1st International Conference on Infrastructure Development (ICID): Theory, Practice and Policy

Sustainability and Resilience

29th-30th April, 2021
(Virtual Mode)

Book of Abstracts

Editors
Dr. Rachna Gangwar
Dr. Astha Agarwalla
Dr. Sandhya Sreekumar

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ICID Curtain Raiser -
Making Sustainability Mainstream

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Former Director, IIMB and Academic Advisor, NRTI

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CEO, Adani Transmission Ltd.

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PANEL DISCUSSION

Transport Sustainability during Pandemic

Dr. Satyam Shivam Sundaram
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Prof. Shailesh Gandhi
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PLENARY SESSION

Should all creativity be covered by concrete: Infusing Physical Infrastructure with Ecological, Social and Knowledge Capital?

Prof. Anil Gupta
Former Professor, IIMA;
Founder, HoneyBee Network

PANEL DISCUSSION

Moving ESG from 5-Star Conferences to the Board Rooms

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PANEL DISCUSSION
Vision for the Future

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Ex Secy to GoI.
Chairman -
Energy Infratech

Mr. Ajay Shankar
Ex Secy to GoI.
Expert - TERI

Mr. Anish De
Director, KPMG

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Academic Advisor, NRTI
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Conference Coordinator
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International Conference on Infrastructure Development (ICID):
Theory, Practice and Policy

Track: Sustainable Urban and Real Estate Infrastructure
(29th April between 11:10 - 13:40 hrs)

Paper Presentations

- Design Development of Sustainable Zero Cement Mortar by Co-Fired Blended Ash and Basalt Fibers - Kunal Shelote (VNIT), Hindavi Gavali (NICMAR), Paulina Faria (University of Lisbon), Ana Bras (Liverpool John Moores University), Rahul Ralegaonkar (VNIT)

- A system simulation framework to evaluate the sustainability of buildings - Ann Francis & Albert Thomas (IIT Bombay)

- Need for an alternative approach to Housing for Industrial Workers - A case of Morbi, Gujarat - Madhu Bharti (CEPT University), Gargee Das (Rudrabhishek Infosystem)

- Reclaiming and Rejuvenating Urban Water Bodies: Case of Mullassery Canal, Kochi, Kerala - Ar. Akhila N Menon & Puneet Sharma (NIT Hamirpur)

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Prof. Sebastian Morris
(Goa Institute of Management, Former Professor IIMA, Infrastructure, PPP, Regulatory Economics Expert, a member of various distinguished Government Committees.

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Design Development of Sustainable Zero Cement Mortar by Co-Fire Blended Ash and Basalt Fibers

Kunal Shelote¹, Hindavi Gavali², Paulina Faria³, Ana Bras⁴ and Rahul Ralegaonkar⁵

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Abstract

Increasing demand of building materials consumes huge amount of natural resources and energy. Conventional construction materials are being replaced by composite materials, where modern technology permits to exclude the inclusion of metals and incorporation of some natural or artificial fibers, which are eco-efficient. Basalt fibers obtained from basalt rock are one of the eco-efficient fibers that are being used as a reinforcing material. In the present study, physico-mechanical and thermal performance related properties of basalt fibers reinforced alkali-activated masonry mortar were evaluated and compared with similar but unreinforced mortar. Various mix proportions with co-fired blended ash and sand in the ratio of 1:1, 1.5:1 and 2:1, and 0.4 sodium-based alkali activator to solid ratio were designed. With a varying percentage of chopped basalt fiber (0.5, 1 and 1.5 %), mortar cubes were cast and tested. The study resulted that though addition of basalt fibers reduces the compressive strength, it enhances the flexural and flexural bond strength when in contact with a substrate as compared to unreinforced plain mortar. The chloride and sulphate content of the developed reinforced mortar found within the prescribed limit as per Indian standards. In addition, the developed masonry mortar has less thermal conductivity as compared to conventional cement mortar. If used as plaster, developed alkali activated mortar reduces the peak cooling demand of building by almost 6% as compared to conventional cement plaster. The study concludes that the inclusion of 0.5 % chopped basalt fibers in alkali-activated masonry mortar is an optimum solution for reinforced mortar with improved performance.

Keywords

Alkali-Activated, Basalt Fibers, Co-Fired Blended Ash, Masonry Mortar, Reinforcement
A System Simulation Framework to Evaluate the Sustainability of Buildings

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Abstract

The development of building and infrastructure directly influences the economic and social growth of nations. However, they also negatively impact the environment through massive resource consumption, waste generation, and pressure on natural resources. Hence, buildings and infrastructure should embrace sustainable practices that minimize harmful environmental impacts and enhance economic growth and social well-being throughout its life-cycle. Therefore, sustainability assessment gains significant relevance in these sectors. However, on evaluating the existing sustainability assessment methods, it can be observed that they are primarily focused only on the environmental pillar and lacks a coherent and robust structure encompassing all the dimensions of sustainability. These tools and methods also ignore the interdependencies and interactions between the social, economic and environmental aspects. Further, conventional assessment methods adopt a static approach in their mode of evaluation by ignoring the external and internal changes that could occur with time in the building’s long-life span. Therefore, this paper proposes a system dynamics-based modelling approach for sustainability evaluation that is capable of evaluating buildings by capturing the interdependencies between the pillars of sustainability as well as accommodating the dynamic temporal changes that occur in a building life cycle. A case study project from the Indian context demonstrates the features of the framework and its capabilities. Sustainability evaluation using this framework showed that currently, buildings need to focus on reducing energy consumption apart from achieving material efficiency. Similarly, it also demonstrates the importance of a dynamic sustainability assessment framework by illustrating the underestimation of emissions by about 50% when a static approach is adopted in terms of the building’s energy consumption. Therefore, this integrated framework could serve as a means to achieve sustainable development targets envisaged by nations.

Keywords

Sustainability Assessment, Systems Thinking, System Dynamics, Life Cycle Sustainability Assessment (LCSA)
Need for an Alternative Approach to Housing for Industrial Workers - A Case of Morbi, Gujarat

Madhu Bharti¹ and Gargee Das²
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²Rudrabhishek Infosystem
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Abstract

With increasing urbanization and growth of real-estate sector the demand for ceramic tiles and sanitary wares has seen a significant surge. Due to easy availability of raw material i.e., the local clay suitable for ceramic products, quartz, calcite, frits and glazes in Gujarat and neighbouring places like Rajasthan, uninterrupted power supply and availability of cheap labour, Morbi has emerged as a prominent centre for ceramic production. The ceramic industries situated near between Morbi and Wankaner accounts for 90% of total ceramic production in India and employs migrant labours. Ceramic Industrial units provide limited housing to the migrant workers, often with minimum level of amenities. Such housing is provided near the industrial unit, often on the campus. The spillover demand of labour housing is cratered by the local market.

This research aims to study the provision of industrial housing provided by ceramic industry, focuses on the condition of ceramic industrial labours’ housing and proposed interventions to improve the housing supply for the migrant labour.

Keywords
Ceramic Industry, Industrial Workers Housing, Morbi, India
Reclaiming and Rejuvenating Urban Water Bodies: Case of Mullassery Canal, Kochi, Kerala

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Abstract

Water bodies play an important role in shaping the environmental, social and economic aspects of communities in an urban setting. Recent rapid urbanization and population growth has resulted in enormous degradation of such natural resources. Unchecked encroachment and pollution are continuously threatening the ecosystem services provided by these water bodies. Mullassery Canal, a tidal canal that flows through the city of Kochi in Kerala, India is one such example. This paper attempts to establish a framework for rejuvenation of urban water bodies for sustainable city development. First section of the paper explores various methods employed for improving deteriorated water bodies through various case examples. The second section lists out factors instrumental in restoration of the canal and prioritizes the first course of action through AHP. Subsequently, the evaluation and identification of the most vulnerable segment of the canal is performed through field study, interviews and visual analysis so as to begin the restoration process with that segment. The last section illustrates the reclamation and rejuvenation process through daylighting/de-culverting and the design interventions involving Low Impact Development (LID). The results indicate the suitability of employing daylighting process in addressing the most pressing concerns regarding the restoration of the canal. The proposed interventions are also instrumental in enhancing the environmental, social and economic qualities of the area.

Keywords

Urban Water Bodies, Rejuvenation, Daylighting, Low Impact Development
International Conference on Infrastructure Development (ICID): Theory, Practice and Policy

Transportation and Mobility Systems
(April 29, 2021, 14:00 - 18:00 hrs)

Panel Discussion: Making Transport Sustainable during Pandemic (14:00 - 15:00 hrs)

- Dr. Satyam Shivam Sundaram (Partner, EY LLP) - Moderator
- Prof. Wouter Dewulf (Professor, Antwerp University)
- Mr. Ben Zandi (CEO, Adani Airports)
- Prof. Shalish Gandhi (Professor, IIMB)

Technical Session: Transportation and Mobility Systems (15:10 - 17:40 hrs)

Paper Presentations

Hybrid Infrastructure for effective sustainable growth
Abhishek Singh & Pratul Chandra Kalita (IIT Guwahati)

Evolution of electric mobility policy in India: A historical analysis
Sarath KT & Rangan Bannerjee (IIT Bombay)

Examining the Potentialities of Intelligent Transportation System in Improving Transportation Facilities of Lucknow City
Abdur Raoof Khan, Nand Kumar & Tarush Chandra (MNIT Jaipur)

Effect of Transit-Oriented Development on Air Quality in Neighbourhoods of Delhi
Smriti Bhatnagar (TERI School of Advanced Studies)

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Contact person: Dr. Sandhya Sreekumar, Research Officer (Conference Coordinator)
Email id: conference@aaiim.ac.in Contact no.: 6358858010
Hybrid Infrastructure for Effective Sustainable Growth

Abhishek Singh¹ and Pratul Chandra Kalita²
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Abstract
The rapid urbanization around the globe is exploiting the natural resources exponentially, may it be water, air, land or minerals. In last couple of decades, the awareness for sustainable growth has attained significant pace and the same can be observed in the global policies also.

