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SYNERGY

BANGLADESHI ENGINEERS & ARCHITECTS WORLDWIDE

Welcome to Synergy Magazine:

A New Chapter for BEAWorld!

"Organisations and institutions urged to take SMART road map as baseline document for performance measurement. Government, semi-government and private institutions shall streamline management system in line with transformation road map tapping maximum benefit of it."

- Engr. Rafiqul Islam Talukder

Synergy Magazine Index Design or Matrix (August 2024)

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Editorial Message

At BEAWorld, our unwavering commitment to sustainability has inspired us to dedicate Synergy's second issue to this crucial theme. Our editorial team has aligned itself fully with this vision, and for the first time, we have engaged students from various disciplines to contribute their insights on sustainability. However, we faced an unexpected challenge that shifted our focus from our planned core topic to addressing more immediate and pressing concerns.

The Synergy editorial board faced significant difficulties in releasing this issue on time due to the unprecedented circumstances in Bangladesh from July to August 2024. During this period, Bangladesh underwent a monumental change with the revolution in early August 2024, marking a shift in political power. The driving force behind this change has been the country's youth (Gen-Z), particularly the students, who have shown remarkable leadership and vision. The entire nation now eagerly anticipates the direction in which the country will move post-revolution. As responsible and conscious members of this society, we hope for a Bangladesh that is progressive, inclusive, and guided by democratic values such as freedom of choice, thought, and speech. All citizens must practice coexistence and resilience, fostering unity as one nation.

Reflecting on our past, it is evident that the ideology-driven politics that has long been practiced has not delivered the intended well-being for the nation; instead, it has often led to societal and economic disruptions. If the true purpose of politics is nation-building, then it is imperative to replace rigid ideologies with a dynamic, action-oriented, and SMART vision that focuses on productive outcomes. With this broader objective in mind, Synergy's lead article for this issue, "Bangladesh Transformation Roadmap," aims to outline a path to a prosperous future for our country.

Despite the turbulence and distractions, we have received several insightful articles from esteemed writers and students, for which we are deeply grateful. We hope that this second volume of Synergy will quench the intellectual curiosity of our readers and academic community, even if only modestly, as it is in this pursuit that we find our true satisfaction.

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Bangladesh Transformation Roadmap

Engr. Rafiqul Islam Talukder
P.Eng, F/3808 (life)

Bangladesh at present passes 53 years since independence achieved visibly infrastructural development. On contrary, population booming suffers quality education and training hindering human development growth. Eventually, large portion of youths is unable to find suitable job pushing them out of development process. Keeping vast majority of youths out of the development process, sustainable development may not be achieved leaving infrastructural development as cosmetic development only. Moreover, Country experiences volatile and chaotic political outburst at certain intervals leaving a fragile social and economic structure. Absence of resilience and coexistence amongst the political parties split the society. Fierce Ideological conflict takes terrible shape, damage social harmony, compromise peace and tranquility, cripple our economic prosperity that people hardly bear. It dictates us realigning the behavior pattern across the board. Political institutions shall undertake development vision as an objective goal over the ideological belief.

Bangladesh Development Transformation road map set out 21 SMART goals for nation building with broader objective of

* Progressive Bangladesh.
* Productive Bangladesh.
* Inclusive Bangladesh.

In pursuit of transformation road map, national character shall take paradigm shift from ideological belief to development vision, from subjective to objective goal.

Goal 01: Macro Objective:

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 1.1	Economic Growth rate target	Third party report	<6 %	>6% till 2040	>8 % till 2040	>9% till 2040	Monitoring and Control / Incentive
Goal 1.2	Coexistence and Resilience -no. of Violation	Third party report	>30	<30 Yearly	< 20 Yearly	<10 Yearly	
Goal 1.3	Smooth transition	Third party report	<90	90 %	>90 %	>98 %	
Goal 1.4	Social justice and welfare - Deviation	Third party report	>400	<400 by 2030	< 300 by 2030	<200 by 2030	
Goal 1.5	Poverty Alleviation	Third party report	below	>20% by Dec 40	>30% by Dec 40	>40% By Dec 40	

Goal 1.6	Democracy exercise- all level ➢ Freedom of speech ➢ Freedom of choice ➢ Freedom thought	Third party report	<94%	95%	>96%	>97%	

