that are prevailing globally. It will also showcase the types of these digital assets and their role in their impact on global economic development. It will contribute as a foundation work to be performed further for research with more deep insights into crypto assets and future opportunities in the global market.

Keywords: G20, Fintech Payment, Digital Assets, Bitcoin, Blockchain Technology

Introduction

Positioning the G20 with Facets of Digital Assets in Financial Technology Payment Solutions involves recognizing the

potential of digital assets in transforming the global financial landscape while addressing the associated challenges. The G20 is an international forum for governments and central bank governors from 19 countries and the European Union, and its mission is to promote international finance. Fundamentally, digital assets are a kind of data in a binary coded form securely saved in a computer system through internet facilities. Toygar, Alp et al. (2013) presented a new side of digital assets that is compiled of all the social activities on websites like having an account on Twitter, Instagram, etc., or documents on cloud and virtual investments also. Moon (2009) simplified the term digital asset by saying that the data need to be reusable then it could have some sort of significance. Recognition and reusability

In a report, it has been mentioned digital assets which are also known as crypto assets are multidimensional with technological advancements. With more than 12,000 variations availing services to the people, it's a very complex functionality to be understood easily and effectively. Meghna Bal (IAMA 2022) defined digital assets as something which can be secured and transmitted with the help of an electronic platform and virtual software abiding by the coded format for processing the transactions easily. Also mentioned is stablecoins and non-fungible token (NFT) that have been launched by an artist named Beeple who sold on auction the non-native crypto-assets for \$63 MN. She pointed out the benefits of Government through blockchain during COVID as in Maharashtra the RT-PCR (Reverse Transcription-polymerase chain reaction) has been built with Polygon an Ethereum scaling solution.

Signed transmissions in a Cryptographic form having a record in distributed ledger based on consensus are called Crypto assets. It is basically based on a combination of cryptography, procedural algorithms, and peer-to-peer networks. H. Knewton (2019) showed the levels about ordinal levels of the technology paradigm to make people understand the Uncertainty degree, Profitability edge, and relative resource efficiency. Stages named Obsolete, Mature, Status Quo, and Bleeding Edge. Fintech monetary alternatives are being categorized into crypto, P2P Payments, and B2B Payments. Wolf A. Kaal (2021) emphasized Decentralized Finance (DeFi) and its influence over the market

of Crypto Assets. The pros and cons are discussed in a case study. Brukhanskyi & Spilnyk (2019) stressed the need for time regarding the implementation of the accounting laws for cryptocurrency so that it could be easily a part of our economy.

Digital Assets in Global Market

Digital society is developing and giving birth to cyber-related issues and to solve those there are several laws to protect and share useful information data without any fear of theft or loss. Information security helped a lot since the beginning of financial technology. (Toygar Alp et al. 2009)

There is a huge Indian market open for crypto assets with a value of USD 15 billion. According to the latest analysis, there are over 6 million users in the Indian crypto community. Crypto assets are non-correlated which means it is free from any kind of flexibilities in the typical market. Discussing bitcoins, initiated as open-source software in 2008 by someone called Satoshi Nakamoto, without the need for any intermediary party/bank. Central Bank Digital Currency is a type of fiat currency inspired by virtual cryptocurrencies. As per IMF, the estimated market for cryptos' capitalization is at \$2.5 TN. A January 2022 survey which was performed by crypto firm New York Digital Investment Group and used by Newsweek Magazine showed American's status of cryptos ownership of 46 MN or 14% of the crowd. In the UK also 2.3 MN people are the owners of digital assets in 2020. In a previous report on the crypto rise, it has been mentioned that the traditional payment transformation can only be possible with the identification and implementation to be in the foundation of payment solutions with the crypto-assets.

As per a report on Global Crypto hedge funds in the year 2022, Hedge funds are known on the basis of volatility. Wulf A. Kaal (2021) discussed the initial coin offerings and compares them by examining trends available through data regarding the new innovative technologies. The proliferation begins in 2016-18 with the phase named 'crypto winter'.

FinTech Payment Solutions with Digital Assets

H.S. Knewton & Rosenbaum (2020) focused on and presented the fintech industry and distinguished it with financial

technology. Fintech firms use tools for fintech industries in order to avail financial markets of financial products or services. Agile technologies, fintech assets, services, and regulatory framework along with the standard of assets, and value of innovative agile techniques compiled the space for the fintech industry. Chen et al. (2019) discussed about the fintech innovative technical pros with the help of Machine Learning. As a payment solution, Dandapani (2017) pointed out in his work the development of research in electronic finance in the field of payment systems, infrastructural arena, costs, benefits, and protections. Cyber security is also a matter of fact to be considered as well as trading activity of quantum. Das (2019) discussed the ways to prevent online fintech payment solutions from any kind of fraudulent practices. So there are many software available for capturing the virus and creating a strong firewall for security and authentication. Cybersecurity issues and illicit finance are also been discussed and also suggested to grab information on the areas like Firm Value, Corporate Governance, Security Issuance, etc. in Fintech firms. Shashkova Anna V. (2020) shared in his research article about 3 blockchain acts i.e., Digital Rights Act, DFA Act, and Crowdfunding Act. Blockchain-based assets are been initiated after these laws were launched as a base for a “digital right”. Brukhanskyi & Spilnyk (2019) pointed out the steps that are being taken by the Governments of many countries in order to use centralized digital money. As the increasing number of digital asset investments is a matter of thought, it is essential that the (DLT) blockchain system must be enough to handle the actions for the development of financial technology. As per data published by Eurex report in 2021 with reference to digital asset trading, the major factor for the adoption of crypto assets is basically the opportunities available in trading as 91.30% of respondents follow this.

Types of Digital Assets

Meghna Bal (IAMAI, 2022) presented the distinctive points among the crypto assets and CBDCs (Central Bank Digital Currency) as both are sharing some similar features like basic technological advancement instead CBDC is a liability over the central banking authority. Crypto assets are categorized like asset-backed, utility, rights-based, payment, and prohibited. As

per the IMF, digital tokens (a type of transferable unit which can be measured with the help of blockchain's distributed ledger system) are bifurcated into four types: Payment tokens, Utility tokens, Asset tokens, and Hybrid tokens. Toygar et al. (2013) compared tangible and intangible assets with digital assets and also talked about their legal recognition in the market. He considered all the social media platforms as a digital asset for people like Facebook, Twitter and how it impacts the service provider policies.

As per a report by KPMG, more than 2,000 significant crypto assets instead of this only a few are functional and acceptable by the Government legislation and people for investment and usage purpose. Cryptocurrency can be further categorized as Cryptocurrency in which Ether, Bitcoin, Litecoin, stablecoins, etc. comes, and Crypto tokens which could be asset-backed, utility, security, and hybrid. The market of cryptocurrency got developed up to 212 coins and tokens which resulted in an exclusive increment of more than 5,300 cryptocurrencies till April 2020. (Chaefeddine et al.) Brukhanskyi & Spilnyk (2019) discussed the issues that need to be dealt with while considering the crypto assets as an object in accounting procedures. There is a requirement for a proper legislative framework to consolidate the universal approach towards the display. It's valuable due to the scarcity. BNY Mellon by A. Hamilton reported about Stablecoins exceeded the market capitalization of \$100 BN. Till April 2021, US \$2 TN made a market for cryptocurrency variations. HQLAx has been using the disruptive technology of digital ledger for streamlining securities lending and collateral management. The data about digital assets is useful for practitioners, bankers, and start-up firms dealing with financial technology.

(Hu et al., 2019) Research work done and conclusive data suggested that cryptocurrency is a way apart from bitcoin which has been used as a rage through blockchain technology as a distributed technology. Shashkova Anna V. (2020) studied the financial products/services (digital assets) post-pandemic in European countries. The regulatory bodies used blockchain bases and preventive measures for innovative support. There is a virtual financial asset act established for applicable processing to give licenses or fulfilling the needs of fintech firms. Russian

disruptive techniques are comparatively far growing in the field of digitalization and FinTech development. T.J. Chemmanur et al. (2020) featured the growth and sustainability of financial intermediaries and start-up firms contributing to various fintech sectors linked with lending and payment, capital market innovations, insure tech, proptech, digital wealth managers. (Figure No. 1)

Role & Its Impact on Economic Development

The Pulse of Fintech H2'21 by KPMG mentioned the attractive points of investment available in fintech solutions with blockchain and cryptocurrencies. At the global level, \$30 billion expanded for crypto and blockchain. In fact, BNPL (Buy Now Pay Later) crossed the acute level of investments. H2, 2021 in America the fintech investment went higher on \$105.3 BN with 2,660 deals.

FinTech Futures mentioned Bermuda which launched its very first digital asset industry association of fully licensed and regulated companies known as NEXT in the consensus 2022. Some of the priorities like support for industrial and talent development, reputation, and ecosystem growth and stability. DABA (Digital Asset Business Act 2018) has been formulated to consume the benefits.

AIMA (Alternative Investment Management Association) discussed that about 67% of funds are invested in digital assets and is going on in order to deploy most of the capital into assets till 2022.

The financial crisis that happened in the year 2008 when the banking fraternity saw a big loophole of competition which ultimately led to an increment in the cost. All the banks were in a state of pressure for launching online services to reduce high expenses related to operations and to focus on the services that are being provided to the customers. Shashkova Anna V. (2020) A report provided by SYGNUM digital Asset Outlook shared that the regulators are mainly focusing on the protective arena to be developed for investor parties, essential ease to be given in terms of taxation policies and transparency. Bitcoin's popularity is coming on slow down phase in the year 2021 from 70% to 40% gradually. Here are some of the lists of reports regarding crypto assets and their development. (Table No.1)

G20 And Facets of Digital Assets in Financial Technology Payment Solutions

The G20 should prioritize regulation and standardization of developing a harmonized regulatory framework for digital assets and financial technology payment solutions. This framework should address issues related to consumer protection, anti-money laundering (AML), counter-terrorism financing (CTF), and data privacy while fostering innovation and competition in the fintech space.

Encouraging financial inclusion and the use of digital assets in financial technology payment solutions can enhance financial inclusion by providing access to financial services to unbanked and underbanked populations. The G20 should promote policies that leverage digital assets to reach these marginalized communities, enabling them to participate in the global economy.

Digital assets can facilitate cross-border payments and remittances, potentially reducing transaction costs and increasing efficiency. The G20 should explore mechanisms to promote interoperability between different payment systems and digital asset networks, fostering seamless global transactions. Given the increasing reliance on digital assets in payment solutions, cybersecurity becomes a paramount concern. The G20 should work towards developing cybersecurity standards, sharing best practices, and promoting cybersecurity awareness among stakeholders to ensure the resilience of digital asset infrastructures.

Central Bank Digital Currencies (CBDCs): Some G20 member countries are already exploring the development of CBDCs. The forum should facilitate information sharing and cooperation among countries considering CBDCs, ensuring they understand the potential benefits and risks associated with these digital currencies.

The G20 should support research and development in fintech and digital asset technologies. Encouraging innovation through regulatory sandboxes and public-private partnerships can help drive advancements in payment solutions and financial technology. As digital assets gain popularity as investment

vehicles, the G20 should emphasize investor protection measures. This could involve implementing appropriate disclosure requirements, enhancing market transparency, and combating fraudulent schemes in the digital asset space.

The increasing energy consumption of certain digital asset technologies, such as proof-of-work blockchains, has raised concerns about their environmental impact. The G20 should explore ways to promote sustainable practices in the development and operation of digital asset networks.

Role of G20 In Financial Stability and Economic Growth

During times of financial crises or economic downturns, the G20 acts as a platform for swift and coordinated responses. Member countries collaborate to provide liquidity support, prevent contagion effects, and stabilize the global financial system. The G20 meetings allow member countries to discuss and align their economic and financial policies. This coordination helps prevent “beggar-thy-neighbor” policies that could lead to protectionism and worsen global economic conditions. The G20 tackles various global challenges, such as climate change, digitalization, and the Fourth Industrial Revolution. By working together, member countries can devise strategies that foster sustainable development and harness new technologies for economic growth. The G20’s significance lies in its ability to influence the global economic agenda. The policies and commitments made during G20 summits often have a significant impact on international financial institutions and multilateral organizations. As a representative group of major economies, the G20 provides a more inclusive platform for dialogue than smaller groups or organizations. It allows emerging economies and non-G7 nations to participate in shaping the global economic and financial landscape.

Discussion & Conclusion

It is very significant to understand the increasing demand for digital assets and the environmental arena which is developing worldwide for the best of economic development. It cannot be ignored how financial disruptive technology is challenging

traditional banking procedures and making the place for online applications and platforms to secure the mind of consumers regarding payment solutions. Digital assets like cryptocurrency, blockchain technology, tokens, and commodities will help further grabbing of market share.

There is a requirement for the G20's role in financial stability and economic growth is instrumental in fostering international cooperation, addressing global economic challenges, and ensuring a more stable and prosperous world economy. Its efforts are aimed at achieving sustainable development, reducing economic disparities, and enhancing the resilience of the global financial system along with the Government role with more participation in the framework design and implementation of fintech projects so as to make it beneficial for society. Crypto assets' volatile positions will keep a challenge not only in front of investors but also in front of researchers and practitioners. There will be a purchasing power instability which will be noticed by the Government as well as start-up giants who are making this fiat currency domain a must for global development.

Annexure

Figure. No. 1: Various Digital Instruments



Table 1 : Conclusive Reports of Crypto Assets and their Development

S.No.	Name of Reports	Conclusive Summary of Report
1.	SYGNUM Digital Asset Outlook	Published in 2021 as a follow-up on "Crypto on Rise". Discussion on the price of Bitcoin and cryptocurrencies, user adoption rate, investor's fund flow, and regulatory framework. Designing for Gaming and Web3 is also mentioned. Metaverse crypto projects to be analyzed for performance. Non-fundable tokens and stablecoins came into a rage in the year 2021 and mad trend for digital tokens.
2.	Thomas Reuters	Discussion held regarding the Central Bank Digital Currencies (CBDCs) and G7 countries discussion about not considering CBDCs as crypto-assets. Talked about Stablecoins and its significance in the field of banking and payment. Non-Fungible Tokens having a digital code over blockchain performed as an asset in the form of a distributed digital ledger.
3.	Annual Global Crypto Hedge Fund	Two categories i.e., crypto hedge funds for liquid instruments and traditional hedge funds for
4.	Digital Asset Outlook	The research insights about the cryptocurrency reach in the market, trends, gaming through blockchain technology and decentralized finance are being the focal point. During 2013, GSR created an ecosystem for the crypto market and also worked for the growth of token issuers, traders, investors, and fund miners. World's top ten bitcoin network channels are being discussed and the monthly hikes. 1703 transactions and approx \$25.1 BN quantified the financing volume.

5.	BIGG Digital Assets Inc.	BIGG is having 575 bitcoins at present worth \$22 MN along with crypto holdings of \$51.1 MN. Netcoins are creating brokerage and exchange value for customers or investors and TerraZero is also a web 3.0 company, basically a Metaverse technology group.
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29. <https://www.mondaq.com/india/fin-tech/1164634/virtual-digital-assets-in-india-a-sneak-peek-into-india39s-regulatory-framework>
30. <https://www.pwc.com/gx/en/financial-services/pdf/4th-annual-global-crypto-hedge-fund-report-june-2022.pdf>
31. <https://www.oliverwyman.com/our-expertise/insights/2021/aug/digital-assets-going-mainstream.html>
32. <https://www.tbstat.com/wp/uploads/2021/12/The-Block-Research-2022-Digital-Asset-Outlook.v2.pdf>
33. <https://www.thomsonreuters.com/en/reports/cryptos-on-the-rise-2022.html>
34. <https://techcrunch.com/2022/06/06/wealthy-crypto-digital-assets-investors-asia-2022/>

8

SDG, G20 and Education Inclusivity: Connecting the Dots

Ishani Chakraborty & Asha Mathew

“Vidya dhanam sarve dhanam pradhanam” (education is the best wealth among all)

“An investment in knowledge pays the best interest”

By Benjamin Franklin

In an era defined by unprecedented environmental challenges and social responsibility, the concept of sustainability has gained prominence across various sectors, including education. Aligning with India’s G20 objectives, the education sector needs to be equitable, inclusive and resilient to support the nation’s overall sustainable development goals. Education should not be limited to academic learning only, and must include necessary vocational skills to facilitate an overall development of the learner’s life. Leaders and policymakers across the globe have now put emphasis on creating a framework of quality and affordable education, offered as life – long learning for all.

As part of the education theme, the last three G-20 summits focused on technology for education. These summits took place in 2020, 2021, and 2022. G20 Education Ministers recognized the value of distance learning and blended learning and creating digital infrastructures and content accordingly. Additionally, they underscored the importance of professional development for educators, as well as increasing access to high-quality education, enhancing educators’ professional skills, increasing cybersecurity awareness, and incorporating active learning.

In their previous meetings the Education Ministers explored how digital technologies, artificial intelligence, and big data might impact the overall education pedagogy. Last year in Bali, Indonesia, the G20 Education Ministers discussed the use of digital technologies in addressing issues

of accessibility, quality, and equity within the education system, as well as the creation of interactive, personalized, and engaging learning experiences. In light of the previous three meetings of G20 Education Ministers, digital technology-mediated education has become a new norm in the educational system. To promote technology-enabled learning, this year the G20 Education Ministers met in Pune, India, on 28 June 2023. In addition to showcasing India's accomplishments in technology-enabled education, the meeting also resulted in India learning from and utilizing technology-based education's best practices from other G-20 countries and improving its school and higher education systems.

Keywords: *Inclusive Education, Quality Education, Educational Sustainability, G20 Goals, Equitable Education*

Nurturing Globally Responsible Citizens for Sustainable Future

'One Earth, One Family, One Future'

In an era defined by pressing environmental challenges along with the urgency of sustainable development, the concept of sustainability has emerged as a beacon of hope for a better future. As the custodians of knowledge and the architects of tomorrow's leaders, higher education institutions hold a unique responsibility in fostering a greener, more sustainable world.

It is unanimously agreed in the action plan to speed up progress on the Sustainable Development Goals (SDGs) that teacher capacity must be built, education is recognized as an essential tool for human dignity, and digital transformation is a means to empower people. These goals can be achieved by investing in digital infrastructure and providing access to technology for all citizens. The G20 is also committed to tackling gender gaps in education, ensuring an inclusive, fair, and equitable educational system. It was emphasized that quality education is essential for a sustainable economy on both at national and global scale.

SDG Targets and Indicators Related to Sustainable Education

Although SDGs do not have a specific goal dedicated solely to "sustainable education" (Holfelder, 2019), however, elements of sustainable education are integrated into various other SDGs, particularly in SDG Goal 4, which put emphasis on quality

education (Biancardi, 2023). In order to achieve sustainable development an essential aspect is Sustainable education, as it involves fostering awareness, holistic knowledge, contemporary skills, universal values, and attitudes that contribute to a responsible society (Olsson, 2022).

Quality education ensures acquiring comprehensive learning and practical expertise that would further support gender equality, global citizenship, culture of peace and non-violence, cultural diversity and an overall sustainable lifestyle (Haseena and Ajims, 2015). This target emphasizes the integrating the education for sustainable development (ESD) into the learning process. It calls for educational institutions to incorporate themes related to sustainability, environmental stewardship, human rights, and cultural diversity into their curricula. By promoting ESD, individuals are equipped with the necessary tools to understand the interconnectedness of social, economic, and environmental issues, besides making informed decisions that contribute to a more sustainable future (Fomba et.al, 2023).

Indicators of Quality Education

The indicators related to quality education include specific measurements that assess the extent to which education for sustainable development is being implemented within the education system. The proposed indicators consist of the extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment. The proposed indicator aims to evaluate the integration of global citizenship education and education for sustainable development at various levels of the education system, from policymaking to classroom instruction. It helps to gauge the progress made in embedding sustainable education principles within the education sector. Additionally, countries may adapt or modify the indicators based on their national contexts and priorities.

Sustainable development vis-à-vis quality education: NEP 2020 and Current Trends

The “UN 2030 Agenda for Sustainable Development” highlights the importance of quality education. The agenda emphasizes

lifelong learning opportunities and inclusiveness. Education in the information age is aimed at connecting the general trends. Education plays a vital role in building new perspectives for sustainable development, which must take care of social and cultural reforms. For sustainability to thrive, it must be woven into the fabric of education. In line with similar ethos, National Education Policy 2020 (NEP 2020) now promotes the following facets in the Indian education sector:

Holistic education: Irrespective of a student's gender, race, ethnicity, socioeconomic status, or geography, holistic education ensures their overall development, which includes social, emotional, mental, physical, and cognitive aspects.

Borderless learning: After the Pandemic, the education sector has become increasingly digitized and technologically driven. It has become 'borderless' as the education system has gone from local to global.

Inclusive learning and educational equity: An inclusive educational system ensures that every qualified person has the chance to obtain education regardless of their gender, caste, religion, language, race, colour, political opinion, nation or social origin, or economic situation. Individuals' diverse interests, aptitudes, and capabilities can also be accommodated through a wide variety of education opportunities (Patfield et.al, 2022).

Digital and blended learning, lifelong learning: Adoption to e-learning technologies is now facilitating lifelong learning for individuals. Teachers across the globe are now encouraged to explore and adopt evolving e-learning technologies. E-learning offers personalised digital platforms to connect students globally. It has also brought in significant change in terms of student assessment methods. Blended learning is expected to support executive learning or lifelong learning as well.

Education for active citizenship: In order to foster democracy and civic participation locally, nationally, and internationally, education is crucial. To be successful in this complex and fast-changing environment, higher education institutions must develop outcomes-based curricula. In order to make informed and adequate decisions, students need be agile and think critically.

In India, as well as around the world, we are seeing a reorientation of an economic model that emphasizes education and training the youth, in order to ensure sustainability. In NEP 2020, the

concept of 'Education for active citizenship' is also stressed. NEP 2020 places sustainability at the centre of education rather than just as a superficial promise.

Nurturing Seva Bhaav through Education: In this 'brittle', 'anxious', 'nonlinear' and 'incomprehensible' (BANI) world, compassion, empathy, and love are characteristics that must be instilled in children from an early age so that they may contribute to the advancement of society. In early 2022 both "All India Council for Technical Education (AICTE)" and "University Grants Commission (UGC)" started registration for Vidyanjali Higher education – a scheme for support to the students, faculty members, and institutions through volunteerism. As per this scheme serving or retired faculty members, scientists, retired government officials, self-employed and salaried professionals, alumni etc., can offer remedial classes/training to the needy students. Corporates and NRI are encouraged to support higher education institution to build the necessary infrastructure. Ethical literacy can spark an inner recognition of the interdependence of life, integrity, and humility - this awakening of the self is 'Sewa Bhaav' and can distinguish India from the rest of the world.

Building an Inclusive Educational Ecosystem for Global Challenges: The international debate on inclusive education is now in its silver jubilee, nonetheless, consensus remains elusive. The UNESCO 2017 guidelines air that every learner matters and matters equally. As a principle supporting and welcoming diversity amongst all learners, inclusive education has become a global focal point. By embracing this view, academic world should aim to eradicate social exclusion caused by discriminatory attitudes toward a particular social class, ethnicity, religion, gender, and physical or mental ability. Education is a fundamental right of every human being, and a just society is based on the principles of inclusive education. Human rights and inclusive education are increasingly getting significant attention across the globe.

Steps for Building Inclusive Educational Ecosystem

The concept of 'learning to live together' is based on the three domains of Cognitive, Socio-emotional, and Behavioral learning. Learners are empowered to make informed decisions and take

responsible actions for the environment, economic viability, and unbiased society for themselves and for the next generation. In other words, it is a learning process that helps us live sustainably.

- **Adapt to an era where cultural heterogeneity is ‘the new normal’.** With the proliferation of global communication networks, students are now able to access information beyond national borders, and teachers need to recognize that they are embedded in complex transnational networks of communication.
- **The entire system must be involved in making policy changes:** Policymakers can shape an inclusive culture by shifting their values and thinking. Equity and inclusion need to be defined clearly and widely before policies can be developed. Current practices must be examined for their effects on students’ participation, attendance, and achievement. Every person involved in the lives of students should contribute his or her experience and expertise to the formulation of policies. It is essential for education departments, both locally and nationally, to promote equity and inclusion as guiding principles.
- **Education to ensure sustainable transformation:** Educating for sustainable development (ESD) involves developing critical and creative thinking skills, imagination, and collaboration abilities. The stakeholder community can collaborate to create an inclusive and global-minded educational ecosystem by promoting policy dialogue, fostering exchange programs, conducting joint research, building capacity for digital skills, investing in teacher training, engaging civil society organizations, and encouraging private sector participation.

Components of sustainable quality education

It is imperative to design programs and curricula, develop learning resources, develop pedagogy, assess teacher competency, and utilize technology in the classroom. The concept of sustainability, on the other hand, involves changing the way resources (environmental and non-environmental) are used. Achieving quality and sustainability in educational institutions is a constant pursuit, but implementing a change

globally is a challenge. Lifelong learning relies on sustainable and high-quality education and can be facilitated through the following:

- **The system's thinking-** Experiencing life in all its complexity, messiness, and uncertainty opens up a whole new perspective for students.
- **Thinking ahead** - preparing for the future with creativity and critical thinking
- **Strategic thinking:** assists students in achieving their goals.
- **Interpersonal competence** - A common cause can only be achieved by mobilizing groups, teams, and communities. The leadership skills required for sustainability require students to build alliances, inspire followers, negotiate with opponents, and communicate across cultures. As a result, topics such as teamwork, partnerships, leadership, democracy, or participation need to be discussed.

Approaches to Sustainable Learning

Learning content: Understanding topics from an interdisciplinary perspective. For example, teaching economic growth exclusively from an economic viewpoint may not be sufficient to analyse its causes and consequences. Using the concept of education for sustainable development, consider the social effects of economic growth, such as income (in)equality, health, and well-being. As well as understanding economic growth from an environmental perspective, one should also analyse whether it affects the environment positively or negatively. It is imperative that educational institutions change their objectives and aims in order to foster the right talent. Skills-based education combined with students' responsibilities for a sustainable future will result in better outcomes.

Pedagogy: It should be student-cantered, interactive, and engaging. In addition to classroom lectures, students should get opportunities to solve real-life problems for an external client, and work collaboratively on group assignments.

Global educational changes: The pandemic has prompted institutions around the world to focus on sustainable operations. In response to the pandemic, students, faculty, and

staff are engaging with campuses differently, so institutions are prioritizing physical and technological improvements. The leaders of global higher education outlined a number of initiatives to support the environment, including a goal of becoming carbon neutral by 2030, removing single use plastic, using renewable energy, and using electric vehicles.

Using sustainable IT: A single laptop produces on average 316 kg of CO₂ emissions, contributing to global warming in the mining, manufacturing, and production stages. Using remanufactured IT resources may be a sustainable solution. Advocate zero waste at campus events.

Conclusion

Education plays a crucial role in the lives of people. It nurtures inclusiveness and promotes shared goals that the world focuses to meet. When we talk about sustainable development, a lot of changes have to be done, not only in terms of policy and processes but also in terms of social, economic, and cultural reforms. The thrust towards quality and sustainable education at global level is a wholesome approach to include each and every aspect such as pedagogy, curriculum design, delivery, learning environment, school environment and teacher capacities performed to the optimum level of available resources.

Through multi-dimensional, multi-disciplinary, 'Seva Bhaav' and humanistic approach, we can equip our students to adapt to the sporadic BANI world. By reorienting education and learning environment it can be ensured that every student has an opportunity to acquire knowledge, skills and values that empower him/her to contribute to a more sustainable future.

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9

Embracing the G-20 Digital Revolution: Path to Inclusive Technological Transformation

Shama & Prof. Syed Shahid Mazhar

Abstract

A period of last decade has witnessed the prevailing view of digital technologies which is aligned with the firm's business operations. Digital empowerments such as Blockchain networks, Internet of Things (IoTs), Artificial Intelligence (AI), Cloud Computing, and Big Data possess all the inbuilt capacity to transform any business digitally. This rapid advancement has turned has altered economies, cultures, and cross-cultural exchanges in various ways.

Across the globe, industrial sector along with other business domains are fundamentally transforming their business strategies, processes, internal and external capabilities, the offered products and services, and even their methods of recording data.

The relevance of digital technology and its ability to promote equitable growth, encourage innovation, and address global concerns have been acknowledged by the Group of Twenty (G20), the premier forum for international economic cooperation. In recent years, the G-20 member countries have been at the forefront of embracing digitalization and leveraging technological advancements to shape policies and strategies for sustainable development.

This chapter aims to explore the current state of digital technology adoption within the G-20 member countries in particular and novel state of digital technologies when applied in firms in general, providing a comprehensive analysis of the opportunities, constraints, scale and potential pathways towards achieving a more digitally inclusive world.

This chapter delves into four themes and covers the (1) overall scope of digital technology, (2) scale and extent of digital technology, (3) potential

of digital technologies, and (4) constraints associated with the adoption of digital technologies and also highlights the common situations of G-20 nations under the stated themes.

These four key themes will shed light on digital strategies and provide valuable insights to gauge success metrics with the enhancement in the potential performance. The aim is to offer directions which eventually can advance understanding and shape the trajectory of future research in this domain.

Keywords: *Digitalization, Group of Twenty (G20), Digital Technology, Artificial Intelligence, Big Data*

Introduction: Emergence of Digital Technology

The industrial era has seen significant technological and industrial progress due to major advancements in the fields of science and technology. The integration of the advanced digital tools and techniques has completely transformed the landscape and marked a new beginning. In the past, communication was limited to letters only, and responses could take weeks or even months to arrive. However, this is no longer the case.

In the past few years, one can witness a noticeable improvements in manufacturing, trading and mechanical area as digitalization and changing dynamics of business have unleashed new aspects of technology. In addition, the G-20 summit has garnered the importance of digitalisation, not only for twenty member countries but across the globe. In the dotcom decade, firms have witnessed—both startups and scale-up organizations, make full use of efficient management, lower cost with maximum profitability, and enhance the performance levels of firms. Technology facilitates global connectivity through certain standard protocols which help businesses to grow and transform in the new digital era.

With the world increasingly interconnected, digital technology has played a critical role in enhancing communication not only for business owners but also for G-20 nations, specifically for promoting cross-border collaborations, and facilitating the free flow of information and ideas.

Traditional strategies and operations of business firms are being substantially reshaped by digital technologies as it facilitates social connectivity, communication speeds, versatile working,

automation of the process, information storage, editing, and so on. Moreover, it allows work to be completed across time, distance, and function boundaries. Modern technologies also provide different sorts of dynamic capabilities that are quite ideal for tumultuous situations (Mitchell et. al, 2013). Digital empowerments, particularly social networking platforms, are significantly influencing the dynamics of societal relationships within households and commercial environments (Cardinali et al., 2023).

It is believed that with the passage of time, human race is expected to be dominated by artificial intelligence and the separation of goods and services from the underlying IT infrastructures would not be easily possible (Lundin and Kindstrom, 2023).

Industrial operations across borders can be done with ease with the help of IT infrastructure. It has also led to the establishment of the virtual world (Neschen, 2023). Although many studies concluded that the technologies are dynamic in nature which can pose certain challenges to firms.

Ultimately, the future generation will increasingly be offered services through digital platforms due to their enhanced capabilities of processing data, storage, bandwidth, and software applications. Artificial Intelligence (AI), cloud computing, automation of processes, etc. offer new insights and eventually uplift the performance of firms. However, alongside the opportunities, the G-20 nations and the belonging entrepreneur also face the challenges associated with digitalization, such as cyber threats, data privacy concerns, and potential job displacements due to automation. Therefore, these entrepreneurs need to examine carefully the trends to explore the suited technologies that are in line with company strategy. Instead, it should be combined to form a larger phenomenon so that the virtual marketplace can be created. The use of digital technology undoubtedly creates differential business value which enables the entrepreneurs to grab command in the global market.

Research Design and Methodology

This paper is conceptual and relies on secondary data. Statistical information has been obtained from diverse sources, such as

published articles in relevant journals, magazines, and related articles available on Scopus and Research Gate. The researcher has gathered associated information and statistical data through online portals and website as well.

Objectives of the study

This chapter intends to map the base of digital technologies and is more confined towards technological integration, especially in the operating firms. The key objective of this article is to understand the overall four major aspects associated with digital technologies and to highlight the its interconnection with the G-20 initiative. The study aims to study the following objectives-

1. To review the scope of digital technology
2. To evaluate the scale of adoption of digital technology
3. To study the opportunities offered by digital technology in business firms
4. To identify the challenges imposed by the adoption of digital technologies

These objectives are studied under four specific themes for better understanding and clarity as mentioned in the next section (**Section 4**).

1. Digital Business Themes

The study has recognized specific themes to provide a base on digital technologies and provide a framework for novel insights. The four themes in which this chapter is classified are- (1) *overall scope of digital technology*, (2) *scale and extent of digital technology*, (3) *the potential of digital technologies*, and (4) *the constraints associated with the adoption of digital technologies*. This chapter intends to capture the key areas of digital technology and assist in articulating its core elements. This study is crucial for academicians, scholars, and entrepreneurs as it will enable them to understand the nature, extent, role, and emergence of technological know-how and the main drivers for the adoption of these digital technologies (Figure 1).