Innovation and smart integration can be a very efficient tool to improve the efficacy of the output of technologies with sustainable goals. In this paper we have considered a case study of Guwahati, where a metro rail network is in planning stage and parallely we have also conducted field surveys to identify the issues pertaining to the people of the city which can be solved through proper infrastructure planning. The motive was to design a user centred infrastructure model. After listing out all major issues, brain storming sessions were organized between a group of researchers and consultants. The literature pertaining to these issues and sustainable goals were also analysed to develop a hybrid model of infrastructure.

To understand the space constraints of the project, 3D modelling of the city was done with hybrid infrastructure. For understanding the financial implication of the project, Break Even Analysis was conducted. The outcome of this paper is that smart infrastructures can give multi fold benefits with some additional cost and this cost can be recovered from the earning of the infrastructure within 15 years in this particular case. Hence instead of conventional infrastructure practices, smart and innovative infrastructure should be promoted for a more efficient and sustainable growth.

Keywords
Hybrid Infrastructure, Smart Infrastructure, Integrated Infrastructure Design.
Evolution of Electric Mobility Policy in India: A Historical Analysis

Sarath KT\textsuperscript{1} and Rangan Bannerjee\textsuperscript{2}
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E-mail: \textsuperscript{1}ktsarath@gmail.com; \textsuperscript{2}rangan@iitb.ac.in

Abstract

The paper has analyzed national-level transport and environment policies, judicial activism, emission standards, initiatives of international organizations and government programs critically to understand the evolutionary timeline and possible linkages among the milestones till electric mobility. Electric vehicles are one of the greenest means of transport available now, that can reduce vehicular emission to a great extent and improve ambient air quality in cities. The Government of India has initiated various schemes and initiatives to support electric vehicles in the past decade, which will be analyzed in this paper. Vehicular emission became a serious concern after the surge of automobiles in cities after the liberalization in 1991.

The judicial intervention in the 1990s was the first case of the government enacting the Fuel quality standards and vehicle emission controls as instructed by the supreme court. The heavy pollution forced citizens to file litigation against the state for inaction and delay in implementing the AIR Act. This shows how the judiciary has influenced policymaking on air quality. Global institutions such as the UN has also influenced policymaking through climate change agreements. The main drivers are technology transfer and financial support, along with the need to improve ambient air quality as India currently has 22 out of 30 most polluted cities in the world.

The National Electric Mobility Mission Plan gave an initial boost for the uptake of EVs but did not achieve its projected EV sale targets. The government introduced the Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME) scheme, a positive step towards the electric mobility initiative. Further, FAME II was formulated based on the experience of FAME 1 and the suggestion of the stakeholders. The BS-IV standard was made mandatory to all vehicles in 2017, and BS V was leapfrogged to BS-VI directly and the introduction of scrappage policy indicates the push towards green mobility. The paper has studied such significant milestones in shaping electric mobility policy and initiatives and the linkages between the institutional approaches and synergy among initiatives.

Keywords

Emission, Electric Mobility, Sustainable Transport, Policy
Examining the Potentialities of Intelligent Transportation System in Improving Transportation Facilities of Lucknow City

Abdur Raoof Khan¹, Nand Kumar² and Tarush Chandra³
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Abstract

The urban development sector in India has been pushing forward with a range of development projects and fast rate of development. Considering the commitments towards emission reduction and improvement on public transportation system, a transition into Smart Transport solution is quite certain. The improvement in the ITC and Digital technology has also enabled the development scenarios and projects to adapt to the technologies very easily, and with Smart cities in motion and having the top most priority in the current time frame, it would be crucial for any transportation development projects to blend in. Intelligent Transport System becomes the indispensable component among all. Leveraging citizens with an Intelligent Transport System (ITS) can save their time and make the city even smarter. ITS aims to reduce travel time of commuters as well as enhances their safety and comfort. Information and communication technologies (ICT) have considerable importance for transport systems, it helps to communicate travel patterns. This paper will majorly focus on the use of smart information and technologies dissemination systems that could be incorporated into modern transit systems, particularly in a context of a growing urban agglomeration as Lucknow city, that is undergoing rapid urban development and transition in terms of its urban services and commodities. With the implementation of the Metro Rail system in the city of Lucknow in full thrust, it is vital that one can take into purview of the possibilities and implications of the Smart ICT and technology integration in the modern transit system to the growing city. The paper will very briefly and crucially look into the job of ITS in management and planning of public transportation in cities with high sustainability indices as well as, it is going to look into the possibilities for improving urban transportation system of Indian cities as Lucknow with the assistance of ITS.

Keywords

Effect of Transit-Oriented Development on Air Quality in Neighborhoods of Delhi

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Abstract
This study aims to find the effect of Transit-oriented development on air quality in neighborhoods of Delhi. Two methodologies namely: the land use regression analysis and the Transit-oriented development index analysis are being used to explore the relationship between urban form and air quality. Land Use Regression Analysis makes use of urban form characteristics for 33 neighborhoods in Delhi as independent variables. These independent variables belong to one of the following broad five heads: road lengths, land use areas, population and household densities, number of amenities and distance between amenities. For the above-mentioned 5 broad variable heads, 29 urban form data points are collected for 33 neighbourhoods in Delhi. This data collection exercise is performed using ArcMap 10.8. Four air quality parameters (NO2, SO2, PM10 and PM2.5) are used as the dependent variables. The data for these dependent variables is obtained from the pollution monitoring stations in Delhi. Ordinary least square stepwise forward and backward regressions are conducted to establish the relationship between urban form variables and air quality parameters. The second methodology the information entropy weighing method is used to establish the transit-oriented development index. This index proves useful in measuring the ‘transit-orientedness’ of the select 33 neighborhoods of Delhi mentioned above. Ordinary least square stepwise forward and backward regressions are conducted to establish the relationship between the transit-oriented development index and air quality parameters. Conducting the exercise with two separate methodologies helps in triangulation of results, and establishing the efficacy of the transit oriented development index and the information entropy weighing (the methodology used to create the index).

Keywords
Air Quality, Land Use Regression, Mixed-Use Planning, Transit-Oriented Development Index, New Delhi
International Conference on Infrastructure Development (ICID) Theory, Practice and Policy

Track: Energy and Green Infrastructure
(30th April between 13:30-15:30)

Paper Presentations

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Prof. Amit Garg
(IIMA)

Fuel of the Future
Rahul Rajbhar & Rhitika Rajbhar
(Thakur College of Science and Commerce)

A case study on Agrovoltaic: technology for rural infrastructure development
VVG Sai Sreek, Nandini Ashish Gaikwad & Tushar Sathe
(VJTI Mumbai)

Impact of Renewable Energy on Indian Economy
Bhaveshkumar Govindbhai Patel & Sunil Patel (Karnavati University)

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Fuel of the Future

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Abstract

This paper is about the alternative energy which can change future. As people are using fuel and petrol which have some disadvantages. The alternative energy can bring the new technology. There are many form of energy like solar energy, green energy, and many others. But we have to change these energy or amendment the technology. Because there are too old technology and not suitable for this time, it should be updated as per time.

Piezoelectricity is the electric charge that accumulates in certain solid materials (such as crystals, certain ceramics, and biological matter such as bone, DNA and various proteins) in response to applied mechanical stress. The word piezoelectricity means electricity resulting from pressure and latent heat.

Hydrogen is a clean fuel that, when consumed in a fuel cell, produces only water. Hydrogen can be produced from a variety of domestic resources, such as natural gas, nuclear power, biomass, and renewable power like solar and wind. Hydrogen fuel can be produced through several methods. The most common methods today are natural gas reforming (a thermal process), and electrolysis. Other methods include solar-driven and biological processes.

A fuel cell is an electrochemical cell which captures the electrical energy of a chemical reaction between fuels.

Keywords

A Case Study on Agrovoltaic: Technology for Rural Infrastructure Development

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Abstract

Electricity and water are two very essential factors every farmer across the globe is concerned about. The availability of electricity for various farming operations are still very limited in the developing country like India. Generation of electricity from conventional power plant requires huge infrastructure and sometimes it becomes very difficult to supply the generated electricity to the remote rural areas. The depth of ground water is also increasing year by year and it becomes very imperative to somehow increase the water level below the earth surface. Considering the necessity of electricity and water harvesting; agrovoltaic with rain water harvesting system is proposed in the present research work. Agrovoltaic stands for system that utilizes same arable land for the production of crops and generation of electricity from solar panels. Agrovoltaic with rain water harvesting system can generate electricity, produced conventional crops and deposit rain water from the same piece of land that used for farming. The theoretical case study is performed in the present research work for Indian conditions and it is observed that the proposed system can be a viable solution for the farmers issues related to basic water and energy requirements. The proposed system can also be employ for animal’s shelter and other aligned applications. The possible challenges for the efficient utilization of proposed system like crop compatibility, effect of solar panels shadow and other issues are also enlightened in the current research work. The payback period of around 9-10yrs is observed from the present study with initial investment cost of around 8 million for Maize as a crop. The average annual income for farmers is also estimated to be around 0.8 million with additional benefits of rain water harvesting.

Keywords

Agrovoltaic, Water Harvesting, Rural Infrastructure, Land Equivalent Ratio
Impact of Renewable Energy on Indian Economy: A Review

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Abstract
Renewable forms of energy are unconventional, need of the hour sources of energy. The decline in production of green-house gases and multiple socioeconomic gains from clean energy sources in conjunction with fossil carbon fuels add a great deal. India deployed 7.3 GW of solar power throughout the country in 2019 and has developed itself as the world’s third-largest solar sector. As of 31 October 2020, the built power was 89.63 GW, of which 36.31 GW and 38.26 GW is solar and wind. Northern India is projected to become a centre of renewable energy in India with a possible ability of 363 GW and policies centred on renewable energy. This paper has attempted to illustrate the value of green energy, the effect on India’s renewable solar energy economics of the international solar alliance and government policies to encourage and enhance renewable energies.