Goal 02: Strengthening Local Government : Decentralization

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	**Target**	**Exceeding**	**Significantly Exceeding**	**Remarks**
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 2.1	Govt. machineries to be accountable to local govt.	Third party report	Below	<5%	<3%	<2%	Reform appraisal system
Goal 2.2	Budget & operation	Third party report	Below	<5%	<3%	<2%	Sector-wise
Goal 2.3	interference by Legislative body	Third party report	>10%	<10%	<7%	<5%	% of total Upo-Zilla.
Goal 2.4	Land mapping for sectoral development	Third party report	Beyond	by Dec 35	by Dec 32	by Dec 30	Land segregation
Goal 2.5	Physical and social infrastructure hub	Third party report	Below	by Dec 30	by Dec 28	by Dec 26	Implementation
Goal 2.6	Social welfare Hub	Third party report	Below	by Dec 30	by Dec 28	by Dec 26	Implementation
Goal 2.7	Human resource dev hub	Third party report	Below	by Dec 30	by Dec 28	by Dec 26	Implementation

Goal 03: Human resource development – Quality of life and economic growth

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 3.1	Human Capital Index (HDI) Target	Third party report	Below	<129 By Dec 30	<120 By Dec 30	<110 By Dec 30	Education, training and health is important
Goal 3.2	Compulsory Vocational training for each youth	Third party report	Below	50 % By Dec. 25	>50 % By Dec. 25	>80 % By Dec. 25	Knowledge and Skill development
Goal 3.3	Every house be a human resource power house	Third party report	Below	50 % By Dec. 25	>50 % By Dec. 25	>80 % By Dec. 25	Scale up confidence level

Goal 04: Educational Institution – Centre of Excellence and Research hub

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 4.1	At least 10 universities to position in international ranking –	Third party report	Below	<200 By Dec 30	<180 By Dec 30	<150 By Dec 30	
Goal 4.2	Faculty position	Third party report	Below	<180 By Dec 30	<150 By Dec 30	<120 By Dec 30	
Goal 4.3	Research and development fund increase	Third party report	Below	50 % By Dec. 28	>50 % By Dec. 28	>80 % By Dec. 28	
Goal 4.4	Contribution to National economy	Third party report	Below	10 % By Dec. 28	>15 % By Dec. 28	>20 % By Dec. 28	

Goal 05: Think Tank for Strategy and Policy- Propelling the nation on right direction

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 5.1	Identify sectors	Third party report	Beyond March	By Dec 25	By Nov 25	By Oct 25	Public sector to prioritize
Goal 5.2	Search experts and talents having insight & foresight on subject	Third party report	Beyond April	By April 26	By Feb 26	By Jan 26	Combination of SME / social science/Economist
Goal 5.3	Policy Dialogue	Third party report	Beyond Oct	By Oct 26	By Sept 26	By August 26	To consolidate the objectives
Goal 5.4	Engage Stakeholders	Third party report	Beyond January	By January 27	By Dec 26	By Nov 26	Participatory & feedback
Goal 5.5	Formulation policy	Third party report	Beyond April	By April 27	By March 27	By Feb 27	

Goal 06: Strengthening Institutions – Effective Institution can build a nation on justice and system

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 6.1	Conduct Institution performance audit	Third party report	Beyond March	By March 25	By Jan 25	By Dec 24	Objective Goal vs delivery
Goal 6.2	Conduct Gap analysis & recommendation	Third party report	Beyond July	By July 25	By June 25	By May 25	Ground effect /Satisfaction level
Goal 6.3	Identify sectors of Reform & direction	Third party report	Beyond Oct	By October 25	By Sept 25	By August 25	Detailing with benefit
Goal 6.4	Set the SMART goal institution reform	Third party report	Beyond January	By January 26	By Dec 25	By Nov 25	Reform goal in sequence

Goal 07: Performance Measure – You cannot manage unless you measure

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 7.1	Performance objective data collection	Third party report	Beyond June	By June 25	By May 25	By April 25	Take an organization as sample
Goal 7.2	Review performance goal by Expert HR team	Third party report	Beyond Oct	By Oct 25	By Sept 25	By Aug 25	Verification
Goal 7.3	Open forum discussion	Third party report	Beyond Oct	By Jan 26	By Dec 25	By Nov 25	Awareness and assimilation
Goal 7.4	Finalize framework of SMART KPI at organization and individual level	Third party report	Beyond June	By Jun 26	By May 26	By April 26	
Goal 7.5	Enactment	Third party report		By Dec 26	By Nov 26	By Oct 26	Every institution & organization