1.1 Broad areas of digital technology (Scope)

Digital era is marked with an expansion in the scope of modern technologies and their adoption. At the first place, it covers the

portfolio of manufactured outputs and businesses and whereas on the other, it includes the activities carried out within a business. Many studies interrogated the interconnected concepts of advanced technical mechanism which can be drawn and also categorized its scope. Knowing the spectrum of technologies allows us to envision how they relate to enterprises, households, whole industrial sector and the dynamic external environment. In view of the various competitive strategies it is recommended that close attention has to be paid on the ways through which such empowerments influences the scope of digital business strategy.

1.1.1 Digital technologies transcend traditional activities

Digital technology stands out from conventional IT infrastructure and extends beyond obsolete functional domains (such as sales, finance and marketing) and diverse IT-enabled operations. It also goes beyond cross-functional strategies (such as order management, customer service, and others). Thus, it's completely viable to assume digital technology as intrinsically trans-functional.

The term “digital technology” has been described differently by different authors but if summed up, it can be defined as those digital devices, systems, and resources that helps to initiate, create, store, and manage information and data. IT no doubt facilitates digital strategies for firms and it was found these digital business strategies rely on filthy exchange of information (Roth et al., 2023).

As a result, the digital revolution is more substantial, more visible, more ingrained, and more comprehensive than previous revolutions. The global economy strives to be digital and formulates numerous policies for its adoption. Artificial Intelligence and Big data are contributing equally, more or less, to drive innovations in national and international business.

Figure 2 shows the clear state of AI and Big Data adoption in organizations at the global level. As is clearly depicted in the figure these digital technologies not only manage data as a business asset but also establish a digital data culture, drive and facilitate innovation, and build a competitive strategy based on data and analytics. The data of recent years i.e. from 2019 to 2023

clearly depicts the increasing trend in the adoption of AI and Big Data. Around 39.5% of companies manage their data with these technologies in the year 2023. However, in the other previous years, this percentage was more or less the same, say 39.7% in 2022, 39.3% in 2021, and 50% in 2020, which is quite high due to the outbreak of covid-19 pandemic. Therefore, strategies for digital transformation must be equally designed and must be positioned with business strategy. Few articles recommended that digital transformation must be treated as the business strategy itself in the digital era.

1.1.2 Digital technology facilitates digital transformation of goods, services and information

With the advent of technology, the whole scenario has changed. Digitalization facilitates dynamic changes. For instance, using digital resources to implement changes in corporate processes, product and service design, and their compatibility with other complementing platforms.

Many firms begin to observe the undying potential of digital resources as it creates novel empowerments as well as reformulate old methodologies and strategic plans (Bhardwaj et al., 2013). Amazon's Web Services on the Cloud plus can be one of the examples that stand out. By including cloud computing services Amazon has initially expanded the strategy of a normal online shop. Other renowned firms including Google, Microsoft team, and Netflix have also marked significant adoption as they continue to benefit from advancements that took place in hardware, software, and Internet access. Companies must continue to alter and refine their organizational scope in order to be efficient. Digitized products introduced by Nike supported by Apple's iOS could be another example. The technology of the digital era is *"more than just bits and bytes."*

1.2 Scale of Digital Technology

As the market becomes more and more digital, there is a need to consider the scale of technology in both physical and digital dimensions. The higher the scale of adoption of technology in business; the higher will be the profitability. Although the scale is likely to be affected by other factors too, such as the size of the business firms, business strategies, dynamic policies, and environment, and so on.

1.2.1 Strategic Dynamic Capacity of Quick Digital Scale-Up/Down

Increased prevalence and availability on Artificial Intelligence, cloud computing, blockchain technology, etc. provide a strategic dynamic flexibility to hike the organization's infrastructure and vice-versa. When the IT infrastructure is clubbed with strong business strategies, there comes a rapid scaling ability of firms. The prominent Cloud service providers such as Google Cloud, Microsoft Azure, and Amazon Web Services (AWS) provide elastic resources such as hardware, infrastructure configurations, and user-friendly web interfaces. These services enable clients to simply and dynamically change their technological assets in response to the ever-changing competitive situation. This flexibility enables organisations to scale up or down as needed, keeping them nimble and responsive in the face of market demands.

1.2.2 Favourable Impact of Networks on Multi-sided Platforms

As companies are shifting to the digital realm, consideration by entrepreneurs has to be given to various multi-sided operations designs and models. This can be implemented on the demand side through links between web pages and on the supply side through digitally connected partnerships (like Facebook and Google partnerships).

With the support of Government of India, tremendous opportunities are reaping, more specifically in the context of G-20 summit. The report shows huge contribution in the IT and Operations tracks. Few of them are listed below-

1.3 Opportunities of Digital Technology

- 1. Production of Hybrid Work Culture:** Digitalization is the engineer as well as the facilitator of the 'work-from-home opportunities. Though the digital transformation started ages ago, it proved to be the support system everyone needs since COVID-19 hemmed us in its never-ending poisonous trap. Where a lot of businesses faced tremendous loss, the digitally equipped business all sailed their boat and survived this storm. The majority of the employees worked from home and some followed the hybrid system i.e. WFH

a.k.a work from home and WFO a.k.a work from office. Social media applications like Zoom, Google Meet, Skype, etc. helped all the co-workers to stay connected.

2. **Rise in Efficiency and Productivity:** Digitalization has made workflow highly efficient and brought a significant change in business productivity. For instance, automation processes and chat-bots are the commonly used digital tools for such purposes. It developed the concept of 'work smarter, not harder' among business people whether an employer or an employee. Digital tools work as time-savers by consolidating the back-office processes. It also axes the roadblocks in the ROI. The use of Digitech assists in completing a task relatively faster and accurately, leaving abundant time for the workers to produce large profits.
3. **Augmentation of Employment Opportunities:** The common belief is that AI is gradually taking away job options from humans. On the contrary, it provides greater elbow room to employees and gives them a plethora of time, free of minuscule or complicated tasks to showcase their abilities to produce the best results. Digitalization has, in fact, generated various job opportunities, especially in the IT sector. Also, it has created a whole new department of digital marketing in the corporate world.
4. **Upgraded Resources for firms:** The emerging concepts of the Internet of Things (IoTs) and ICT have significantly changed the development graphs of entrepreneurs. The competition is increasing by every minute and companies utilizing digital tools to keep themselves updated on the resource tools and its management gain profit in their business to the highest. In simple words, the more tech-savvy, the more the profitability. Whether it's operations or marketing, digital tools help a company realize its strengths, weaknesses, and also their potential.
5. **Improved Customer Relationship Management(CRM):** The people in the present era want easy and quick solutions to their problems. Customers seek rapid and accurate answers to their queries whether it is work-based or for leisure purposes. Through customization, businesses make the experience for their consumers more personal and

suitable for their specific needs. Whether it is any product or service, digitization has proved highly beneficial for both the buyer and the seller. It is easier for marketers to understand what best caters to a customer's needs through various analytics programs in relatively lesser time.

6. **Better Internal Communication among the Workforce:** A company has different departments for different purposes and requires communication with each other from time to time for the smooth running of the business. In such scenarios, miscommunication happens, data gets lost, ideas are not well-putted for others' knowledge, etc. can go wrong. Digital transformation aids the corporate sector with hassle-free and streamlined connectivity, making the work process easier. It creates a positive space and a safe place for the growth of the business and its people.
7. **Faster analysis of data:** Technology allows business firms to collect, analyze and tabulate data at a faster speed. Advanced technologies such as cloud computing, artificial intelligence, big data, and blockchain technology provide a strong base to store and analyze data which serves as a boon for all firms.
8. **Ease in transferring data:** The traditional method of transferring data has been swapped with novel technologies. It helps entrepreneurs to transfer the data at a minimal period of time and most important it adds place utility by transferring information instantly from and to the remote areas.

1.4 Constraints of Digital Technologies

Alongside the opportunities, the concept of digitalization drags the attention and pinpointed that apart from the G-20 nations, all other business firms face certain challenges associated with digitalization, such as cyber threats, data privacy concerns, and potential job displacements due to automation. G-20 nations are collaborating and sharing best practices to address common challenges and foster global digital cooperation.

1. **Lack of Strategy:** Organizations with comprehensive strategies are in a better position to achieve their goals considering the integration of digital technologies. The success of any firm

depends on a flexible culture of workplace, and the absence of a quick managerial decisions in any new project may result in failure in most of cases. .

2. **‘Complicated technologies and their implementation:** Generally, softwares designed for business firms are complicated in nature. The introduction of new technology can be a daunting endeavor that might turn out as a significant barrier for businesses. When companies integrate digital technologies in their early phases, top management should take this into account and look for the solutions that are the most user-friendly and well-integrated else the results may not be as per the determined standards.
3. **Resistance from Employees’:** Employees and workers of any organisation, say small or large, resist to change from long-tenured personnel. Sometimes, they are not ready to accept technological innovation and procedures. They believe that the way things should continue as the way it is, even in the future.

To help employees and to make them more productive and proficient with the digital tool and platforms, companies must implement new software while simultaneously offering comprehensive on-board training and continuing employee performance assistance.

4. **Legacy systems:** Even after the introduction of some reliable and efficient platforms, there are few commercial organizations which continued to use old surfaces. They must ripe the benefits of large financial investment in technologies that bring fruitful results in the long run. The rule of thumb must be replaced with the scientific selection of antiquated technologies. Out of all the constraints in digitalization, legacy system is the major one. The owners must reduce it in order to obtain absolute advantage.
5. **Risk-averse corporate structure:** Change-resisting business cultures impede growth and advancement. Many firms are risk-averse when digital transformation comes in play. Adoption of novel technology is met with considerable scepticism, from C-level executives to employees. Some business executives believed that it is unnecessary to change their tried-and-true practices, especially if they are

yielding positive results. Employees may be uneasy about the new roles and responsibilities that come with the digital revolution. Even the slightest change is unacceptable. Businesses will tend to lose huge potential if these concerns are not addressed.

6. **Insufficient resources for technological changes:** Businesses with huge losses find it difficult to transform digitally. Due to the financial limitations they have had to put off digital transformation. The pandemic COVID-19 has also worsened the situation for them. Entrepreneurs even those belonging to G-20 nations assumed that putting new digital solutions into practice is a costly process that demands large investments. In addition, many business owners have misunderstood that expenses on technology adoption are business expenses and insufficient funding for such transformation will be a failed strategic investment.
7. **Poor strategy for digital transformation:** More or less every sector will require some sort of capabilities as corporate with reference to digitalization. Basic technical knowledge will be required even in the non-technical occupations. Lack of the range of digital competencies is actually required for successful digital transformation. Such transformation requires expertise in a variety of areas, including analytics, blockchain technology, cloud computing, cyber security, corporate infrastructure, and digital experiences. Regrettably, it is quite difficult and even expensive to identify the proper personnel in a pool of talent to fit the right man at the right job.
8. **Scarcity of technological resources:** In addition to personnel scarcity, businesses today are also struggling to find additional resources that are essential for implementing digital initiatives. Some businesses are still hindered by basic facilities such as software for data feeding, the unavailability of advanced processors, and so on. Furthermore, the supply chain for IT gear and equipment is also being hampered by persistent problems.
9. **Massive security risks:** The attempt to keep pace with the prompt shifts in demands of household, many owners hastened the digital transformation and adopted

technologies. As a result, They are now more vulnerable to escalating cyber security threats. This has also made other organisations concerned about experiencing similar breaches while launching their own programmes. Nonetheless, the issue is not without merit. Collaboration with several SaaS (or Software as a Service) providers is difficult, especially for firms with a solid technological foundation.

However, by promoting responsible digital innovation and addressing potential risks, the stated challenges can be minimized and even prevented. G-20 approach and its vast scope can lead the way towards a future where technology fosters sustainable development and improved quality of life for billions of people across the globe.

Conclusion and Suggestion

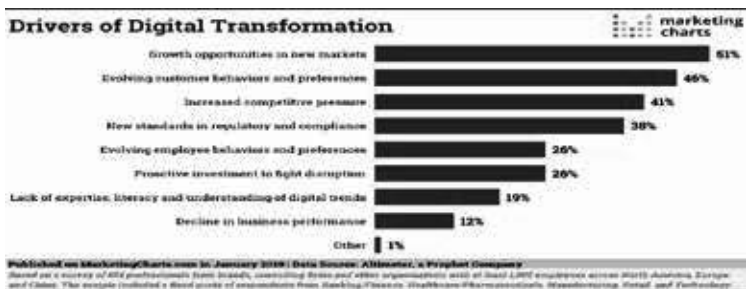
Digitalization requires high availability of resources, not only for investment purposes but also for digital transformation. All business firms require various competencies and knowledge in order to train their workforce. If digital transformation is implemented keeping in mind all the favorable points and proper strategies are designed especially for contingencies, then no doubt it will bring fruitful results to the business organization whether small or large. As the environment keeps on changing, all business firms are required to scan the environment first and then formulate strategies accordingly. The adoption of digital technology is also subjected to environmental dynamism. To obtain maximum benefits entrepreneurs must align business strategies with digital business strategies. After the content analysis, it can be stated that the integration of technology in business operations multiplies the expected outcome by approximately six times the output obtained from traditional technology. However, the adoption and implementation of technologies must go hand-in-hand so that numerous opportunities can be drawn. The previous studies also highlighted that for smaller firms, the concept of digitalization is quite difficult as it requires huge investment at the initial stage but with minimum packages and digital tools this problem can be resolved.

As we move forward into an era increasingly shaped by digital technology, understanding the G-20's approach to adoption and utilization of these technological advancements will be crucial in shaping international policies and promoting global digital inclusivity. By seeking innovative solutions to overcome the challenges, the G-20 can pave the way for a more equitable and technologically empowered future for all nations.

It is suggested that prior to the adoption of digital technology, business firms must prepare themselves for the transformation in every aspect. The employees should be given proper training so that no resistance can come from their side later on. It is also feasible for companies to adopt user-friendly technology for handling operations as it not only saves time but also allows employees to explore the area of interest in terms of job satisfaction. The government of India is also working as a nodal agency for the digitalization of enterprises and provides assistance to entrepreneurs through web portals and digital facilities for constructing the digital base.

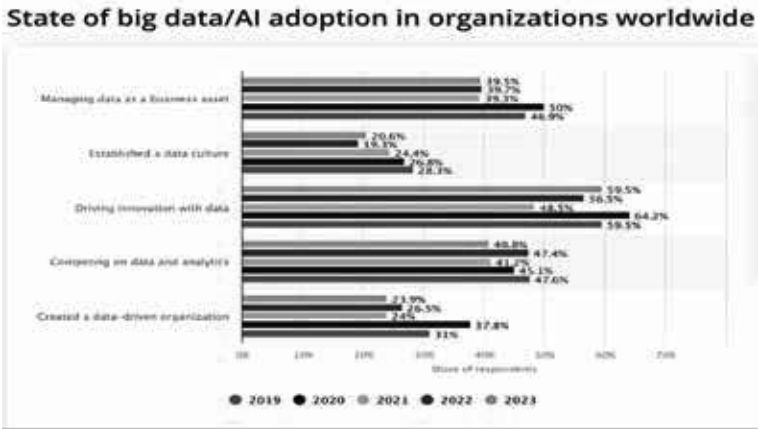
Annexure

Fig. 1: Drivers of Digital Transformation in Business Firms



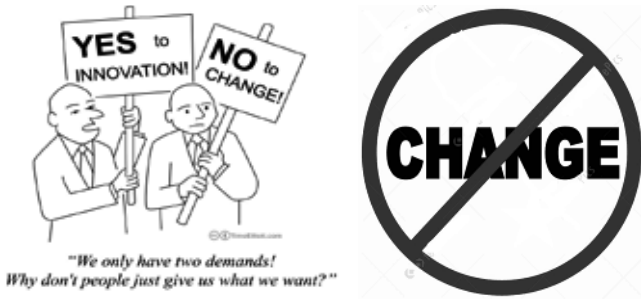
source: <https://www.marketingcharts.com/business-of-marketing-107115>

Fig. 2: Adoption of Big Data and Artificial Intelligence in Global Organizations



Source: www.statista.com

Fig. 3: Resistance from Employees for the adoption of technology



source: www.businessprocessincubator.com

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10

Technology-Driven Employee Engagement: A Pathway to Sustainable Growth in G20 Nations

Arti Awasthi & Dr. Farhina Sardar Khan

Abstract

The increasing use of technology in the workplace, including in India, is crucial for employee engagement and organizational success. As the G20 continues to pursue sustainable growth, investments in technology-enabled and human-led transformation programs are essential for long-term business viability. This study aims to explore the technological influence on employee engagement in Indian settings by reviewing the latest evidence. A comprehensive search of electronic databases and manual searching was conducted to identify relevant articles published in recent years. Twelve articles meeting the inclusion criteria were examined using a coding framework to discern significant themes and findings. These encompassed aspects such as the types of technology employed for employee engagement, the technological impact on employee-engagement outcomes, and factors influencing the relations between technology and employee engagement.

Keywords: *Employee Engagement, Digital Technology, Disruptive Technology, Organizational Success, Investment*

Introduction

In the dynamic and ever-changing business environment of today, technology holds a pivotal position in nurturing employee engagement and securing the triumph of organizations. India, a prominent member of the G20, has been embracing technological advancements in the workplace, transforming the way organizations operate, communicate, and interact with their

workforce. The aim of this study is to analyze and synthesize the most recent evidence concerning the influence of technology on employee engagement in India. The primary focus is to examine and consolidate the latest evidence on technology adoption in employee engagement strategies, identify the various types of technology employed to engage the workforce, explore the consequences of technology implementation on employee-engagement levels, and investigate those factors that moderate the relationship between technology and employee-engagement.

India is one of many countries where digital and disruptive technologies are transforming the economy by creating new business models, products, and services that can drive growth and improve efficiency. These technologies, such as social media, mobile devices, automation, and artificial intelligence, are changing the way employees interact, communicate, and perform their tasks, boosting innovation, productivity, and efficiency. Employee engagement refers to how dedicated, motivated, and contented employees are with their jobs and organization. It serves as a critical factor influencing both organizational performance and the well-being of employees. Understanding the impact of digital and disruptive technology on employee engagement in Indian organizations is crucial for both academic research and managerial practice. The findings hold immense significance for organizations operating in the Indian market, as they navigate the complexities of a globalized economy and strive for sustainable growth. The research's implications extend to policymakers and business leaders as they shape strategies and policies that foster an environment conducive to employee engagement and technological innovation. Therefore, understanding the impact of digital and disruptive technology on employee engagement in Indian organizations is crucial for both academic research and managerial practice.

Latest Technologies to Improve Employee Engagement

There are several latest technologies used in employee engagement. Some examples are:

Artificial Intelligence (AI): AI is being used to develop chatbots and virtual assistants that can help employees with their queries, feedback, and other concerns. These AI-powered chatbots can be integrated into various platforms like the company intranet, social media, and messaging apps.

Augmented Reality (AR): AR technology can be used to create immersive training experiences for employees. AR can help employees learn new skills and procedures in a more engaging and interactive way. For example, an employee can use an AR headset to learn how to operate a machine or perform a complex task.

Virtual Reality (VR): VR can be used to create virtual simulations of work environments, which can help employees, experience real-world situations and scenarios. VR can also be used to create virtual team-building activities and events.

Employee recognition platforms: Employee recognition platforms like Bonusly and Kazoo use technology to create a workplace culture of appreciation and recognition. These platforms allow employees to give and receive recognition for their work, which can boost morale and engagement.

Social media: Platforms such as LinkedIn, Twitter, and Facebook offer opportunities to establish employee communities and foster seamless communication and collaboration among them. Companies can also use social media to share company news, events, and employee stories.

Gamification: Gamification involves using game mechanics and elements to make non-game activities more engaging and motivating. Companies can use gamification techniques to create training modules, wellness programs, and other employee engagement activities.

It's worth noting that the latest technology trends in employee engagement are constantly evolving and changing, so companies should stay up-to-date with the latest developments in this field. (Refer Table No.1)

(Figure No.1)

Challenges that may impede the efficient utilization of technology for enhancing employee engagement.

There are several potential barriers to the effective use of technology in improving employee engagement. Here are some of them:

Resistance to Change: Employees may resist the introduction of new technology due to a fear of the unknown, a lack of confidence in their ability to use it, or a belief that it will make their jobs more difficult.

Technical Issues: Technical issues such as slow internet speeds, software bugs, or hardware malfunctions can hinder the effective use of technology and reduce employee engagement.

Lack of Training and Support: Employees may not be adequately trained or supported in the use of new technology, which can lead to frustration and decreased engagement.

Security Concerns: New technology usage might trigger employees' concerns regarding the security and privacy of the personal information. This might lead to distrust in the organization and reduced engagement.

Digital Divide: Employees with varying levels of technological proficiency may experience a "digital divide," with some struggling to adapt to new technology and others feeling more comfortable and engaged with it.

Overreliance on Technology: Overreliance on technology can lead to a lack of face-to-face interaction between employees, reducing opportunities for relationship-building and collaboration.

Cost: The cost of implementing new technology can be a significant barrier, particularly for smaller organizations or those with limited budgets.

It is important for organizations to identify and address potential barriers to the effective use of technology in improving employee engagement. This may involve providing training and support for employees, addressing security concerns, and ensuring that the benefits of technology are clearly communicated to employees.

Review of Literature:

Gupta and Chauhan (2019) studied the role of technology in employee-engagement and performed a SLR of 25 articles indicating that technology has a positive impact on employee engagement, particularly in terms of communication, collaboration, learning and development, and job satisfaction. Incorporate technology to improve communication, collaboration, learning and development, and job satisfaction.

Bhagat et al. (2020) identified how digital technology affects employee engagement in India. A survey of 150 employees in

India indicates that digitization has a positive effect on employee engagement, specially in the context of communication and cooperation, and job satisfaction. Encourage the use of digital technology to improve communication, collaboration, and job satisfaction in the Indian context.

Raghavendran and Uthayakumar (2020) recognized that digital transformation impact employee engagement in the Indian IT sector after a survey of 150 employees in the Indian IT sector indicates that digital transformation has a positive impact on employee engagement, particularly in terms of job satisfaction, learning and development, and empowerment. Encourage digital transformation to improve job satisfaction, learning and development, and empowerment in the Indian IT sector.

Kumar et al. (2020) A study was conducted to assess how digital technology affects employee engagement in the Indian hospitality industry. The survey, which included 150 employees, revealed a positive impact of digital technology on employee engagement, particularly in the areas of communication, collaboration, and learning and development. The findings encourage the adoption of digital technology to enhance communication, collaboration, and learning and development practices within the Indian hospitality industry.

Bhattacharya et al. (2020) In a study exploring the connection between digital technology and employee engagement in the Indian manufacturing industry, researchers identified the role of digital technology. The survey, which encompassed 200 employees, emphasized digital technology's positive impact on employee-engagement, particularly in communication, collaboration, and job satisfaction. These findings advocate for the adoption of digital technology to enhance communication, collaboration, and job satisfaction within the Indian manufacturing industry.

Mohanty and Rath (2021) Researchers conducted an analysis to to look into the impact of technology on employee engagement in the Indian banking system. Based on a survey involving 200 employees, the study revealed a positive impact of technology on employee engagement, particularly in the areas of communication, learning and development, and job satisfaction. It is recommended to implement technology to enhance

communication, learning and development, and job satisfaction in the Indian banking sector.

Chavan and Khade (2021) showed that technology impacts employee engagement in the Indian pharmaceutical industry. A survey of 200 employees in the Indian pharmaceutical industry indicates that technology has a positive impact on employee engagement, particularly in terms of communication, collaboration, and learning and development. Encourage the use of technology to improve communication, collaboration, and learning and development in the Indian pharmaceutical industry.

Srivastava et al. (2019) studied the impact of technology on employee engagement in the Indian healthcare industry. A systematic literature review of 24 articles indicates that technology has a positive impact on employee engagement, particularly in terms of communication, collaboration, and job satisfaction. Incorporate technology to improve communication, collaboration, and job satisfaction in the Indian healthcare industry.

Narayanasamy and Srinivasan (2019) identified the impact of technology on employee engagement in the Indian IT industry. A survey of 200 employees in the Indian IT industry indicated that technology has a positive impact on employee engagement, particularly in terms of learning and development.

Tyagi and Pandita (2021) examine the role of artificial intelligence (AI) and people analytics in promoting employee engagement. The authors highlight the increasing importance of employee engagement in the modern workplace and the potential of AI and people analytics to facilitate this. He suggests that AI and people analytics have the potential to significantly improve employee engagement in the modern workplace. By providing real-time support to employees, analyzing employee feedback, and identifying patterns and trends in employee data, these technologies can help organizations make data-driven decisions and promote a more engaged workforce.

Shaik and Makhecha (2019) examine the drivers of employee engagement in global virtual teams. The authors argue that virtual teams, which are increasingly common in today's globalized work environment, require unique strategies for promoting employee engagement.

Author(s)	Topic	Research Question	Journal
Gupta and Chauhan(2019)	The role of technology in employee engagement: A systematic literature review	How does technology contribute to employee engagement?	International Journal of Management, Technology, and Social Sciences
Bhagat et al.(2020)	Digital technology and employee engagement in India: An empirical study.	What is the impact of digital technology on employee engagement in the Indian context?	Journal of Indian Business Research
Raghavendran and Uthayakumar (2020)	Impact of digital transformation on employee engagement in Indian IT sector.	How does digital transformation impact employee engagement in the Indian IT sector?	Journal of Management and Entrepreneurship
Kumar et al. (2020)	Impact of digital technology on employee engagement: A study of the Indian hospitality industry.	The study explores the impact of digital technology on employee engagement within the Indian hospitality industry	Tourism Review
Bhattacharya et al.(2020)	Role of digital technology in employee engagement in the Indian manufacturing industry: An empirical study.	How does digital technology contribute to employee engagement in the Indian manufacturing industry?	Journal of Advances in Management Research
Mohanty and Rath(2021)	Impact of technology on employee engagement: Evidence from the Indian banking sector.	What is the impact of technology on employee engagement in the Indian banking sector?	International Journal of Bank Marketing

Chavan and Khade(2021)	Impact of technology on employee engagement: A study of the Indian pharmaceutical industry.	How does technology impact employee engagement in the Indian pharmaceutical industry?	Journal of Advances in Management Research
Srivastava et al.(2019)	Impact of technology on employee engagement in the Indian healthcare industry: A systematic literature review.	How does technology influence employee engagement in the Indian healthcare industry?	Health Management Journal
Narayanasamy and Srinivasan (2019)	Impact of technology on employee engagement: A study of Indian IT industry.	What is the impact of technology on employee engagement in the Indian IT industry?	International Journal of Management, Technology, and Social Sciences
Tyagi, D. M., & Pandita, D. (2021).	Artificial Intelligence and People Analytics-A Key to Employee Engagement	How can AI and people analytics be used to improve employee engagement?	International Journal of Emerging Technologies and Innovative Research
Paul, P., & Singh, B. (2023).	Healthcare Employee Engagement Using the Internet of Things: A Systematic Overview	How can IoT be used to improve healthcare employee engagement?	The Adoption and Effect of Artificial Intelligence on Human Resources Management
Shaik, F. F., & Makhecha, U. P. (2019).	Drivers of employee engagement in global virtual teams	What factors contribute to employee engagement in global virtual teams?	Global Business Review

Source: Author's Compilation

Objectives

The aim is to identify various types of technology that can improve employee engagement.

This study intends to explore the advantages and disadvantages of technology in enhancing employee engagement.

The objective is to identify potential obstacles to the effective use of technology for improving employee engagement.

To review the latest evidence on the link between technology and employee engagement for the sustainable development of the economy as per the G20 agenda.

By analyzing the literature using a coding framework, we can identify common themes and patterns across studies. This can help to build a comprehensive understanding of the link between technology and employee engagement in the Indian context.

Methods

To compile the most recent data available on the given topic, a systematic search was conducted in academic databases (Google Scholar, Scopus, Science Direct, and Web of Science) to identify articles published between 2015 and 2023 that focused on the link between technology and employee engagement. The search was conducted using keywords such as “Digital technology”, “Disruptive Technology”, “information technology”, “employee engagement”, “employee motivation”, “employee satisfaction” and “India”. We identified twelve studies that met our inclusion criteria and synthesized their findings to draw insights on the impact of digital and disruptive technology on employee engagement in Indian organizations. These studies employed various research methods, such as surveys, interviews, and case studies, and examined a range of digital and disruptive technologies, such as social media, mobile devices, artificial intelligence, and automation.

Author(s)	Technology Types	Employee Engagement Factors	Positive Impact	Negative Impact	Industry
Gupta and Chauhan (2019)	Social Media, Online Learning Platforms	Communication, Learning and Development, Job Satisfaction	Improved Communication, Enhanced Learning and Development Opportunities, Increased Job Satisfaction	Technological overload, information overload, work-life imbalance, and privacy concerns	IT
Bhagat et al. (2020)	Social Media, Mobile Devices	Communication, Collaboration, Learning and Development	Improved Communication, Enhanced Collaboration and Learning, Increased Job Satisfaction	Technological distractions, reduced face-to-face interactions, and negative impact on work-life balance	IT
Raghavendran and Uthayakumar (2020)	Social Media, Mobile Devices	Job Satisfaction, Employee Motivation	Improved Job Satisfaction, Enhanced Employee Motivation	Resistance to change, technological distractions, and negative impact on work-life balance	IT
Kumar et al. (2020)	Mobile Devices, Online Learning Platforms	Learning and Development, Job Satisfaction, Work-Life Balance	Increased Learning and Development Opportunities, Improved Work-Life Balance	Technological distractions, and negative impact on work-life balance	Banking

Bhattacharya et al. (2020)	Mobile Devices, Social Media	Communication, Employee Empowerment, Job Satisfaction	Improved Communication, Increased Employee Empowerment, Enhanced Job Satisfaction	Technological distractions, and reduced face-to-face interactions	Banking
Mohanty and Rath (2021)	AI, Blockchain, Virtual Reality	Knowledge Sharing, Employee Empowerment	Increased Employee Engagement and Knowledge Sharing	Technological distractions, and reduced face-to-face interactions	Hospitality
Chavan and Khade (2021)	Virtual Reality	Training, Job Satisfaction	Enhanced Training and Development Opportunities, Increased Job Satisfaction	None mentioned	Non-Indian
Srivastava et al. (2019)	Social Media, Mobile Devices	Communication, Employee Motivation, Collaboration	Improved Communication, Increased Employee Motivation, Facilitated Collaboration	None mentioned	Non-Indian context
Narayanasamy and Srinivasan (2019)	E-Learning	Learning and Development	Enhanced Learning and Development Opportunities	Technological distractions, and reduced face-to-face interactions	Non-Indian context

Tyagi, D. M., & Pandita, D. (2021).	Artificial Intelligence, People Analytics	Recognition, Communication, Learning and Development, Well-being	Improved engagement, productivity, retention, and job satisfaction	Possible concerns over privacy, security, and ethical considerations	General
Paul, P., & Singh, B. (2023).	Internet of Things	Training and development, Leadership, Work-life balance, Positive culture, Effective communication	Improved employee satisfaction, engagement, retention, and quality of care	Possible concerns over privacy, data security, and data misuse	Healthcare
Shaik, F. F., & Makhecha, U. P. (2019).	Not Specified	Trust, Communication, Cultural diversity, Leadership, Collaboration	Improved engagement, motivation, and team performance	Possible barriers related to cultural differences, language barriers, and communication difficulties	Global virtual teams

Source: Author's Compilation

Using the coding framework, we can see that the technology types mentioned in the literature include social media, mobile devices, e-learning platforms, AI, blockchain, virtual reality, people analytics, and the Internet of Things. The employee engagement factors discussed include communication, learning and development, employee motivation, collaboration, employee empowerment, job satisfaction, well-being, work-life balance, leadership, culture, and trust. The findings across all studies suggest that digital and disruptive technologies have a positive influence on employee engagement. These technologies are associated with improved communication, enhanced learning and development opportunities, increased employee motivation, higher retention rates, improved productivity, facilitated collaboration, increased employee empowerment, enhanced job satisfaction, and enhanced team performance. However, the negative impacts include technological overload, information overload, work-life imbalance, privacy concerns, technological distractions, reduced face-to-face interactions, and possible concerns over privacy, security, and ethical considerations. The studies were conducted in various industries including IT, hospitality, banking, healthcare, and global virtual teams as well as in non-Indian contexts. This suggests that the link between technology and employee engagement is relevant across various industries and geographical contexts. In conclusion, the analysis utilizing the coding framework consistently demonstrates a positive impact of digital and disruptive technologies on employee engagement, not only in the Indian context but also beyond it.

Results and Findings

In the industries within the Indian context, digital technologies exert a noteworthy positive impact on employee engagement like IT, banking, healthcare, and hospitality. Encouraging the use of these technologies leads to improved communication, learning opportunities, and job satisfaction. Organizations should provide adequate training and support to ensure employees are comfortable and proficient in using these technologies.

On the whole, the literature strongly advocates the notion that integrating digital and disruptive technologies can yield

a positive impact on employee engagement across diverse industries. Organizations should consider incorporating these technologies to improve employee engagement, productivity, and retention. However, it is important to ensure that the technologies are implemented effectively and in a way that is accessible to all employees to avoid creating a digital divide.