Keywords
International Conference on Infrastructure Development (ICID): Theory, Practice and Policy

Social Infrastructure and Sustainability
(30th April, 09.30 - 13.00 hrs)

Panel Discussion: Moving ESG from 5-Star Conferences to the Board Rooms
Time: 9:30 - 10:15 hrs
Speakers

Dr. Prasad Modak
(Executive President, Environmental Management Centre LLP)

Mr. Susha Tulipenker
(Founding Director, Legasis Service)

Mr. Mukund Rajan
(Chairman, ECube Investment Advisors Private Ltd)

Mr. Shankar Chakraborty
(CEO, Acute Ratings, Chairman, SMERA Grading & Ratings)

Technical Session (11.30 - 13.00 hrs)

Paper Presentations

Does Social Infrastructure Influences Gender Discrimination in Private Health Expenditure in India?
Manik Kumar (Centre for Budget and Governance Accountability) & Nilesh Kumar (Mahatma Gandhi Mission’s College of Engineering and Technology)

Student Perceptions of safety, climate and Campus Infrastructure: A Pan-India Study
Shreya Rai (Ansai School of Architecture), Farhan Asim (IIT Roorkee) & Shiv Dayal Singh (RIMT University)

People’s Perception about Weather Changes In Lucknow and How their Knowledge of Global Concerns such as Climate Change affect the Choices of a Sustainable Lifestyle
Kshitij Tewari & Abdul Razak Mohamed (School of Planning and Architecture Vijayawada)

Register at: https://forms.gle/gq8Ko1PsmtR54k8b9
For more details, please visit: https://www.aii.ac.in/aiim/icid-2021/
Contact person: Dr. Sandhya Sreekumar (Conference Coordinator)
Email id: conference@aai.ac.in Contact no.: 6358858010
Student Perceptions of Safety, Climate and Campus Infrastructure: A Pan-India Study

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Abstract

Majority of the time of the students is spent in academic campuses and a number of studies have outlined the impact of campuses on student’s personality. Thus, a Pan-India survey was conducted to understand the students’ perception of their academic campuses. The data collected from the students is about their social and recreational campus features, and evaluation of their campus on basis of safety, satisfaction with offered extra-curricular activities infrastructure and comfort of the climate. The study also evaluates the frequency data about the students’ visit to social and recreational spaces within their campus. The results suggest that the perception of safety in an academic campus neither depends on gender nor on the age of the respondent. According to half of the respondents, the offered diversity and extra-curricular activities are satisfactory and is comfortable with the climatic condition of their academic campus. The study also recognises the areas of major and minor safety concerns in and around the campuses associated with walking around the campus at night, off-campus housing and neighbourhoods and other areas surrounding the campuses. The study was an attempt to understand the generalised perception of campuses on the basis of physical infrastructure and also to analyse the students’ behaviour pattern in order to understand the role and usefulness of different spaces within the built environment of the campus.

Keywords

Perception of Spaces, Sense of Safety, Sustainable Built Environment, Mental Health and Behaviour
People’s Perception about Weather Changes in Lucknow and How their Knowledge of Global Concerns such as Climate Change affect the Choices of a Sustainable Lifestyle

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Abstract

The sustainable development goal 13 states that the climate action highlights that there is no such country which is not experiencing the drastic effect of climate change. Global warming is causing long-lasting changes to our climate system which threatens irreversible consequences not just on a global but also on a local level if we do not act immediately. Climate change includes both global warming driven by human emissions of greenhouse gases, and the resulting large-scale shifts in weather patterns. Though there have been previous periods of climatic change, since the mid-20th century humans have had unprecedented impact on Earth’s climate system and caused change on a global scale. India is one of the few countries which have faced the worst of the consequences. This makes it important to understand how and to what extent has this affected the perception of the people. Public opinion impacts on the issue of climate change because governments need willing electorates and citizens in order to implement policies that address climate change. Furthermore, when the perceptions of the populace and the government differ, the communication of risk to the public becomes problematic. This article attempts to analyze the various impacts of global climate change in the context of India and how the people of the north Indian city of Lucknow perceive it on a local level. The research finds out the role of environmental knowledge in how sustainable a lifestyle would people choose. The perception of respondents clearly aligns with the scientific data about the weather and climate change in Lucknow which has happened gradually. This research helps us understand as to how important it is to inform people about how their actions affect the well being of the entire world and how their informed choices can help the idea of sustainability to take shape.

Keywords

Weather, Sustainability, Climate Change, Lucknow, Perception
Does Social Infrastructure Influences Gender Discrimination in Private Health Expenditure in India?

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Abstract

The paper examines how social infrastructure effect gender discrimination in household resource allocation with spatial reference to private health care expenditure; understand the role of factors underlying the discrimination. To estimate deference as well as discrimination this paper used Percentage Gap Ratio (PGR) and Bliender-Oaxaca (B-O) decomposition with help of two round (60th and 71th) national representative NSSO unit level data.

Results indicate that average health spending for female is not only; always lower than that of male regardless of type of social as well as economic group and survey rounds but this gap is also increase significantly over the period of time. The results indicate that there is clear gender bias in favor of man in rural and urban sector. This bias is also visible when we take into account the socio-economic indicators in India.

Keywords

Gender Discrimination, Health Care Expenditure and Social Infrastructure
International Conference on Infrastructure Development (ICID) Theory, Practice and Policy

Track: Financing Sustainable Infrastructure
(29th April between 17:50-20:20)

Paper Presentations

Potential of blockchain based tokenized securities for green real estate bonds
Ravi Shankar (National University of Singapore)

Trade facilitation and Global Value Chain Participation: Cross-Country Analysis
Ketan Reddy & Subash S (IIT Madras)

Private Infrastructure Financing Through Public Private Partnership in India:
An Investigation for Renewable Energy and Transport
Aditi & Nalin Bharti (IIT Patna)

Sustainability and Resilience of the Economic Transformation in Rural India:
An Analysis with the Performance of PACS Pankaj Kumar Soni (BHU)

Listen To:
Prof. Richard Thakor
(University of Minnesota)

Register at: https://forms.gle/gq8Ko1PsmtR54k8b9
For more details, please visit: https://www.aii.ac.in/aiim/icid-2021/
Email id: conference@aii.ac.in Contact no.: 6358858010
Trade Facilitation and Global Value Chain Participation: Cross-Country Analysis

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Abstract

In this paper, we examine the role of trade facilitation in fostering firm participation in global value chains (GVCs). To achieve this objective, we use the World Bank Enterprise Survey database for 115 economies over 2006-2018. We employ four trade indicators: customs, regulation quality, loans, and digitalization indicators proxying for trade facilitation measures and correct for reverse causality using the instrumental variable technique. Our empirical findings highlight that customs have a negative impact on GVC participation of the firm. Further, adhering to government regulation, having access to loans, and digital communication adoption fosters supply chain integration of the firm. The present study also finds a favourable heterogenous effects of trade facilitation on GVC participation of less productive firms and larger firms employing more than 100 workers. Our findings are further robust to alternative methods of endogeneity correction and GVC definitions.

Keywords
Global Value Chains, Trade Facilitation and Customs
Private Infrastructure Financing through Public Private Partnership in India: An Investigation for Renewable Energy and Transport

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Abstract

Physical infrastructure such as power or energy, bridges, dams, roads, railways, telecommunication etc. is touted as one of the biggest constraints in propelling inclusive growth or overall development of an economy. According to Economic Survey of India (2017-18), India will require $4.5 trillion infrastructure investment by 2040. The urbanisation in India is at a meteoric rate. Access to energy and transport influences our daily life from studying, commuting, online shopping, using electronic goods etc. This triggers the debate over resilience in energy accessibility and sustainable mobility. Transport and energy promote economic growth, facilitates trade, stimulates rapid mobility, augments industrialization and service sector and helps reduce poverty indirectly by creating jobs. It has been a recognizing fact today that governments cannot bridge these growing infrastructure financing gaps through tax revenues and aid alone, so private or foreign sector participation in infrastructure development can help reduce pressure on public finances. The significance of FDI and in some cases ODA (Official Development Assistance) generated through international agencies like World bank, AIIB, ADB, IFC etc. as the significant source of emerging financial option for Infrastructure investment is still underexplored. In this context, the paper tries to conceptually assess the importance of PPP (public private partnership) in mitigating the infrastructure finance gap in India, also considering Budget 2021-22 and privatization. Further, a discussion on various initiatives in India along with the case study from other countries like Africa, U.S.A, Bangladesh, Indonesia etc. is also taken into consideration. An exploratory research based on contextual content analysis is performed through review of reports from McKinsey & Company, UNCTAD, World Bank, ADB, NITI Aayog etc. The paper could be theoretically instrumental for the Indian Policy makers to outline better policies to de-bottleneck infrastructure facilities in India.

Keywords

Private Infrastructure Finance, Renewable Energy and Transport, Conceptualization, FDI or ODA
Sustainability and Resilience of the Economic Transformation in Rural India: An Analysis with the Performance of PACS

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Abstract

The correct questions of rural development become particularly important at the present time, which is one of the rapid changes in the economic environment of small and poor countries. In a poor developing country, the impact rural development of is very closely linked to the economic inequality. This observation is of considerable significance as it helps to determine rapid, though approximate, estimates the question of the economic growth of these countries. The measurement of inequality and poverty in India has a difficult task to specify in the traditional adopted definition. Some empirical surveys try to shows that the main bottleneck of these problems exists in some other type problem which not define in a particular way. It is this strong link between colonization and economic growth based on a traditional dependency growth model based relation norm, which unable access to an analysis of the recent development trends in reducing economic inequalities and poverty.