Goal 08: Rational Distribution of Resources -Holistic development ensuring social justice

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 8.1	Policy dialogue to Identify sectors of deprivation /marginalized group	Third party report	Beyond Feb	By Feb 25	By Jan 25	By Dec 24	Potentiality to judge
Goal 8.2	Figure out basis of budget allocation.	Third party report	Beyond March	By March 25	By Feb 25	By Jan 25	Through Model
Goal 8.3	Figure out Economic and social benefit on Investment.	Third party report	Beyond June	By Jun 25	By May 25	By April 25	

Goal 09: Establish Social & Regional Harmony: Narrow down conflict to make an inclusive society

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 9.1	Unified education Syllabus & curriculum	Third party report	Beyond	By June 26	By May 26	By April 26	Up to 10th class
Goal 9.2	Include moral education in syllabus	Third party report	Beyond	By June 26	By May 26	By April 26	Objective based society
Goal 9.3	Form truth and reconciliation commission to resolve conflict	Third party report	Beyond	By Jun 25	By May 25	By April 25	Take as a model
Goal 9.4	Reform /formulate Policy of inclusiveness	Third party report	Beyond	By Jun 25	By May 25	By April 25	Social , cultural, political , economical
Goal 9.5	Identify context of common interest & tie up opportunity	Third party report	Beyond	By Jun 25	By May 25	By April 25	Regional
Goal 9.6	Identify element hindering healthy relationship, suggest road map of redressing	Third party report	Beyond	By Jun 26	By May 26	By April 26	

Goal 10: Transparency and Accountability – National growth and image building

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 10.1	Form Centralized T & A Excellence Centre with expert panel	Third party report	Beyond Feb	By Feb 25	By Jan 25	By Dec 24	Report to highest authority like President
Goal 10.2	Develop framework of T & A benchmarking	Third party report	Beyond June	By June 25	By May 25	By April 25	Outline and broadline objective, plan , procedure etc

Goal 10.3	Develop SMART Monitoring and enforcement mechanism	Third party report	Beyond Dec	By Dec 25	By Nov 25	By Oct 25	Transparent way
Goal 10.4	Engagement session with stakeholders	Third party report	Beyond June	By Jun 26	By May 26	By April 26	Awareness and assimilation

Goal 11: Access to Opportunity Fund – Economic growth and employment generation

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 11.1	Policy and strategy framework	Third party report	Beyond	By March 25	By Feb 25	By Jan 25	Social & financial analysis
Goal 11.2	Identify opportunity sector of investment	Third party report	Beyond	By June. 25	By May. 25	By April 25	Economic & social benefit analysis /ROI
Goal 11.3	Eligible investors hunt	Third party report	Beyond	By Dec. 25	By Nov. 25	By Oct. 25	Media or centralized data pool
Goal 11.4	Allocate fund and Expertise / technology	Third party report	Beyond	By March 26	By Feb 26	By Jan 26	

Goal 12: Health and Hygiene -HDI Improvement and productivity improvement

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 12.1	Regional Health and Hygiene mapping	Third party report	Beyond	By March 25	By Feb 25	By Jan 25	Community health out of biological infection
Goal 12.2	Vulnerability mapping & benchmarking	Third party report	Beyond	By June. 25	By May. 25	By April 25	Degree of epidemic / pandemic
Goal 12.3	Compulsory health insurance for all citizen	Third party report	Beyond	By Dec. 25	By Nov. 25	By Oct. 25	Analysis
Goal 12.4	Monitoring & Enforcement mechanism	Third party report	Beyond	By March 26	By Feb 26	By Jan 26	Feed back from consumers very important