Conclusion

The literature suggests that the adoption of digital technologies has a positive impact on employee engagement in various industries, including IT, banking, healthcare, and hospitality. The studies conducted in India have consistently found that digital and disruptive technologies positively impact employee engagement in terms of communication, learning and development opportunities, job satisfaction, and team performance. However, organizations must ensure that these technologies are implemented effectively and in a way that is accessible to all employees to avoid creating a digital divide. Adequate training and support for employees are crucial to ensure proficiency and comfort in using these technologies. It is also important to balance technology use with face-to-face communication and interaction. In summary, implementing digital technologies can result in enhanced employee engagement, productivity, and retention, thereby contributing significantly to the organization's overall success. This research paper has highlighted the vital role of technology in augmenting employee engagement within the Indian context. As the G20 countries continue to pursue sustainable growth, investments in technology-enabled and human-led transformation programs have emerged as essential drivers of long-term business viability. Through a systematic analysis of 12 relevant articles, we have gained valuable insights into the various facets of technology's impact on employee engagement.

While technology offers numerous benefits in bolstering employee engagement, this research has also highlighted the need for a nuanced approach to its implementation. The study reveals that the successful utilization of technology is contingent upon factors such as organizational culture, leadership support, and the alignment of technology with employee

needs. Organizations must be mindful of potential challenges and adapt their strategies to ensure a seamless and productive integration of technology in the workplace. Furthermore, this research has illuminated the broader implications of technology-driven employee engagement efforts. By enhancing workforce well-being and job satisfaction, organizations contribute to the G20's vision of sustainable and inclusive growth. Engaged employees are more likely to be innovative, adaptable, and resilient in the face of global challenges, bolstering the economic competitiveness of both individual organizations and the larger Indian economy on the international stage. It is essential for organizations and policymakers to recognize the critical interplay between technology, employee engagement, and sustainable growth. By prioritizing investments in technology-enabled transformation programs and fostering a human-centered approach to technological adoption, businesses can create a virtuous cycle of enhanced employee well-being and improved organizational performance.

As we move towards an increasingly interconnected and technology-driven future, the findings of this research serve as a call to action for organizations to embrace technology strategically and foster a culture of continuous learning and employee development. By doing so, Indian businesses can position themselves at the forefront of the global marketplace and contribute significantly to the collective objectives of the G20 in achieving a more sustainable, inclusive, and prosperous world.

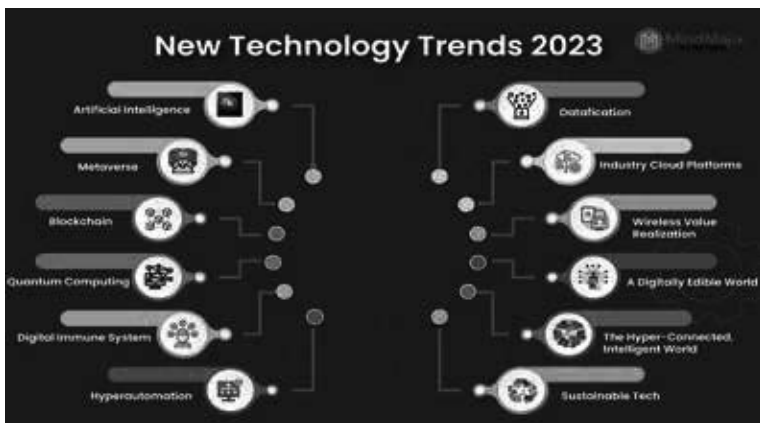
In conclusion, employee engagement is a key enabler for organizations to thrive in the globalized world and complements the ideals of "Vasudhaiva Kutumbakam" endorsed by the G20 countries. By prioritizing employee engagement, businesses can contribute to sustainable growth, foster collaboration among diverse teams, and demonstrate social responsibility, all of which align with the broader global goals pursued by the G20.

Annexure

Table No.1: Pros and Cons of Technology

Pros and Cons of Technology	
Pros	Cons
Increased communication between employees and employers	Technology can be a distraction and lead to reduced focus and productivity if not used properly
Improved access to information about the company	Technology can create a feeling of disconnection and isolation if used as the sole means of communication
Better employee training and development	Technology can create a dependence on automation, reducing critical thinking and problem-solving abilities
Employee recognition and rewards programs	Technology can create concerns over data privacy and security
Improved remote work capabilities	Technology can increase feelings of burnout and fatigue if not managed effectively
Enhanced collaboration and teamwork	Technology can create a digital divide between employees with varying levels of technological proficiency

Figure No.: New Technology Trends



Source: <https://mindmajix.com>

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11

Challenges in the Agricultural Supply Chain and Energy Transition during the G20 Presidency: Proposed Strategies for Mitigation

Shama & Prof. Syed Shahid Mazhar

Abstract

The growing global demand for food products demands resilient and reliable supply chains. Addressing challenges like climate change, food security, economic and geopolitical uncertainties, inflation, and logistics is crucial for a sustainable global supply chain. Climate change, population growth, and urbanization threaten global food security, while poor distribution poses risks. The agriculture industry is undergoing a revolution with cutting-edge technologies, while global politics and inflation threaten food safety and availability. The G20 nations must collaborate to strengthen agricultural and food supply systems in poor nations. The G20 Action Plan on Climate and Energy for Growth promotes sustainable and low greenhouse gas emission energy systems. The Bali Roadmap for Energy Transitions from now to 2030 aims to address individual situations, ensure energy accessibility, and boost clean energy funding. The energy crisis following Russia's invasion of Ukraine has motivated governments worldwide to increase renewable energy expenditure by over \$500 billion.

Keywords: Food Security, Climate Change, G20, Agricultural Supply Chain, Energy Transition

Introduction

Prime Minister Narendra Modi announced India's goals as G20 president on December 1, 2022, "Global availability of food, fertilizers, and medical products, so that geo-political

tensions do not lead to humanitarian crises would be India's top priority if the G20 worked well". He claimed that humanity's 'greatest obstacles', which includes climate change, too, could be overcome by working together.

The G20's cooperation on these two fronts is crucial to life on Earth. One, the G20 must boost the agricultural and food supply systems of impoverished countries to better resist climate change and other shocks. The G20 must remember that agriculture sustains most of the world's population to reach the second aim. Second, to keep global warming at 1.5 degrees Celsius above pre-industrial levels, the G20 must speed the energy transition immediately. India has achieved significant progress in each of these areas in recent years, and its lessons may help G20 collaboration.

The need for farmers and markets to establish robust and dependable supply chains is greater than ever before in light of the rising worldwide demand for food. Climate change, food security, economic and geopolitical risks, inflation, and logistics are only few of the issues that must be resolved to build a sustainable and efficient supply chain across the globe. First, it is necessary to go through the supply chain's problems, and then address how the G20 can help fix them. (Miranda, 2023) The problems with the food or agricultural supply chain are many.

Loss of Biodiversity due to Climate Change

Climate change threatens world food production. Climate change, including rising temperatures and more droughts, floods, and storms, affect the worldwide business chain. For instance, California's strawberry crop was impacted badly by this year's storms. And South American fires destroyed 53,000 hectares of cropland in Chile, while floods and severe rains destroyed 33,000 in Peru.

Rapid deforestation and soil erosion threaten food production. Soil erosion and soil degradation cost the globe \$40 billion annually. Therefore, global warming-resistant agricultural approaches are essential. This includes conservation farming, agroforestry, precision agriculture, organic production, and approaches that emphasize society and the environment.

These activities need sustainable resource management to minimize environmental impacts and maintain the ecosystem.

Rising hunger threatens Global Food Supplies

Global food security is being put at risk as a result of rising population and rising urbanization. There will be 9.7 billion people on Earth by 2050, causing food consumption to increase by 50 percent. Experts agree that a 20-30% increase in agricultural production is necessary to meet demand.

A food shortage may also be caused by sloppy distribution. In 2021, the FAO estimated that 811 million people will be hungry. This highlights the need of direct and effective supply routes in the fight against food waste and for global food security.

The Need to Use Cutting-Edge Technology

The agriculture business is experiencing a revolutionary change thanks to the widespread use of cutting-edge technologies including artificial intelligence (AI), data analysis (DA), real-time data collecting (RTDC), and automation of processes (AoP). The increased digitization made possible by these new technology makes for a more streamlined supply chain.

In addition, consumers and financiers alike will value businesses that provide cutting-edge technical solutions. Research and Markets predicts that the worldwide market for agricultural technologies will expand at a CAGR of 14.9% between 2021 and 2028.

Increased interest in Wholesome Fare

The increased desire for healthier, safer, and more sustainably produced foods has led to an increase in the development of organic, natural, and additive-free products. The growing interest in vegetarian and vegan diets may also boost demand for vegetables and fruits.

In response to these demands, supply networks are changing to become more environmental friendly and sustainable. This calls for improvements to the current infrastructure for processing, transporting, and distributing food crops. Further, a more efficient network will lead to less waste, less overexploitation of resources, and less pollution.

Uncertainties in Global Politics

Financial and political instability threatens the global supply chain. Food safety and availability are threatened globally.

Restrictive trade laws, transportation delays, and conflicts may devastate food-importing nations, endangering local and international investment. For instance, Russia and Ukraine's conflict has affected food distribution worldwide. Further, reciprocal economic sanctions have hindered trade between the countries.

These restrictions have reduced Ecuador's banana exports to Russia and Ukraine since February 2022. Ecuador relies on banana exports, but since losing Eastern European consumers, it has struggled to locate new ones.

Price increases and rising Operating Costs due to Inflation

Inflation affects the supply chain. Fertilizers and pesticides cost more. Transportation and energy costs increase farmers' production costs, which raises retail prices.

Fertilizer prices rose 20% in the first half of 2022, after rising by 80% in 2021. These big price hikes on crucial goods imperils agriculture. Land and marine transportation expenses have increased in recent years. US shipping expenses rose 50% in 2020.

Disruptions caused by Logistical Issues

Fresh food is dangerous; therefore, the supply chain faces several challenges. Perishable goods and complex taxes and customs might hinder a company's worldwide trade.

Shipping has been impacted due to port congestion, and this problem is here to stay. Higher energy costs and geopolitical challenges may potentially impact operations, even if some shipping lines have returned to full transit capacity. Stores in the United Kingdom reduced their stock of perishables such as tomatoes, cucumbers, lettuce, and peppers due to a worldwide shortage.

Addressing the Challenges

It is high time to address these challenges, and to that end, India's presidency of the G20 is attempting to address these

concerns with mutual consent. On these two fronts, which are crucial to the survival of life on Earth, it is hard to emphasize the significance of the G20 countries working together. The Group of Twenty (G20) must step up its efforts to bolster the agricultural and food supply systems of less developed countries so that these countries are better able to resist the impacts of climate change and other stresses. The second objective can only be accomplished if the G20 maintains awareness of the fact that agriculture is always vital to the survival of a significant proportion of the world's population. Second, in order to achieve the aim of limiting the increase in global temperature to less than 1.5 degrees Celsius over pre-industrial levels, the G20 countries need to take urgent action to speed up energy transition. Over the last several years, India has achieved significant progress in each of these areas, and the lessons it has learned in each of these areas may serve as crucial benchmarks for G20 collaboration. (PMO., 2022).

Environmentally Friendly food production methods

Using environmentally friendly food production methods, it will be possible to eliminate hunger and malnutrition on a global scale. By the year 2030, the Sustainable Development Goals (SDGs) planned to put an end to hunger, ensure that everyone has access to sufficient food, and improve nutrition. Despite this, progress toward Goal 2 has slowed significantly during the last several years. The pandemic caused by COVID-19 has resulted in a lack of food on a global scale, causing acute food insecurity for millions of people. The war between Russia and Ukraine has further aggravated the problem, which resulted in an increase of 18% in the Food Price Index maintained by the Food and Agricultural Organization (FAO) during the months of January and March 2022. (FAO, 2015) Additionally, the fighting has made the vulnerability to global food systems that is presented by rising temperatures even more severe. (AGM, 2022).

Adopting Nutrition and Food Security (FSN) Framework

In 2014, the G20 nations took a more courageous step by adopting the Nutrition and Food Security (FSN) Framework, which outlines three Prior Objectives. These Prior Objectives include increasing investment in agricultural frameworks,

increasing revenue and the quality of work in food frameworks, and enhancing productivity in a sustainable manner to increase food supply. The framework is centered on enhancing the availability and accessibility to sustainable finance in both the food and agriculture industries, with the goal of allowing small-scale firms and family farmers to participate. (AGM, 2022).

Matera Declaration

In 2021, the foreign ministers and development ministers of the G20 countries all signed the Matera Declaration, which acknowledged the significance of lowering poverty levels and maintaining food security in the context of combating global hunger. According to the World Trade Organization's (WTO) rules and duties, the declaration places an emphasis on the significance of a food and agricultural market that is open, transparent, and efficient (Declaration, 2021). This market should also provide nations the opportunity to exercise some control over their own regulatory frameworks. The leaders of the G20 have stressed the need of maintaining an adequate supply, which should be based on indigenous food sources, as well as expanding production of food and fertilizer products in order to assist those who are most susceptible to difficulties associated with food trade. (WTO, 1994). Due to the fact that the Agreement on Agriculture (AoA) monitors essential policy tools pertinent to this industry, the World Trade Organization (WTO) plays an essential part in ensuring that agricultural commerce and production are open and predictable (DWG, Development Working Group, 2014). However, the AoA also places an emphasis on non-trade problems, such as the safety of food supplies, the viability of rural livelihood, and the advancement of rural areas, and these issues must be acknowledged. On behalf of developing nations that are economically reliant on agriculture, India has been a prominent advocate for the efficient execution of non-trade issues such as these. The G20 Leaders Declaration expresses support for the gathering's advocacy of "open, transparent, inclusive, predictable, and non-discriminatory, rules-based agricultural trade based on WTO rules." (Declaration, 2021)

Bali Declaration

India and Indonesia, along with several other developing nations, have been attempting to impose revisions in key aspects of the AoA in order to assure more fairness in the markets for agricultural exports. It is imperative that the aim of “sustained supply, in part based on local food sources, as well as diversified production of food” that was established by the G20 leaders in Bali be achieved in order to protect the most vulnerable individuals from interruptions in the food commerce supply chain (G20, Bali Leaders’ Declaration, 2022).

The Indian G20 Presidency could establish an operationally practicable roadmap for the realization of climate-resilient agriculture. This roadmap would acknowledge the significance of family and small-scale farmers in the process of creating sustainable food production systems. Because of this, it will be easier for the Indian Presidency to build upon many significant choices that were taken during the two presidencies that came before it. (Sharma, 1978)

The G20 Action Plan on Climate and Energy for Growth, which was established in 2017 when Germany held the presidency of the G20, serves as the framework for the continuing talks that are taking place among the G20 countries to minimize their dependency on fossil fuels. The Action Plan places a strong emphasis on a “transition to sustainable and low greenhouse gas emission energy system that is technically feasible and economically viable.” (Group of Twenty, Hamburg Plan for Climate and Energy Action, 2017) Since 2018, members of the G20 Energy Transitions Working Group (ETWG) have been organizing meetings on a regular basis in order to advance the broad implementation of cleaner energy systems (Declaration, 2021). The Indonesian G20 Presidency has made the transition to renewable energy a top priority on a global scale, putting an emphasis on the need to swiftly transform and diversify energy systems, increase energy security and resilience, and achieve energy transitions that are clean, sustainable, just, cheap, and inclusive. The goal of the Bali Roadmap for Energy changes from Now to 2030 (the “Bali Roadmap”) is to hasten these changes by increasing financing for clean energy technologies, expanding the use of smart and clean energy technology, and ensuring

that energy is accessible to everyone. In addition, the road plan intends to address the problem of the technical imbalance that exists between developed and developing countries by working towards the goal of making energy more accessible and cheaper to low-income people. (Group of Twenty (G20) Leaders' Declaration, Bali, 2022)

The energy crisis that followed Russia's invasion of Ukraine has driven the demand for energy transitions, and as a result, governments all over the globe have increased the amount of money they spend in renewable energy sources by more than \$500 billion. The International Energy Agency (IEA) has stressed the need for international help in generating the required investment in renewable energy. This requirement has been brought to the attention of the world community.

Conclusion

India is one of the developing countries that has made a commitment to transitioning to the generation of electricity using renewable energy in order to lessen its carbon footprint. To combat food insecurity and vulnerability, the Indian Presidency must promote environmental friendly food production systems, with a particular emphasis on family and small-scale farming communities. (IEA, 2022).

The countries that make up the G20 have concluded that it is critical to aid farmers with small holdings, and place emphasis on food production methods that are robust to effect climate change. The Indonesian Presidency has brought the group's debate to the level of taking meaningful action, connecting it with the Glasgow Climate Pact and India's experience with phasing in renewable energy sources. (UN Framework Convention on Climate Change, Simon Stiell, 2023). The energy transitions agenda has the potential to achieve great headway during India's tenure as the rotating chair of the United Nations Security Council, provided that actionable efforts are made to amass the required financial resources and technology without regard to the complexities of intellectual property protection.

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12

Role of G20 in Strengthening the Supply Chain in Post Pandemic Era

Sundus Chishti & Prof. Salma Ahmed

Abstract

In the era of inter-network competition, business management has shifted from traditional brand and store-level competition to a focus on collaboration and competition among suppliers, brands, and stores within supply chains. This new competitive environment emphasizes the importance of supply chain management and cooperation to achieve success in the modern business world. The outbreak of pandemic "Covid 19" lead to disruption in the supply chain. The G20 forum deals with various critical issues related to global economy in order to strengthen it. India's G20 presidency offers a golden opportunity for the nation to play a pivotal role in shaping the global policy agenda on critical issues, particularly in the realm of supply chain resilience and management. As the world continues to grapple with the aftermath of the COVID-19 pandemic and the challenges posed by disruptions to supply chains, India's leadership can make a substantial difference. By prioritizing supply chain resilience and advocating for collaborative efforts, India can foster international cooperation and dialogue among G20 member countries. This will lead to the development of secure, reliable, and sustainable supply chain networks that can withstand unexpected disruptions and crisis.

Keywords: Supply Chain Resilience, G20, Covid 19, Collaboration, Technology

Introduction

“One of the most significant paradigm-shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains.” In the era of inter-network competition, business management has shifted from traditional brand and store-level competition to a focus on collaboration and competition among suppliers, brands, and stores within supply chains. Success now depends on a company’s ability to effectively integrate its complex network of business relationships. This new competitive environment emphasizes the importance of supply chain management and cooperation to achieve success in the modern business world (Drucker, 1968; Lambert & Cooper, 2000). Ensuring the smooth flow of goods and services from suppliers to customers, while optimizing various factors like timing, location, cost, quantity, and quality, is the primary goal of supply chain management. A robust supply chain network can support international trade and promote economic integration on a global scale. (Warp & Weft International, 2021). Supply chains play a crucial role in driving the economic as well as innovative performance of a country (Rosenberg, 1963). Thus, supply chains play a major role in the overall growth of a country. Supply chain disruptions indeed refer to unforeseen events or challenges that disrupt the smooth flow of goods, services, or information within a supply chain. These disruptions can originate from various sources, such as natural disasters, political conflicts, labour strikes, transportation issues, supplier problems, or even global pandemics like the COVID-19 outbreak. The consequences of these disruptions can be substantial, affecting not only individual businesses but also entire industries and economies. Managing and mitigating supply chain disruptions is crucial for businesses to maintain continuity, minimize losses, and enhance overall supply chain resilience. Research programs have highlighted that modern supply chains face higher risks than what their managers typically acknowledge. These risks encompass a wide range of factors, such as natural disasters, terrorism, cyber-attacks, credit crunch, financial crises, and government policies. The potential consequences of these risks include significant losses in productivity, revenue, competitive advantage, profitability, and overall business performance. It is crucial for supply

chain managers to be aware of these risks and implement robust risk management strategies to safeguard their supply chains and ensure business continuity. (Mensah & Merkuryev, 2014). “The G20 or group of 20 is an intergovernmental forum comprising of 19 countries and the European Union (EU). It works to address major issues related to the global economy, such as international financial stability, climate change mitigation and sustainable development” (Ramachandran, 2015). G20 plays a major role in formulating policies that support overall development of the nations. This paper discusses the role of G20 in strengthening the global supply chains.

G20: Origin and background

“The **G20 or Group of 20** is an intergovernmental forum comprising 19 countries and the European Union (EU). It works to address major issues related to the global economy, such as international financial stability, climate change mitigation and sustainable development” (Ramachandran, 2015). The G20 is a forum consisting of the twenty largest economies in the world, representing both advanced and emerging nations. It serves as a platform for these countries to engage in high-level discussions and cooperation on various global economic issues. It accounts for more than 80% of world GDP, 75% of global trade and 60% of the population of the planet. The members of G20 include “Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom and the United States, plus the European Union” (World Economic Forum, 2022).

“World Economic Crisis” led to the foundation of the G20 in 1999. Since then, the G20 has been convening at least once a year for summits that involve the participation of each member’s head of government or state, finance minister, or foreign minister, along with other high-ranking officials (Global solution, 2023). The G20 Summits are held annually and provide a platform for the heads of state or government from these countries to address key global challenges and discuss important international issues. The topics covered during these meetings are broad and can include matters related to the global economy, trade, finance, climate change, energy, poverty, and other pressing issues that

impact the global community. Table 1 (Appendix) shows the list of G20 summits held.

Role of G20 in Strengthening Supply Chains

India took the presidency of G20 from December 2022 (Jash & Jain, 2022). The theme for India's G20 presidency is "Vasudhaiva Kutumbak" meaning "One earth – One family – One Future". India aims to address various challenges that the world is facing at the G20 summit (Konishi, 2023). Being the president of G20, India is in the position to formulate and shape various policies to solve the challenges the world is facing. One of the key issues that India seeks to address is "building secure global supply chains" (Jash & Jain, 2022). Covid 19 pandemic had a profound impact on supply chains worldwide. It exposed the vulnerabilities and limitations of complex interconnected global supply chains. PM Narendra Modi stated during his address that "Global supply chain are in ruins. There is a crisis of essentials and essential goods all over the world. The challenge for the poor citizens of every country is severe" (Rana, 2022). India's focus on creating secure and robust global supply chains as part of its G20 presidency is indeed timely and critical in the post pandemic era. Given the challenges and disruptions experienced during covid 19, there is a growing recognition of the need to strengthen the supply chain to ensure resilience, sustainability and faster recovery for the economies. As the G20 president, India can play a crucial role in shaping the policy agenda and facilitating discussions among member nations on various aspects related to supply chain resilience (Das, 2022). India's G20 presidency provides a significant opportunity for the country to influence the policy agenda for developing resilient and secure global supply chains in the post pandemic world. As the world seeks to build back better and recover from the impacts of Covid 19, supply chain resilience has emerged as a critical focus area for governments and businesses alike. India can use its leadership to champion initiatives and policies that address the complexities and challenges of supply chains in the new world order (Jash & Jain, 2022). According to a statement from India's Ministry of External Affairs, Prime Minister *Narendra Modi* said, "Global supply chains are in ruins. There is a crisis of essentials and essential goods worldwide,

and the global challenge for underprivileged citizens is more severe.” (Das, 2022). India’s approach to developing a strong and resilient supply-chain strategy for the post-Covid era through global collaborations and diplomatic efforts is commendable. With the opportunity to host more than 200 G20 meetings over the next 12 months, India has a significant platform to engage with other nations and collectively address the challenges posed by disrupted supply chains and the digital divide (Das, 2022). India has various opportunities to strengthen the global supply chains which are discussed below:

Collaboration among Various Parties

India’s role in developing supply chain diplomacy initiatives is crucial, especially given the surge in economic protectionism in response to the pandemic. By promoting a culture of cooperation and facilitating energy diplomacy, India can help foster collaboration among governments and businesses to create efficient, robust, and adaptive supply chains. The success of the ISA (Refer to Box 1) is a testament to India’s capability as a facilitator of such initiatives (Das, 2022). Collaboration between states and businesses is essential to understand the factors contributing to successful supply chains and identify potential vulnerabilities. By working together, they can develop regulations that provide businesses with certainty and a conducive environment for investments. Public-private partnerships can foster innovation and enable joint efforts to enhance supply chain robustness (Jash & Jain, 2022). India, now the fifth-largest economy, sees an opportunity to integrate itself into high-end and resilient supply chains through collaborations with groups like QUAD, SCRI, and IPEF (Refer to Box 1). The Production-Linked Incentive (PLI) scheme launched under Atmanirbhar Bharat supports domestic production and technology localization, boosting supply chain resilience. However, India faces challenges in attracting businesses to relocate their supply chains completely. Japanese firms prefer a phased approach, importing inputs from other nations first, which India’s policymakers need to consider. The PLI scheme and infrastructure development efforts like Bharatmala and Sagarmala are steps in the right direction to enhance supply chain resilience. India should align its efforts with the emerging

economic architecture in the Indo-Pacific, collaborating with QUAD members, Taiwan, South Korea, ASEAN (Refer to Box 1) countries, and the European Union. Such partnerships will enhance India's geoeconomic relevance and geopolitical significance. Therefore, as India assumes the G20 presidency in 2023, it has the opportunity to lead the post-pandemic economic recovery and establish itself as a sourcing, manufacturing, and assembling hub in diversified and sustainable global value chains by means of collaboration with various parties (Tapan, 2023).

Focus on Regional Supply Networks

The shift towards regional cluster-based supply networks like Integrated Public Expenditure Facility can indeed help businesses mitigate risks and enhance supply chain resilience. The recent supply chain disruptions during the pandemic have highlighted the importance of diversifying supply sources and reducing dependency on a single state or region. By working with smaller groups of suppliers and traders within a region, businesses can potentially have more control over their supply chains and respond more effectively to disruptions (Das, 2022)

Exchange of Knowledge and Resources

By exchanging knowledge and resources across governments, jurisdictions, and industries, countries can collectively build energy-efficient supply chains that contribute to sustainable development and environmental goals (Das, 2022). India's policy initiatives have a significant opportunity to address these concerns and explore potential solutions to enhance supply chain resilience and cybersecurity. Collaborating with organizations like the IPEF and SCRI, which includes Australia, Japan, and India, can be instrumental in supply chain diversification. By forging partnerships with like-minded countries, India can reduce its dependency on a single state or region, thereby mitigating risks associated with supply chain disruptions (Das, 2022).

Empowering MSMEs

By empowering small and medium businesses and democratizing value chains, India can create a more inclusive

and equitable supply chain network. This approach benefits not only urban areas but also remote regions, leading to more balanced economic development (Das, 2022).

Adoption of Technology

Safety and security are paramount considerations for enterprises when it comes to their supply chains. Focusing on cybersecurity requirements across trusted channels is crucial to safeguarding supply chain data and operations. Cyber threats can severely impact supply chains, and measures to strengthen cybersecurity infrastructure and protocols are essential. Adoption of modern technologies can play a pivotal role in enhancing supply chain security, transparency, and efficiency. Leveraging technologies like blockchain, Internet of Things, and Artificial Intelligence can improve traceability, reduce counterfeit products, and enhance overall supply chain management (Das, 2022). The focus on future-proofing supply chains and ensuring agility is vital to tackle disruptions effectively. Global efforts to digitize supply chains and adopt interoperable standards can improve communication and coordination among supply chain partners. This would allow for better adaptability to changing circumstances and enhance the resilience of supply chains across borders (Jash & Jain, 2022).

Integration of Agricultural Sector in Global Supply Chain

Integrating Indian agriculture into the global value chain can create opportunities for farmers and smaller businesses to access international markets. By participating in global trade, they can benefit from increased demand for their products, leading to higher incomes and improved livelihoods. As part of the global value chain, India can contribute to addressing food shortages in regions that face challenges in food production. By exporting agricultural products, India can help meet the dietary needs of people in different parts of the world. Integrating with the global value chain can provide a pathway for marginalized communities and regions to improve their livelihoods and reduce disparities in access to resources and opportunities. Being part of the global value chain allows for knowledge exchange, where best practices in agriculture, technology, and sustainability can be shared among nations, leading to improved agricultural practices worldwide (Das, 2022).

Financial Initiative

India, as the G20 president, must work towards ensuring access to trade finance for low- and middle-income countries, which have faced challenges due to deteriorating sovereign ratings and reduced credit lines from international banks. Encouraging multilateral development banks to devise innovative financing methods for trade operations will be essential to correct supply chain disruptions. India aims to increase global value chain integration to revive the world economy post-pandemic. It plans to develop geospatial mapping of global value chains, restructure networks, and manage supply chains to build resilience. Additionally, India's role in reviving multilateralism and introducing measures to eradicate non-tariff barriers will be crucial (Lalwani, 2023).

Focus on Clean Energy

Prioritizing sectors like technology and energy in India's strategy is a wise move, considering their critical importance for both domestic and global interests. By focusing on energy transitions and renewable energy targets, India can not only drive clean transitions domestically but also play a significant role in shaping the global clean energy agenda. Becoming a key manufacturer and supplier of alternative fuels, such as hydrogen, can open up new economic opportunities for India and strengthen its position in the global energy market. This can also support efforts to decarbonize energy-intensive industries. Making supply chains energy-efficient and increasing the use of renewables in their operations can significantly contribute to reducing carbon footprints. As India encourages energy efficiency in supply chains, it can inspire other countries to follow suit and adopt greener practices by facilitating the sharing of information and capacities between states, India can ensure that various jurisdictions have the ability to develop energy-efficient supply chains. This can lead to the dissemination of best practices and innovation in energy management across borders (Jash & Jain, 2022).

Strengthening Health Supply Chains

The call for a strong and efficient global health architecture is of utmost importance, as demonstrated by the experiences during the COVID-19 pandemic. The need for a united global response involving scientists, governments, political leaders, the private sector, and regulators is crucial to address health emergencies effectively. Building on the success of initiatives like the “Access to COVID-19 Tools Accelerator”, there is an opportunity to create a permanent institutional platform that can respond swiftly and effectively to future health emergencies. India’s G20 presidency presents an opportunity to drive discussions and policy initiatives that strengthen global health resilience and preparedness. By fostering a culture of collaboration, inclusivity, and equity, the world can better navigate future health emergencies and ensure that life-saving interventions reach all those in need, regardless of their geographical location or economic status (World Economic Forum, 2023).

Trade Facilitation

India can advocate for measures that facilitate the smooth flow of goods and services across borders. Simplified customs procedures, efficient logistics, and streamlined regulatory processes can reduce trade barriers and enhance the agility of supply chains. By promoting trade facilitation initiatives, G-20 countries can improve the efficiency and resilience of their supply chains. Strengthening global regulatory cooperation is essential for harmonizing standards, reducing redundancy, and enhancing predictability in international trade. India can encourage G-20 member countries to collaborate on common regulatory frameworks and share best practices to ensure consistency and transparency in supply chain operations. India can advocate for the adoption of resilience planning by businesses and governments. This involves diversifying suppliers and markets, creating redundancies in critical supply chain components, and developing contingency plans to address potential disruptions effectively (Maryam & Gopalakrishnan, 2022).

Conclusion

India's G20 presidency offers a golden opportunity for the nation to play a pivotal role in shaping the global policy agenda on critical issues, particularly in the realm of supply chain resilience and management. As the world continues to grapple with the aftermath of the COVID-19 pandemic and the challenges posed by disruptions to supply chains, India's leadership can make a substantial difference. By prioritizing supply chain resilience and advocating for collaborative efforts, India can foster international cooperation and dialogue among G20 member countries. This will lead to the development of secure, reliable, and sustainable supply chain networks that can withstand unexpected disruptions and crises. India can take the lead in promoting trade facilitation, global regulatory cooperation, and digital transformation in supply chain management, empowering businesses of all sizes to thrive in the interconnected global economy. Furthermore, India's focus on inclusivity, sustainability, and social responsibility in supply chain practices will ensure that the benefits of resilient supply chains extend to all stakeholders, including small and medium enterprises. Through its G20 presidency, India has the platform to drive discussions and build consensus on the importance of supply chain resilience, fostering a spirit of collaboration and cooperation among nations. By working together to address supply chain challenges, the world can build a safer, more reliable, and adaptive global supply chain ecosystem that supports economic growth and development. In this era of interconnectedness and uncertainty, India's leadership in supply chain resilience can pave the way for a brighter and more resilient future, benefiting not only G20 member countries but also the entire global community. By embracing this opportunity, India can position itself as a key driver of positive change in the evolving economic order, leaving a lasting impact on the world stage.

Annexure**Box-1**

- ISA (International Solar Alliance): “It is a global initiative aimed at promoting the adoption of solar energy and reducing the dependence on fossil fuels. It was launched in November 2015 at the United Nations Climate Change Conference”
- QUAD (Quadrilateral Security Dialogue): “It is a strategic forum that brings together four major democracies in the Indo-Pacific region: the United States, Japan, India, and Australia. The primary purpose of the QUAD is to promote cooperation and address regional and global challenges, with a focus on promoting a free, open, inclusive, and rules-based Indo-Pacific.”
- IPEF (Indo Pacific Economic Framework): “It Is an economic initiative launched by U.S. President Joe Biden on May 23, 2022. Biden described the initiative as writing the new rules for the 21st century economy, stating that the agreement would make the participant’s economies grow faster and fairer”.
- SCRI (Supply Chain Resilience Initiative): “It is a trade initiative launched by India, Japan, and Australia. The initiative aimed to create a more resilient supply chain network in the Indo-Pacific region, especially in the wake of disruptions caused by the COVID-19 pandemic.”
- ASEAN (Association of Southeast Asian Nations): “It is a regional intergovernmental organization that promotes political and economic cooperation among its ten member countries in Southeast Asia.”