This paper argues that the performance of Primary Agriculture Credit Societies as case studies in the age of growing demand for the finance. Agriculture Credit Societies have been formed with the aim of spacing framers from the exploitation through the hands of moneylenders but useful to handle the problem of the corporate sector in the context of contract farming. During this time period in the agrarian sector has also presented what could be the way forward, given our objectives of accelerated growth, inclusiveness and the reducing of poverty and hunger. This paper tries to examine the agricultural development in the scenario of the cooperative movement. Credit institutions provide enough scope for accelerated and sustainable agricultural growth of Indian economy and ensuring the welfare of its people hinges on agricultural development. Recognizing the importance of agrarian development is more important for the state development, this paper tries to describe the status of agrarian development in the historical time frame. At this time ‘growth with inclusiveness’ can be achieved only when
agriculture growth accelerates and is also widely shared amongst people with the help of credit agencies. All these factors point to just one thing that agriculture has to be kept at the centre of any agenda or planning process, in order to make a significant indentation on poverty and malnutrition and to ensure long-term food security for the people.

This paper argues that the performance of credit system which has been formed with the aim of spacing framers to meet their requirements regarding the agrarian sector. These means make the medium of exploitation through the hands of moneylenders as in the new forms like the corporate sector.

**Keywords**

Rural Development, Credit, PACS, Agrarian Sector, Cooperative Movement
Potential of Blockchain Based Tokenized Securities for Green Real Estate Bonds

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Abstract

Green financing in the real estate sector has been rising recently because of trend towards ESG (environmental, social, and corporate governance) investing and increased consensus towards a need for carbon neutral construction in the real estate sector. The popular instruments of green financing include, green bonds, green loans, equity-based instruments, sustainability-linked loans etc. However, the green investment vehicles face several bottlenecks such as high transaction costs for managing the principal agent relationship, higher minimum sum to be invested, and opportunity costs. The recent popularity of green bonds also leads to high incidences of green washing. Blockchain based tokenized securities can improve transaction efficiency, liquidity, and transparency through better management of intermediaries in the real estate sector. However, they face certain risks such as the regulatory risk, technology risk, and acceptability of the asset class. The purpose of this research is to find out whether the blockchain technology has the potential to solve the existing problems of paper-based transactions, high transaction costs, lack of transparency, high costs of property valuation, slow and opaque process, fraudulent transactions and green washing related to green real estate bonds. The benefits and barriers of tokenizing real estate green bond issuance were also explored. The data sources include in-depth interviews with diverse stakeholders such as developers, subject matter experts including practitioners and academicians, and industry analysts as well as other secondary sources of data. It is found that the blockchain based tokenized securities for green real estate bonds can help in improving liquidity and efficiency of real estate transactions. The transparency is also improved due to disintermediation. The study regarding potential of tokenization is still in its infancy. The interviewed experts also opined that the potential of tokenization has not yet been fully realized because of paucity of technical infrastructures, weak state capacity for regulation, immature asset class and volatilities in the token market, and missing out of an entrepreneurial public sector.

Keywords

Green Bonds, Green Finance, Sustainability, Blockchain, Tokenization
Prepared by faculty members, students, and other stakeholders of Adani Institute of Infrastructure Management as a precursor to the International Conference on Infrastructure Development: Theory, Practice and Policy focusing on the theme of Sustainability and Resilience. All the given views are authors' personal ones. Any reproduction of material from this compilation requires permission. Please write to Research and Publication Division at aiim.library@aii.ac.in for comments/suggestions/permissions.
PREFACE

Sustainability is a ubiquitous yet elusive concept. Though its genesis can be traced back to the early 20th century when concerns over nature conservation and preservation started gaining attention, it emerged as an international agenda only after the 1972 United Nations conference. The far-reaching consequences of the growth model of most nations, particularly the developed countries, were seen to be unfavorable. Mahatma Gandhi’s often quoted response when asked about India attaining the same standard of living as Britain, “It took Britain half the resources of the planet to achieve this prosperity. How many planets will a country like India require!” truly reflected the unsustainability of the growth model.

In a united effort to achieve sustainable development globally, the 193 Member States of the UN adopted 17 sustainable development goals in 2015. These goals call for a development model that must balance the 3 pillars (social, economic, and environmental) of sustainability. Social sustainability refers to impact of development on people and communities. Economic sustainability refers to practices that contribute to the long-term economic growth with the least amount of resource use and environmental harm. Environmental sustainability is about acting in a way that minimises negative effects on environment.

In this context, sustainability in various domains of infrastructure will strive to adopt technologies that are nature-friendly and less resource intensive (renewable energy, green buildings, mass rapid transit systems, electric vehicles, etc.), business practices that bring the sustainability in forefront of all actions, and government policies that reward sustainable practices. The biggest challenge faced in embracing sustainable practices by enterprises and individuals is the higher cost of production and financial viability. For example, organic (sustainable) products will not become mainstream until their prices are comparable to other products. This is possible by research & development, and/or government support that brings the cost of production down for companies and consumers. Successful examples are renewable energy and electric vehicles that are consistently innovating to reduce costs and increase market penetration.

The notion of resilience is the ability to resist, absorb, and recover quickly after a crisis. In the context of infrastructure, it would mean the ability of an infrastructure system to withstand unpredictable scenarios, minimise disruptions, and have short response times in resuming services. Examples include water, energy, and transport infrastructure systems that are resilient in the face of accidents, floods, hurricanes, earthquakes, extreme weather conditions, etc. Though unprecedented, the COVID 19 crisis offers unique insights and presents challenges to resilience for the infrastructure sector.

To make infrastructure systems more resilient, the project design, integration, sequencing, and coordination must ensure that failing of one/part structure does not take down the whole system. This would be possible in practice only when the infrastructure systems are made up of smaller, self-sustained, integrated pieces and parts instead of a few large projects. This also means that designing the infrastructure systems and networks to be resilient might need an unconventional approach.

As a precursor to the conference, we present to you, perspectives on various domains of infrastructure sectors as put together by the various Centres of Excellence of AIIM. These are aligned to various tracks of the conference. The Centre of Surface and Air Transport (C-SAT) brings out relevant perspectives on sustainability in transport and mobility systems. Issues around financing sustainable infrastructure are presented by the Centre of Excellence in Finance and Risk Management (CFRM). Perspectives on the development of energy and green infrastructure are presented by the Centre of Excellence in Energy (CEE). The Centre of Excellence in Urban and Real Estate Development (CURED) presents insights on sustainability in urban and real estate infrastructure. Perspectives on issues around making the social infrastructure sustainable are presented by the Centre for Social Infrastructure.

Sustainability and resilience are no longer an option but a priority. We look forward to enriching discussions at the conference!
True Sustainable Education

Prof. Devang Desai
Dean, Adani Institute of Infrastructure Management

Educating means first learning and then teaching. Learning comes from observing how individuals and communities care for continuity in a wholesome manner. The best lessons come from those who have faced adversity, scarcity and inequality. Their actuated ideas of value, group behaviour and nurturing are admirable goals to be pursued.

At, Adani Institute of Infrastructure Management (AIIM), the emphasis is on building the nation through sustainable Infrastructure learnings. Infrastructure and welfare are closely linked, and real prosperity is achieved when people appreciate the complex process of sustainable infrastructure building.

Sustainability embedding is very crucial when a nation with a large population needs transformative changes in planning its cities, transportation and energy needs.

We, at AIIM, have focused on teaching the complex issues of Infrastructure Management. Our course takes the learners through the multi-disciplinary attributes of infrastructure, its many regulatory dimensions and absorption of the commonalities and uniqueness of the Infrastructure sectors.

Our learners at AIIM are taught the importance of long-term vision and framework approach blending theory, practice and policy. The manager must learn the art of balancing the private drive and efficiency with public good and compassion.

With its far-reaching impact, interdependencies, diverse stakeholders and public answerability, Infrastructure Management requires differentiating managerial competencies. We emphasise the art, science and technology of persuasion, people priority, resource optimisation, partnering imperatives, sense of fairness, ethics and innovative implementation of complex infrastructure projects.

We combine the rich learnings of infrastructure practitioners, consultants, academicians, and regulators while outlining the concepts and practices. We have established COEs around the key infrastructure sectors and through its multifold activities, the subtle nuances of the policy impacts are learned. They address the challenging issues of economic growth with its social cost-benefit understandings. The topics of climate change, culture diversity, people-machine roles and development world imperatives are debated at various forums.

Our carefully structured ‘Infrastructure LAB’ initiative provides hands-on learning of the real-world and imparts the larger life aspects of health, safety, governance, and environmental care while planning infrastructure developments.

Our initiative of ‘Innovation Hub’ provides opportunities to young minds to learn from startups and harness entrepreneurial enthusiasm.

Ensnconced in the green township at ‘Shantigram’, AIIM practices what it teaches in terms of care for its people, surroundings and nature conservation. ESG, Tripple bottom reporting, people-PRO policies are driven by our deep value systems of courage, trust and commitment.

At AIIM, we work to live the virtues of a sustainable existence.
Sustainability in HR

Mr. Vikram Tandon
Group Chief Human Resources Officer
Adani Group

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs.

The World Economic Forum (WEF) has issued a publication ‘Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation’. The publication discusses the new environmental, social and governance (ESG) disclosure framework developed by the Big Four accounting firms. The framework includes a universal set of metrics and recommended disclosures intended to lead to a more comprehensive global corporate reporting system. The framework divides disclosures into four pillars — principles of governance, planet, people, and prosperity — that serve as the foundation for ESG reporting standards.

The People Pillar here is the center stage for HR. For human resources - sustainability would mean fostering a conducive working environment that results in positive human and social outcomes without focusing on financial strategies and results.

How can an organisation operating sustainably affect the morale of its employees?

It is imperative that Human Resources embrace Sustainability.

An organisation that focuses on sustainability is always viewed more favourably by People. By 2025 majority of the workforce will be Gen Z & Millennials and they have been vocal about their passion and alignment towards meaningful work. The organisation’s efforts towards Sustainability & Climate Change will in turn make customers and employees partners in making the difference.

COVID-19 has bought the whole world together and there has been added emphasis on the organisation to put ethics and sustainability over profit and work together to create a more just & better world.