Goal 13: Social Safety Net: Narrowing Class discrimination

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 13.1	Ensure Food and nutrition for under-privileged section at subsidized rate	Third party report	Below	>1950 KCL by Dec 30	>2200 KCL Dec 30	>2300 By Dec 30	Vulnerable group
Goal 13.2	Free transportation- for senior citizen and under-privileged group	Third party report	Below	>70% subsidy Dec 25	>80% subsidy By Dec 25	>90% subsidy By Dec 25	Follow the best example
Goal 13.3	Ensure quality Housing and sanitation at affordable cost for under-privileged section	Third party report	Below	>70% subsidy Dec 25	>80% subsidy By Dec 25	>90% subsidy By Dec 25	Low income group
Goal 13.4	Health and education for under-privileged section.	Third party report	Below	>70% subsidy Dec 25	>80% subsidy By Dec 25	>90% subsidy By Dec 25	Slum people for example
Goal 13.5	Capacity build up training	Third party report		>70% subsidy Dec 30	>80% subsidy By Dec 30	>90% subsidy By Dec 30	Purpose of education to be analyzed

Goal 14: Eradication of Un-employment – Long Journey towards Economic & Social Development

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 14.1	Institutions to analyze and develop Income generating model project.	Third party report	Beyond	>5 project each institution	>10 project each institution	>20 project each institution	Can be included in the thesis curriculum
Goal 14.2	Un-employments mapping	Third party report	Below	By July 25	By June 25	By May 25	Survey – Student can participate
Goal 14.3	Vacancy Mapping	Third party report	Below	By March 26	By Feb 26	By Jan 26	National data center

Goal 14.4	Mentorship training	Third party report	Below	>70% by June 26	>80% By May 26	>90% By April 26	Mentor data bank from retiree / NRB can
Goal 14.5	Employment opportunity	Third party report	Below	>70% by June 27	>80% By May 27	>90% By April 27	Financial institutions role

Goal 15: Environment, Safety and Housekeeping – Loss Prevention

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 15.1	**Environment violation Reduction**	Third party report	Below	50% by Dec 25	70% By Dec 25	90% By Dec 25	Technology, compliance and regulation
Goal 15.2	**Safety / fire risk reduction**	Third party report	Below	50% by Dec 25	70% By Dec 25	90% By Dec 25	Technology, Compliance, regulation
Goal 15.3	Road accident risk reduction	Third party report	Below	50% by Dec 25	70% By Dec 25	90% By Dec 25	License & fitness, traffic, Infrastructure, administrative, regulation

Goal 16: Good Governance –Revolutionize Integrity, Reputation and growth

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 16.1	Fit to purpose-Implementation	Third party report	Below	>70% by Dec 25	>80% By Dec 25	>90% By Dec 25	Right tool for right job
Goal 16.2	Develop framework of governance, validate ,implement evaluation	Third party report	Below	By June 25	By May 25	By April 25	Guiding principle
Goal 16.3	Reduction of harassment to consumers -	Third party report	Below	>50% Dec 25	>80% subsidy By Dec 25	>90% subsidy By Dec 25	Consumer Feedback

Goal 16.4	Corruption reduction by system enhancement	Third party report	Below	>20 Dec 25	>25 By Dec 26	>30 By Dec 27	MIS implementation , Decentralization
Goal 16.5	Productivity enhancement	Third party report	Below	>10% Dec 25	>20% By Dec 25	>30% By Dec 25	To be measured
Goal 16.6	Quality Assurance	Third party report	Above	<10% failure	<5% failure	<3% failure	Practice national & international codes / standard
Goal 16.7	Continuous engagement of stakeholders	Third party report	Below	>50% Dec 25	>80% By Dec 25	>90% By Dec 25	Awareness & understanding
Goal 16.8	Task monitoring via modern tools and technique	Third party report	Below	>50% Dec 25	>80% By Dec 25	>90% By Dec 25	Application software e.g ERP

Goal 17: Climate and Environment – Protection of Lives & Livelihood

Goal	**Element**	**Judging criteria**	**Performance Measuring Criteria**				
			Not Meeting	**Target**	**Exceeding**	**Significantly Exceeding**	**Remarks**
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 17.1	Waste to Energy	Third party report	Below	>10% by Dec 30	>20% By Dec 30	>40% By Dec 30	Organic waste - carbon credit
Goal 17.2	Double Energy efficiency	Third party report	Below	>20% by Dec 30	>30% by Dec 30	>40% By Dec 30	Incandescent to LED
Goal 17.3	Boosting renewable energy 30%	Third party report	Below	>15% by Dec 30	>20% By Dec 30	>30% By Dec 30	Solar Power
Goal 17.4	Wet land and forest restoration/ Protection eco-system and bio-diversity	Third party report	Below	>10% by Dec 30	>20% By Dec 30	>40% By Dec 30	Preservation and restoration