Table-1: Table 1: G 20 summits

S. No.	Date	Host country
1	14-15 November 2008	United States
2	14-15 November 2008	United Kingdom
3	24-25 September 2009	United States
4	26-27 June 2010	Canada
5	11-12 November 2010	South Korea

6	3–4 November 2011	France
7	18–19 June 2012	Mexico
8	5–6 September 2013	Russia
9	15–16 November 2014	Australia
10	15–16 November 2015	Turkey
11	4–5 September 2016	China
12	7–8 July 2017	Germany
13	30 November – 1 December 2018	Argentina
14	28–29 June 2019	Japan
15	21–22 November 2020	Saudi Arabia
16	30–31 October 2021	Italy
17	15–16 November 2022	Indonesia
18	9–10 September 2023	India

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13

People's Perception of Trustworthiness Towards G20 Nations

Ambreen Shakir

Abstract

Trust is needed for human interactions whether at personal, professional, government, domestic, or international level. In international relationships, trust plays a pivotal role in building and maintaining strong relationships. This paper is a review of the literature available online. The aim of this paper is to show people's perception of trustworthiness towards different G20 countries and why it is important to have trust among the trading nations.

The study found that there is level of trust present among the people of G20 nations. People of different G20 countries have different perceptions of trustworthiness towards other G20 nations. For some there is a positive perception, and for some there is negative perception.

Keywords: *Trust, Trustworthiness, G20 nations, Perception of Trustworthiness, Relationship*

Introduction

Trust is needed everywhere and, in every relationship, whether personal, professional, or political. In simple words, trust is the belief of one person on another that the latter will not take advantage of former's vulnerabilities. When someone trusts other person, he/she puts faith in that person and believes that person will always do good. Organizations are also agreeing with the fact that it is effective to create a culture of trust within the organisation instead of providing random perks to their employees. Employees in high trust organisations are more

energetic, produce more, maintain better intra-organisational relationship, and are more loyal to their employers, than employees who are working at low trust organisations. They are less stressed and happier with their lives. These factors contribute in better and stronger performance (Paul J Zak- Neuroscience of Trust 2017). Trust also plays a pivotal role in building and maintaining inter-organisational and intra-organisational relationships. Many social and economics scholars found strong interest in the concept of trust to characterise inter-organisational relation.

Trust helps in building and maintaining strong, mutually beneficial relationship built on the premises of understanding and loyalty. Thus, trust is needed to foster business and diplomatic relations. When there is trust between the parties, there is a better chance of reaching a negotiable agreement. According to Dekker et al. (2007), trust effects on both the levels of trade and the levels of "Foreign Direct Investment (FDI)". The study revealed that with every 1% increase in trust between the people of two countries, exports between them increases by 0.6% and foreign direct investment by 3%, other things being equal.

G20, formed in 1999, is a group of 20 countries comprising the nations like Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom (UK), the United States (US) and the European Union (EU). Every year a G20 summit is held to discuss economic and financial issues and to make policies on the other issues of mutual interest. G20 does not have a headquarter, office, or staff; its leadership keeps rotating among its members annually. Previous summits of G20 have dealt with issues like "covid 19 pandemic", "2008 financial crisis", the "Iranian nuclear program", and the "Syrian civil war".

When a country prepares itself to build its future in its relations with other countries, it has to rely on how much its government, institutions, companies, and people are trusted all over the world. This means it is important to know the perception of trustworthiness of people of different countries towards your own country. In international relations, "openness", "contribution to development in poorer countries", "a free justice system",

“world-leading arts and culture”, “working constructively with other governments”, “treating people fairly” etc are some of the qualities which help a country to gain trust of the people of other nations. Trust is earned gradually over long period of time but can be lost very easily. It is indeed a powerful tool but should be carefully handled. This paper is a review which shows people's perception of trustworthiness towards different countries and why it is important to have trust among the trading nations.

Trust and Trustworthiness

Different authors defined the concept of trust in different ways. Two parties are involved in a trust relation- a trustor and a trustee. The one who trusts is the trustor, one who takes the risk of being in a vulnerable situation. The one who is being trusted is a trustee. This person can take advantage of the trustor's vulnerability.

Bachmann's (2001) definition stresses on the importance of role of institutional based trust in a business system. According to Bachmann's (2001), “trust in complex business environment depends upon the institutional framework in which the exchange relationship is taking place”. Bachmann's definition does not give much emphasis on the personal trust, rather emphasis was laid upon the type and kind of institutions on which the relationship is embedded. In 2002, Medlin gave the importance to events that already happened between the trustor and the trustee. According to him, it is the nature of past events which depicts the level of trust between two parties. Medlin (2002) sees trust more as a social concept than a business concept. However, Svensson (2004) sees “trust as an important factor in business relationship” because business is managed by the people. Halliday (2003) described trust as a theme or condition arises due to uncertainty. Olmedilla et al (2005) gave more detailed and understandable definition of trust, stating that phenomenon of trust happens between two parties related to a specified service for a specified period of time. In terms of Olmedilla et al, one party (trustor) needs to have belief or faith that the other party (trustee) will behave in an expected trustworthy way for a fixed period of time. Just like Bachmann (2001), Calnan and Rowe (2006) also highlighted the importance

of set of institutional laws, rules and regulations. According to Chen and Barnes (2007), "trust is perceived usefulness, perceived security, perceived privacy, perceived good reputation, and willingness to customize are the important antecedents to online initial trust". Wasti and Wasti (2008) gave a broad concept of trust which says "technology trust is an individual's willingness to be vulnerable to the technology based on expectations of predictability, reliability, utility and influenced by an individual's predisposition to trust technology". This definition talks about willingness of the individual, vulnerabilities involved, and the role of predictability, reliability, and utility in trust. Finally, definition given by Laeequddin et al (2009) is a better version of trust as it talks about the risk involved in the relationship which was missing in all the definitions discussed above. According to Laeequddin et al (2009), "trust is a threshold level of a supply chain member's (trustor's) risk bearing capacity related to trustee. Beyond the trustor's risk bearing capacity, the subject of trust turns into risk management rather than a matter of trust". Tatham and Kovacs (2010) describe "trust as a non-rational choice of a person faced with an uncertain event in which the expected loss is greater than the expected gain or a rational choice based upon optimistic expectations or confidence about the outcome of an uncertain event; given personal vulnerability and the lack of control over the action of others". This definition cancels out the possibility of calculative trust because it considers trust either as a non-rational decision or a rational decision based on positive expectations. Vollan (2011) also talks about positive aspect of trust.

Concept of trust is related to trustor, while the concept of trustworthiness is related to trustee. Trustworthiness can be assessed by gaining or losing something by lying. If trustee can earn anything by lying, he/she will be considered as less trustworthy, and vice versa. It is important for a trustor to consider the degree of trustworthiness in the trustee to avoid risk in the best possible way (Ring and Van de Ven 1992). Hovland, Janis, and Kelly (1953) suggested that there are two factors that affect the credibility of a person- "expertise and trustworthiness". Trustworthiness can be considered as the motivation to lie. Factors like ability, benevolence, and integrity should be considered before deciding whether the parties are

trustworthy or not. Ability consists of skills, competencies, and characteristics of a person (trustee) which enable him/her to influence the other person (trustor) within some specific domain. When a trustor has faith on the trustee that the trustee will do good to the trustor without expecting any future gain from him, it is benevolence. Benevolence shows trustee's specific attachment towards the trustor. Trustor define some set of rules and principles which he/she considered as acceptable, and trustee has to follow them, and if the set of principles is not accepted by the trustor, then the trustee does not seem to have integrity (Mayer, Davis, Schoorman; 1995).

In international context, trust can be considered as the willingness to take risk on other's behaviour (Hoffman, 2002). "Trust is firstly a belief about the probability that the other state will co-operate – where the considerations are no different from those a rational actor applies in deciding whether to place a bet (Coleman, 1990), and secondly a belief about the likely *preferences* of that country" (Kydd, 2010). Social perspective defines trust as the confidence that the other country will not do anything wrong and will always do whatever is right (Hoffman, 2002). This means that it is mandatory for a country to fulfil the responsibility of being trusted. Trustworthy countries are considered as 'upright' and 'honourable' (Hoffman 2002). Trust is also an ongoing and two-way process (Booth and Wheeler, 2008). Trust between countries is highly dependent on the interactions and personal connections between their respective leaders. This truth neglects the connection among the infinite number of general public's connections and networks. People to people connection is important to build a sustainable relationship between nations over a long period of time.

Importance of Trust

When people work together, they have to depend on each other to accomplish their personal goals in particular and organisational goals in general. This interdependency is unavoidable and hence the risk involved with it too. Several theories have been designed to suggest mechanism in order to regulate and minimise the risk involved in working relationships. "In order to minimise risk and avoid the consequences of broken trust many firms utilise control mechanisms and contracts in order

to change their structures, decision making processes, reward system and internal policies (Jensen & Meckling 1976, Meyer 1983, Sitkin & Bies 1994, Williamson 1975)". Contracts are impersonal substitute of trust (Sitkin & Roth 1993) which may prove useful in some cases but ineffective in other cases (Argyris 1994, Donaldson & Davis 1991, Granovetter 1985, Sitkin & Roth 1993).

When an organisation has workforce from all around the world, people with different backgrounds deal closely with each other. "This diverse workforce is not able to rely on interpersonal similarities and common background and experience to contribute to mutual attraction and enhance the willingness to work together (Berscheid & Walster 1978, Newcomb 1956)". From this point of view, developing mutual trust among the employees can be proved as one mechanism that may enable them to work together effectively.

Another reason due to which need of trust has arisen is the emergence of self-directed team and reliance on empowered workers (Golembiewski & McConkie 1975; Larson & Lafasto 1989). Self-directed team and empowered workers emerge due to increase in interactions and removal of control mechanisms. Lawler (1992) cited the implementation of work team and participative management style in the workplace.

Need of Trust Between Trading Nations

Advantages of trust among the countries trading with each other cannot be overlooked in any aspect. It is because of trust that long term relationships and strategic alliances are formed in international relations. Globally when the organizations or governments of different countries trust each other, this leads to mutual cooperation and harmony among their people. According to Francis Fukuyama (1995) "prosperous countries tend to be those where business relations between people can be conducted informally and flexibly on the basis of trust" (Trust-the social virtues and the creation of prosperity, 1995). According to Berggren, Elinder and Jordahl (2007), trust and economic growth are positively related. Zak and Knack (2001) concluded that for every 15% increase in trust, there is 1% rise in economic growth. Dekker et al. (2007) stated that with every 1%

increase in trust between the people of two countries, exports between them increases by 0.6% and foreign direct investment by 3%. The logic behind this is that presence of high trust in a relation decreases its transaction costs, and low transaction cost leads increase in production, investment, and trade which in turn accelerates economic growth (Dyer and Chu, 2003). Trust between different nations can be cultivated by believing and practicing certain values like “openness, contribution to international development and co-operation”. These are the strong drivers of people-to-people trust. Instead of telling the world what a country believes in, their culture relations can show that in practice (Alice Campbell-Cree and Mona Lotten, 2018).

Presence of trust also lowers the cost of doing a business. Time for negotiating the terms and conditions between the parties is lowered down when both the parties have faith in one another. When parties trust each other the transactional cost, financial or political, are reduced and the added requirements of ‘insurance policies’ eliminated.

People's Perception of Trustworthiness Towards G20 Nations

On one hand, people's perception of trustworthiness affects a country's prosperity, and on the other hand it imposes threats to the country's security also. Decisions like making international alliance or spending more on its defense depend upon whether that nation is a friend or a nemesis to that country. If a former alliance is no longer trustworthy, new alliances may come into existence. A country's image is made not only by its government but also by its people, values, and culture.

“The British Council” conducts a survey every two years from 2016 showing how “people's perception of trustworthiness” is being shifted for G20 nations from time to time. The survey was undertaken through online mode by interviewing 18- to 34-year-olds, with at least secondary education, in each of the 19 member nations of the G20. The ranks of each country in the survey undertaken by the British Council in the year 2016, 2018 and 2020 are presented in (Refer Table 1).

In the year 2020, Canada ranked 1st for “trust in its people, government, and institutions”. UK ranked 1st along with

Canada for “trust in institutions”, 2nd for “trust in people” and 3rd for “trust in government”. Germany stood 2nd for “trust in government”. Countries like Indonesia,

India, and China stood last in the ranking with 13th, 14th, and 14th ranks respectively for “trust in government”.

In 2018, Canada ranked 1st for “trust in its people”, followed by Australia and UK for the joint position at 2nd rank. For “trust in government”, 1st place goes to Canada followed by Australia and UK for 2nd and 3rd ranks respectively. For “trust in institutions”, 1st rank again goes to Canada followed by UK, Germany, and Australia for 2nd, 3rd, and 4th, ranks respectively. On the other hand, Indonesia, India, Saudi Arabia, Turkey, and Mexico are some of the countries which ranked low in this survey. India got 17th for “trust in people”, 18th for “trust in government”, and 19th for “trust in institutions”.

In 2016, Canada was the 1st choice for the people of different G20 nations in all the three criteria namely “trust in people, trust in government, and trust in institutions”. UK was 2nd in “trust in institutions”, and got 4th position for “trust in people and trust in government.” Germany held 2nd position jointly with UK for “trust in institutions” and got 3rd for “trust in people and trust in government” both. Countries among the lasts were India, Indonesia, and Saudi Arabia. India got 13th rank for “trust in people”, 17th for “trust in government”, and 19th for “trust in institutions” in the year 2016.

G20’s Test of Trust- Role of G20 at the Time of Pandemic

The pandemic had exposed the vulnerabilities of low-income nations, lack of access to vaccines, climate change adaptations, and their limited policies. So, a collective action was needed from the part of G20 nations to handle these problems. Their first priority was to access the “vaccines, diagnostics, and therapeutics”. There was a need of more access to vaccination specially for the poorer countries. The IMF, World Bank, WHO, WTO, in cooperation with “ACT-A (Access to COVID-19 Tools-Accelerator)”, decided to form a team to vaccinate at least 40% of the total population of every country by 2021 and at least 60% by the end of mid-2022. Further financing of ACT-A was needed along with encouraging the vaccines donations from those

countries who are having surplus doses. Vaccine manufacturers were also told to prioritise delivery of vaccines to low or lower middle-income countries first. Export restrictions on vaccines and raw material were also removed.

It was found that EU alone donated 100 million doses of vaccines to poorer countries. EU in cooperation with European industrial partners –“BioNTech-Pfizer”, “Moderna and Johnson & Johnson”, and made 1.3 billion of vaccine doses available for low-income countries at cost of production and for middle-income countries at very low cost in the year 2021. In 2022, more than 1 billion doses were distributed by EU. In October 2020, India and South Africa proposed to temporary waive “Intellectual Property Rights” on COVID-19 vaccines as well as “diagnostics, therapeutics and medical devices”. Some were in favour while others were against this proposal.

Second issue there was that of climate change. For that EU proposed a legally binding agreement to cut the emissions of Carbon di oxide by 55% before 2030.

Many countries had huge debts when the pandemic hit them hard. Among the world's 76 low-income nations half of them were already having huge debts at that time. In addition to that, low-income nations had to spend more on health of their people and also on providing basic means of livelihood and supporting local businesses to lower the financial and social impact of Covid 19 pandemic. These expenses led them into debt stress. Debt stress can be proved as a hindrance in a country's development for many years. Proactive steps were needed to pull the nations out of this situation by providing financial aids to them. A relief to 29 low-income nations was provided through IMF's Catastrophe and Containment Relief Trust (CCRT) in which EU's alone contribution was €183 million.

EU also supported “G20/Paris Club Debt Service Suspension Initiative (DSSI)” for low-income countries. DSSI was taken to postpone the debt taken by low-income countries with an aim to provide them financial support for covid 19 crises and a temporary relief to their debts. Out of all the 73 countries eligible for DSSI, half of them were African. DSSI brought together the traditional lenders and emerging creditors, particularly China. It has also contributed to enhancing debt transparency –a high

priority for accurately assessing debt sustainability-. In April 2021 the G20 Finance Ministers and Central Bank Governors agreed to a final extension of the DSSI until December 2021. So far 45 eligible countries have applied to benefit from the first six-month extension of the DSSI (from January to June 2021) amounting to an estimated US\$4.6 billion of debt service deferred in the first half of 2021.

In October 2020, "G20/Paris club" also proposed a framework for debt treatment beyond DSSI for countries with unsustainable debt. This approach ensures a fair burden sharing and deals with solvency challenges. For this purpose, it is necessary for private-sector creditors to treat on similar terms as those provided by official creditors, to make it fair according to the principle of comparability of treatment. G20 debt relief initiative helped in improving multilateral coordination in sovereign debt resolution.

Conclusion

Trust is indeed needed at every aspect of life. It is common sense that trust is needed for human interactions whether at personal, professional, government, domestic, or international level. In international relationships also, trust plays a pivotal role in building and maintaining strong relationships. This review study found that there is level of trust present among the people of G20 nations. People of different G20 countries have different perceptions of trustworthiness towards other G20 nations. With some there is a positive perception, but with some there is negative perception.

As far as the review of the literature is concerned, Canada proved to be the most trusted nations among the G20 countries. This means Canada has built a reputation as a dependable, stable, and liberal nation. It is a high income, free democratic country which offers values, such as "openness, contribution to development in poorer countries, a free justice system, world-leading arts and culture, working constructively with other governments, treating people fairly" etc, that are important for people of young age. Other countries like UK, Germany, Japan, and Australia are also among the favorites of the young people which are thriving towards gaining more and more trust from

people of other countries. UK has especially improved a lot in its ranking. From 4th place for “trust in people and government” and 2nd for “trust in institutions” in 2016, to 2nd for “trust in people and institutions” and 3rd for “trust in government” in 2018, and 2nd for “trust in people”, 3rd for “trust in government” and 1st for “trust in institutions”, UK has completed a long way in this journey. A lot of perception of people has also been changed for countries like India, Mexico, Saudi Arabia etc. From 2016 to 2020, all those countries who ranked low earlier, have improved their ranking drastically.

At the time of pandemic also, G20 nations worked together as a team. Nations with wealth and prosperity considered for low and middle-income countries. Their first priority was to access the “vaccines, diagnostics, and therapeutics”. There was a need of more access to vaccination specially for the poorer countries. Countries who are a part of G20 as members of European Union helped those members of G20 who are low or middle-income nations in providing access to vaccinations and waiving off their debts.

Annexure

Table-1: Showing the ranking of each G20 country in the survey undertaken by the British Council in the year 2016, 2018 and 2020 respectively.

Countries	Trust in People	Trust in Government	Trust in Institutions	Year
Argentina	12th	12th	12th	2016
	10th	10th	11th	2018
	-	11th	-	2020
Australia	2nd	2nd	4th	2016
	2nd	2nd	4th	2018
	-	4th	-	2020
Brazil	11th	13th	13th	2016
	10th	12th	14th	2018
	-	12th	-	2020
Canada	1st	1st	1st	2016
	1st	1st	1st	2018
	1st	1st	1st	2020

China	10th 12th -	10th 12th 14th	10th 12th -	2016 2018 2020
France	6th 6th -	6th 6th 5th	6th 6th -	2016 2018 2020
Germany	3rd 5th -	3rd 3rd 2nd	2nd 3rd -	2016 2018 2020
India	13th 17th -	17th 18th 14th	19th 19th -	2016 2018 2020
Indonesia	16th 15th -	17th 16th 13th	18th 16th -	2016 2018 2020
Italy	6th 7th -	7th 7th 5th	8th 7th -	2016 2018 2020
Japan	4th 4th -	5th 5th 3rd	5th 5th -	2016 2018 2020
Mexico	17th 15th -	14th 16th 10th	14th 16th -	2016 2018 2020
Russia	14th 14th -	11th 10th 7th	10th 10th -	2016 2018 2020
Saudi Arabia	19th 19th -	19th 19th 10th	14th 18th -	2016 2018 2020
South Africa	14th 13th -	14th 15th 9th	16th 15th -	2016 2018 2020
South Korea	9th 9th -	9th 8th 6th	9th 9th -	2016 2018 2020

Turkey	17th	14th	16th	2016
	17th	14th	13th	2018
	-	8th	-	2020
United Kingdom	4th	4th	2nd	2016
	2nd	3rd	2nd	2018
	2nd	3rd	1st	2020
USA	8th	8th	7th	2016
	8th	9th	8th	2018
	-	4th	-	2020

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14

Achieving Sustainability in G20 Countries: A Comprehensive Review

Mohammed Azeem

Abstract

This comprehensive review paper examines the progress and challenges faced by G20 countries in achieving sustainability across environmental, economic, and social dimensions. Through an extensive analysis of literature, reports, and policies, the study assesses the alignment of G20 nations' strategies with global sustainability frameworks, such as the United Nations' Sustainable Development Goals (SDGs) and the Paris Agreement. The paper identifies key sustainability indicators used for assessment and investigates the impact of environmental policies and measures implemented by G20 countries. Additionally, the research explores successful initiatives promoting sustainable economic growth, social inclusion, and environmental conservation within the G20 context. By identifying best practices and common obstacles, this review aims to offer valuable insights to policymakers and stakeholders in shaping effective sustainability agendas and advancing global efforts towards a more sustainable future. The findings contribute to a comprehensive understanding of G20 countries' collective role in fostering sustainability and highlight opportunities for enhanced collaboration and knowledge-sharing on a global scale.

Keywords: G20 Countries, Environmental, Social, Economic, Policy

Introduction

Background and significance of sustainability within the G20 context

Within the G20 context, sustainability has gained increasing significance as the world's leading economies grapple with

mounting environmental, economic, and social challenges. The G20, comprising 19 individual countries and the European Union, represents approximately 85% of the global GDP and two-thirds of the world's population (G20, 2020). As major contributors to global resource consumption and greenhouse gas emissions, G20 countries play a crucial role in shaping the planet's sustainable future.

The background of sustainability within the G20 context goes back to the "United Nations Conference on Environment and Development" (UNCED) in 1992, where discussions on sustainable development gained international attention. Subsequent G20 summits and meetings have increasingly recognized the importance of integrating sustainability into their policy agendas.

The significance of sustainability within the G20 context lies in its potential give importance to pertinent issues such as climate change, biodiversity loss, and inequality. By fostering cooperation among the world's major economies, the G20 can influence global policies, promote sustainable practices, and mobilize resources to address urgent sustainability challenges.

Furthermore, the G20's commitment to sustainability can set a positive example for other countries and inspire collective movement for attainment of United Nations' Sustainable Development Goals (SDGs) by 2030. As the G20 countries represent a significant portion of the world's economic and political power, their joint efforts towards sustainability can significantly impact the global trajectory towards a more sustainable and inclusive future

Objective

The objective of the review paper titled "Achieving Sustainability in G20 Countries: A Comprehensive Review" is to conduct a thorough and in-depth assessment of the sustainability efforts and achievements of the G20 countries across various dimensions, including environmental, economic, and social aspects. The paper aims to provide a comprehensive and up-to-date analysis of the progress made by G20 countries in pursuing sustainable development, as well as to identify the key challenges, best practices, and success factors that have influenced their sustainability outcomes.

Specifically, the objectives of the review paper are as follows:

Evaluate Environmental Sustainability Efforts: Assess the measures taken by G20 countries to address environmental challenges, such as climate change, biodiversity loss, and pollution. This includes examining their commitment to international agreements, adoption of renewable energy, and conservation efforts.

Analyze Economic Sustainability Measures: Investigate G20 countries' economic policies and initiatives that promote sustainable economic growth, green finance, resource efficiency, and inclusive development.

Assess Social Sustainability Initiatives: Explore the social programs, policies, and efforts undertaken by G20 countries to ensure social equity, improve education and healthcare, and address poverty and inequality.

Identify Interlinkages and Synergies: Examine the interconnectedness between environmental, economic, and social sustainability efforts, identifying areas of synergy where addressing one dimension contributes positively to others.

Highlight Challenges and Barriers: Identify common challenges and barriers faced by G20 countries in achieving sustainability and discuss potential solutions to overcome these obstacles.

Showcase Best Practices and Success Factors: Identify successful sustainability practices and initiatives from G20 countries that can serve as examples for others and offer insights into effective strategies for achieving sustainability goals.

Provide Recommendations: Offer evidence-based recommendations for G20 countries and other stakeholders to enhance their sustainability efforts and advance the global sustainability agenda.

By fulfilling these objectives, the review paper aims to contribute valuable insights to policymakers, researchers, and stakeholders, encouraging informed decision-making and actions towards achieving sustainability within the G20 group and beyond.

Sustainability Frameworks and Indicators

Overview of sustainability frameworks used in the context of G20 countries

In the context of G20 countries, various sustainability frameworks have been utilized to guide their efforts towards

achieving sustainable development. These frameworks provide a structured approach to assess and address the interconnected environmental, economic, and social dimensions of sustainability. One commonly employed framework is the United Nations “Sustainable Development Goals” (SDGs), which were adopted in 2015 by all UN Member States, including G20 countries. The SDGs focus on 17 goals and 169 targets, which begin from sustainability issues, such as poverty eradication, clean energy, climate action, and gender equality (UN, 2015). G20 countries have aligned their national sustainability agendas with these global goals, allowing for a common framework to guide their actions.

Another influential framework is the “Triple Bottom Line” (TBL) approach, which advocates for the consideration of three pillars: economic, environmental, and social, in decision-making processes (Elkington, 1997). G20 countries have increasingly adopted TBL principles to balance “economic social and environmental” considerations, aiming for long-term sustainability.

Furthermore, the Earth System Governance framework emphasizes the need for effective governance structures to address global sustainability challenges (Biermann et al., 2009). Within the G20 context, this framework recognizes the importance of international cooperation and policy coordination to address transboundary issues like climate change and environmental degradation.

Overall, the use of these sustainability frameworks within the G20 context helps guide the development of policies, initiatives, and collaborative efforts that promote a holistic and integrated approach to sustainability, contributing to a more sustainable future for the entire globe.

Key sustainability indicators employed for assessment

Key sustainability indicators play a vital role in assessing the progress and performance of countries towards achieving sustainability goals. In the context of G20 countries, several essential indicators have been employed to monitor and evaluate sustainability efforts across environmental, economic, and social dimensions.

Environmental indicators commonly used include greenhouse gas emissions, energy intensity, renewable energy share, and waste generation per capita (G20 Insights, 2017). These indicators help assess the environmental impact of G20 countries' activities and their commitment to reducing carbon emissions and transitioning towards sustainable energy sources.

Economic sustainability indicators encompass metrics such as gross domestic product (GDP) growth rate, income inequality, and employment in green industries (OECD, 2020). These indicators provide insights into the G20 countries' efforts to achieve sustainable economic development while considering social inclusivity and resource efficiency.

Social sustainability indicators include measures such as poverty rate, education attainment, health care access, and gender equality (UNDP, 2020). These indicators reflect the G20 countries' commitment to improving social well-being, reducing inequalities, and promoting inclusive and equitable societies.

By utilizing these key sustainability indicators, policymakers and researchers can assess the overall sustainability performance of G20 countries, identify areas that require attention, and develop targeted policies and strategies to accelerate progress towards a more sustainable and resilient future.

Environmental Sustainability Efforts

Analysis of G20 countries' commitments to climate change mitigation

The G20 countries, as major global economies, play a critical role in addressing climate change and mitigating its impacts. Various international agreements and commitments have been made by G20 nations to tackle this pressing issue. The Paris Agreement was embraced in 2015 under the "United Nations Framework Convention on Climate Change" (UNFCCC). It represents a landmark in global climate action. The objective is to restrict global warming to a level of below 2 degree Celsius and also undertake action to bring it down to 1.5 degree Celsius above pre-industrial level.

Many G20 countries have submitted their Nationally Determined Contributions (NDCs) under the Paris Agreement, outlining their specific climate change mitigation targets and actions.

However, an analysis of these NDCs reveals both strengths and shortcomings in G20 countries' commitments.

Some G20 nations have made ambitious commitments, setting targets for significant reductions in greenhouse gas emissions and renewable energy adoption. For instance, the European Union, Japan, and several European G20 countries have pledged to achieve carbon neutrality by mid-century (WRI, 2020).

On the other hand, certain G20 countries' commitments may fall short of their fair share in global climate efforts, lacking ambitious and concrete actions to meet the Paris Agreement's goals (WRI, 2020). Additionally, despite pledges, some G20 countries' policies and actions have not been fully aligned with their stated climate goals.

Overall, while G20 countries collectively represent a substantial portion of global emissions, the extent and effectiveness of their commitments to climate change mitigation vary significantly. Strengthening and implementing these commitments are essential for advancing global climate action and achieving a more sustainable future.

Assessment of the impact of environmental policies and measures

It is important to assess impact of environmental policies to help determine their effectiveness in addressing environmental challenges. Various studies have been conducted to evaluate the outcomes of environmental policies in different contexts.

For example, Burke et al. (2018) in their work examined effect regulation on pollution on public health in China. The researchers found that the implementation of stringent air quality standards led to significant reductions in particulate matter levels, resulting in substantial improvements in life expectancy and reduced healthcare costs.

Another assessment conducted by Gillingham et al. (2019) evaluated the impact of renewable energy in the United States. It revealed that by adopting of renewable energy sources, driven by supportive policies and incentives, resulted in reduced greenhouse gas emissions and increased employment in the renewable energy sector.

Furthermore, a study by Costantini et al. (2017) analyzed the impact of environmental policies on the environmental, economic, and social performance of G20 countries. The research indicated that countries with stronger environmental policies tend to perform better in sustainability indicators, demonstrating the positive impact of policy interventions.

In summary, assessing the impact of environmental policies and measures is crucial for evidence-based decision-making and policy refinement. Such evaluations provide valuable insights into the effectiveness of various environmental interventions, guiding policymakers and stakeholders towards more efficient and impactful strategies for sustainable development.

Economic Sustainability Measures

G20 countries' strategies for sustainable economic growth

G20 countries have implemented various strategies to promote sustainable economic growth, how important it is to balance economic with environment and society. Some key strategies include:

Green Investment and Innovation: G20 countries have prioritized investments in clean energy, sustainable infrastructure, and green technologies. These investments not only stimulate economic growth but also contribute to reducing greenhouse gas emissions and enhancing resource efficiency (Kharas & Hamel, 2018).

Circular Economy Promotion: G20 countries have increasingly embraced the concept of the circular economy, which emphasizes recycling, reuse, and sustainable production processes. By transitioning to a circular economy model, G20 nations aim to reduce waste generation and minimize the depletion of natural resources (Weizsäcker et al., 2018).

Sustainable Finance Initiatives: Several G20 countries have taken steps to promote sustainable finance, encouraging private investments in environmentally and socially responsible projects. This includes issuing green bonds integrating factor of environment, society, and governance (ESG) criteria into investment decisions (UNEP, 2017).

Inclusive Economic Policies: G20 countries have recognized the importance of inclusive economic growth, aiming to reduce

income inequality and address social disparities. Policies promoting education, skills development, and social safety nets help ensure what benefits one gets from growth of economy is shared with one and all (OECD, 2020).

Climate and Energy Policies: Many G20 countries have implemented climate and energy policies to transition to low-carbon and renewable energy sources. This includes setting emissions reduction targets, implementing carbon pricing mechanisms, and promoting energy efficiency (IEA, 2019).

By adopting these strategies, G20 countries aim to foster sustainable economic growth that aligns with environmental conservation and social well-being, contributing to a more balanced and resilient global economy.

Social Sustainability Initiatives

G20 countries have undertaken various efforts to promote social inclusion and equity, recognizing the significance of addressing social disparities to see that well-being of all citizens is maintained. Several key initiatives and policies have been implemented in this regard.

One example is the G20's focus on reducing poverty and inequality. G20 countries have committed to implementing social safety nets, enhancing access to quality education, and improving healthcare services to uplift vulnerable populations (G20 Insights, 2017). These efforts aim to provide equal opportunities for all and reduce the socio-economic gaps within their societies.

Moreover, G20 countries have emphasized gender equality and women's empowerment. They have launched initiatives to promote women's economic participation, leadership, and education, recognizing the significant role of women in driving sustainable development (G20, 2017).

Furthermore, G20 countries have worked towards enhancing social protection and promoting decent work. By investing in labor market policies, vocational training, and social security systems, they aim to foster inclusive and sustainable economic growth (ILO, 2017).

These efforts are in accordance with "United Nations Sustainable Development Goals "(SDGs), It refers to SDG 10 (Reduced

Inequalities) and SDG 5 (Gender Equality), highlighting G20 countries' commitment to achieving a more equitable and inclusive world.

Challenges

G20 countries face several common challenges in achieving sustainability due to their diverse economic, social, and environmental contexts. One significant challenge is the trade-off between economic growth and environmental protection. The pursuit of economic development can sometimes result in increased resource consumption and environmental degradation (Cohen & Winn, 2007). Striking a balance between economic growth and sustainable resource use remains a complex issue for G20 countries.

Another challenge is the lack of strong and coordinated policy implementation across G20 nations. While many countries have made commitments to sustainability, the actual implementation of policies may vary, leading to uneven progress towards sustainability goals (G20 Insights, 2017). This underscores the importance of effective governance and international cooperation to address shared sustainability challenges.

Moreover, G20 countries may face resistance from vested interests and industries that prioritize short-term profits over long-term sustainability. Political and institutional barriers can hinder the adoption of sustainable practices and the shift to a green economy (Chan et al., 2018).