That Value proposition will be emerging as a top talent magnet. Best of the talent will always want to work for an organisation which resonates with larger betterment of world & society at large.

How can HR help in adopting more sustainable practices?

HR is best positioned to lead the momentum for the adoption of more sustainable practices.

It all begins with setting the right cultural elements & then integrating it into the everyday processes & interventions.

Can we ensure that selection happens on the understanding of the importance of Sustainability in the world we are in? Asking the right questions to probable employees on why we have such a focus of Sustainability goes a long way in setting the right expectations. Similarly, with onboarding, upskilling the current manpower & right rewards & recognition practices we can move positively in the direction of ingraining sustainability as the DNA of the organisation.

Paperless processes, forums for innovation & platforms with excellent rewards for ideas & suggestions which foster a culture of waste management, energy saving & sustainable practices is the way to be & will boost sustainability at the workplace.

Lessons from COVID-19 on HR’s resilience?

COVID-19 has been the biggest black swan event of our lifetimes. While it has imparted innumerable wisdom to societies, nations, individuals & organisations – the whole world could showcase
resilience. Further, the role of HR has further deepened.

The biggest lesson learnt is to be proactive in planning and to become ready for any disruptions that are to be followed. We have to become more agile and adaptable to any change that shall come.

The world will keep on changing, the technology developments & changes will accelerate. The battles remain to be fought on a personal level, health & hygiene – providing a healthy workplace to our people shall remain an important topic to be addressed in this reality.

We have already begun to put in place how the return to work should look like. We have the data to back that the work from home is here to stay for the foreseeable future. We also need to accept that not all employees are returning in their best shape.

My biggest asset – the employees will require to be provided a healthy & effective workplace to ensure they reach their best potential, become resilient & in turn provide a strong foundation to the organisation.

Vikram is a seasoned Human Resources professional with over three decades of experience across a range of diverse businesses, geographies, and cultures. His expertise lies in thoughtful management of the intersection of strategy, talent, and organisation culture, with extensive outcomes in organisational effectiveness, talent management, succession planning and leadership development.

Prior to joining the Adani Group, Vikram was the Head of Human Resources at HSBC India, one of the world's largest banking and financial services organisations. Before HSBC, Vikram was at the American International Group as the Regional Human Resources Director for the Mediterranean, Middle East and South Asia region and participated in AIG's rapid growth through several startup joint ventures and acquisitions. His career also included several years at Inchcape Plc, Dubai, the ANZ Grind lays Bank, India, and Indian Hotels Company Ltd., where he has held multiple roles in HR.

Vikram holds a master's degree in Human Resources from XLRI Jamshedpur and has certifications in Leading Change, Management & Innovation from the Harvard Business School. Vikram is the President of the National HRD Network, Mumbai Chapter and has been a recipient of the GNOSIS Excellence award from XLRI.
Global debates on the need for businesses to adopt sustainable practices go back many decades. The movement for environment protection and sustainable development started taking shape in the 1960s when several environmental problems captured the interest of governments around the world and catalysed awareness on the need to act. India was one of the first signatories to the landmark Stockholm Declaration of 1972 which laid down the guiding principles of environmental protection. After signing the Stockholm Declaration on Human Environment, 1972, India enacted the Water Act of 1976, Environment Protection Act of 1986, Air Act of 1981 and framed many other programmes of nature conservation. These were pathbreaking enactments, especially for a country which was still very poor and was grappling with the huge challenge of eradicating poverty. Yet, we were the first among the leading nations of the world to put in place such an elaborate and evolved framework of environment protection. After signing the Rio Declaration on Environment and Development in 1992 and the Johannesburg Declaration on Sustainable Development in 2002, India has been striving hard to build our economy on the three interdependent and mutually reinforcing pillars of sustainable development—economic development, social progress and environment protection. We were again among the first few nations to adopt the 1992 UN Framework Convention on Climate Change which paved the way for the 1997 Kyoto Protocol. But a defining momentum in this journey in terms of proactive participation from the private sector, came after the 2015 United Nations Climate Change Conference in Paris, also known as the Paris Agreement or COP21. The push came primarily because for the first time many decisive governments aligned their national goals with global climate goals. This is particularly true for India which outshined its global peers.

Our nation's intent was validated by a very recent BNEF Climatescope study that ranked it as the top emerging market for clean energy, well on its way to meet its goal of 450 GW of renewable energy by 2030. Today, India is the only G20 nation whose actions have showed its dedication to the committed rate of decarbonization. India's COP21 commitments became a guiding light for the Adani Group, given its alignment with governments' vision and national priorities. It is widely known that since our inception, the Group has created critical infrastructure to mitigate demand gaps in our nation. Even as our group-wide businesses were already committed towards sustainable value creations - as is demonstrated in our vision statement - the momentum garnered from the COP21 conference charted a focused growth path for our group.

We know that the Adani Group is the country's largest thermal power producer, a fleet that primarily comprises super & ultra-critical plants. This business was built to serve the needs of our citizens including the 300 million people in our country that lack access to electricity. The success and health of this significant part of our population that India must uplift are dependent on having electricity. To make this a responsible transition, and to balance the resulting CO2 emissions, we also built the world's largest solar generation business in just five years and have a line of sight to become the world's largest renewable power business by 2025. Given the efforts demonstrated so far, Mercom Capital, the US-based think-tank ranked Adani
Green Energy Limited (AGEL) as the world's largest solar power generation asset owner in 2020. Not only did we channelise our focus into clean energy transition by earmarking 70% of our Capital Expenditure in the energy vertical towards the renewables sector but each of our group businesses have also set in place a measurable ESG (Environmental, Social and Governance) dashboard with short-term and long-term targets.

For instance, the Adani Ports and Special Economic Zones (APSEZ) Ltd. ranked 14th in the Dow Jones Sustainability Emerging Markets Index in the transportation and transportation infrastructure sector and was the only company from India to be featured in the coveted list.

We were the 1st Indian port company to sign up for the Business Ambition 1.5 degree Celsius. We have a renewable installation of 19MW contributing to 3% energy share and APSEZ targets to increase this by more than five-folds to 100MW by 2025. Moreover, we have conserved more than 2,800 Ha of mangroves and planted over one million trees in and around our ports. The business has also created more than 1,90,000 man days for green activities and a low carbon investment of more than INR 130 crore. We have also treated and reused 528 million litres of wastewater and harvested more than 6 million litres of rainwater. In terms of preserving biodiversity, the area nearby Dhamra port is a nesting ground for rare Olive Ridley Turtles, recognised as vulnerable by the IUCN Red list. In view of this, we have created a corpus of 30 crore for conservation and protection of the Olive Ridley Turtles.

Likewise, our city gas distribution business is contributing to India's target of improving its energy mix. The government's vision is to increase the share of natural gas from 6% to 15% by 2030. Similarly, our power transmission business aims to triple its renewable power procurement share from 3% to 30% by 2022 and as much as 50% by 2025.

In line with India's vision towards achieving 40% of Energy from Renewable Sources by 2030, Adani Wilmar has launched projects for installation of Solar Generation capacity across its refineries in India. AWL has also installed Zero Liquid Discharge (ZLD) facility at all their plants in an effort towards Water Conservation. Fortune Brand of AWL is the first Edible Oil brand in India to replace its packaging with recyclable Material and aims to collect 100% of the produced plastic packaging within the next two years.

At this point I must talk about the groupwide efforts put in by the Adani Group's Horticulture Team. The combined green zone coverage of the group stands at nearly 2,000 Ha. This includes mangroves afforestation of 2,889 Ha, mangrove conservation of 2,340 Ha and terrestrial afforestation of 1,987 Ha. Green zones, trees plantations and plantation of shrubs have collectively contributed in offsetting 1,52,621 tonnes/year of carbon emissions.

In terms of community outreach and contributing towards globally identified sustainable development goals, the Adani Foundation has been striving to mitigate urban-rural divides and empowering the rural populations of India by creating equal opportunities for growth. So far, the foundation has touched over 3.2 million lives across 2,250 villages through its work in education, community health, rural infrastructure development and sustainable livelihood development activities and these numbers are only expected to multiply in the near future. This is further supported by encouraging our portfolio companies to develop local vendors, thus helping create an effective and viable local MSME ecosystem.

From a governance perspective we are fully cognizant that this aspect is critical for our future success and reputation. We have implemented a strict policy for related party transactions and to ensure transparency that all transactions are at arms-length, multi-level assessments by internal business teams, reviews through external agencies, and due diligence by an Executive Committee consisting of the Board of Directors. Furthermore, we are in the process of implementing formal assurance mechanism for our ESG programmes by formation of a Corporate Responsibility Committee at each public board no later than 30 September 2021. We see these activities and the assurance mechanism as critical to accelerate our global capital raise programmes.

These are measurable actions. Organisations are way past the stage when climate goals were mere
commitments on paper. What this shift demonstrates is a transformation in the way new-age entrepreneurs are expected to view businesses. It is imperative for every business to measure bottom lines through long-term sustainable returns for the planet and society. Business leaders who fail to adapt are likely to lose relevance because key stakeholders of any business such as shareholders, governments, employees, investors, and customers in the modern world judge an organisation based on its ESG footprints. Even from a brand affection perspective, popular sentiments connect with brands that are environmentally responsible, compassionate towards communities and maintain a transparent and robust corporate governance framework.

Mr. Pranav Adani is the Managing Director (Agro, Oil & Gas) and Director of Adani Enterprises, the in-house incubator of the Adani Group. Mr. Adani heads a diverse portfolio of businesses such as City Gas Distribution, Agro, Real Estate and Natural Resources. Mr. Adani began his entrepreneurial journey in 1999 with Adani Wilmar Limited, whose flagship food brand Fortune commands over 20% market share in India's edible oil segment. Being a strong advocate of India's food security and farmers' empowerment, his vision enabled the group's foray in the agri sector with Adani Agri Logistics, and Adani Agri Fresh.

Mr. Adani nurtured Adani Gas Limited, in becoming India's largest private sector listed City Gas Distribution Company, catering to 3B regions that account for 8% of India's population along with its strategic JV partners Indian Oil Corporation and France Energy Major Total. He also spearheads Adani Realty, the group's realty business with established presence in Gujarat, Maharashtra and NCR. At the group level, he plays a key role as the chief custodian of Brand Adani.

Mr. Adani, a Bachelor of Science in Business Administration from Boston University is also an alumnus of the Owners/President Management Program of the Harvard Business School. In 2009, Mr. Pranav Adani was conferred with the 'Globoil Man of the Year' award.
1st International Conference on Infrastructure Development (ICID):
Theory, Practice and Policy
Theme: Sustainability and Resilience

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  Emeritus, Queensland University of Technology, Australia

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Financing Sustainable Infrastructure

To understand sustainability and sustainable finance we need to first comprehend the financial market. Fundamentally, the financial market is a sort of machine which takes cash from financial specialists and disperses it to business visionaries that need cash for their businesses. Those businesses promise a return on investment depending on the business and investment comes with a certain risk. We can say that the risk and return arrangement of a business generally encourages investors to pick where to invest.

What is the significance of sustainability here?
So, there are different sides to sustainability. The first is business: it covers what we do, how we do it, how we work, how we go about as a responsible sustainable business. The most significant is what impact it has on the community around us. What impact it has on the climate. So, we are simply viewing ourselves as a business and ensure that we do the correct things or more precisely we do climate-friendly things.

The subsequent thing is as exciting or possibly all the more exciting. It thinks about how we drive more extensive sustainable behaviour, how would we move things in the more extensive world without competitors, our clients, our partners? So now here the part of sustainable finance comes into the picture.

Sustainable finance comprehensively talks about the means by which you move subsidising ventures. We consider that it focuses on something beyond financial consideration. It covers things like the climate, social perspectives, government, ESG thought, and so on.

Here the role of data and our expertise becomes important. We need to take a gander at what sustainable financing mechanisms require to redesign and develop the financial ecosystem to implement sustainable practices. While it is easy for the developed economies of Europe and the USA to adopt sustainable financing integrating to ESG, the developing countries in Asia and Africa are finding the same hard.

Infrastructure financing for developing economies depend on the following sources and its challenges:

- Commercial Banks and other Financial Institutions - Infrastructure projects are capital and cost intensive projects with long term cash flow generation and payback period. Commercial Banks and other financial institutions have short term liabilities/sources of funds. So they lend to corporates for projects only for short term requirements of projects.
- Sustainable financing requires tweaking of banking regulations by the national governments to empower the commercial banks for infrastructure with credit enhancement schemes and structures.
- Development Financial Institutions (DFIs) - are special financial institutions created to cater to long term financial requirements of capital projects by raising resources from international development institutions mostly with sovereign guarantees.
- With the withdrawal of sovereign guarantees, DFIs find it difficult to raise funds and lend long tenor loans for infrastructure.

Infrastructure Financing in Developing Economies

Prof Ravindra Kumar Das
Professor (Finance)
expertise we have when it comes to analytics and benchmarks as standards. The data and those standards allow transparency into this ecosystem. They allow us to compare, contrast de-risk projects and investments.

Sustainable finance takes a look beyond the simple numbers of risk and return. It takes a gander at the effect of the investment. Does the investment negatively affect environmental, social, or governance aspects? In sustainable finance, these impact related issues do matter for the investment decision and they might even matter for the risk profile. A few investors may lean toward a profile, a few investors may favour a more sustainable investment over another project with similar risk and return profile. Others may only consider sustainable projects in general.

Sustainable finance adds an entirely different viewpoint to investments. Now, it is a difficult matter to decide whether each investment can be called sustainable or not. In this specific situation, the topic currently becomes tremendously important for many companies, financial institutions, and researchers. Now corporate executives and researchers have begun zeroing in on sustainability. Executives look every year at how they can increase their energy, execution of their portfolio and make it more durable.

The blend of individuals that have solid abilities in finance and sustainability is very rare. So, measuring the qualitative aspect is something novel and the blend of finance and sustainability is actually a decent match. “It's also profitable”. Various research says that the businesses that are more sustainable perform better over the long haul.

Experts in the area say that sustainable finance is not a hot topic but an urgency.

- There is a need for more special DFIs to cater to sustainable financing in the infrastructure projects.
- Local Bond issuances in debt capital market by corporates and institutions - Vast pool of resources are available with private investors. These investors participate in Corporate Bond issuances and provide long term funds. In developing economies, corporate bond market is not developed and highly illiquid refraining investors to participate. Sovereign governments do adopt policies to develop the bond market to channelize resources to long term sustainable financing.
- Green Bond issuances in the international finance market - Green Bonds are debt capital market instruments issued to support environmentally sustainable infrastructure activities/projects in energy, transport, water, waste management, etc.
- With lower credit rating very limited number of Green Bonds are tapped in the international financial market by issuers of developing nations.
- Proactive policies by the national governments are needed to support and develop the nascent green bond market with a substantial number of issuances."
Transport and Mobility Systems – Issues of Sustainability

Prof Kamal Kishore
Professor & Head
Centre of Surface and Air Transport

Prof Rachna Gangwar
Associate Professor
Centre of Surface and Air Transport

Prof Mukesh Parikh
Adjunct Professor
Centre of Surface and Air Transport

Transport is inevitable for human civilisation and the nervous system of an economy. It enables communication, trade and commerce, the economic pillars around which humanity survives. However, transport mediums including air, rail, road and shipping also account for about a quarter of the global CO2 emissions. Alongside, they also contribute handsomely to other GHG gas emissions and dust pollution. The social costs or the negative externalities associated with transport systems are a major threat to sustainability and have enormous costs on the economy and human health. Consequently, we have to discover and espouse sustainability within all our means.

Sustainability in transport has to address all the three impact dimensions viz. economic, social and environmental. Different modes of transport compete amongst themselves for passenger and freight share with varying levels of efficiency and system effectiveness. The social and economic costs of transport include accidents and crashes, fire, the unproductive excess time spent while on the move due to congestion, human physical inactivity, price impacts, delays in cargo transport & delivery, etc. More often the impacts in terms of access and costs are disproportionately higher on poorer sections of the society.

On the environmental costs front, more than 95% of transport related emissions come from the direct burning of fossil fuels and the sector grows faster than any other energy using sector. The fossil fuels driving transport modes include diesel, petrol, ATF, natural gas & electricity, each helping achieve varying levels of efficiency and the associated emissions. The electricity used to drive railways and ships is also derived majorly from coal-based steam-power. While rail transport is more efficient & sustainable than the road for the same weight-distance, road transport is preferred because of its last mile reach, flexibility and competitive prices. Incidentally, road transport is also a major cause of local air dust pollution & smog causing respiratory and carcinogenic diseases.

Sustainable transport thus has to address simultaneous issues of access, convenience, congestion, costs, time, environmental emissions, security and safety.

Key Issues

One of the major challenges before the government is to push to a modal mix that is sustainable both on the efficiency and environment friendliness front in the longer run. The current modal share of the road at 65% in freight and 85% is not sustainable. The Government of India recognises this and the policy push in the recent decades is helping increase the share of rail, pipeline, coastal shipping, and inland waterways in freight transport, rail and rail-based transport modes in passenger transport. The use of cleaner fuel, thrust on electric vehicles, and electrification of railways are other priority areas for government to fight pollution, and the use of technology in managing and integrating the transport systems, to reduce congestion. Simultaneous development of the road network access, expressways and highways has not helped this switch in recent times.

Another major negative externality of the transport system is that it is one of the major causes of...
deteriorating quality of life in cities. The challenges posed by rapid urbanisation resulted in burgeoning mobility demands but the investments in public transport could not keep pace with the demand. This resulted in an exponential growth of private vehicles and chaotic traffic conditions. Congestion leading to loss of time on the road, poor average speed, accidents and pollution in cities are alarming and safety is a major concern. Huge investments are required in building a good quality public transport network in all metropolitan cities. First mile and last mile connectivity, affordability and accessibility are key to the success of public transport systems.

Other areas of concern are environmental degradation caused by unsafe disposal of vehicles including ships and increasing demand on urban land for parking.

Key Policy Interventions

The national logistics policy announced by the government in 2020 is an important step towards an integrated approach to transport and will address many issues faced in the freight segment. The initiatives of multimodal logistics parks, dedicated freight corridors, hub and feeder model for surface transport and a larger share of rail and coastal shipping will reduce congestion on road and thus reduce pollution and improve safety.

For passenger transport, the Regional Rapid Transit System in the National Capital Region, High Speed Rail project between Mumbai and Ahmedabad, development of regional airports are important projects to shift traffic from the road to other modes.

The high seas shipping sector is bracing itself to meet the ambitious IMO targets viz. sulfur cap by 2020, 40% improvement in ship efficiency by 2030, and 50% reduction in CO2 emissions by 2050. The traditional government owned Indian ports sector is engaging with private players using public private partnership model to develop and expand existing ports and set up new private ports. Indian ports are further focusing on building IT enabled resilient infrastructure, improving port efficiency, reducing carbon emissions, engaging in local community outreach, innovation, safety & security.

The National Urban Transport Policy places a major thrust on equitable use of public space. Metro and bus rapid transit systems are given priority in all major cities.

Another initiative towards a cleaner environment is the adoption of electric vehicles. The Electric Vehicle Policy 2020 tries to address major challenges (infrastructure and technological), provide support to all stakeholders, and create a conducive environment to make EVs economically viable.

Technological advancements in the form of electronic toll collection, intelligent transport systems, and electronic payment of GST have gained momentum over the years and are crucial to sustainability.

Lesson from COVID-19 on Sector’s Resilience

The strongest lesson we have learned from the Covid-19 pandemic environment is that the current transport models that assume a linear world where predictable reactions are caused by actions and interventions are not valid. The global interconnectedness led a small change (Corona-19 virus in China) to affect the entire world with enormous consequences for the economy & society. Unlike some systems, transportation services cannot be stored to be used later. Economic entities and communities lost out due to their poor resilience to cope up with change.