Furthermore, the complexity of sustainability issues requires comprehensive and integrated approaches. Addressing environmental, economic, and social challenges simultaneously demands multi-dimensional solutions and policy coherence (Biermann et al., 2009).

To overcome these challenges, G20 countries must foster stronger collaboration, promote policy alignment, and adopt innovative strategies that prioritize long-term sustainability over short-term gains. Enhanced international cooperation and knowledge-sharing can also facilitate collective efforts to achieve a more sustainable future.

Best Practices and Success Factors

Key success factors in achieving sustainability goals involve a combination of effective strategies, collaborative efforts, and policy implementation across various sectors. Several factors contribute to successful sustainability outcomes for countries and organizations:

Strong Political Will and Leadership: Political commitment and leadership at the highest levels are crucial for driving sustainability initiatives forward and overcoming barriers (Löfstedt, 2019).

Multi-stakeholder Engagement: Involving diverse stakeholders, including governments, businesses, civil society, and academia, fosters collective action and generates broader support for sustainability initiatives (Lacey et al., 2017).

Clear and Measurable Targets: Setting specific, measurable, and time-bound sustainability goals provides a clear direction and enables progress monitoring (Hanna & Newman, 2016).

Effective Policy and Regulatory Frameworks: Robust policies and regulations that incentivize sustainable practices and penalize unsustainable behavior are essential for creating an enabling environment (Van der Heijden, 2016).

Investment in Research and Innovation: Continuous research and innovation are fundamental for developing sustainable technologies, practices, and solutions (Hilty et al., 2018).

Integration of Environmental, Economic, and Social Aspects: Adopting an integrated approach to sustainability which creates a balance between environmental, economic, and social dimensions ensures comprehensive and balanced outcomes (WCED, 1987).

Knowledge Sharing and Capacity Building: Sharing best practices, experiences, and knowledge among countries and organizations enhances learning and capacity building for sustainable development (Biermann et al., 2009).

By recognizing and incorporating these key success factors, countries and organizations can make significant progress towards achieving sustainability goals and creating a more sustainable and resilient future.

Fostering best practices across G20 countries to promote sustainability requires coordinated efforts and knowledge-sharing among nations. Here are some recommendations:

Establish a Knowledge-Sharing Platform: Create a dedicated platform where G20 countries can exchange experiences, success stories, and lessons learned in sustainable development (G20 Insights, 2017). This would facilitate the dissemination of best practices and foster mutual learning.

Encourage Peer Reviews: Encourage G20 countries to conduct peer reviews of each other's sustainability initiatives, providing constructive feedback and recommendations for improvement (OECD, 2020). Peer reviews can help identify areas where countries can learn from each other's experiences and strengthen their sustainability efforts.

Develop Joint Research Projects: Collaborate on joint research projects focusing on sustainability challenges common to G20 countries (G20 Insights, 2017). Such research initiatives can lead to the development of evidence-based policies and solutions.

Establish Sustainability Awards: Institute sustainability awards within the G20 framework to recognize and promote outstanding achievements in sustainable development (Lacey et al., 2017). These awards can serve as incentives for G20 countries to adopt and replicate successful practices.

Support Capacity Building: Provide technical assistance and capacity-building programs to G20 countries, especially those facing resource constraints, to enhance their sustainability practices (G20, 2020). Capacity-building initiatives can strengthen institutional capacity and facilitate the implementation of sustainable policies.

Facilitate South-South Cooperation: Encourage G20 countries to engage in South-South cooperation, sharing knowledge and experiences with non-G20 developing nations (UNDP, 2020). This would foster a more inclusive and globally impactful approach to sustainability.

By implementing these recommendations, G20 countries can create a conducive environment for fostering best practices, accelerating sustainable development, and collectively advancing the global sustainability agenda.

Conclusion

Summary of the review's findings

One must bring trade off between different dimension of sustainability and ensure equitable distribution of benefits to one and all. This would be more welcome.

Significance of G20 countries' efforts in advancing global sustainability

The significance of G20 countries' efforts in advancing global sustainability lies in their collective economic and political influence, which can drive transformative change and set a precedent for global action. As major economies representing around 80% of the world's GDP and two-thirds of the global population, the G20 nations have the capacity to address pressing sustainability challenges on a global scale (G20 Insights, 2017).

By aligning their sustainability agendas and policies, G20 countries can promote international cooperation and knowledge-sharing, fostering a more coordinated and effective response to face global challenges biodiversity loss, and poverty (Biermann et al., 2009). Their joint commitment to sustainability can encourage other nations to follow suit, setting a positive example for the rest of the world.

Furthermore, G20 countries' efforts in advancing global sustainability can contribute to achieving the United Nations' Sustainable Development Goals (SDGs) and the objectives of international agreements such as the Paris Agreement (UNFCCC, 2015). This can accelerate progress to have a sustainable and equitable future for all.

However, the significance of G20 countries' efforts also lies in the need for shared responsibility and collective action. As major contributors to global challenges, their commitment to sustainability is crucial for addressing root causes and finding viable solutions that go beyond national borders.

Future directions for sustainable development within the G20 group

Future directions for sustainable development within the G20 group involve building on current efforts and adopting more

ambitious and coordinated strategies to address pressing global challenges. Some key directions include:

Strengthening Climate Action: G20 countries should enhance their commitments to climate change mitigation and adaptation, aiming for more ambitious emission reduction targets and enhancing amount spent in clean energy and sustainable infrastructure (Höhne et al., 2020).

Advancing “Circular Economy”: G20 nations can promote the transition to a circular economy model, which encourages resource efficiency, waste reduction, and sustainable consumption and production patterns (Ellen MacArthur Foundation, 2019).

Integrating Environmental and Economic Policies: G20 countries should foster greater policy coherence between environmental and economic objectives, ensuring that economic growth is aligned with sustainable development goals (G20 Insights, 2017).

Empowering Sustainable Finance: G20 countries can further promote sustainable finance and responsible investment practices, have social, environment and governance factor whenever any investment is made (UNEP FI, 2019).

Promoting Social Inclusion: G20 nations should prioritize inclusive economic growth and social policies that address inequalities and enhance social protection systems (Lacey et al., 2017).

Emphasizing Global Cooperation: G20 countries can strengthen international cooperation on sustainable development, engaging in knowledge-sharing, technology transfer, and joint research initiatives to address global challenges collectively (Biermann et al., 2009).

By pursuing these future directions, the G20 group can play a transformative role in advancing sustainable development on a global scale, driving shift towards environmentally responsible future.

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Empowering Consumers: The Role of G20 in Shaping Attitudes Towards Online Shopping Through Advertising

Hera Zaidi & Anusha Suhail

Abstract

This research article delves into the interconnected relationship between programmatic advertising, consumer attitudes towards online shopping, and the influence of the G20 on global economic policies. Programmatic advertising, a data-driven and automated method of buying and selling digital ad inventory, has emerged as a powerful tool for marketers to deliver personalized and targeted advertisements to consumers. At the same time, the G20, an influential forum comprising major advanced and emerging economies, plays a pivotal role in shaping global economic policies. By examining the impact of programmatic advertising on consumer behaviour in the online shopping environment and its alignment with the G20's economic initiatives, this study aims to shed light on the evolving landscape of digital marketing and consumer preferences within the context of the G20's influence. Furthermore, this research article explores the dynamic relationship between programmatic advertising and consumer attitudes towards online shopping, with a specific focus on how the G20's initiatives influence this interaction. The findings of this study underscore the importance of responsible data usage, transparency, and cross-border trade facilitation in enhancing consumer experiences and attitudes towards online shopping. As digital marketing continues to evolve, this research serves as a roadmap for marketers and policymakers to foster an ecosystem where consumers are at the forefront, informed, and confident in their online shopping decisions. This article explores how the G20's initiatives and regulations impact programmatic advertising, subsequently shaping consumers' attitudes towards online shopping. By understanding this dynamic

relationship, stakeholders can navigate the digital marketing landscape responsibly and foster a positive and empowered consumer experience.

Keywords: *Relationship, Programmatic Advertising, Consumer Attitude, Online Shopping, Economic Policy*

Introduction

The evolution of digital marketing tools and strategies has revolutionized how businesses interact with their customers. Unlike traditional marketing, which was one-way communication, the rise of social media has enabled two-way conversations between brands and consumers. This shift empowers customers to provide feedback, share opinions, and voice complaints, leading to the integration of consumer insights into companies' strategies and product development processes (Saura et al., 2020). As internet usage continues to grow, online purchasing is also on the rise (Joines, Scherer & Scheufele, 2003), fueling the growth of online shopping and transforming consumer behavior. Technological advancements and widespread internet access have led to the exponential growth of e-commerce, with global online retail sales projected to reach trillions of dollars (Deloitte, 2020). However, concerns have arisen about the environmental impact and long-term sustainability of these digital practices.

The advent of the digital revolution has brought about a profound transformation in how consumers engage with brands, especially in the context of online shopping. According to [statista.com](https://www.statista.com), programmatic advertising is projected to account for 46% of the display revenue in the Digital Advertising market by the year 2023. This highlights the significant growth and adoption of programmatic advertising as a prominent and influential aspect of the digital advertising landscape. Programmatic advertising, with its data-driven approach and personalized messaging, plays a pivotal role in influencing consumer attitudes towards online shopping. The shift brought about by programmatic advertising has made the advertising process more need-based through the use of targeted campaigns. This approach has proven to be more effective, providing advertisers with improved returns on their advertising investments and offering brands valuable insights into the needs and preferences of their audience. Consequently,

programmatic advertising has a substantial impact on users' online shopping decisions. Concurrently, the G20, representing major economies worldwide, wields significant influence in shaping global economic policies.

The Rising Trend of Online Shopping

Online shopping has experienced a meteoric rise in recent years, driven by factors such as convenience, access to a wide range of products, and personalized recommendations. The global rise of online shopping has been significantly influenced by the convergence of programmatic advertising and the policies set forth by the G20. As consumers spend more time online, programmatic advertising and the G20 play pivotal roles in empowering consumers and shaping the digital landscape of online shopping and their purchase decisions.

Online Shopping and G20

Online shopping has witnessed exponential growth and widespread adoption within the G20 countries, encompassing a diverse range of products and services. As a group of major economies, the G20 plays a significant role in shaping global trade and e-commerce trends. The ease of access to digital platforms, increased internet penetration, and improved logistics have fueled the rise of online shopping across these nations. With the COVID-19 pandemic driving a surge in online retail, G20 countries have witnessed a transformation in consumer behaviour, with a shift towards digital transactions and contactless delivery methods. However, this rapid growth in e-commerce also poses challenges, including concerns related to consumer data privacy, cybersecurity, and sustainable practices.

Programmatic Advertising: A Paradigm Shift in Digital Marketing

Programmatic advertising is an automated method of buying and selling ad inventory in real time through data-driven algorithms. It enables advertisers to reach their target audience with greater precision and efficiency. By utilizing vast amounts of data, programmatic advertising optimizes ad placements and content, creating personalized experiences for consumers.

The Process of Programmatic Advertising Involves the Following Steps:

Data Collection: Programmatic advertising relies on collecting vast amounts of data on users' online behaviour, demographics, interests, and preferences. This data is obtained from various sources, including cookies, website interactions, and third-party data providers.

Real-Time Bidding (RTB): When a user visits a webpage or app, an ad space is made available for auction. Advertisers bid in real-time for the opportunity to display their ad to that particular user based on their profile and the context of the content.

Ad Placement: The highest bidding advertiser wins the auction, and their ad is instantly displayed to the user within the available ad space on the webpage or app.

Targeting and Personalization: Programmatic advertising allows advertisers to target specific audience segments based on their data, ensuring that the right message is delivered to the right users at the right time. This level of personalization enhances user engagement and increases the chances of conversion.

Performance Optimization: Programmatic advertising continuously optimizes ad performance by analyzing real-time data on user interactions, click-through rates, and conversions. This data-driven approach enables advertisers to make informed decisions and adjust their strategies for better result.

Personalization and Relevance: A Win-Win for Consumers and Advertisers

Programmatic advertising enables brands to deliver personalized content based on consumers' interests, preferences, and behaviours. This tailored approach creates a sense of relevance and resonance with consumers, leading to increased engagement and conversion rates. For advertisers, this translates into more efficient ad spend and higher return on investment.

G20

The G20, or Group of Twenty, is an international forum comprising 19 individual countries and the European Union, representing major advanced and emerging economies.

Established in 1999, the G20 holds annual summits where leaders gather to discuss and coordinate on pressing global economic issues. Its key objectives include promoting global economic growth, strengthening international financial regulation, addressing economic imbalances, encouraging trade and investment, tackling climate change and sustainable development, combatting tax evasion, and fostering innovation and cooperation in the digital economy. As one of the most influential economic forums, the G20 plays a crucial role in shaping global economic policies and promoting international cooperation for a more stable and prosperous world.

The G20's Influence on Programmatic Advertising

The G20's influence on programmatic advertising lies within its broader economic policies and regulations that can shape the digital advertising landscape. Programmatic advertising, an automated method of buying and selling ad inventory, has revolutionized the digital marketing industry by allowing brands to deliver personalized and targeted ads to consumers. However, as a global forum representing major economies, the G20's decisions can impact data privacy regulations, cross-border data flow, and consumer protection, all of which have implications for programmatic advertising strategies.

G20's Role in Data Privacy and Consumer Protection

The G20 countries actively engage in discussions and initiatives related to data privacy and consumer protection. Stricter regulations and guidelines are established to safeguard consumer data and ensure responsible data usage. Programmatic advertising relies on collecting and analyzing vast amounts of user data to deliver personalized ads. Any changes in data privacy regulations could impact how advertisers access and utilize consumer data, requiring programmatic advertisers to ensure compliance with the evolving data protection measures. Programmatic advertising, in adhering to these regulations, builds consumer trust and fosters positive online shopping attitudes.

Enhanced Consumer Decision-Making

Programmatic advertising provides consumers with relevant and timely product information, guiding their decision-making

process. By displaying ads that align with consumers' interests and preferences, programmatic advertising helps users make informed choices, contributing to overall satisfaction and repeat business.

Cross-Border E-commerce and the G20

The G20's commitment to facilitating cross-border e-commerce and reducing trade barriers has significant implications for programmatic advertising. Brands can leverage programmatic advertising to target international audiences and expand their global reach, aligning with the G20's objectives of fostering interconnected markets.

Consumer Protection and Transparency

The G20's emphasis on consumer protection and transparency can drive the adoption of ethical and accountable practices in programmatic advertising. Advertisers may need to be more transparent about data usage and ad placements to maintain consumer trust, as the G20 seeks to promote fair and ethical practices in the digital advertising ecosystem. Transparency and ethical practices are crucial in programmatic advertising to build and maintain consumer trust. The G20's emphasis on ethical standards reinforces the need for responsible data handling, ensuring consumer data is used responsibly and with explicit consent.

Impact on Brand Loyalty and Customer Experience

Programmatic advertising's ability to deliver personalized and relevant ads enhances the overall customer experience, leading to increased brand loyalty and advocacy. The positive impact of programmatic advertising on consumers' online shopping attitudes can significantly influence brand perception and long-term customer relationships.

Antitrust Measures

Stricter antitrust measures implemented by G20 countries can impact the competitive landscape of programmatic advertising platforms and agencies. Advertisers may need to reconsider their partnerships and media buying strategies to comply with antitrust regulations.

Conclusion

The seamless integration of programmatic advertising and online shopping attitudes is reshaping the digital marketing landscape, empowering brands to connect with consumers on a more personal level. The G20's role in shaping attitudes towards online shopping through programmatic advertising is crucial in empowering consumers and fostering a positive digital marketplace. The G20's emphasis on data privacy, consumer protection, transparency, and cross-border e-commerce aligns with the principles of programmatic advertising, creating a synergistic relationship between responsible marketing practices and consumer trust. By prioritizing data privacy and security, the G20 ensures that programmatic advertising adheres to stringent regulations, safeguarding consumer information and instilling confidence in online shopping. Consumers are more likely to engage with brands that respect their data preferences and prioritize their privacy, leading to enhanced trust and loyalty.

Moreover, the G20's focus on transparency and consumer protection reinforces the need for ethical advertising practices in programmatic advertising. As advertisers provide clear disclosures and ensure transparent data usage, consumers can make informed decisions about their online shopping experiences, building a sense of empowerment and control over their choices. The G20's promotion of cross-border e-commerce aligns with programmatic advertising's ability to connect brands with global audiences. This convergence opens up opportunities for businesses to expand their reach and cater to diverse markets, providing consumers with access to a wide array of products and services. Through programmatic advertising's personalization capabilities, the G20's initiatives are amplified, enabling brands to deliver tailored messages and recommendations to consumers. This level of personalization fosters positive user experiences, influencing consumer attitudes towards online shopping and driving engagement and conversion rates. As the G20 continues to implement economic reforms, programmatic advertising plays a vital role in adapting to changing market conditions and consumer behaviors. Brands that leverage programmatic advertising strategically can respond to shifting consumer sentiments, ensuring relevance and sustainability in the ever-evolving digital landscape.

In essence, the G20's influence on programmatic advertising is a catalyst for consumer empowerment. By promoting responsible data usage, transparency, and cross-border trade facilitation, the G20 creates an environment where programmatic advertising can enhance consumer experiences, inspire trust, and contribute to a thriving digital marketplace. As the digital economy evolves, the partnership between the G20 and programmatic advertising will continue to shape consumer attitudes towards online shopping positively. The potential for growth and innovation in digital marketing is vast, and by embracing the G20's principles, stakeholders can create an ecosystem where consumers are at the centre, empowered to make informed choices, and confident in their online shopping decisions. The harmonious interplay between programmatic advertising and the G20's initiatives is instrumental in ensuring a sustainable, inclusive, and consumer-centric digital future.

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Big Data and G20: Harnessing the Potential of Data

Zia Qasim Rizvi

Abstract

Big data refers to the large volumes of data that contain mounds of information. It has end number of benefits that can be utilized by G20 member countries. It can be used for laying down better policies, to boost e-commerce and digital trade and for managing risks in the financial sector. However, it also has its challenges like data security and privacy and data sovereignty which must be addressed for harnessing its full potential. Further it must also be ensured that the use of data benefits is not limited to specific regions but enjoyed by all. This paper identifies and discusses the benefits of big data that G20 member countries can harness and also advocates how they could address the concerns and challenges.

***Keywords:** Big Data, G20, Data Security, Digital Divide, Digital Trade*

Introduction

The Group of Twenty (G20) is an international forum comprising 19 of the world's prime economies and the European Union. The G20 was created in 1999 to provide a forum for discussing world economic problems and advancing financial stability on a global scale. It was intended to serve as an opportunity for discussion of global economic and financial stability, drawing together the most significant industrialised and developing economies. India became a founding member of the G20 nations in 1999, and being one of the major economies with the quickest growth rates, India has a big role to play in this forum. As a result, the importance of India's involvement in the G20 has

increased over time and on December 1st 2022 Prime minister Modi received the gavel of G20 presidency from his Indonesian counterpart in Bali for one year. Embarking on this year long journey with the motto of ‘Vasudhaiva kuttumbakam’ the Prime Minister said “India’s G20 presidency will work to promote the universal sense of oneness. Hence our theme- One Earth, one Family, One Future.”. Round the globe experts are viewing this leadership as extraordinary and unparalleled prospect with tremendous potential and promise. India has already vowed to take advantage of the connections between technical advancements, gender equality, economic progress, and peace and security for the benefit of all people. The priorities established by India’s presidency clearly reflect the agenda for inclusive growth. Priorities include multilateral institutions for the twenty-first century, women-led development, accelerated, inclusive, and resilient growth, climate finance and LiFE, technological transformation, and digital public infrastructure. These aims include, among others, ensuring not just women’s participation but essentially women-led growth, challenging the WTO’s process, making individuals an integral part of environmental protection (via LiFE), and targeting egalitarian growth in infrastructure. There are eleven engagement groups, twelve working groups under the Sherpa track, and eight under the Finance track. The dedication to inclusivity is also evident in India’s handling of the G20 Presidency. Instead of limiting all events to the capital, the Presidency is hosting over 200 sessions of ministers, officials from the government, and members of civil society, involving young people from multiple educational institutions across 32 distinct employment streams in 50 cities across the length and breadth of the country. As one of the fastest growing economies, India aims to contribute and elevate the global economic growth through its domestic policies. Its expanding renewable energy sector is one of the most prominent examples of how the economy of the world can be accelerated sustainably. However, there are various factors that affect the pace of development be it financial or social: and one of the most important affecting paces of development is data and technology. one of the most important being data and technology. As a result of the digital revolution, over time businesses and cultures have changed around the world, it has

become an essential part of the contemporary global economy. This paper explores the G20's role in exploiting and policing big data to promote inclusiveness, innovation, and economic growth.

Big Data

Large volume of data be it structured or unstructured that contain mounds of information is called big data that cannot be processed by traditional data management tools. Today, one and all are living in a data driven world and every aspect of the world is now being affected by data, every action is now based on a very calculated decision that is backed by data. The need for trustworthy development statistics is generally acknowledged as being essential to making informed policy decisions, managing resources effectively, and providing good public services. In every area of development, including education, women's empowerment, infrastructure improvement, public health, and climate change response, data is becoming more and more crucial for policy and reasoned action. Making decisions based on data can assist in achieving the Sustainable Development Goals (SDGs). India recognizes the central role of data in development and therefore the prime minister gave the theme of 'data for development' and hence emphasized the role of data for socio-economic transformations. Thus, the data flood generates both enormous opportunities and difficulties, making it crucial for countries and international organisations like the G20 to address the impact of the data flood on the global economy. Big data now has a large influence on the global economy, some of which are:

- Big data has led to economic expansion, innovation and development. The 21st century's economic development and innovation are now mostly driven by big data. Businesses can discover important information about customer preferences, market trends, and operational inefficiencies by analysing large databases. By using this information, businesses may streamline their operations, customise their goods and services, and promote innovation, all of which eventually improve their ability to compete and produce at a higher level. Big Data has the potential to hasten economic growth in regions of the world where it has historically been

most unreachable. Big data can be applied in development economics in a variety of ways. The UN Global Pulse, the UN's big data effort, notes that less expensive access to vast amounts of data via satellites, mobile monitoring, social media, and transactional data can provide information on people that are otherwise hard to reach. Additionally, it encourages the growth of the green economy and aids in the advancement of technology more.

- Big data can be used by governments to help them make better policy choices. Policymakers can create more focused and effective programmes to address social concerns and promote sustainable development by analysing data relating to demography, healthcare, education, and infrastructure. It can be framed as a tactical chance to establish new public policies, enhance the effectiveness and quality of public services, and make better use of available resources. Big Data has been utilised by governments for policymaking in a number of ways. Basic statistical or quantitative studies have been performed utilising census records on population density, living circumstances, and other demographic features obtained by sampling or public administration information on taxation, employment, and other factors.
- The efficient use of big data is crucial for the development of e-commerce and digital trade. The Organisation for Economic Cooperation and Development (OCED) and the World Trade Organisation (WTO), which are both international organisations, are primarily responsible for defining the term "digital trade." They define it as the ordering, production, and delivery of goods and services using the Internet and other digital technologies. This idea includes both physical items sold through ICTs and digital channels as well as service products delivered digitally. The technological and industrial revolutions have greatly altered the pace and character of economic development. In particular, the development of digital information technology, such as big data, has led to the emergence of the digital economy, which has gradually grown to dominate each nation's economy. By using data analysis to understand consumer behaviour, international trade, and logistics,

nations can harness the promise of digital trade and increase their economic influence around the world.

- Big data analytics has significant benefits for risk management in the financial sector. Large financial datasets can be analysed by institutions to spot systemic threats and weaknesses, resulting in more secure and robust financial markets. The finance sector has a big impact on big data events. As a result, the financial industry sees several hundred million of financial transactions every day. As a result, handling information and analytics for various financial services and products is seen by financial analysts and practitioners as a growing issue. Financial services and products are significantly impacted by big data as well. Finding the financial issues on which big data has a significant impact is therefore an important area to research. Big data assists in recognising and anticipating dangers that could endanger the business in terms of financial threats. Big data analysis can be used to identify trends that could point to a cybersecurity concern to your company given the rise in cybercrime. Financial institutions can get a real-time understanding of their risks by analysing big data using data science technology that uses predictive algorithms in conjunction with risk assessment. They can then utilise this information to inform their risk management strategy. Organisations gain a wealth of knowledge about organisational risk by utilising the various sources of big data, which enables analysing and minimising dangers.
- While one cannot deny the immense benefit that big data offers, the number of issues and obstacles must be addressed to harness its full potential. Some of the challenges and concern that lie in this path are:
- **Data privacy and security:** Privacy and security issues are raised by the massive amounts of private and sensitive information being gathered and analysed. For legislators, finding a balance between encouraging innovation and safeguarding people's privacy rights continues to be a difficult task. The foundation of some of the biggest companies in the world today is made up of information gathered from individual devices, the digital trail left by

transactions, and information from other sources. Numerous startups and hundreds of thousands of small businesses rely on personal data to provide customised digital services, market predictions, and customer insights. Over the past 20 years, the commercial use of individual information has expanded like the Wild West. This has caused a great amount of concern among individuals as it is leading to data theft and over sharing. Even though the advantages of open data exchange for the GDP, exports, and other factors have been extensively addressed, many industrialised and developing nations now place a high priority on data privacy. More control over and independence for the data that is generated by people and governments is now being demanded. To that goal, the adoption of procedures that strike a balance between competing interests has been suggested by Data Free Flow with Trust (DFFT), as authorised in the G20 Digital Ministerial Meeting 2021. The DFFT urges the adoption of data governance rules that are beneficial to development. India, however, chose not to take part in the DFFT side-discussions that were held alongside the Osaka track and is even reluctant to accept it due to its concerns about data accessibility, specifically that once the information travels to another country, it won't be treated equally to the information at home. Additionally, India is still developing its information security and web-based rules, similar to many non-industrialized nations.

- **Data sovereignty:** Big data and cloud computing are global phenomena, which calls into question the concept of “data sovereignty,” which holds that information created within a nation should be subject to that nation’s laws. To resolve this problem and guarantee smooth data flows, international collaboration and standardisation are necessary. India must make certain that the prerequisites of the developing nations are taken into account when debating cross-border data flow while it holds the presidency. It is crucial to recognise that in this time of geopolitical unpredictability, where both advanced and emerging economies are susceptible to cyberattacks and other digital safety threats because of an unhealthy reliance on the internet, it is imperative to help the less developed nations arm themselves with effective

cyber defence systems. It is equally important to understand that simply storing data locally is costly as its utility lies in its usage. Thus, cross border data flows should be exercised with accountability. Creating standards and processes for data flow is similar to creating soft infrastructure that is advantageous to all parties. The promise of digital transformation must be unlocked by fostering trust among companies, platforms, and governments because it is expected to facilitate a global economic recovery.

- **Digital divide:** Reducing the digital divide through the sharing of digital technology, especially in developing countries, has been one of the key objectives of India's G20 presidency. This has been made possible by India's increased prominence in the digital sphere. Prime Minister Narendra Modi urged the G20 leaders to commit to working for digital inclusion among developing countries while at the group's final session in Indonesia in 2022. PM had also discussed the importance of digital technologies at the same summit when it came to addressing issues like poverty, climate change, and health. The "most remarkable change of our era," according to Prime Minister Modi, is the digital transformation. He added that the effective application of digital technologies can help the world's long-running war against poverty. He added that the use of digital technologies can be beneficial in the fight against climate change. Only when digital technology is widely used and when access to it is truly universal will these advantages be realised. He lamented that up to this point, "we have only seen this powerful tool through the lens of simple business, keeping this power bound in the ledgers of profit and loss." According to PM, it is the duty of G20 leaders to make sure that the benefits of the digital transformation do not only benefit a small segment of population but has benefits for all irrespective of caste creed and nationality.

G20's Role in Harnessing Big Data

The G20 has a vital role in determining the global strategy for big data because it is the foremost venue for global economic cooperation. The G20 can take a number of important acts that can promote the creation of global data standards and

enhance interoperability and data sharing while addressing privacy and security issues. The G20 has constantly emphasised the necessity for effective data protection measures when conceptualising and advancing global collaboration on the Data for Development agenda. In general, the G20's efforts have concentrated on supporting programmes that use data for sustainable development, assuring data availability, quality, and accessibility, and assisting to protect data privacy and security. The G20 has acknowledged that growing concerns regarding data privacy, security, and interoperability have been raised as a result of the increased demand for data for global development and trade. As a result, the G20's proposal for Data Free Flow with Trust (DFFT) in 2019 under the Osaka Track aims to forge agreement on "cross-border data free flow with trust to harness the opportunities of the digital economy" and work towards creating a standard data governance framework. Particularly in the lead-up to its G20 presidency, India undertook several revolutionary D4D programmes and gained experience in data-use efficiency for sustainable development. By combining public data and making it freely available, the National Data and Analytics Platform (NDAP) was established to democratise data delivery. The Digital Personal Data Protection Bill and the drafted National Data Governance Framework Policy, both of which aim to make a sizable corpus of anonymized datasets publicly accessible, were both launched in 2022. A common concept of sensitive and non-sensitive data should be developed by the G20. If India's presidency kicks off progress on data classification, all G20 countries will gain significantly. Using data for development will make it easier to identify vulnerable populations and track their development over time.

Conclusion

Big data has become a disruptive force in the global economy, impacting many industries and spurring economic development. It is essential that the G20 participate in defining the proper use and regulation of big data in order to maximise its potential benefits while minimising dangers and obstacles. The G20 can play a crucial role in directing the world towards a data-driven future that is inclusive, inventive, and sustainable by encouraging global cooperation and collaboration.

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The Role of G20 in the Global Economy

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Abstract

It was expected that with the formation of international institutions, it would be possible for all countries, both developed and developing, to participate more in global relations. But the difference in the economic power and development levels of the countries provided the opportunity for some of them to practically play the role of a pole and a single voice in international decision-making processes by forming limited and multi-country assemblies.

The oil crisis and the collapse of the Bretton Woods system led to formation of the group of 7 industrialized and developed countries. This later developed the group of G20. The agenda of this Group is to deal with macroeconomic issues and the international financial system. This Group is becoming the most important political and financial institution in the world. In this paper, the researchers examined the process of formation and development process of Group 7 and assessed its impact on the global economy. It also examined the interaction of other governments with this international institution.

This paper traces the origins of G20 countries and its formation process. It provides a list of member countries and the summit held. The structure of the group and the objectives are presented in detail. Finally, it concludes by suggesting extension of membership to developing countries too.

Keywords: Group of Eight (G8), Group of Twenty (G20), International Economy, Macroeconomic Issues, Hub and Spoke Bilateralism Model

Introduction

In the process of development in economic history and especially after the increase in the range of interactions between

governments and regional blocs during the last century, the creation and expansion of multilateral and international arrangements were found necessary. This was needed for the development of political and economic relations. These were also tools to maintain the roots of domination in other societies. After the end of the Second World War, it was necessary to rebuild the damage caused by the war and lay down development strategies to reduce the class gaps between the societies. For this it was important to form international organizations. Finally, with the efforts of a group of countries in the 40s, the International Monetary Fund, the World Bank, the GATT, the Marshall Plan and European Economic Cooperation Organization and the Organization for Economic Cooperation and Development were formed. After that, during the 1970s and 1980s, international institution-building only flourished a little. The G7 summit was the only innovation of that time. The establishment of the World Trade Organization and the formation of the Group of 20 industrialized and developing countries are among the most important of these arrangements

Formation of the Group of 20

A look at the structure of the Group of 20 and the importance and possibility of countries playing a role in the decisions of this Group shows that the same five Western countries that laid the foundation stone for the formation of the library group in the 1970s continue to manage the process of global developments in the form of a group regardless of the participation and influence of all. Even in this existing format, the role of the United States is stronger than that of other members of the Group. One of the criticisms raised against the Group of 8 during the past years was the lack of membership of important and influential countries such as China, India, Brazil, South Africa and South Korea. With the emergence of the Asian financial crisis and the debt crisis in South America and Russia in the late 1990s, the presence of other governments among industrialized countries became more necessary. Thus, with the joining of some countries to this Group, the Group of Twenty Industrialized and developing countries (G20) was formed in 1999, which is actually the developed form of the Group of Eight.

- **Members**

The G20 or the Group of Twenty is an international community of 19 major countries in the world along with the European Union. This group is known as a group of countries with large and globally influential economies.

G20 includes 19 large countries from different regions of the world, all of which have large and influential economies. They ensure the presence of all factors influencing the world's economic developments. The president of the World Bank and the International Monetary Organization are also invited to the G20 meetings. These countries are in alphabetical order: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, United Kingdom, United States of America and also, the European Union as a whole.

- **G20 Summits**

Heads of state or government from member nations convene at the highest level during the G20 Summits to address significant global concerns. These summits typically occur yearly and are hosted by various member nations (Refer to Appendix, Table 1). They provide leaders the chance to have important conversations, bargain deals, and decide what matters most in terms of international collaboration.

- **Objective of the G20**

The major objectives for formation of G20 is to bring together economic officials and heads of industrialized countries and some major developing economies to provide a platform for negotiation and consensus on important global issues, especially in the economic field and international interactions.