Massive disruptions were witnessed in transport systems in both people as well as freight movement. Airlines stopped flying. Assets lay idle. Trucks got stuck across the roads of India. Railways stopped passenger moving trains. The inter-relatedness and inter-dependence in a multi-modal transport led to an even larger impact. Containers were stuck everywhere and the freight rates shot up. Hinterland movement embargoes prevented cargo to reach ports and ships sailed empty. The focus was on emergency services and essential services with a skeletal set of people. Revenues dropped significantly. The sector being investment intensive, players faced great difficulties in meeting the fixed costs and scheduled repayments. Workmen could not travel to workplaces impacting even the essential services. A wide impact was seen on employment & salaries especially in the private sector. Low morale and motivations and heightened anxiety related to Covid-19 spread took a massive toll on the workforce. The sector could do better with a higher dose of resilience.

Resilience helps systems & people deal with disruptions to minimise impacts. However,
transport system designs and plans have failed to integrate resilience with action over time. The argument of costs of integrating with resilience needs outweighing benefits and investing in options that have a more visible cause-effect relationship does not hold as we have seen during this pandemic.

While the resilience and preparedness for disruptions would find more attention in due course, the current focus is more on post-pandemic recovery. The demand is bound to surge with increasing coverage of vaccines and lifting of movement restrictions. While vaccine delivery and essential services will be on priority, pressures on the restoration of full regular services have to be dealt with. Transport planners need to engage with stakeholders. The pandemic showed numerous instances of key personnel working as warriors. There is a need to not only adequately recognize them but also resolve to build a larger pool of such resources. Asset maintenance may take a hit for some time under continuous pressure to meet the pent-up demand. In the longer run, investments in quality & sufficiency of assets, training of people in the more stringent safety and health security, building redundancy & better planning for disruptions is called for.

ICID 2021 and Transport Infrastructure

The conference track on sustainability in transport will have knowledge sharing by experts from the transport sector. In addition, the best four papers from the participants will be selected for presentation in this track and one of them would get the best paper award of INR 25,000. The discussions & papers in the track will focus deeply on issues of economic contributions and sustainability in the Indian transport sector.
Sustainable Urban Development – Challenges and Perspectives

Prof. Astha Agarwalla
Associate Professor (Economics & Public Policy)
Head, Centre of Excellence in Urban and Real Estate Development
Co-convenor - ICID 2021

Urban areas are cosmos of economic activity, aggregating economic agents such as producers, workers, consumers, and policy makers. Empirical evidence has suggested the high productivity and contribution of cities to output and employment. However, in the process emerges the spectres of concentration of urban poverty, over and mis-utilisation of natural resources, heavy concentration leading to pollution and related negative externalities, energy loss due to faulty planning and implementation and challenges of waste management.

Challenges of sustainable urban development are the most crucial among the infrastructure sectors since it is the spatial allocation of resources in cities and towns that enables the most efficient and productive utilisation of resources and services.

Oxford dictionary defines sustainability as ‘the ability to be maintained at a certain role or level’. For cities, the cosmos of economic activity, this would mean a multifaceted challenge. We at Centre for Urban and Real Estate Development (CURED) perceive the challenge to cities in three main dimensions, people, profit, and planet.

Equitable cities – People Perspective
Cities are the centres of growth; the challenges are to grow in a balanced manner. This also has multiple dimensions. Demographically, all citizens should get equal opportunity to work, earn and grow. Emergence of urban slums therefore is an indicator of lack of sustainability. Addressing the issues of urban poverty and providing liveable spaces to urban poor is therefore one of the leading themes of sustainability in cities. Spatially, the city planning should lead to balanced regional and local development. High concentration of people and activity in an area is therefore another indicator of lack of sustainability, resulting in high pollution and issues related to congestion. Addressing these is a priority for sustainable planning.

Resource Efficient cities – Planet Perspective
Another challenge for Cities is to organise their affairs in a manner that natural resources are utilised optimally. Green spaces, rainwater harvesting and recycling are some of the low-hanging practices helping cities to achieve the objective. Reducing the wasteful usage and reusing resources are also options that can be pushed for by relevant policy designs. Tariff principles such as polluters pay can lead to people making planet-friendly choices.

Growing Cities – Profit Perspective
City growth also means output growth. Growing consumerism has caused this growth to be haphazard, with every opportunity to earn easy profits materialised, without paying attention to the negative externalities generated in the process. Resource augmentation requires a careful examination into the environmental impact of resources used, such as building material and fuel, and looking out for less harmful alternatives.

Policy Space
Sustainable urban development requires a multi-stakeholder policy environment. An informed set of citizen stakeholders involved in policy making and planning and a healthy balance outlined by policy options where growth happens with care and concern for the environment is required for sustainable urban development.

Government: At the level of city governments, initiatives such as local taxes to incentives
sustainable waste disposal, water usage and cleaner air have been put in place. Regulatory instruments such as permits, and quotas are used to control resource usage. Fines and fees are used to internalise negative externalities. Tariff schemes are utilised to control the choices and subsidies are designed for the needy to ensure equity and balanced growth.

Private Sector: Policy induced actions by the private sector also account for sustainable development in a big way. For example, carbon accounting in real-estate is one practice that leads to significant impact on the environmental impact of real estate development. While making innovative choices, and using resources, a little consciousness on private sector's part to ensure use of more local resources (to reduce transport requirements), to develop sustainable backward and forward linkages etc. would produce significant results.

Non-Governmental Organisations (NGOs) and other civil society groups: NGOs and civil society has a large role to play in policy setting and implementation, as the insurers of last mile effectiveness. These people centric organisations are closer to people and can work more effectively in designing choices and affecting mind-sets. Awareness generation is one such initiative that can successfully be taken up by these groups. Willingness to pay assessments for natural resources such as water and solid waste can result into design of more efficient and economical practices. These organisations can go a long way in promoting a healthy and balanced lifestyle in cities, leading to greener and cleaner environment.

ICID 2021 and CURED.
As a part of ICID 2021, CURED is expected to receive original research contributions from academicians and practitioners addressing any aspect of sustainable cities. Contributions are likely to address challenges in the areas of resource efficiency, cleanliness and waste management, policy design and principles, and sustainable infrastructure choices such as transport and mobility planning, affordable housing, land-use and spatial planning, social equity, and affordability of infrastructure, among others. Smart City mission has been a pioneering effort in India for development of sustainable cities and urban infrastructure in both greenfield and brownfield manner. Any research contributions looking at the design, implementation and effectiveness of the initiative will be welcomed.

The recent pandemic has caused cities to stall, reboot and refunction in a manner which was unprecedented. Lock-down as the policy response presented challenges in logistics, livelihood, migration and need for redesigning the housing and commercial space keeping in mind the need for social distancing and lowered down interactions. These themes are new and developing, any original research ideas addressing these themes will be welcomed and given priority.
Social Infrastructure and Sustainability

Social Infrastructure and Sustainability

Prof Diti Vyas
Associate Professor (Communication)
Head, Centre for Social Infrastructure

Whichever definition one accepts, the term sustainability encapsulates the qualities of lasting long and being accessible and affordable equitably. Specifically, the 17 Sustainable Development Goals (SDGs) developed by the United Nations revolve around the pillars of ecological protection, social development and economic growth. Through its core focus on social services comprising education, sports, art and culture; medical and public health, family welfare; water supply and sanitation; housing; urban development; the welfare of SCs, STs and OBCs, labour and labour welfare; social security and welfare, nutrition, relief on account of natural calamities, etc.; social infrastructure sector becomes a marker of mapping the SDGs (Economic Survey 2020-21).

Sustainability Issues in Social Infrastructure Sector

One of the pressing challenges of implementing practices in a way that is accessible and affordable in the social infrastructure sector is the sheer expansiveness of India as a nation. The social, political, economic diversity and variations in physical infrastructural availability ranging from nonexistent to fail-proof, create challenges which are unique. For example, while Chandigarh and Kerala show a composite SDG score of 70, Bihar ranks as low as 50 on the SDG India Index 2019. According to National Sample Survey (NSS), Punjab reports an attendance rate as high as 61.6 percent in the age group of 3-5 years whereas Karnataka showed the lowest attendance rate of 18.3 percent. This makes the aggregate numbers misleading. All India literacy rate was 77.7 percent but female literacy among social groups of Scheduled Caste, Scheduled Tribes, Other Backward Class, including some religious groups remained dismally low. Micro-level identification of problems with the engagement of local bodies, therefore, becomes vital.

The second challenge is the paucity of scientifically derived estimates on certain disadvantaged and disenfranchised segments of society. For example, the data sources such as National Family Health Survey or the National Sample Surveys, do not contain information extent of urban homelessness and the conditions of the homeless. Though the government has taken steps for the welfare of the workers under Aatmanirbhar Bharat Rojgar Yojana (ABRY), there is limited data available on inter-state migration and employment in informal sectors, the numbers of migrants who lost jobs and accommodation during the pandemic.

Yet another pressing issue stems from the challenges of the state-driven delivery mechanism. The efficacy of social infrastructure hinges upon the delivery of its services. And it is a common perception that social services, which are managed and operated by the state, are dominated by centralised operations, command and control style and dependence on government funding. Therefore studies, such as Indicus Analytics, show that children even from poorer families prefer studying in private schools. Similarly, a study of the Dharavi slums of Mumbai by the Department of Health study reveals that many prefer availing treatment from private sources for minor ailments. Ironically, the Economic Survey 2020, shows how the private sector patients demonstrate high mortality rates, despite longer and costlier readmissions. In this context, it is worth noting that around 74% of outpatient care and 65% of hospitalisation care in urban India was provided by private sector health providers in the year 2020.
Policy Interventions
The key interventions in the areas of social infrastructure are addressed at both national and sub-national levels. Over last 5 years the total expenditure by Centre and States combined as a proportion of GDP on social services has increased from 6.2 to 8.8% across all social services. To address the issues related to quality in the education sector, the Indian government has recently revamped its 36-year-old National Education Policy (NEP) with 2020 version which focuses on transformational reforms through a comprehensive curriculum, teaching training, open schooling, skill-based education, integration of Vocational Education and Training (VET) and digital initiatives. Samagra Shiksha programme covering school education from preschool to Std.12, is in the implementation phase with the aim to improve effectiveness through equal opportunities and equitable learning outcomes. To address the regional differences, this programme directs special attention to Educationally Backward Blocks (EBBs), Special Focus Districts (SFDs), border areas and the 115 aspirational districts identified by NITI Aayog.