It was declared by president of USA, Obama in September 2009 that the Group of 20 should become the main framework for international economic cooperation. The group strives to contribute towards sustainable development through economic cooperation, financial policies, trade, and political issues. The group provides a hub for world leaders to discuss important global issues. The objective of the G20 group in general are:

- Sustainable economic development: G20 members try to promote global economic recovery and encourage sustainable growth and employment programs.
- Regulation of markets: The G20 group assesses strength of markets by agreeing and cooperating on financial and trade issues.
- Combating discrimination and poverty: The G20 group tries to introduce programs and solutions to reduce social discrimination and help countries fight poverty.
- Dealing with climate change: The G20 group emphasizes the importance of protecting the environment and fighting climate change; and promotes international cooperation in this field.
- Interaction with developing countries: The G20 group tries to cooperate with developing countries and pay attention to the importance of sustainable development of these countries.
- Strengthening the international financial system: The G20 members are currently working on restructuring the global financial system and proactively averting any other potential financial crises in the time ahead.

These goals are only part of the activities and goals of the G20 group. Its members also address security issues, cooperation in the fields of scientific and technological research, the fight against terrorism and other humanitarian crises. Due to the presence of countries with powerful economies, this group has great importance and influence in international issues.

- **Group Meetings**

G20 meetings were first held at the ministerial level, but since 2008 and with the intensification of the international financial crisis, the first meeting of G20 leaders was held in Washington. And after that, due to the sensitivity of the global economic conditions, more than one meeting was held annually at the level of leaders. At the Seoul Summit in November 2010, it was decided to hold one meeting at this level annually.

- **Participants**

In addition to the members of the Group of 20, representatives of important international and regional organizations such as the United Nations, the International Monetary Fund (IMF), the World Bank, the International Labor Organization (ILO), the Organization for Economic Cooperation and Development (OECD), the World Trade Organization (WTO) and the Association of Southeast Asian Nations (ASEAN) are also participants in this summit. Many a time some non-member countries are also invited by the host country to group meetings.

- **Group Structure**

The structure of the group of G20 is that the Group of 20 does not have employees and a permanent secretariat, but every year one of the members is elected as its president and takes charge of hosting the meet and holding the meetings of the Group. In 2010, France proposed the establishment of a permanent secretariat to this Group. Establishment of a virtual secretariat was also proposed. Both proposals were not accepted. The chairmanship of this Group is determined periodically, and every year, one of the members assumes the responsibility of chairing the Group and coordinating and hosting its meetings.

As the group does not have a permanent secretariat, it is supported by the previous, current and future holders of the presidency, known as the Troika. In 2023, the Troika consists of Indonesia, Brazil and India.

- **Membership**

It is noted that possibly there are no clear criteria for the membership of the governments in the Group of 20. The members are selected based on their economic components, their position in the world economy, and some geographical and demographic considerations. Of course, limiting the number of members to maintain the Group's effectiveness and continuity of activities is also considered. (Chen, D., 2011)

The Position of the Group of 20 and its Transformation Perspective

The G20 can help bring great transformation in global economy. This is because it has about two-thirds of the world's population.

Also, it contributes 87% of the world's nominal GDP (2010) and consists of 80% of world trade. Hence, the Group of 20 can significantly impact the world's economic direction. Some believe that this Group, which apparently includes representatives of all five continents, is becoming the most important governing body in the world, in the field of the international economy and in the managing of the global financial crisis. Therefore, even the Group of 20 was called an institution on the path of transformation whose role has changed from being a crisis committee to being a global economic steering committee. (Chen, D., 2011)

The vision of the G20 group is dependent on the current conditions and challenges of the world. With the spread of new technologies, economic and social changes, and global events, the need for more regulation and coordination of international affairs is felt. In addition, environmental issues, climate change, poverty, terrorism, migration and human crises are among the global challenges that require international cooperation and interaction.

It seems that the vision of the G20 group will be towards a more active development of role-playing and international cooperation. Some of the important aspects that are likely to be emphasized in the vision of the G20 group are:

- **Sustainable development:** Paying attention to sustainable and renewable development in economies is an important agenda item for the G20 group. This issue has been raised as one of the main goals of this group. The reason for this focus is due to issues related to climate change, reduction of natural resources, ecological balance the need for sustainable development and reduction of negative effects on the environment.
- **Dealing with poverty and inequality:** Dealing with poverty and inequality is another main goal of the G20 group. It is trying to improve living conditions and reduce inequality in a world. As an international association representing major economies and regions, the G20 can play an important role in promoting cooperation between countries and implementing joint measures to combat poverty and inequality; which includes encouraging investment and creating job opportunities in developing

countries. Its objectives are also to improve employment conditions in weaker economies, supporting disadvantaged sections of society and strengthening social and economic infrastructure in these areas. It also focuses on increasing access to education and healthcare services, especially in developing countries. It is also promoting responsible use of resources.

- **Fighting terrorism and security threats:** The G20 Group strives to reduce the number of terrorist attacks and security concerns. It does so by emphasizing the facilitation of cooperation between countries and the exchange of security information, the improvement of security measures, and the strengthening of national capacities to deal with security threats. Among the actions and solutions related to the fight against terrorism and security threats that the G20 group pursues include facilitating the exchange of information and security cooperation between countries, in order to identify and monitor terrorist activities and prevent attacks, creating advanced border management systems to prevent the entry of terrorists to these countries. Also, monitors and reduces sources of funding for terrorist groups by following up activities related to money laundering, strengthening the capacities of security forces and regular training to deal with security threats.

Group of 20 and Non-Member Countries

Despite some collective advantages that the Group of 20 enjoys and the fact that all members of the Group are among the top 30 economies in the world, more than 170 countries still need to be members of this Group. According to the statistics of the International Monetary Fund, based on the nominal index of GDP, countries with high ranks such as Switzerland, Norway, and Taiwan are not in this Group. The governments of Spain, Holland, Belgium, Sweden, Poland and Austria are also indirectly present in the Group as members of the European Union. The ranking of the economies based on the purchasing power parity index also confirms the need for more attention to economic criteria in the selection of members. Despite the capacities and status of some governments in international relations, from the beginning of the library group, there was a

belief that if the heads of governments negotiate with each other in limited and informal circles, instead of holding extensive and formal meetings, they will achieve effective solutions; which was less possible to reach in different sessions.

It is related to all of them, whose results will not be approved and accompanied by other governments. In the meantime, it is possible to point out the non-membership of Norway as one of the most significant contributors to the development programs of the World Bank and the United Nations, which has included strong protests from the authorities of this country, so that the Minister of Foreign Affairs, Norway, Group of 20 has called it a group and considered its decisions under the will of the great world powers (Gahr Støre, J., 2010). As the G20 meetings became more severe and it was upgraded to the level of the summit, the opposing opinions towards this Group also took a more coherent and standardized form. One of the essential critical moves in this field is the formation of an unofficial group consisting of 24 countries called the Global Management Group headed by the government of Singapore (Including the governments of Switzerland, Malaysia, Qatar, United Arab Emirates, Kuwait, Bahamas, Bahrain, Barbados, Botswana, Brunei, Dar es Salaam, Chile, Costa Rica, Guatemala, Jamaica, Liechtenstein, Monaco, Zelandano, Panama, Philippines, Rwanda, San Marino, Senegal, Uruguay and Singapore) which, by inviting some non-member governments in the Group of 20, launched a new movement in the direction of criticizing the club of industrialized countries and their deviation from the decision-making process of the United Nations (Tan, S.S., 2016). Of course, apart from the individual and group opinions of the governments against the G20, there are also side movements that indicate the lack of reliance of emerging and industrialized countries on the structure of this Group. Including the holding of meetings of the BRIC group, which includes four emerging global economies, namely Brazil, Russia, India and China; all of these governments are also members of the Group of 20. Russia and China have both votes and permanent seats in the Security Council; this structure shows the weight and influence of this Group on the decision-making process and seeking more privileges of these governments even outside the framework of the Group of 20.

Suggestion: There are many countries with high GDP who are not members of this group. The member of the group could be increased. Membership could be increased to include more developing countries too and countries with high GDP. In this manner all present member countries will benefit more. Further, the existing benefit will be shared areas with developing countries too.

Conclusion

Considering the high economic and development capacities, the Group of 20 can significantly impact the world's economic direction, including in the field of the international economy, and help in dealing with the global financial crisis. The group strives to contribute to the improvement and sustainable development of the global economy through economic cooperation, financial policies, trade and political issues. Some believe that this Group, which includes representatives from all five continents, is becoming the most important governing body in the world. Therefore, they are even called the G20, an institution on the path of transformation.

Appendix

Table-1: G20 Summits in Different Countries

	Date	Host Country	Host City
1st	14-15 November 2008	United States	Washington, D.C.
2nd	02 April 2019	United Kingdom	London
3rd	24-25 September 2009	United States	Pittsburgh
4th	26-27 June 2010	Canada	Toronto
5th	11-12 November 2010	South Korea	Seoul
6th	3-4 November 2011	France	Cannes
7th	18-19 June 2012	Mexico	San José Del Cabo, Los Cabos
8th	5-6 September 2013	Russia	Saint Petersburg
9th	15-16 November 2014	Australia	Brisbane

10th	15–16 November 2015	Turkey	Serik, Antalya
11th	4–5 September 2016	China	Hangzhou
12th	7–8 July 2017	Germany	Hamburg
13th	30 November – 1 December 2018	Argentina	Buenos Aires
14th	28–29 June 2019	Japan	Osaka
15th	21–22 November 2020	Saudi Arabia	Riyadh
16th	30–31 October 2021	Italy	Rome
17th	15–16 November 2022	Indonesia	Nusa Dua, Bali
18th	9–10 September 2023	India	New Delhi

Source: https://en.wikipedia.org/wiki/List_of_G20_summits

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18

Promoting Circular Economy

Sania Khan

Abstract

The circular economy seeks to shift the paradigm away from the linear economy by reducing environmental impact and resource waste while enhancing efficiency at all phases of the product cycle. Recent concerns about trash pollution and natural resource scarcity are supporting the growth of a circular economy.

Circular economy's primary advantage is that it protects the environment by lowering waste and greenhouse gas emissions, systematising reuse and recycling, and eliminating planned demise. It also promotes innovation and economic growth, by which the competitiveness of national enterprises' might improve in the long run. In addition to that, the circular economy produces employment and enables people to save money, decreasing poverty and joblessness as well as the societal consequences of pollution and global warming.

Keywords: *Circular Economy, Reverse Logistics, Waste Management, Linear Economy, E-Waste*

Introduction

A growing number of environmental and economic issues have been addressed in recent years by the idea of circular economy (CE). The resources are finite and the consequences of those resources in mostly negative resulting in rise of waste and pollution. The traditional linear model of economic growth could be replaced by circular economy which acts as a more sustainable and resilient alternative.

Around the world, law institutions, companies, and other organisations are progressively looking at methods to implement circular practises and move towards a more circular economy. The importance of the circular economy in India's efforts to reduce carbon emissions by promoting responsible consumption and sustainable resource management was also highlighted at the COP27 meeting.

The International Energy Agency asserts that if the aim is to decrease global carbon dioxide emissions to net zero by 2050, one must fundamentally alter how they produce, transport, and use energy. A paradigm change that would reshape the renewable energy sector into a more circular economy has the potential to significantly cut waste and carbon emissions while increasing the availability of components and materials, including essential metals. It lessens the amount of polluted waste, loss of biodiversity, and ecological degradation caused by mining. In addition, a circular economy diversifies the supply of vital metals for the renewable energy sector by reintroducing resources to the market in a sustainable manner.

What is A Circular Economy?

The new paradigm provides sustainable enterprises and local work opportunities for men and women, opportunities that are badly needed by economies that were afflicted by the pandemic. Secondary market for the repair, refurbishing, and trade of old components were also born under it. There are enormous prospects for innovation provided by new business models that emphasise sharing, reusing, mending, and remanufacturing.

For equipment used in renewable energy, a circular economy would produce a more durable global supply chain for resources, energising economies, generating additional uses, and diverting trash from landfills and back into the market. This emerging strategy has the potential to improve lives, give women more power, build communities, and guarantee that workers and communities gain from the shift to a new clean energy economy. There is much to be learnt from nature, which provides a superb example of a circular system. The difference between Circular and Linear Economy can be illustrated through Figure 1.

Need for Circular Economy

To establish a system that encourages sustainability, lifespan, reuse, and recycling, CE aims at limiting junk while optimising utilization.

Although recycling and reuse have long been part of Indian culture, circular economy adoption has been of greater importance now than ever due to the country's fast economic development, expanding population, effects of climate change, and rising environmental degradation.

In accordance with the 2030 Agenda for Sustainable Development, CE can promote the formation of more environmentally friendly production and consumption patterns, giving both developed and developing nations the chance to experience economic growth.

India's Initiatives to Promote Circular Economy:

In accordance with a circular economy and in recognition of the significance of sustainable growth, the government laid down various comprehensive guidelines for managing battery waste, plastic and e-wastes too. These results and guidelines have been described below:

(a) Battery Waste Management Rules 2022

"The Ministry of Environment, Forestry and Climate Change (MOEFCC)" has announced this rule to guarantee responsible management of used batteries.

Key Highlights of the Rules

- The requirements apply to all battery types, including industrial, car, portable, and electric vehicle batteries.
- The rules are based on the concept of Extended Producer Responsibility (EPR), that considers battery producers responsible for collecting, recycling, and repairing used batteries, as well as using waste-derived recovered materials in new batteries. EPR prohibits the dumping and burning of old batteries and mandates that every single utilised batteries be obtained and transported for recycling or refurbishment. Producers can complete their EPR obligations by arranging for the collection, recycling, or rehabilitation of obsolete batteries. They have the authority to provide approval to any other entity. It will be able to construct a system and a

centralised website for the exchange of EPR certifications in order to fulfil producer requirements.

- **Waste management:** They promote new enterprise and entrepreneurship in the collection, recycling, and repair of spent batteries.
- **New Business possibilities:** The laws will bring fresh innovations, investment, and business opportunities into the recycling and refinishing sector by requiring a minimum proportion of resource recovery from spent batteries.
- Reducing the demand for new raw materials while also protecting natural resources can be done by requiring the use of a certain amount of reused components in the manufacture of new batteries.
- Online registration includes online reporting, auditing, and a committee to supervise the implementation of regulations and take appropriate action to fix any concerns.
- The Extended Producer Responsibility (EPR) objectives, duties, and obligations specified in the guidelines will result in environmental compensation being enforced.
- Environmental Compensation Fund: Uncollected and non-repurposed waste batteries will be collected, refurbished, or recycled with the help of the money raised under environmental compensation.

(b) Plastic Waste Management (Amendment) Rules 2022

“The Extended Producer Responsibility (EPR)” for plastic packaging was laid down clearly in the “Plastic Waste Management (Amendment) Rules, 2022”.

The Waste Management for Plastics Guidelines of 2016 have been changed in order to encourage alternatives and speed the removal of single-use plastics.

Prolonged Procedure The duty of a manufacturer to handle a product in an environmentally sound manner to the very end of its service life is referred to as responsibility.

Significance of the Guidelines

Significant standards have been established to stimulate the development of new plastic replacements and to provide enterprises with a roadmap for transitioning to environmentally friendly plastic packaging. The ideas provide a framework for improving waste plastic packaging’s circular economy.

By reusing, sharing, repairing, refurbishing, remanufacturing, and recycling materials, a closed-loop system is built that reduces resource utilisation, waste creation, pollution, and carbon emissions.

These are crucial actions for lowering pollution brought on by the nation's discarded plastic garbage. Every year, India produces roughly 3.4 million tonnes of plastic garbage. By 2024, the United Nations Development Programme wants to virtually treble the number of Indian towns where it manages plastic garbage.

Plastic garbage accumulation is harmful to the environment, and when this waste enters the water, it may cause significant harm to aquatic ecosystems.

Other steps taken to put a check on the Plastic Waste:

- Swachh Bharat Mission (Refer Box 1)
- India Plastics Pact (Refer Box 2)
- Project REPLAN (Refer Box 3)
- Un-Plastic Collective (Refer Box 4)
- GloLitter Partnerships Project (Refer Box 5)

Way Ahead:

- A general prohibition will not be sufficient to prevent companies from making single-use plastic items.
- Finding alternatives to single use plastic and providing manufacturers, garbage pickers, and other individuals involved in the industry with alternate livelihoods will require huge efforts in alleviating the issue.
- The government must encourage companies to convert to more sustainable goods by offering incentives in addition to fines for breaking the rules. Promoting responsible consumption is highly essential, along with effective monitoring.
- Citizens must also adjust their conduct and make a contribution by not littering and by aiding in garbage management and waste segregation.

(c) e-Waste Management Rules 2022

The draught notification for electronic waste management has been made available for public comment by the "Ministry of

Environment, Forest, and Climate Change". India's explicit guidelines for managing electronic waste, which were initially published in 2016 and updated in 2018. By August 2022, the most recent regulations are anticipated to take effect.

Earlier, the Plastic Waste Management Amendment Rules, 2021 had been announced by the Ministry. By 2022, certain plastic objects that can be used only once that have "low utility and high littering potential" will be forbidden by these regulations.

Draft Notification for Electronic Waste Management

- **Electronic products Covered:** The alert covers a wide variety of electrical items, including desktops, telephone and cellphones, recording devices, audio systems, microwaves, fridges, and medical equipment.
- **E-trash Collection Goal:** Manufacturers of consumer products and electronics must make sure that they gather and recycle at least 60% of their electronic trash by 2023, with goals to raise those percentages to 70% and 80% in 2024 and 2025, respectively. A company's yearly production and e-waste collection goals must be stated when registration on an internet portal.
- **EPR Certificates:** The regulations implement a system of trade in certificates, similar to the trading in carbon credits, which would allow businesses to fill gaps for time being. The regulations specify a procedure for businesses to get Extended Producer Responsibility (EPR) certifications. These certificates attest to how much e-waste a business gathered and recycled in a certain year, and an organisation may sell excess amounts to another business to assist it achieve its responsibilities.
- **Circular Economy Focus:** The EPR, recycling, and trade are highlighted in the new rules. This is a result of the government's goal of fostering a circular economy.
- **Penalty:** Businesses who do not fulfil their yearly goals must pay a fee or a "environmental compensation," however the legislation doesn't define how much these fines will cost.
- **Implementing Authority:** The Central Pollution Control Board (CPCB) will be in charge of ensuring that these regulations are generally put into effect.
- **Responsibilities of the State Governments:** State governments are responsible for granting industrial premises for e-waste

disassembly and recycling facilities, developing industrial skills, and implementing rules to protect the well-being and security of workers at e-waste plants.

E-Waste:

Old, outdated, or abandoned electronic appliances are referred to as “E-Waste,” which is short for “Electronic-Waste.” It comprises all of their parts, supplies, and spares.

India has e-waste management laws in place and effective since 2011, requiring that only authorised dismantlers and recyclers collect e-waste. In 2017, the E-waste Rules, 2016 were passed. In Bhopal, Madhya Pradesh, the nation’s first e-waste clinic has been established to separate, treat, and dispose of garbage from residential and business units.

The Basel Convention (1992) did not initially address the issue of e-waste, but it did so in 2006 (COP8). The Basel Convention on the Control of the Trans-boundary Movement of Hazardous Waste’s COP9 endorsed the Nairobi Declaration. It sought to develop ground-breaking approaches to the ecologically responsible treatment of e-waste.

Challenges of Managing of E-Waste in India:

- Lesser Participation of People: One major reason why discarded electronic gadgets weren’t recycled was because customers didn’t do it themselves. However, nations all over the globe have recently been striving to enact successful “right to repair” legislation.
- Child Labour: In India, it has been estimated that 4.5 lakh children between the ages of 10 and 14 work in various E-waste-related activities without the proper protections and safeguards in different yards and recycling facilities.
- Ineffective Legislation: The majority of State Pollution Control Boards (SPCBs)/PCC websites do not provide any public information.
- Health risks: Land and groundwater have been damaged by more than 1,000 hazardous substances found in e-waste.
- Absence of incentive programmes: The clear procedures for handling e-waste are lacking on the unorganized industry’s part. Additionally, there are no mentions of incentives

to persuade interested parties to follow a formal path for treating e-waste.

- 80% of the electronic trash (E-waste) produced in developed countries for recycling is shipped to developing countries such as India, China, Ghana, and Nigeria.
- Lack of coordination among the different entities in responsibility of the handling and disposal of e-waste, particularly by municipalities.
- End-of-life computers typically include critical private data such as bank account information, which, if not wiped, opens the door to fraud.

Way Forward:

In India, a number of new businesses and corporations have begun to gather and recycle electronic garbage. Better implementation strategies and inclusion guidelines are required so that the informal sector may step up and assist in meeting recycling goals in an ecologically responsible way.

Additionally, all actors, including consumers, have to be involved in order to successfully increase collection rates.

(d) These regulations enable transactions among stakeholders for “Extended Producer Responsibility (EPR)” certifications and provide target waste disposal guidelines for manufacturers, producers, importers, and bulk consumers.

In accordance with the 2016 Plastic Waste Management Rules, the Union Environment Ministry has released a draught notification for regulation of Extended Producer Responsibility (EPR). The sketch outlines the volume of garbage that manufacturers, importers, and brand owners that produce waste from plastic packaging in India will need to handle.

Earlier, the Plastic Waste Management Amendment Rules, 2021 had been announced by the Ministry. By 2022, certain plastic objects that can be used once and have “low utility and high littering potential” will be forbidden by these regulations.

Key Points:

- **Producers’ Mandate:** It requires producers of plastic packaging materials to collect all of their output by 2024 and guarantee that a certain percent of it is recycled and utilised in following supplies. Plastic producers will be required to submit their yearly plastic production to the government via a centralised website.

- EPR certifications: It has also outlined a method via which producers and consumers of packaging made of plastic can acquire and trade in certifications known as EPR certificates. EPR refers to a producer's obligation for ecologically sound management of a product (plastic packaging) till the end of its life. The certifications will assist organisations in compensating for shortfalls caused by other firms that employed recycled material in violation of their obligation.
- End-of-life Disposal: Only a tiny amount of non-recyclable plastic, including multifaceted, multi-material plastics, will be permitted to be utilised in end-of-life disposal processes such as "waste for energy, waste to oil, and cement kilns". They can only be disposed of in ways approved by the Central Pollution Control Board (CPCB).
- Plastic Packaging categories:
 - **'Rigid Plastic'**: These are items made of plastic that are difficult to crush. A lot of them are big, clunky things like lawn chairs, buckets, kid's toys, etc.
 - **'Flexible Plastic'**: This category comprises single-layer and multilayer packaging (packing with more than one layer of different kinds of plastic), plastic sheets and covers, carry bags (bags made of biodegradable polymers as well), and plastic sachets and pouches.
 - **"ulti-Layer Plastic Packaging"**: These are polymers that contain both plastic and a layer of another substance.
- **Targets:** Companies will have to collect at least:
 - 35% of the estimated target in 2021-22.
 - 70% of the set target by 2022-23.
 - 100% of the set target by 2024.

By 2024, they will have to recycle at least 50% of their hard plastic and 30% of their category 2 and 3 plastics. After 2026–2027, around 80% of their category 1 and around 60% of the other two categories will need to be recycled, with the objectives getting higher every year.

Companies who import packaging materials as well as use them have comparable aims with a few minor variances.

- **Purchasing EPR Certificates:** Entities may purchase certificates on a "case-by-case basis" if they are unable to meet their requirements. A framework for

these exchanges on a centralized internet site will be developed by the CPCB.

- **Non-Compliance:** Non-compliance, however, won't result in a customary fine. Instead, a charge for environmental compensation will be imposed, albeit the guidelines are ambiguous as to how much it would cost.
- **Fine:** Organisations that fall short of their goals or don't buy enough credits to reach their yearly objective must pay a fee. They would be eligible for a 40% return if they achieved their goals in just three years. But after that, the money would be lost forever. The money collected in this manner will be placed in an escrow account. It will then be utilized for the collection and end-of-life disposal of plastic packaging trash that has not been collected, recycled, or disposed of in accordance with the law.
- **Banning Plastics:** Starting in July 2022, a variety of plastic items will no longer be manufactured. Earbuds with plastic sticks, balloon sticks, plastic flags, candy sticks, and more are on the list.

Action plans stressing the value of recycling secondary materials were also developed across ten sectors, including "e-waste, lithium-ion batteries, end-of-life cars, scrap metal, municipal solid trash, etc".

Roadblocks to Achieving Circular Economy

There are many obstacles that comes in the way achieving CE.

- Uncertainty around the final aim of India's circular economy agenda and gaps in the execution of the regulations are two main obstacles. Despite the efforts of the Government's through policies, progress has been lacklustre.
 - Additionally, attempts to promote CE are made towards the end of value chains, leading to less-than-ideal effects for the economy and the environment.
- Industries' reluctance to adopt the circular economy model is a result of supply chain constraints, a lack of investment incentives, complicated recycling procedures, and a lack of knowledge to promote involvement in these processes.
- Lack of Knowledge and Understanding: It is challenging to get support for adopting circular economy projects in India since many people are unaware of the idea of a circular economy and its advantages.

- **Infrastructure Challenges:** The infrastructure of India doesn't seem well-suited to sustain a circular economy. For example, the absence of recycling facilities renders recycling and reusing materials difficult.
- **Cultural Barriers:** It is challenging to influence consumer behavior and move towards a circular economy in India due to a cultural reluctance to the notion of reusing and recycling things.

Steps to Promote Circular Economy

Certain steps could be taken to promote CE. They could be through statutory reforms ensuring that laws are aligned with implementation strategies making sufficient investment in R&D and promoting a technology driven recycling system.

- **Statutory Reforms:** By creating a single piece of legislation that addresses the circular economy from a regulatory standpoint, legislative regulations for the acquisition of recycled/secondary raw materials in the early levels of cycle of production may be able to address the issues stated above.
 - Simplifying the reporting requirements for the circular economy, defining the trading rules for "EPR certificates", and offering financial subsidies for businesses to finish their supply chains will all be beneficial.
- **Aligning Laws with Implementation Strategies:** In order to reap the rewards of the circular economy, government initiatives must work in tandem with actionable steps and industry participation.
 - The government's ongoing initiatives combined with effective implementation techniques will provide businesses the confidence they need to adopt the production model of circular nature.
- **Investments in R&D:** Recycling technologies must be researched and developed by the renewable energy sector. Research and development spending may pave the path for the development of new recycling techniques that are more effective and have a less environmental imprint.
 - In order to build domestic trash recycling facilities, industries should investigate technology transfers with international recycling companies.

- **Technology Driven Recycling:** To stimulate public engagement in the advancement of waste management technology, the government must support R&D in the field of waste recycling at educational levels.
 - Additionally, urban composting facilities may be constructed to recycle organic waste, increasing soil carbon content and obviating the demand for artificial fertilizers.

Conclusion

Residents know little about and comprehend nothing about CE. The public lacks fundamental knowledge regarding their role in promoting CE, even when the government sets an ambitious objective and assumes greater responsibility in this area. The majority of locals don't participate in CE promotion. Despite the hurdles, if concerted efforts are made by all stakeholders, the government, the respective industry players as well as consumers, achieving a CE is a near possibility.

Annexures

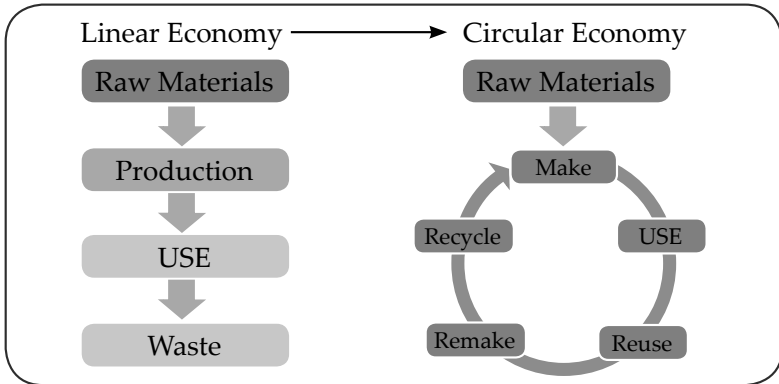


Figure 1: Circular and Linear Economy

Box-1: Swachh Bharat Mission

The Indian Prime Minister announced the “Swachh Bharat Mission” on October 2, 2014, to speed up efforts to achieve complete access to sanitation and to prioritise sanitation. The programme intends to ensure that all “Indian villages”, “Gramme Panchayats”, “Districts, States”, and “Union Territories” declare themselves “open-defecation free” (ODF) by 2 October 2019 by constructing more than 100 million toilets in less developed part of India.

Box-2: India Plastic Pact

In order to reduce, reuse, and recycle plastics across their value chain, corporations, governments, and NGOs have joined forces under the ambitious India Plastics Pact effort. The goal of the Pact is to convert the present linear plastics economy into a circular one.

Box-3: Project REPLAN

For its groundbreaking Plastic-mixed Handmade Paper, which was created to lessen the threat of plastic in the environment, Khadi and Village Industries Commission (KVIC) has obtained patent registration. The handmade paper that contains plastic was created as part of Project REPLAN (REducing PLAstic from Nature). The first initiative of its sort in India uses plastic trash that has been destructured, degraded, diluted, and mixed with paper pulp to create handmade paper, reducing the amount of plastic waste that enters the environment. The innovation supports the Prime Minister’s call to action to combat the danger of single-use plastic.

Box-4: Un-Plastic Collective

The Collective works to reduce the negative effects plastic pollution has on the ecological and social wellbeing of our world. Un-plastic is a term used to describe the movement of all forms of plastic in a circular economy and the long-term elimination of superfluous plastic while adopting sustainable alternative materials.

Box-5: GloLitter Partnerships Project

“The International Maritime Organization (IMO)” and the “Food and Agriculture Organization of the United Nations (FAO)” together established the GloLitter Partnerships Project.

The project’s original financing came from the Norwegian government. The initiative intends to assist the fishing and marine transportation industries in adapting to a future with less plastic. This effort will help developing nations implement best practices for the prevention, reduction, and management of waste in the form of marine plastic litter from those sectors in order to reach this aim.

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Dealer Management in Automobile Industry: Comparative Analysis of G20 Countries

Sumit Tomar

Abstract

A dealer is an important intermediary in automobile supply chain. With the changing scenario, new challenges have emerged in the functioning of traditional “OEM to dealer to consumer” model. The advancement of technology in recent years has moved manufacturers closer to the end consumer. It has forced firms to switch to newer advanced dealership models. This study seeks to address the new dealership models and their adaptability by the G20 countries i.e., India, US, China and European Union.

Keywords: *Dealer Management, Dealership Models, Automobile Dealer, G20 Countries, Manufacturer-Dealer relationship*

Introduction

Peter Drucker called the automobile industry “the industry of industries”. The OICA (International Organization of Motor Vehicle Manufacturers) has identified more than 50 nations involved in the assembly, production, or distribution of automobiles. Greater China is the largest producer of cars with 33% share followed by Europe (21%) and Japan & Korea (15%) (Refer to Table-1), of those, only 15 countries have the capacity to independently design and manufacture entirely original automobiles. (Lynch, Jared, Hawthorne, 2015).

Out of these 15 countries, India’s automotive industry holds the position of being the third-largest in the world in terms of production. As of 2023, in terms of sales, India ranks as the

third-largest automobile market globally. By the valuation of its automotive industry, India achieved the position of the fourth-largest country in the world in 2022. The Indian automobile sector contributes approximately 7% to the national gross domestic product.

With the growing market demand and production, efficient distribution is a new challenge faced by the Indian automobile Industry. Automobile dealerships fulfil a vital function by serving as intermediaries between automobile original equipment manufacturers and end customers. They provide after-sales services and facilitate the sales of new vehicles (Singh, F. B., Kakkar, G., & Mishra, B, 2021).

Before liberalization, India had a handful of auto companies but post-liberalization many global companies entered India. India has seen exponential growth in automobile production since then but with an increase in competition dealer's margins went low as compared to the world average. As per the study by the "Federation of Automobile Dealers Associations" (FADA), the majority of automakers in India provide dealer margins that are below 5 percent of the average fixed amount, typically ranging from 2.9 percent to 7.49 percent on the price of ex-showroom for all brackets. In India, the highest average dealer margins are provided by MG Motors at 5.22 percent, and Maruti Suzuki at 5.07 percent. Nevertheless, these numbers still fall significantly below the standards accepted internationally. As an example, countries such as the United States offer dealer margins of 8 to 10 percent, while figures in China typically range from 9 to 11 percent. In contrast, countries like France, Italy, Spain, Germany, Denmark, Belgium, and South Africa have margins on car dealership that approximate around 13 to 14 percent.

The article attempts to compare the adaptation of potential dealer management models in the auto industry of G20 countries i.e., India, the United States, China, and the EU.

Dealer in the Auto Sector

A dealer operates as an intermediary between a 'franchisor', who owns the brand's trademark and business system, and a 'franchisee', who pays a royalty and possibly an initial fee to conduct business using the franchisor's name and system. The

dealer represents a specific brand franchise at a designated location. (Charles Murry, Yiyi Zhou (2019)

The legal definition of new motor vehicle dealer is provided under the “Motor Vehicle Manufacturers, Distributors, and Dealers Franchising Practices” Act, a “New motor vehicle dealer” refers to an individual involved in the activity of selling, offering to sell, soliciting, or advertising the sale of new motor vehicles. This person must hold, or have held at the time a cause of action under this chapter arose, a valid sales and service agreement, franchise, or contract issued by the manufacturer or distributor, which authorizes the retail sale of the manufacturer’s or distributor’s new motor vehicles.

The 1988 Act of “Indian Motor Vehicle” also defined the motor dealer. As per the Act, a dealer refers to any individual who is involved in either of the following activities:

1. Constructing bodies to be attached to chassis; or
2. Repairing motor vehicles; or
3. Engaging in the business of leasing, hypothecation, or hire-purchase of motor vehicles.

The “Federation of Automobile Dealers Associations” (FADA) serves as the primary national organization representing the Automotive Retail Industry in India. It explained two modes of earnings of automotive dealer. According to FADA, dealer has primary and secondary modes of earning. Primary earning comes from selling new cars on margin. There are other secondary modes of earning also. It enables them to maintain their financial stability. Dealers generate income through various means, such as partnering with banks and financial institutions, selling third-party motor vehicle insurance policies, and offering the company’s official accessories along with after-market fitments that customers often install to enhance the appearance or features of their vehicles. Additionally, some dealers also provide exchange facilities and venture into the sale of used bikes and used cars.

Dealer Management

The management of dealers involves a strategic approach adopted by manufacturers to maximize their gains from the enterprise solution in a convenient, effective, and cost-efficient

manner. This approach includes the distribution of materials produced by the manufacturer to dealers, covering aspects such as warranty, claims, service, and bidding, tailored to the specific requirements of each manufacturer. It functions as a B2B application, managing both, primary dealers and tertiary dealers to track the distribution of production all the way to the end customer. (Manisha Madhwani, R. Roseline Mary, 2013)

In the dynamic world, to achieve competitive advantage, firms and national governments are introducing new methods to understand the market forces and to increase bargaining power. In the post covid era, with an increase of uncertainty in the market, executing the management fundamentals of planning, organizing, controlling, coordinating, and directing industries has changed. The automobile industry is also leading the transition towards zero-emission mobility.

Manufacturers aim to foster positive and fruitful rapport with their franchised dealers to enhance the flow of vehicles through distribution channels, favouring their brand over competitors. They also value insights from local dealerships, learning about customer preferences and demands. On the other hand, dealerships strive to establish long-term relationships with customers, aspiring to provide an ideal customer experience. (Brunson, Kendrick, and Barnes, Steve, "Automotive Dealership Management Fundamentals", 2020)

Supplier-Dealer Relationship

Various studies on the supplier-dealer relationship have been done to increase the effectiveness of the channel relationship. From the suppliers' point of view, supplier managers prioritize evaluating dealers' performance rather than their satisfaction levels.

In the automotive industry, manufacturers are required to meet dealers' expectations concerning effective communication, adherence to marketing policies, efficient order handling, technical support, post-sales service, and involvement in research and development (R&D). The manufacturer-dealer relationship is reciprocal since their profitability and competitiveness are interdependent on each other. (Aboltins and Rivza, 2014)

A dealer's job satisfaction and job performance are positively correlated, with social satisfaction carrying more significance than economic satisfaction. (Lai, C. S.,2007). Hence this interconnected relationship of performance and satisfaction has been studied by many scholars. Satisfaction plays a crucial role in influencing the relationship between a dealer and his supplier (Dwyer, 1980) since not only is the morale of channels influenced by satisfaction, but satisfaction also serves as a contributing factor to collective activity (Schul, Little, & Pride, 1985). Ambler, Styles, and Wang (1999) discovered that a channel's qualitative results, including satisfaction, have a direct impact on its performance.

Various other factors were studied by scholars. Such as, the frequency of using relatively high-pressure influence strategies by the manufacturer's field representatives was found to be positively associated with the manufacturer's perceived power (Kale, S. H. 1986). The organizational structure of firms was found to influence the prices negotiated. Negotiations between firms, in turn, affected the value of the firm. Firms that consistently engaged in more effective negotiations tend to have captured greater value. (Victor Manuel Bennett, 2013)

Roles and Responsibilities of Manufacturer and Dealer

Regarding their association with dealers, manufacturers hold a dominant role. They have the final authority to decide which dealerships will receive the inventory of new vehicles directly from the assembly line. Dealers place orders with Original Equipment Manufacturers (OEMs) for specific volumes of inventory they require. Nevertheless, dealers with higher sales performance for the OEM are more likely to secure an adequate inventory of the vehicles they desire. Dealers with a track record of low sales figures may not receive their full requested vehicle inventory. The relationship operates on a merit-based system, relying on past sales performance as a determining factor. (Brunson, Kendrick, and Barnes, Steve, "Automotive Dealership Management Fundamentals", 2020).

The manufacturer ultimately decides which dealers meet the criteria to become the franchise owner within a designated geographic market area. (NADA.org).

Integrated Automobile Product Development Process (PDP)

The automobile industry generally follows the following basic major steps for product development before sending the end product to the dealer. The PDP (Product Development Process) influenced by market demands consists of five primary stages, as outlined by Joy ChiaHuh Liang in 2009:

1. Gathering Customer Input
2. Developing Conceptual Designs
3. Creating Detailed Designs and Engineering
4. Implementing Manufacturing Processes and Production
5. Managing Sales and Distribution.

Automotive Dealership Models

There are various automotive dealership models which are prevalent. One is a traditional model.

Traditional Dealership Model

This is a three-tiered model, wherein OEMs provide vehicle to dealer who supply to consumer. The car goes downward in supply chain while information and money flows upward in supply chain (Refer to Figure-1). The global automotive industry is being rapidly disrupted by technological innovation (Rajan et al., 2017). The retail sector is undergoing substantial transformations, and the automotive retail industry is also experiencing these changes. The widespread impact of the internet has facilitated revolutionary and unprecedented shifts in retail, creating new markets with emerging competitors and consumers. As a result, there are new expectations and a transformation in how value is generated and offered (Gielens & Steenkamp, 2019). The emergence of electric vehicles (EVs) is raising doubts about traditional auto-dealership business models. Worldwide, there is a growing trend of investigating alternative models in response to the automotive sector's increasing shift towards online sales platforms, with a particular focus on significant markets such as China. Various disruptive approaches are already being tested, including luxury car malls, automotive vending machines on Alibaba's T-mall, and value-added services provided directly by original equipment manufacturers (OEMs) like Musk's Tesla.

Yet another model is the Agency Sales Model.

Agency Sales Model

Agency sales represent a progression from the conventional three-tiered sales model to a more cohesive online-offline approach. In this system, original equipment manufacturers (OEMs) directly engage with customers and assume responsibility for the sales process. Although the dealer still interacts with the customer, their role shifts to that of an agent, as they are no longer the contractual partner in the sales transaction (Refer to Figure-2).

McKinsey & Company Model

McKinsey & Company have proposed four dealership models; them being, brand-focused dealership (Refer to Figure-3).

- Dealerships with a focus on specific brands located in second-tier cities.
- Dealerships pursuing this strategy will focus on luxury brands that will likely withstand more severe disruptions due to consumer loyalty and the differentiated brand and customer experience they offer. They will likely grow their presence in tier-two cities less severely affected by the trends discussed above. One would expect regional and brand-level dealership consolidation to occur, supported by strong improvements to operational efficiency and high customer focus.
- Creating a large geographic presence and expanding the range of operations.
- Dealerships adopting this approach will aim to enhance their geographic scale through non-organic means by entering neighbouring markets and expanding their presence in existing ones. They will broaden their scope by incorporating new capabilities, such as increasing the availability of white-label F&I (Finance and Insurance) products or strengthening their position in collision services and crash parts. Additionally, they might establish collaborations with local mobility providers to offer a diverse range of services and parts. By diversifying their offerings, these dealerships can mitigate profit declines in new and used vehicle sales while building resilience by developing new capabilities.

➤ Establishing an ecosystem platform.

Over the past three years, automotive retailers faced challenges similar to other retailers. The successful ones prioritized understanding customers, loyalty, and share of spending, creating personalized offerings. Instead of focusing solely on transactions, they aimed to grow their share of wallet, prompting customers to spend more with them. They employed strong customer-relationship-management models and insights to develop tailored product and service propositions. Success relied on a seamless, transparent, and convenient mobile experience. Dealerships could follow suit with customer-centric features to boost loyalty and share of wallet.

➤ Prioritising markets with low levels of disruption.

Dealerships with a predominately rural footprint are most likely to pursue this strategy. These players will focus on areas less affected by the emerging trends—nonurban and rural locations—and will continue to pursue a more traditional dealership model with a much slower pace of innovation. They could become customers of dealer groups who have developed parts and platform capabilities and purchase these assets rather than building them in-house.

Other Models

Four other models have been suggested, they being Connected Traditionalist, Online Evangelist, Digital Multichannelist, Ecosystem Orchestrator. These four have difference in operation based on sales channel their offering, the network format and the dealer network management. (Refer to Table-2)

Dealer Management in Countries

Dealer management practices differ in different countries. The following presents dealer management strategy and practices of USA, Indian China and EU.

Dealer Franchise System in the United States

In the United States, there is a distinctive business approach concerning the sales of new automobiles known as the United

States Dealer Franchise System. In this system, exclusive franchise dealers have the privilege to sell particular brands, even though they might offer multiple brands at the same dealership location. Around 20 percent of all state sales taxes originate from auto dealers, enabling them, including local or state car dealership associations, to wield considerable influence over local legislatures. As a consequence, these new car dealerships hold a significant sway in the decision-making process. As a result of this situation, a series of state laws have been established to ensure the profitability and survival of dealerships, even if it comes at the cost of reducing manufacturer profits (Lafontaine, Francine, and Fiona Scott Morton, 2010). A new Direct Delivery System for OEMs has been introduced, although it is not widely adopted by many OEMs. However, Tesla stands out as an exception and has successfully implemented this direct distribution system for its vehicles.

In the year 2022, the United States has a total of 16773 new car dealerships. These 16,773 franchised dealerships for light vehicles managed to sell a total of 13.7 million light-duty vehicles, resulting in light-vehicle dealership sales surpassing \$1.2 trillion. In addition to vehicle sales, dealerships generated over 265 million repair orders, and their service and parts sales combined to exceed \$137 billion. (Refer to Table 3)

Sales of dealers, 50% sales were attributed to sale of new vehicles follows by sale of used vehicle (38%) (Refer to Figure-4).

There is a decline in sales by 8% compared with 2021. New light-vehicle inventory is also a challenge faced by the US auto industry in post COVID. In 2022, the number of new light vehicles available remained historically low, hovering around 1.1 million units, due to ongoing constraints. However, in the latter part of the year, OEMs managed to boost production and concluded the year with 1.7 million new light vehicles either already in inventory or enroute. While the microchip shortage is expected to continue affecting vehicle production in 2023, the impact is projected to be significantly less severe compared to the challenges faced in 2021 and 2022.

Single OEM In India

In India, the prevailing dealership setup usually consists of single OEM establishments, with distinct separations between dealerships representing different OEMs. Under the single OEM system, Indian car dealers primarily perform tasks such as Sales and Service, along with additional services like handling registrations, insurance, and vehicle financing.

In India, the auto retail industry is well-established with a significant presence of over 15,000 automobile dealerships, which, upon considering various regional, state, and city associations, total to around 26,500 of automobile dealers. This industry, in its dealerships and service centres, provides employment to an impressive workforce of around 4 million individuals (Federation of Automobile Dealers Associations (FADA)).

In terms of revenue generation, India's dealers can be classified into four levels. According to the ET auto survey, 37% are large dealers (revenue of Rs. 700 crores and above), 31% medium dealers (revenue between Rs. 400 crores and Rs. 700 crores), 14.2 small dealers (revenue between Rs. 200 crores and Rs. 400 crores), and 17% micro dealers with revenue up to Rs. 200 crores.

There is a shift in consumer preference for buying a new vehicle. Recently, there has been a substantial rise in web-based sales inquiries, experiencing a significant increase from 3% to 39%. Additionally, the customer's interaction with the dealership has seen a notable shift, with six out of eight touchpoints in their journey now being conducted through digital channels. (Financial Express)

There are a few new technological initiatives in the automobile industry in India too such as the advent of Virtual reality and 3D which may lead to the possibility that the significance of physically inspecting the car will lose its value. Other initiatives are an individual workshop with an expanded parking area, shared mobility, and autonomous cars.

The OEM plans to raise the parts margins for dealers, allowing them to achieve breakeven with a reduced number of bays. Moreover, the increased margins on sales from the OEM will help dealers offset the effects of lower car sales.

The average dealer margin differs from company to company, the highest being that of MG Motors followed by Maruti Suzuki and Kia Motors (Refer to Table-4).

While the conventional dealership model may not completely disappear, its continuation will depend on the ability of businesses to adapt to the evolving business landscape. According to a study conducted by ET Auto, in this new era, OEMs will need to offer an extra discount of 10% to help dealerships maintain their Profit Before Tax (PBT) at the current level.

The study by ET suggests the following measures for Indian dealers to evolve. Dealers in India have various adaptation options amidst the evolving landscape. Dealers in India have the opportunity to adapt in response to evolving trends. They can collaborate more closely with OEMs, leveraging big data and analytics to establish an omni-channel presence for customers. Achieving regional multi-OEM service flexibility is another option. Transforming into car malls with a single OEM focus and enhancing customer-centricity through interactive websites are viable strategies. Streamlining inventory holding and transitioning much of the sales process online while ensuring high customer satisfaction are important. Other options include introducing service-based apps, providing home delivery of parts and accessories, integrating Retail Walls and 3-D configurators in existing stores to enhance the customer experience, and exploring the untapped potential of the second-hand car market in India.

OEM Dealer-Led Sales Model in China

Chinese Automobile Industry follows the traditional OEM dealer-led Sales model for distributing automobiles throughout Greater China. (Refer to Figure-1)

In China, automotive companies are making efforts to find suitable domestic suppliers, driven by both local content requirements imposed by the Chinese central government and their global sourcing strategies. This push to integrate more domestic suppliers into their supply chains is essential for OEMs and non-Chinese suppliers. Suppliers play a vital role in influencing the competitiveness of the buying firm in terms

of quality, costs, and innovation. Given the complexity of the automotive industry and the need for diverse technical expertise, individual firms cannot possess all required capabilities. Therefore, key players recognize the importance of working towards supplier integration to succeed in this networked industry. (Lockström, M., Schadel, J., Harrison, N., Moser, R., & Malhotra, M. K.; 2010)

China is the best market for OEMs to test the new dealership models. OEMs are redirecting their attention to untapped regions within China. Ford made a notable announcement in 2014, of inaugurating 88 new dealerships in a single day, primarily targeting less competitive tier-4 cities that lacked license registration facilities at the time.

As per the study on Chinese companies, Chinese companies adopt decentralized structures, providing business units with significant autonomy. They prioritize in-house production and offer lower wages than Western counterparts, enabling larger workforce recruitment. This proves essential in China, where limited business infrastructure necessitates more personnel for growth, including logistics providers, distributors, and retail chains. Chinese companies operate in two time-frames: managing present-day operations and simultaneously preparing for three to five years ahead, doubling their size. This includes resource addition, incubating new business models, and launching brands. Unlike the US or Europe, where one business unit head oversees both frames, Chinese founders appoint two managers, each handling a specific frame and competing for resources autonomously. Chinese leaders prefer direct conflict to complex, cooperative management structures involving all subordinates but operating beyond their purview. Rather than creating new cross-organizational roles, they prefer hiring more staff to achieve growth objectives. (*Thomas Hout and David Michael, Harvard Business Review*)

Companies like NIO, an EV disruptor, have effectively revolutionized customer engagement by implementing direct-to-consumer (DTC) strategies. They sell their products directly to end customers through their own brand-owned or agent-managed stores. This departure from the conventional dealer-

led sales model used by OEMs represents a remarkable shift and has yielded remarkable results in enhancing customer interaction and satisfaction.

Rising disposable income in China has driven higher demand for new and used cars. The country's substantial investments in the automobile industry and leadership in developing cost-effective vehicle models have resulted in increased sales and export opportunities to more mature markets. To achieve cost reduction in developing markets, Chinese automotive companies are embracing joint ventures and mergers and acquisitions (M&As) to rapidly gain global presence. These strategies allow companies to obtain strategic assets, bolster their reputation, access valuable resources, and enter new markets. Additionally, these collaborations promote the development of vital skills and competencies, providing a competitive edge worldwide. (Caiazza, R., & Nueno, P. (2014))

According to a study by Accenture, China dominates the global car market, accounting for half of all cars sold worldwide as of Q2/2020. By 2025, one-fifth of China's car sales are projected to be New Energy Vehicles (NEVs). The Chinese automotive industry is incredibly dynamic, with 2 to 3 new vehicle launches occurring daily. Notably, 71% of Chinese consumers begin their car buying journey online, but 77% still desire the tactile experience of physically interacting with a car before finalizing the purchase. Interestingly, two-thirds of consumers gather competing offers from dealers of the same brand to secure the best price, while 81% prefer fixed and transparent pricing without the need for negotiations.

In the Chinese automotive retail industry, independent dealerships play a crucial role, with almost all of them leveraging digital tools for sales and marketing support. A significant portion (56%) views digitization and establishing an online presence as their main investment focus for the next three to five years. However, online platforms are disrupting their businesses as they strive to meet changing consumer demands. A remarkable 81% of dealers recognize the need to adapt their business models for future success. Traditional automotive sales face challenges, including a lack of price transparency and barriers between

online and offline channels. Yet, innovative startups like Aiyas and NIO in the rapidly evolving Chinese automotive market seem to have found a solution by seamlessly managing the online and offline sales journey, offering competitive prices across channels and dealers.

Selective Distribution System in European Union

With the exception of only one or two manufacturers (such as Tesla), vehicle manufacturers in Europe operate so-called 'selective distribution' systems. As the name implies, selective distribution constitutes a type of restrictive distribution because only those 'selected' by the manufacturer (who meet the manufacturer's standards) are entitled to resell the manufacturer's products. Retailers or 'dealers' who are chosen to sell a manufacturer's vehicles are required to abide by distribution agreements (dealership agreements) which govern the way in which the two parties cooperate, often with extensive controls over what the retailer should do or is allowed to do. Such an arrangement can limit competition and – if it were unable to benefit from any exemption – would risk being deemed unlawful. However, as indicated above, selective distribution systems can also generate important benefits, such as the provision of high-quality customer support services for products that are often complex and expensive (Alliance of European Car Dealers and Repairers (AECDR)).

The selective distribution system is facing a new change. Advancing digitalization offers car manufacturers the opportunity to deal directly with car drivers and to offer them products (online etc.) and services (especially data-based) as a direct competitor to the manufacturer's own dealers. In doing so, dealers may be involved in the manufacturer's sales process, but in a different capacity e.g., as a service provider. In other words, the car manufacturer sells directly to the customer, but the dealer may provide certain ancillary services on the manufacturer's behalf (vehicle handover, delivery of the car, etc.) and may receive a commission for these services. At the same time, the dealer continues as an independent distributor of the manufacturer's products.

A potential problem lies in the fact that these two competing models are increasingly mixed together without any in-depth consideration of the apportionment of costs and risks between the parties, or of the manufacturer's capacity to constrain the dealer's ability to compete with it going forward. For example, a manufacturer will oblige all dealers to make significant investments in dealership infrastructure and assume significant risks in their capacity as independent distributors, but the manufacturer might then capitalize on those investments to subsidize other distribution models, including its own, placing dealers at a competitive disadvantage. Alternatively, even where a dealer has made a sale on its own account, the manufacturer might require the dealer to hand over customer data, which allows the manufacturer to acquire control of that customer relationship in the future (European Automobile Manufacturers' Association).

Conclusion

Dealer is a critical component in the supply chain, particularly in automotive industry. The traditional "OEM to dealer to consumer" is widely used. Many different models have emerged of late replacing the old model. And the suitability of a model is found to be country specific.

Annexure

Table-1: World Car Production by Region

World Region	Share (%)
Greater China	33%
Europe	21%
Japan/Korea	16%
North America	15%
South Asia	10%
South America	3%
Middle East/Africa	2%

Table-2: Potential Automotive Sales Model, Publicis Sapient

	Connected Traditionalist	Online Evangelist	Digital Multichannelist	Ecosystem Orchestrator
Sales Channel	Hybrid Dealer centric model with traditional offline channels and direct sales through dealers	Hybrid OEM-centric model with OEM direct sales and dealers as agents	Direct to Customer approach leveraging an OEM's online and mobile channels, along with its customer contact centres	Direct-to-customer approach, along with third-party provider as additional (mobility) sales channel
Offering	New used car and after-sales focus, ownership/mobility service with minor revenue share	New used car sales and ownership services with an increasing focus on customer lifetime revenue	Product-as-a-service exemplified by alternative ownership models in addition to traditional sales	Mobility-as-a-service through sharing fleet operation, alternative ownership and few sales
Network format	Dealership has dominating format, including immersive digital	City store and/or popups complementing a reduced dealer network	Pop-up shops and events as integrated retail formats for seamlessly connecting customers to sales channels	Pick-up and delivery and maximum customer convenience, along with selectes popup/event formats
Dealer Network Management	sales value both on and offline as the main KPIs and incentives	Customer Support as the dealer focus, in additional to after-sales services and maintenance	Mobility fleet and after-sales operations via dealer without end-customer touchpoints	No dealership required; servicing and maintenance are done through the OEMs on the hub and spoke network

Table-3: Dealership Statistics, US

Dealership Components	Value (2022)
New car dealership	16773
Total sales (Light Vehicles)	13.7 million
Sales	\$1.2 trillion
Repair orders	265 million
Service and part sales	\$137 billion
Average Number of New Vehicles Sold Per Dealership	819
Average retail selling price	\$46,287
New-car inventory	1,672,686
New-vehicle days' supply	38(domestic), 27(import)
New cars	2,852,012
Light duty trucks	10,882,191
Total light-duty vehicles	13,734,203
Average Dealership New-Vehicle Retail Sales per New-Vehicle Salesperson	102
Total Used-Vehicle Sales by New-Vehicle Dealerships	12.9 million
Average Retail Selling Price of Used Vehicles Sold by New-Vehicle Dealerships	\$30,736
Average Dealership Used-Vehicle Retail Sales per Used-Vehicle Salesperson	137
Total dealership advertising expenditures	\$8.57 billion
Average Dealership Advertising per New Unit Sold	\$718
Number of Dealership Employees	1,069,633
Average Weekly Earnings of New Light-Vehicle Dealership Employees	\$1,708

(Source: Bureau of Labor Statistics, NADA)

Table-4: Average Dealer Margin, India

Original Equipment Manufacturer (OEM)	Average Dealer Margin
MG Motors	5.22%
Maruti Suzuki	5.07%
Kia Motors	4.43%
Hyundai	4.38%
Mahindra	3.75%
Tata Motors	3.74%
Honda	3.41%
Toyota	2.32%

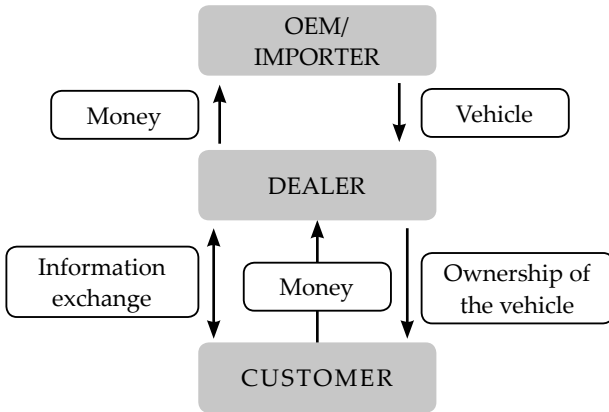


Figure 1: Traditional Dealership Model, Three-tiered, Capgemini

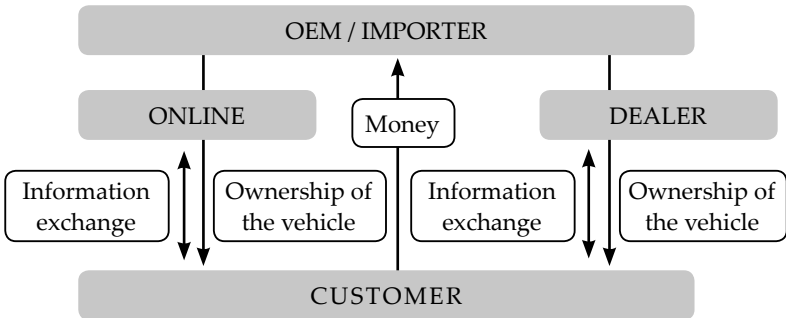


Figure 2: Agency Sales Model, Capgemini

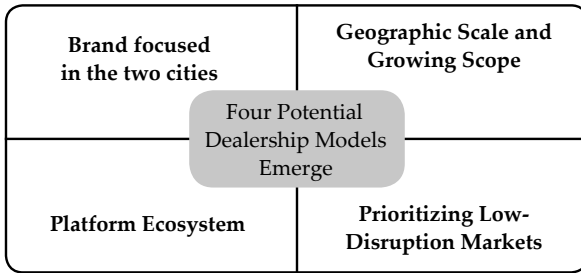


Figure 3: Four potential Automobile dealership models, McKinsey & Company

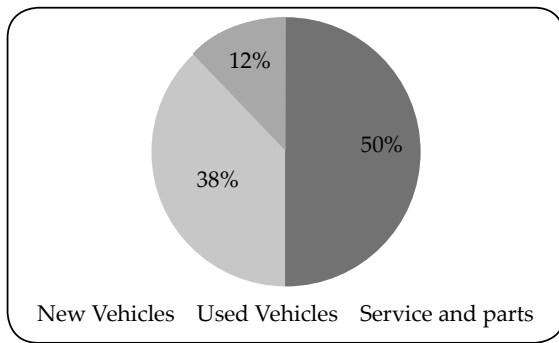


Figure 4: Dealership Sales Data, US

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20

A Global Take on India's Presidency and the Digital G20 Economy

Tooba Fatma Bilgrami

Abstract

The G20 forum has been emphasizing a shared set of principles to encourage cooperation and development in its member-countries' digital economies, focusing on innovation, partnership, and inclusivity. As the current G20 president, India has taken a leading role in promoting digital transformation and establishing a citizen-centric digital economy.

India's "Digital India" initiative clearly indicates her dedication towards the advancement of digital infrastructure. Through this campaign, the country seeks to bring internet access to rural areas, and further promote digital inclusivity. Moreover, India's dedication to identifying and implementing innovative digital technologies, especially in education, health, agriculture, and the economy, is showcased through the G20-DIA (Digital Innovation Alliance) initiative.

India has successfully employed digital identity and financial services systems as part of its digital diplomacy efforts. Under India's leadership, the target of G20 Digital Economy Working Group (DEWG) is to establish a strong and interconnected digital economy that fosters inclusive global growth, benefiting all stakeholders. By leveraging Digital Public Infrastructure (DPI), digital skilling, and cybersecurity, the G20 DEWG seeks to create an enabling environment for the digital economy to prosper, ensuring that technological innovation drives inclusive economic growth and development on a global scale.

This study seeks to analyse the trajectory of the G20 Digital Economy and highlight India's aspirations to strategically lead in the digital sphere within the Global South. It also explores India's partnerships with G20

member nations and non-member countries, all geared towards fostering equitable, inclusive, and sustainable digital economies.

Keywords: *Digital Economy, Digital Transformation, Digital Innovation Alliance, Digital Economy Working Group, G20 Presidency India*

What is a Digital Economy?

When an economy functions by depending on digital technologies, it is called a digital economy. Such an economy encloses a worldwide network of professional interactions, commercial transactions, and economic activities which are made possible by Information and Communication Technologies (ICTs).

The term “digital economy” was introduced by Don Tapscott in his book ‘The Digital Economy: Promise and Peril in the Age of Networked Intelligence’. Nicholas Negroponte, who authored ‘Being Digital’, has characterized the digital economy as a shift from physical objects (atoms) to digital data (bits).

In its initial phases, the digital economy was commonly known as the Internet economy, the web economy, or the new economy, mainly due to its significant dependence on the internet. On the contrary, economists and business executives contend that the digital economy extends beyond the confines of the internet economy, as the latter only encompasses the economic value generated directly from the internet.

The advent of the digital economy signifies a transition from the third industrial revolution to the fourth industrial revolution. The digital revolution, also known as the third industrial revolution, brought about transformative changes that occurred in the late 20th century, specifically in regard with dramatic shifts to digital technologies from analogue devices. Expanding upon the foundations of the digital revolution, the fourth industrial revolution further integrated the physical and cyber realms through modern technologies.

While some entities may employ modern technologies to perform traditional tasks on a computer, the digital economy transcends such fundamental functions. It is not limited to the mere substitution of manual or analogue processes with computer-

based ones. Rather than focusing solely on using technologies for conventional tasks, the digital economy underscores the importance and capability for organizations and individuals to utilize technology to accomplish tasks in a more efficient, rapid, and frequently inventive manner. Additionally, the concept encircles the capacity to utilize technology for undertaking tasks and activities which were previously unattainable. This includes the opportunity for established entities to enhance their operations, expand their capabilities, explore alternative approaches, and embark on entirely new endeavours. This broader concept is encompassed by the notion of digital transformation.

A diverse range of economic activities whose functioning is dependent on digitized knowledge are vital elements of production in a digital economy. Harnessing the power of the internet, fintech, big data, cloud computing, and other cutting-edge digital technologies, information is collected, stored, analysed, and shared digitally, transforming social interactions. The integration of digital technologies in the economy brings forth a multitude of benefits and efficiencies, as it creates opportunities for employment, fosters innovation, and contributes to the growth of an economy. Furthermore, it extends its influence across all facets of society, influencing interpersonal interactions and giving rise to profound sociological shifts.

The shift towards a worldwide digital economy in 2014 was uneven, with some countries experiencing rapid growth while others faced challenges. By the end of the year, the seven largest emerging markets had surpassed the G7 countries in terms of purchasing power parity. Additionally, it was predicted that consumers in the Asia-Pacific region would outspend their North American counterparts online. The potential to cater to online consumers was expanding, provided that one knew where to focus their attention.

The evolving patterns in digital trade extend beyond China or Asia. A German tech firm 'Rocket Internet', has diligently been initiating the launch of various e-commerce startups in diverse emerging and frontier markets, not limited to Silicon Valley,

Shanghai, or Singapore. Their ultimate goal is to establish the largest internet platform globally, excluding the United States and China. Numerous companies under the Rocket umbrella are positioned to become the equivalents of Alibaba and Amazon across the globe. Examples include Jabong in India, Namshi in the Middle East, Lazada and Zalora in ASEAN, Jumia in Africa, and Kaymu across Asia, Africa, the Middle East, and the European Union (EU).

The digital transformation happening in Asia is significantly impacting the economies of the region. Asia's e-commerce transactions make up a substantial 25% of the business-to-consumer (B2C) market globally, driven primarily by the rapid expansion of Chinese companies such as Alibaba and Tencent. The Chinese retail e-commerce market has experienced a remarkable increase in transaction volume, with the numbers climbing from CNY 1.32 trillion (2013) to an approximate of CNY 7.57 trillion (2017). Additionally, fintech (financial technology) firms in Asia have opened up new channels for providing financial services of mainly lending and payment facilitation in the region, thereby fostering financial inclusion in economies of various developing Asian nations. In 2015, fintech-driven lending in Asia reached a notable sum of \$102.8 billion, and the widespread adoption of technologies has significantly improved the efficiency of the payments system, cementing Asia's status as the leading global market for payments. Moreover, the integration of digitized, interconnected, and intelligent ITs enables contemporary economic activities to become more flexible, dynamic, and smart. As Asia continues to harness the advantages of this digital revolution, it remains a challenging task to comprehend the digital economy and its intricacies due to its complexity. (Asian Development Bank, 2018)

The digital economy holds the capacity to fundamentally transform social landscape and economic activities. It is presently witnessing significant growth, rapid innovation, and widespread implementation across various economic sectors.

The G20 Digital Economy

The Group of Twenty, or the G20, is a premier forum of inter-governmental stature formed for the economic cooperation of 20

countries including the EU. The main objective of the G20 is to tackle critical global economic issues, including but not limited to sustainable development, international financial stability, and climate change mitigation. The finance ministers of developing and developed nations from majority of the world's largest economies are a part of this forum.

The G20 was established in response to various economic crises that were occurring globally at the time. Founded in 1999, it has been regularly convening at least once a year since 2008. The summits entail the involvement of highly-ranked officials from each member nation, like finance ministers, government or state heads, and foreign ministers. The EU is represented in the G20 by the European Central Bank and the European Commission. Furthermore, invitations to participate in the summits are sent out to specific countries, non-governmental organizations (NGOs), and international organizations.

The G20 proclaimed itself as the principal platform for international economic and financial cooperation in 2009. During the course of subsequent decade, the influence of the group has expanded, and it is now widely acknowledged for its substantial impact on a global level.

The Organisation for Economic Co-operation and Development (OECD) has collaborated with the G20 to work alongside their digital agenda, aiding countries in leveraging digital transformation and harnessing its benefits, such as business continuity, job creation, and improved access to vital service like education and health. With the employment of evidence-based analysis and the 'Going Digital' project through which it has worked relentlessly, the OECD has provided cross-cutting support and addressed the potential challenges associated with digitalization.