National Health Mission (NHM) has been active since 2013 with the target to provide universal, equitable, affordable, quality healthcare services across rural and urban areas. It also is working on revitalising the local health traditions alongside AYUSH. Swachh Bharat Mission advocating cleanliness launched in 2014 and Har Ghar Jal Abhiyan for providing tap water launched in 2019 contribute to the prevention of communicable diseases. Pradhan Mantri Matru, Vandana Yojana Anganwadi Services, and Scheme for Adolescent Girls under the Umbrella Integrated Child Development Services Scheme (ICDS) and PM Overarching Scheme for Holistic Nutrition (POSHAN) are working for combating the problem of malnutrition.

Lessons from COVID on Sector’s Resilience
The Covid-19 pandemic opened up both the strengths and vulnerabilities of the social infrastructure sector within India. It also revealed, quite brutally, the correlation between healthcare and economic outcomes. So much so that some studies have also advocated for a re-definition of sustainability focusing on the element of public health as a core pillar of sustainability. With the disruption in classroom teaching, under Atmanirbhar Bharat, PM eVidya was introduced for the unification of digital, online and on-air education platforms during the COVID-19 lockdown. Swayam MOOC offered 92 open courses and the National Repository of Open Educational Resources (NROER) provided e-content for all grades.

Amidst the COVID-19 induced lockdown and social distancing, the use of technology-enabled platforms grew leaps and bounds. The Ministry of Health and Family Welfare issued the Telemedicine Practice Guidelines during the same time. A number of e-consultations on tele-consulation platforms such as eSanjeevani and Practo have recorded a phenomenal increase.

ICID 2021 and Social Infrastructure
India still stands at 145th position out of 180 countries on the quality of healthcare as measured by the Global Burden of Disease Study and 131st in the list of 189 countries on the Human Development Index as per UNDP Report 2019. A lot needs to be done and thought through by a lot of us. The social infrastructure track will attract some passionate researchers, scholars and practitioners in public policy, social sciences, health, education and businesses who will deliberate about the existing frameworks and their impacts and would dare to envisage the newer ways of making lives better.
Sustainability and Sustainable Infrastructure: Challenges and Opportunities Ahead

Dr. Samudra Sen
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Head, Centre of Excellence in Energy

Co-authors: Rohan Nandi, Student, PGDM (IM), AIIM
Anand Kumar, Student, PGDM (IM), AIIM

Economic growth is usually referred to by OECD countries as an indicator of growing human welfare. Economic growth alone however does not completely describe the needs and wants of the public. That is where the concept of sustainable development fits in. Sustainable development balances between societies' economic, social and environmental goals. Sustainable development is described as satisfying the needs of the present without undermining future generations' capacity to fulfill their own needs. Sustainable infrastructure, from their meaning, can refer to 'green' or 'smart' buildings, smart homes, green energy, and similar concepts and infrastructure in terms of the application of sustainable practices in the infrastructure sector. More broadly, a wide range of initiatives can be included, with a particular focus on energy, water and land management. Sustainable infrastructure is generally looked upon as a universal approach to development based on global and domestic goals for sustainable development and sustainability. Social, financial and political challenges, public health and well-being, as well as economic and environmental problems, are resolved through sustainable infrastructure. In countries most at risk from the physical impacts of climate change, there is an apparent emphasis on climate-resilient infrastructure. To help mitigate the worst possible effects of climate change, including floods and rising sea levels, low-lying countries such as the Maldives and Singapore are all focused on sustainable growth. More than half of the world's population is projected to live in urban environments by 2050, creating immense obstacles as well as prospects for sustainable infrastructure investment in all facets of the economy. Mobility services will need to be smarter, quicker and more oriented on rapid transit and electric cars. Buildings would need to be more energy effective, greener and more efficient.

Critical issues related to Sustainability

The effect of climate change continues to intensify due to the lack of appropriate protections. Therefore, the promotion of sustainable and integrated management of natural resources must be encouraged. In accordance with the principle of common but differentiated responsibilities, mitigation and adaptation measures are required to be taken.

Hunger and starvation remain constant in other countries though declining in many developed countries, and food security appears to be an elusive target for many. Income disparity has soared and hit an extraordinarily high level within and across many nations, invoking increased friction and social unrest. Rapid urbanisation calls for substantial changes in the design and management of urban growth, as well as a large increase in public and private spending in urban infrastructure and services. For hundreds of millions of people, electricity needs are expected to remain unmet, until substantial progress is made in securing access to modern energy resources. It is important to avoid the recurrence of the financial crisis and to steer financial mechanisms towards fostering access to long-term funding for the projects needed to achieve sustainable growth.
Challenges in the Implementation of Sustainable Development

Huge challenges are encountered while implementing sustainable development. Some of these hurdles and issues are:

- Sustainable growth is frequently not feasible in low-income, underdeveloped and war-torn nations, since there are other pressing issues at hand.
- Natural disasters can pose a danger to sustainability as they can alter water distribution and damage structures.
- The governmental disagreement between quick benefit and involvement in renewable technology. In Poland instead of going full speed ahead towards the introduction of renewable energy sources, the government has also raised subsidies for the mining industry, with coal responsible for 80 percent of overall energy production in Poland.
- Corruption: Financing is typically given by international grants to developed countries. In the case of Nepal, the UK pays for the bulk of international grants. However, due to bureaucracy and incompetence in Nepal, a stipend must be charged to ministers as well as service fees to the government of Nepal that substantially bog down NGO procedures in order to pass such construction projects.
- Lack of good governance: Processes for decision-making are framed by the government. On sustainable development problems, there is a need for unity among all stakeholders of society to identify and enforce objectives: private and public sector businesses, organisations, NGOs, labour unions and residents. It also takes a lot of time to get all interested parties to consensus and to comply with the appropriate protocols and is a significant challenge to the road to sustainable growth.

Key policy interventions

Governing bodies at national, regional and city levels will be instrumental to the shaping of sustainable infrastructure goals and closing the finance gap in three ways:

- **Policy Measures**
  Policies make or break any programme. In this respect, a few steps should be made in the right direction: establishing transparent and supportive policy and regulatory mechanisms and supporting environments to ensure sustainability and stability are integrated into planning and investment requirements, both for public procurement and as a signal for private investment. In addition, meeting commitments to make pollution savings and monitoring obligatory by enforcing domestic laws, including environmental requirements in procurement procedures and expenditure programmes, enhancing transparency, anti-corruption, service quality and time and expense measurement and public sector management, will go a long way to making infrastructure sustainable.

- **Information Flows**
  It is important to disseminate accurate knowledge to all interested parties at frequent intervals in a period where information is of the utmost importance. The following actions lead to achieving this objective: releasing long-term development proposals to help build a consistent pool of bankable investor ventures, promoting the advantages of sustainable infrastructure to all, collaborating vertically and across jurisdictions with other regulatory bodies to develop criteria and gather output data to enhance project comparability, future proof investments and share information about successes and failures.

- **Mobilising Finance**
  Sustainable infrastructure funding will go a long way by diverting fossil fuel subsidies to sustainable infrastructure growth and placing a price on carbon. According to the OECD, OECD countries are investing an estimated US$160 to 200 billion a year on subsidies for fossil fuels in 2019. In the same year, it was estimated that carbon prices account for less than 15% of global carbon emissions.

Developing funding and tax benefits and financial support structures, using public finance and credit enhancement frameworks to draw private investment, raising upfront costs that initially make renewable infrastructure projects more expensive than traditional projects, and improving capital markets and developing green bond requirements are some of the ways of reinforcing infrastructure.
Lessons learnt from COVID-19 on Sector’s Resilience

To solve the present COVID-19 an important condition should be to spend and improve the green economy. It is a major concern to provide for basic commodities to help vulnerable people earn their livelihood.

Human capital, which has been shaken, is one of the critical factors in fostering SDG-8 (decent job and economic growth). Fiscal structures may help fund efforts for recovery and resilience, thus supporting low-carbon growth. Failure to purchase imported goods, non-essential products, improved demand savings, encouragement of consumption reuse, recycling and repair models will lead to a circular economy and minimize the waste produced by current business models. Supporting work-from-home policies to be maintained will minimize road congestion and air pollution. The failure to be accommodated in digital environments impedes the achievement of SDGs 1, 2, and 10 by contributing to more poverty, malnutrition, and inequality. These are the challenges raised by the pandemic, which seriously affects SDG3, to the equity component of full growth (good health and well-being).

Conclusion

The aim of this conference will be on solving fundamental variables through the SDGs, as the world is seeking to solve this pandemic and aims to restore global stability. Sustainable development cannot happen without human beings: it exists by the coexistence of the survival of nature and the development of human civilization through fulfilling the diverse demands for equity. SDG-16, which is about unity, justice and creating solid institutions, is being interrupted today.

While all the governments of various countries are issuing rescue packages to restore their respective economies, the rising deaths of their population due to the pandemic and other factors connected with unsustainable growth still pose a major challenge to them. The different facets of contemporary life and how to deal with contingencies such as the existing COVID-19 scenario need to be extensively debated and discussed. One such forum is the International Conference on Infrastructure Development, where issues pertaining to sustainable development in the infrastructure space are debated and deliberated.