The G20 recognized the significance of digital technologies for economic performance and well-being, and in 2017, they developed an ambitious digital agenda, leading to the adoption of the G20 Roadmap for Digitalization. The OECD actively contributed to the formulation of this comprehensive policy package by delivering a report on 'Key Issues for

Digital Transformation'. The OECD also supported initial implementation efforts, focusing on competition, business dynamics, consumer protection, measurement of the digital economy, and best practices for digital government. In 2018, the OECD expanded the evidence base and facilitated discussions on bridging the digital divide, measuring the digital economy, and safeguarding digital consumers. Additionally, they offered significant assistance to the action-oriented annexes concerning gender and digital government, as detailed in said year's G20 Digital Economy Ministerial Declaration.

The 2017 Ministerial Declaration called on countries to integrate the measurement of the digital economy into their national statistics and evaluate existing statistical frameworks thoroughly. Following this, the G20, presided by Argentina and led primarily by the OECD, worked in conjunction with a council of international organizations. This collaboration resulted in the constitution of a preliminary version of the "G20 Toolkit for Measuring the Digital Economy". The primary focus of this toolkit was on shaping the methodology of various indicators and approaches employed in monitoring the digital economy. It also identified significant gaps and challenges in measuring the digital economy, which required further examination and analysis.

The collective statement released at the conclusion of the G20 summit, known as the G20 declaration, highlights the commitments of member countries to the global community and presents their strategies for tackling prevailing challenges. As per the G20 Ministerial Declaration 2018, the primary objective of the Toolkit was to offer an initial evaluation that could facilitate the proposal of measurement approaches, thereby supporting evidence-based policy making. The objective was to recognize the opportunities and challenges linked to the digital economy, and identify areas that could be tackled through public policies formulation. In addition to this, the Toolkit served as a potential resource for countries, offering guidance on implementing standardized measurement activities.

Instead of generating new content, the document consolidated over thirty pre-existing crucial indicators and methodologies, which international organizations of prime stature had

developed. These were utilized as foundations to track and evaluate the digital economy's reach and dimension. Four main themes were used to organize the document's content. These were as follows:

1. **Infrastructure:** This theme centred on elements such as the advancement of Next Generation Access (NGA) networks, access to fixed and mobile networks, and the uptake of digital technologies by households and businesses.
2. **Empowering Society:** This theme delved into the availability and usage of digital technologies, encompassing aspects like education, financial inclusion, internet usage, and interaction with government services.
3. **Jobs and Growth:** This theme covered indicators associated with the generation of employment, labour market, e-commerce, international trade, ICT investment, and growth in productivity.
4. **Technology and Innovation Adoption:** Here, the emphasis was on the role of ICTs in fostering innovation, business models enabled digitally, and the uptake of emerging technologies by commercial organizations.

Acknowledging the constraints in the timeliness challenges, limited country coverage, and data comprehensiveness, the draft document was prepared by G20 under the presidency of Argentina in cooperation with the United Nations Conference on Trade and Development (UNCTAD), the International Monetary Fund (IMF), the World Bank Group (WBG), International Telecommunication Union (ITU), the International Labour Organization (ILO), and the European Union.

Two types of gaps were acknowledged by the toolkit: availability gaps and methodological gaps. Availability gaps pertained to the limited availability of data, and persisting challenges in data comparability across nations. Methodological gaps, on the other hand, referred to the aspects such as what was being measured by these pre-existing indicators, how was the economy being assessed by them, and how they could improve or develop new measures. It also entailed reviewing sources of data and methods of collection to enhance accuracy and relevance.

Various methods that can guide the agenda for assessing the progress of G20 members, with respect to the digital economy's swift transformation pace, were proposed by the toolkit. The proposal aimed to:

1. Promote the establishment of elaborate and excellent data infrastructure and tools of collection to assess the uptake of digital technologies at every level.
2. Enhance how the digital economy is measured within the existing frameworks of macroeconomics, for example, through the development of national satellite accounts.
3. Facilitate interactions among civil society, businesses, and governments so as to enhance the evidence base and harmonize with official statistics.
4. Encourage improved communication and mutual cooperation between member countries and organizations. Special attention was demanded for capacity building in developing countries where resources are limited.
5. Foster the private and public sectors to coordinate and carry out business surveys to analyse the trend in adoption of digital and innovative technologies.
6. Encourage the adoption of data formats and interoperable tools that facilitate the sharing of public sector data and access to it.
7. Promote the organizations and development partners to collaborate and support less industrialized nations in collecting and analysing statistics pertinent to the formulation of policies based on evidence, in a digital economy.

Digitalisation of G20 Nations

During the 2015 meeting in Antalya, the leaders of G20 recognized the advent of the Internet economy and acknowledged the opportunities and challenges it presents for the collective growth of the world. The G20, in 2016, sought to collaboratively leverage digital opportunities, tackle challenges, and foster digitally inclusive economic growth and development by promoting the digital economy.

Recognizing the existence of strategies at the national, regional, and global levels concerning digital issues, the distinct advantage of the G20 platform was utilized by the Digital Economy Task Force (DETF) to acknowledge the opportunities and hindrances brought by digital technologies. The DETF aimed to create a shared understanding of principles and focal points for the digital economy's cooperation and advancement. It encouraged its members to improve coordination and communication within the group and with external entities, ensuring that robust and interconnected ICTs fostered a dynamic and flourishing digital economy that propelled global growth for the welfare of all.

During the G20 summit held in China in 2016, members reached a consensus on a set of shared principles to advance and foster cooperation in the digital economy. The principles included:

- **Innovation:** Technological innovation in ICT-driven economic activities was recognized as a key driver of inclusive economic growth and development.
- **Partnership:** Strengthening partnerships among G20 members could boost cooperation, tackle shared challenges, and drive progress in the global digital economy. By sharing knowledge, information, and experiences, differences could be narrowed, and diverse interests could be promoted through constructive dialogues.
- **Synergy:** Members of the G20 sought to foster synergy among discourses of diverse subjects, such as the digital economy, innovation, and the new industrial revolution, to avoid duplication and ensure consistency.
- **Flexibility:** Acknowledging its members' diverse priorities and apprehensions, the G20 recognized the importance of flexibility in addressing digital economy-related issues.
- **Inclusion:** Bridging the digital divide by facilitating coordination between G20 members and their stakeholders so as to encourage entrepreneurship, foster innovation, facilitate economic activity, and develop content and services that were accessible to all people.
- **Competitive and Open Business Environment:** The pivotal role of private sector in a digital economy was emphasized

by the G20, while also highlighting the importance of transparent environments in legal, regulatory, and policy making areas, so as to promote open and enabling markets. It also recognized that the role of enforcing laws that regulated competition and consumer protection must be deemed critical for market access, technological innovation, and digital economy growth.

- **Flow of Information for Facilitating Growth:** The roles of freedom of expression and the unrestricted flow of ideas and information were regarded by the G20 as fundamental for the growth of digital economy and considered advantageous for overall progress of global economy.

Since 2016, several milestones have been accomplished by the G20 member-countries (Refer to Figure 1).

G20 Digital Economy Agenda for India

At the G20 Digital Economy Ministerial Meeting in Salta, Argentina (2018), India showcased its “Digital India” initiative, focused on enhancing digital inclusivity and extending internet accessibility to all village clusters. India recognizes the importance of digital infrastructure in overcoming capacity constraints and bridging the digital divide. To achieve these goals, India has implemented the BharatNet program, which aims to provide last-mile broadband connectivity to gram panchayats (village-level governing bodies) through a national Optical Fiber network. The program had covered 66.4% of the gram panchayats under its umbrella by November 2021. (ORF, 2022)

Over the years, G20 countries have covered a host of priority areas (Refer to Appendix, Table 1) to plan and execute their digital transformation. India itself has placed emphasis on developing digital platforms that foster economies to be sustainable, inclusive, and equitable. The nation concentrates on creating applications impact livelihoods positively, strengthen supply chains, improve cybersecurity, and accelerate various sectors.

As part of its G20 presidency, India’s ministerial declaration, according to Minister of State for Electronics and Information

Technology, Rajeev Chandrasekhar, will strongly emphasize digital security, digital public infrastructure (DPI), and digital skills enhancement. The third meeting of the G20 Digital Working Group (DWG or DEWG) focused on drafting the declaration. As the current G20 president, India is leading the efforts. Chandrasekhar highlighted that skilling, DPI, and security are top priorities in the declaration and have received positive reception in other multilateral forums. (MoneyControl, 2023)

India had also entered into Memorandums of Understanding (MoUs) during the Global DPI Summit's inauguration, with the nations of Armenia, Sierra Leone, and Suriname. The MoUs will allow these countries to harness India's digital public infrastructure (DPI), including its digital payment systems and other related technologies.

The G20 Digital Economy Working Group (DEWG)

Over the past decade, India has experienced significant growth in its digital economy and aims to collaborate with G20 and First World countries to create a citizen-centric digital economy. As part of its efforts to ensure online safety and promote digital payments, a multilingual "Stay Safe Online Campaign" was launched by India, that caters to people regardless of their age. Identifying and implementing innovative technologies that are digital in nature and are developed by startups from countries within and outside of the G20, is the main focus of the G20 Digital Innovation Alliance (G20-DIA), with a particular emphasis on sectors such as education, health, agriculture, and the economy. India has planned to enhance the growth of the digital services sector, as part of its G20 presidency. The country's strategic aspirations for leading the Global South digitally, have been highlighted by the Sherpa of India's G20, Amitabh Kant. India has already set an example with initiatives like AADHAR, which provides citizens with their biometric identities, and the online transaction system called the Unified Payments Interface (UPI). The country's digital diplomacy is targeted at enabling seamless cross-border transactions for the Indian diaspora, which in turn boosts the nation's GDP.

Various countries like the UAE, Singapore, and Nepal have embraced India's UPI system for this purpose. Furthermore, India's objective is to extend the licensing of its systems to Asian and African developing nations, enabling them to adopt digital identity and financial services. By doing so, India aims to foster the use of digital facilities around healthcare, finance, and education. These services may include online course, online shopping, online transactions, and telemedicine. This approach is designed to ensure inclusivity and bring tangible benefits to developing countries. (Diplomatist, 2023)

Formerly known as DETF, the Digital Economy Working Group (DEWG), was established under the German G20 Presidency in 2017. The primary objective of this group was to foster the implementation of a digital economy that is secure, interconnected, and inclusive. Given that by 2025, the estimated growth of the global digital economy will reach \$23 trillion, the DEWG assumes a crucial responsibility in influencing international policy dialogues concerning the digital domain. (PBNS, 2023) The evolution of DEWG can be derived from Appendix, Figure 1.

During India's G20 Presidency, the Ministry of Electronics and Information Technology (MeitY) is in charge of organizing the DEWG meetings. As per PBNS, numerous bilateral meetings have been organized by DEWG head, MeitY, along with the launch of several initiatives, including:

- Stay Safe Online campaign: The primary goal of this campaign is to increase awareness among individuals of all age groups regarding the dangers linked to cyber threats and methods to safeguard oneself on the internet.
- The G20 Digital Innovation Alliance (G20-DIA): The G20-DIA supports and acknowledges the startups across the world who have developed inventive digital technologies. It also facilitates the showcasing of state-of-the-art digital solutions at the Bangalore G20-DIA Summit.
- Digital Payment campaign: Recently launched on February 9, 2023, this campaign promotes the adoption of digital payment methods across India.

- **Immersive Digital Mobile Van:** Recently inaugurated on February 2, 2023, this mobile van toured forty-five predetermined destinations in Lucknow, providing an engaging and interactive experience to enlighten people about the progress and journey of India's digital transformation.

The G20 DEWG 2023 held a three-day conference, which closed on June 14, 2023. The Global DPI Summit, was effectively organized during the meeting. India signed Memoranda of Understanding (MoUs) with four countries so that they could imbibe key learnings from the digital solutions that India was successful in implementing through the framework of INDIASTACK on such a large scale. (Ministry of Electronics & IT, 2023)

The Global DPI Exhibition presented a chance for summit attendees, G20 DEWG members, and individuals to experience firsthand India's digital transformation journey and its DPI. Under the Indian Presidency, the discussions focused on DPI, which encompassed the concept of "One Future Alliance & One Future Fund" for DPI development, the establishment of guiding principles for effective DPI, and the importance of financing DPI development in Low and Middle-Income Countries (LMICs). The meeting also addressed topics related to digital upskilling and reskilling, capacity awareness and capacity building, as well as the creation of a framework to mutually acknowledge information exchange and digital skills.

Conclusion

A broad spectrum of economic activities that heavily rely on digitized information and knowledge as essential components of production are what constitute a digital economy. It effectively utilizes modern networks of information as crucial platforms for operations and leverage ICT to enhance productivity and optimize the economic structure. The internet, big data, the Internet of Things (IoT), and other such digital technologies are employed to digitally gather, store, process, and disseminate data, leading to a profound impact on how people interact with each other. These digitized, interconnected, and smart ICTs

empower contemporary economic endeavours to become more adaptable, responsive, and astute.

The digital economy is undergoing swift expansion, marked by substantial innovation and widespread implementation in diverse economic domains. It serves as a vital driver of global economic growth, contributing to accelerated economic development, increased productivity in existing industries, sprouting of new industries, and the achievement of growth that includes all and is environmentally responsible.

Prominent financial experts and business professionals concur that the development of global digital economy is in its nascent stage. In order to maintain their competitiveness in the future, organizations, irrespective of being for-profit companies, non-profit and government institutions, or service-oriented organizations such as healthcare system, will need leaders and employees who have the creative capacity for innovation. They must leverage the possibilities offered by upcoming modern technologies like the IoT and prescriptive analytics to build stronger relationships with current and prospective customers. This will enable them to be more responsive, efficient, and effective in their operations. Additionally, they must be willing to explore the optimal ways to develop or utilize emerging technologies; Not embracing these advancements risks falling behind as the digital economy continues to advance.

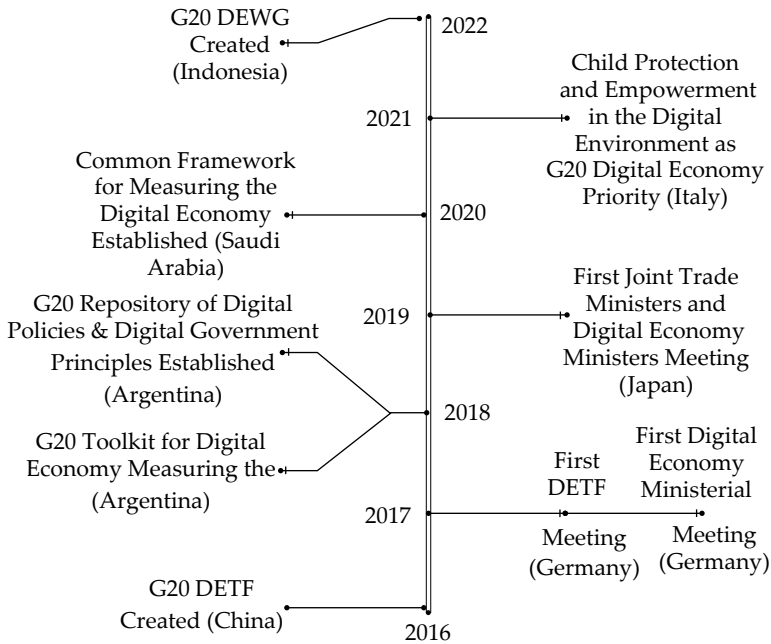
Appendix

Table-1: G20 Digital Economy Priorities (2016-2021)

S. No	Priority Areas	2016	2017	2018	2019	2020	2021
		China	Germany	Argentina	Japan	Saudi Arabia	Italy
1.	Measuring the Digital Economy	•	•	•	•	•	•
2.	Encouraging e-commerce co-operation	•	•	•	•	•	•
3.	Promoting investment in ICT sector	•	•	•	•	•	•
4.	Enforcing IPR to develop digital economy	•	•	•	•	•	•
5.	Promoting digital skills and training	•	•	•	•	•	•
6.	Consumer Protection	•	•	•	•	•	•
7.	Boosting MSMEs and entrepreneurs in digital era	•	•	•	•	•	•
8.	Improving trust and safety for children			•			•
9.	Benefiting from digitalisation and emerging technologies (IoT, AI, 5G)		•	•	•	•	•
10.	Accelerating digital infrastructure	•	•	•	•	•	•
11.	Smart cities		•		•	•	•
12.	Bridging digital divide	•	•	•	•	•	•
13.	Encouraging AI adoption by MSMEs				•	•	•
14.	Innovative or agile governance			•	•	•	•
15.	Free flow of data				•	•	•
16.	Enhancement of security	•		•		•	•

Source: Shruti Jain, "The G20 Digital Economy Agenda for India," Occasional Paper No. 365, September 2022, Observer Research Foundation.

Figure 1: G20 Digital Economy Milestones (2016-2022)



Source: Shruti Jain, "The G20 Digital Economy Agenda for India," Occasional Paper No. 365, September 2022, Observer Research Foundation.

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21

India a Global Production Network- Implications for G20

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Abstract

G20, Group of twenty, are member countries who coordinate amongst themselves to address global issues which range from global warming and climate change to economic growth and financial stability. The member countries work in collaborate to work for betterment of these member countries and of the world at large. This paper is on Global Production Networks and how the G20 member countries can collaborate and coordinate their activities to bring benefit to all member countries.

The paper describes a “value chain”, defines a “global production network”, GPN, highlights factors which influence creation of GPNs, enumerates benefits of GPN and throws light on India emerging as a GPN for automobile sector. The paper concludes by stating India being a member of G20 can leverage India’s position in the GNP.

Keywords: *Global Production Network, Low-Cost Labour, Technical Skill, Hub, Automobile Sector*

Introduction

The concept of global production network derives its origin from the concept of “value chain”. The value chain or ‘value-adding chain’ is an old concept owing its origin to industrial economics and also to management literature. It has been used extensively in management literature. The ‘value’ in value chain lies in “its emphasis on the sequential and inter connected structures of economic activities, with each link or element in the chain adding value to the process” (Porter, 1985, 1990).

“Global Production Network” (GPN) is “kind of organizational innovation, that combine(s) concentrated dispersion of the value chain across firm and national boundaries, with a parallel process of integration of hierarchical layers of network precipitants”. (Ernst and Kim, 2001: 1)

The term GPN is broken down to explain the choice of the term. “Global” has been chosen, to refer to the global-local relations that have become a pre-condition for analyzing economic relationship.

The word “network” has been used, instead of chain, as “chain” does not indicate that an individual firm is existing in a production system. The term network is more inclusive. Further, production also includes intermediate and final markets, and allows for a producer-consumer-intermediary relation, where knowledge, and capital flow between them.

Concept of “Flows”: To understand the dynamics of development it is necessary understand how ‘places’ are being transformed by ‘flows’. The world over, the “space of places” is being transformed into “space of flows”. (Castells, 2000a, 2000b). These are flows of capital, labour, knowledge, power, to name a few. Therefore, the world now consists of both a “space of places” and a “space of flows” and therefore it is important to understand the nature of two way ‘dialectical relationship’ between the two. In simple words it refers to the way in which two different factors work together. Seen in the context of G20 countries, which includes both the developed as well as developing countries and their endeavour to being about economic development, prosperity, financial stability, trade, creation of GPN would enable countries to being about the needed growth and development, be it in any sector.

A GPN framework recognizes that:

- GPN leads to economic development.
- GPN generate value for all in the network
- GPN leads to an understanding of ‘territoriality’ of production networks-defining how they are constituted and how they are re-constituted, majorly by economic factors; the major focus being on scope of developing domestic firms.

- GPN leads to probability of technological alliances and licensing taking place between firms to further the chances of development.

Therefore, GPN focuses on:

- The networks of firms in which are either engaged in R&D, design, production and marketing. It also focuses on how these firms get organized amongst themselves both at the global and regional level.
- How power get distributed within those networks, and how and when changes take place.
- The importance of labour and which leads to creation of value.
- And the impact of these on upgrading of technology, value addition, and economic prosperity etc. for the firms in the network and also the society in which it operates. (Henderson, et al., (2002)).

GPNs brings about economic and social development for very long period of time in the countries where they are created. GPNs lead to economic development, social development, development of clusters, industrial development, poverty reduction, overall generalized prosperity for the country; and also, to create value in term of product, technology, and skill development.

India has emerged as a GPN for automobile and electronic sector. Therefore, G20 member countries could coordinate amongst themselves to bring benefit not only to India but to other member countries as well.

“Group of Twenty” (G20): The Group of Twenty (G20) was established in 1999 with the objective of bringing together member countries, to address issues of global concern. These range from global warming, climate change, sustainability, economic growth, financial stability, international trade to name a few. Member countries co-ordinate to bring benefit to the group as a whole and also to certain member countries.

In this context a discussion on India as a Global Production Network (GPN) has emerged in the automobile sector wherein India has become a hub for manufacturing cars for the world market.

Indian automobile industry: This comprises of the automobile and auto-components segment. It also includes the OEMs, Tier I

and Tier II suppliers. It is the key driver of growth for developing economies and India is no exception. The automobile sector is valued at \$USD 100b and generates 8.7 lakh crore as revenue. It accounts for 8 percent of all exports. It is a sector which contributes to 7.1 percent of GDP. It employs 1.9 crore people. percent of population. The total vehicle production is 27 crore units in the financial year 2023 (Primus Partners report).

The passenger vehicle (PV) segment consists of mid-size and full-size sports utility vehicle (SUV) sub-segment comprises of more than 50 percent, compact sub segment 25 percent and the luxury sub-segment comprises of 13 percent. The major manufacturers are Maruti Suzuki India Limited (MSIL), Hyundai, Tata Motors, Mahindra, Kia, Toyota and Skoda and Volkswagen. Maruti has the largest market share followed by Hyundai and Tata Motors. (Refer Table-1)

India has emerged as a global hub for car manufacturing, particularly for low-cost small cars.

The major strength favouring India were:

- Large domestic market-India is ranked third in terms of size of market for automobile in the world. It is also the fastest growing market with well-developed manufacturing facilities
- Low production cost-This is because of availability of labour at low cost and also because of availability of low cost of input
- High English-speaking population
- High skilled labour- India is said to be one of the major engineering countries in the world. It produces more than 15 lakhs engineering graduates every year.
- Favourable government policies
- Traditional strengths in casting, forging and precision machining, fabricating (welding, grinding and polishing) at technology levels matching the required scale of operations
- Technology upgradation as a result of global affiliations and tie ups

India as a GPN: Plants located in India not only serve the domestic market but also serve other regions of the world. Its manufacturers mainly small and compact cars in India and supplies to the world over. India, served as “lead firms” and this

gave a boost to the industry. This has also enabled the industry to develop its local capabilities.

All aspects of vehicle development and production, which also includes design and engineering, was found in domestic firms, from day one, and this enabled the industry to accelerate its pace of development. Indian industrial policy was such that it encouraged domestic firms to work as lead firms and therefore these local firms' expertise in design, engineering and vehicle development was enhanced. And whenever it was found that expertise was not present in local firms, such lead firms acquired international companies and formed joint venture with them. For instance, Tata Motors has acquired Jaguar Cars and Land Rover from Ford in 2008. These two, which were British brands became Jaguar Land Rover Limited in 2013.

It can be said that India's automotive industry is on a growth trajectory. It has a large domestic market which enables it to evolve and innovate and experiment with new models. It is also exporting its products to international markets. (Refer Table-2)

A discernible shift was found in preferences of consumers as they graduated to buying more powerful vehicles in almost all the segments. It was noted that in the financial year 2022, in the passenger vehicles category, the utility vehicles (UVs) vehicles make up 49% of sales, which is an increase of 10 percent from 39% in the immediately preceding year, that is financial year 2021. The sale of medium & heavy commercial vehicles (M&HCVs) segment in the segment of commercial vehicles (CVs) also increased. It made up 33 percent of sales in the financial year 2022 as compared to 28 percent in the financial year 2021.

Further Indian market is gradually accepting and adopting electric vehicles (EV). The EV segment is projected to grow at a CAGR of 49% between 2022-2030, and the sales is projected to touch 10 million units by 2030. This further would push level of employment and 50 million direct and indirect jobs is expected to be available by 2030. A market size of EV is expected to be of \$50 billion.

Further, with government giving EV sale the much-needed push, sale of EVs has increased in the last two fiscal for all categories of vehicles, be it four wheelers, two wheelers or three wheelers. (Refer Table-3). The EV adoption is anticipated to grow at 49

percent compounded annual growth rate with 10 million EVs sold annually by 2020. And in December 2022, 16.8 percent of all vehicle's sale in Delhi at 86 percent year on year growth.

Indian automobile sector would further grow strong on the economic front. It would thus strengthen its position as a global automotive manufacturer. Soon also it would position India at the foremost position in the international automotive space.

Case-Maruti Suzuki India Limited

Maruti Suzuki India Limited (MSIL) had its beginning as Maruti Udyog Limited (MUL), in 1981, when it set up its first plant in India, as a joint venture company with Suzuki Motors Corporation of Japan.

MSIL has three plants. Its first plant was set up in Gurugram (the oldest, set up in the year 2017, with total production capacity of 7,50,000 units per annum), and another at Manesar in Haryana. The facility at Gurugram manufactures Ertiga, XL6, and Eeco; while the facility at Manesar- manufactures Alto, E-Spresso, Celerio, Brezza and Dzire.

Yet another facility was established at Hansalpur Becharajivillage of Mandal Taluka in Ahmedabad district of Gujarat. This, known as Suzuki Motor Gujarat Private Limited (SMG) is a 100 percent subsidiary of Suzuki Motor Corporation, which was established in the year 2014. This consists of four plants-Plant-A, B, C and D. (Refer Table-4)

The fifth facility is planned to be set up in Kharkhoda in Sonipat in Haryana which is expected to be operational by 2025. This would have a capacity of 2.5 lakh units. (www.economictimes.com)

MSIL exports to five continents. Europe is the most popular destination with 56 percent of all exports. The biggest buyers are Netherland, Italy, United Kingdom, Germany and Hungary. (Refer Table-5). Among the non-European market, highest sale takes place in Algeria, Chile, Srilanka and Nepal.

MSIL began exports in the year 1986-87. These were small and compact cars.

The first big consignment of 500 cars were shipped to Hungary in 1987, followed by exports to Bangladesh and Nepal. Now it

exports to 100 countries. Its key export markets are Africa, Latin America, and the Middle East and also ASEAN countries. It exports seventeen models. (www.timesofindia.com). In January 2023 the first batch of MS Grand Vitara SUV were exported to Latin America and it plans to export the same to sixty other countries. Export exceeded 2.5 million units in the financial year 2023. Export demand is high in for Swift, Dzire, S-Presso, Baleno as well as Brezza. It exported 2,63,068 units in the financial year 2022 which was 28 percent higher than export in the previous year 2021 wherein export stood at 2,05,450 units. (www.timesofindia.com)

Hisashi Takeuchi, the MD and CEO of MSIL, said, "Crossing the two-lakh milestone in exports for the second consecutive year signifies trust, quality, reliability, performance, and affordability of our products. This achievement further aligns with our strong commitment to the Government of India's 'Made in India' initiative to manufacture products to delight global customers". Adding more models in the export category added to the excitement in the market.

It is first ranked car exporter in India. This it has done for the second tie.

Fifty percent manufactured for the domestic market as it is quoted to sell one of every car manufactured in India in international market. (www.economicstimes.com). Therefore, India is a manufacturing hub, that it is a GPN, for international markets.

MSIL two new models Jimny and Fronx are said to be global models. Jimny was produced in India and exported in January 2023 (It is a compact Off-Roaded). The first shipment of 184 units were despatched to Peru and Columbia These were manufactured at the Gurugram facility. It's a three-door model. It plans to launch a five-door mode for Indian market which is expected to launch Fronx soon.

This reflects India's export potential and acceptance of India manufactured vehicles all over the globe.

Export-Milestones of MSIL

It began its journey of exports in the year 1986-87 with 500 cars and reached 5,00,000 (half a million-export reached) in the year

in 2008. (www.globalsuzuki.com) It reached a milestone of one million export in the year 2012-13 and a decade later, in 2023, it crossed 2.5 million units. More than 50 percent of exports were to developed markets in Europe. (See Table-5). Alto, Baleno, Dzire, and Swift were exported to Chile, Indonesia, S Africa and Sri Lanka. It also exported to Egypt, Phillipines and Uruguay. (See Table-6).

Other Automobile Companies using India as a GNP

Not only MSIL, but all other automobile manufacturers have also set up manufacturing plants in India to serve international markets. These are Hyundai, Kia, Nissan, Renault, Honda Volkswagen and Tata Motors and export of each of these have increased substantially. (SIAM) Senior Managers at Hyundai Motor India Ltd said: "India is a key market for the company, not only in terms of volumes but also as a hub of small products for exports to 92 countries".

The industry is being driven to a new level and a significant shift was seen and many companies moved up the "value chain" by establishing design and technology centres in India to serve the world market.

Ford Motor Co. has invested to establish a global technology and business centre in Chennai, Tamil Nadu. This is established as a hub for new product development, mobility solutions and business services not only for the domestic market but for the international market too. Original Equipment Manufacturers (OEMs), MSIL, has invested for developing their Tier I, II and III suppliers. Many international component manufacturers have also formed joint venture with Indian companies with the objective of supplying to parent company abroad. Cummins has set up plant in India as an export hub for all markets abroad. General Motors (GM) stopped sales in India in 2017, but India serves as a manufacturing and export hub for international markets.

Mahindra and Mahindra acquired Italian firm Pininfarina. It also invested in SsangYong and UK-Based Motorcycle Maker BSA Company. Tata Motors acquiring Jaguar Land Rover (JLR) is one such instance. Together, these changes connote that the 'Make in India' story is unfolding. The intent of the government

is to make automobile manufacturing the propellant of its 'Make in India' initiative. It is hoped that passenger vehicles market will touch 9.4 million units by 2026, as per "Automotive Mission Plan" (AMP) 2016-26

The Government of India has also given it the much-needed push. It has taken steps to boost this sector. Permitting 100 per cent foreign direct investment (FDI) under the automatic route, is one such example.

The Indian government has also directed attention to "green mobility". It laid down the "National Electric Mobility Mission Plan 2020" (NEMMP) in 2013 to encourage acceptance of electric vehicles. "Faster Adoption and Manufacturing of Electric and Hybrid Vehicles" (FAME) was another such scheme.

G20 and GPN

Indian automobile sector is fast growing in the domestic as well as international markets. IT has become a hub for manufacture of cars for the international market and rest of the world. Small and compact cars which are exported from India are found to be "competitive" in the international market. This is solely because it has a huge domestic market which enables economies of scale to set in. Further its products could be adapted to fit domestic market conditions. Global Production Networks is "a concept in developmental literature which refers to "the nexus of interconnected functions, operations and transactions through which a specific product or service is produced, distributed and consumed."

As India is a GPN, the local firms can be integrated into global supply chains of G20 member countries. As focus of local firms have shifted from domestic to international markets, they would achieve a higher level of integration in "global value chains" (GVC). This could be seen from the case of Maruti Suzuki India Limited, wherein initially they were exporting only small and compact cars; but gradually moved to manufacturing specifically for international markets and exported them. Further, as these firms have served as "lead firms", their capability as an individual firm has increased. Being a member of GVC of G20 member countries, local firms could share their knowledge, technology, skill, with firms in G20 countries. In other words,

this enhanced knowledge and skill can also be shared across other members of the network in G20. Further, these “lead firms” can also transfer knowledge to its suppliers. This is very important for “small and medium enterprises” (SMEs), (like the component manufacturers) to stabilize their position in the network. Thus, it’s a learning opportunity for all members in the network. SMEs could be a focus area in G20. It could also lead to better integration of SMEs in the global value chain in “low income developing economies” (LIDC) too. Thus, being member of G20 each member has the possibility to rise on the learning curve by transforming “space of places” to “space of flows”. Thus, it would be a win-win situation for all member firms.

Annexure

**Table-1: Market Share of Indian Automobile Manufacturers
(As of March 2023)**

	Company	Market share
1	Maruti Suzuki India Limited	39.53%
2	Hyundai Motor Company	15.60%
3	Tata Motors	13.11%
4	Mahindra & Mahindra	10.68%
5	Kia Motors	6.40%
6	Toyota	5.53%
7	Honda	1.99%
8	MG	1.80%
9	Renault	1.60%
10	Skoda	1.32%

Source: promotedigitally.com

Table-2: Export from India

Year	Export data	% Increase
2020-21	4,134,047	-----
2021-22	5,617,246	21.90%
End 2024	15 lakh crores	28.00%

Source: www.timesofindia.com

Table-3: Sale of EVs in India

Category	2022	2023
Four-Wheeler	10,23,735	11,71,994
Two-Wheeler	2,52,539	7,20,733
Three-Wheeler	1,88,447	3,99,540

Source: www.autocarp.in

Table-4: MSIL facility at Gujarat

Plant	Estb.	Prod capacity	Model
A	Feb 2017	2,50,000	Baleno
B	Jan 2019	2,50,000	Swift
C	Apr 2021	2,50,000	Dzire
D	-----	-----	powertrain

Source: www.globalsuzuki.com

Table-5: Sale of MSIL in Europe

Country	Units exported
Netherland	67,700
Italy	Over 41,000
United Kingdom	Over 34,000
Germany	Over 20,000
Hungary	Over 20,000

Source: (www.globalsuzuki.com)

Table-6: Units exported in 2022

Country	Units
S Africa	63,752
Chile	28,241
Egypt	24,420
Philippines	10,451
Uruguay	10,035

Source: www.statista.com

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