Goal 17.5	Green transport	Third party report	Below	>10 % Dec 30	>20% By Dec 30	>30% By Dec 30	Hybrid car
Goal 17.6	Develop Sustainability practice mapping	Third party report	Below	By June 25	By May 25	By April 25	Conservation of Energy, water and community
Goal 17.7	Plantation	Third party report	Below	> 5b plant by Dec 30	> 7b plant by Dec 30	> 10b plant by Dec 30	Mangrove forest and others
Goal 17.8	Climate risk mitigation by implementing NAP	Third party report	Beyond	by Dec 35	by Dec 32	by Dec 30	Flood defense dam/embankment
Goal 17.9	Access to safe drinking water in climate vulnerable zone	Third party report	Beyond	by Dec 35	by Dec 32	by Dec 30	Desalination plant - Evaporation and condensation
Goal 17.10	Green Climate Fund availability.	Third party report	Below	>2b $ Dec 30	>4b $ Dec 30	>6b $ Dec 30	Decarbonization project , L & D fund

Goal 18: Community Engagement: Awareness on national solidarity and country building

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 18.1	Hospitality campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Model & simulation
Goal 18.2	Culture and Heritage campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	21st February, revisit our culture
Goal 18.3	Good governance campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Mock drill / stage drama / debate
Goal 18.4	Housekeeping campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Within community awareness
Goal 18.5	Sustainability campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Water conservation

Goal 18.6	Fire & Safety Campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Mock drill
Goal 18.7	Sports & Athletics	Third party report	Below	SAF trophy By Dec 28	Asian trophy By Dec 28	World Trophy By Dec 28	Inter- Institute campaign
Goal 18.8	Engagement in social welfare dev. Campaign.	Third party report	Beyond Dec	50 % By Dec. 25	>50 % By Dec. 25	>80 % By Dec. 25	Health Hygiene / eye camp/ blood donation etc.
18.9	Truth and Reconciliation campaign	Third party report	Below	>50% per year to join	>70% per year to join	>90% per year to join	Demo session

Goal 19: Investment Vision -Employment & Foreign Currency Earning

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 19.1	Set up Value added research center	Third party report	Below	>10 nos by Dec 26	>20 nos by Dec 26	>30 nos by Dec 26	Involve Academic institutions
Goal 19.2	Industry reduce Climate risk	Third party report	Below	>10 nos by Dec 30	>20 nos by Dec 30	>30 nos by Dec 30	Waste to Energy
Goal 19.3	Software & programing	Third party report		>10 nos by Dec 30	>20 nos by Dec 30	>30 nos by Dec 30	Booming sector
Goal 19.4	Investment saving Foreign currency	Third party report	Below	>10% by Dec 30	>20% by Dec 30	>30% by Dec 30	Human resource
Goal 19.5	Foreign Direct Investment	Third party report	Below	>10 b $ by Dec 30	>20 b $ by Dec 30	>30 b $ by Dec 30	NRB can join
Goal 19.6	Cold storage	Third party report	Below	>50 nos by Dec 26	>70 nos by Dec 26	>100 nos by Dec 26	Support agri-product
Goal 19.7	Promote agro based industry	Third party report	Below	>50 nos by Dec 30	>70 nos by Dec 30	>100 nos by Dec 30	Mango juice / coconut juice
Goal 19.8	Freelancing & outsourcing by eligibility	Third party report		>2% by Dec 30	>3% by Dec 30	>5 % by Dec 30	IT Field to prioritize

Goal 20: Farm Production-Food & nutritious, food security

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 20.1	Serial production growth	Third party report	Below	>5% per year	>7% per year	>10% per year	Land restoration, protection, irrigation
Goal 20.2	Fisheries growth	Third party report	Below	>5% per year	>7% per year	>10% per year	Every house & wet land / canal/river
Goal 20.3	Poultry	Third party report		>5% per year	>7% per year	>10% per year	Training and loan
Goal 20.4	Dairy	Third party report	Below	>5% per year	>7% per year	>10% per year	Training and loan
Goal 20.5	Fruit Production	Third party report	Below	>5% per year	>7% per year	>10% per year	Training and loan
Goal 20.6	Vegetable Production	Third party report	Below	>5% per year	>7% per year	>10% per year	Each inch to utilize
Goal 20.7	Industry production	Third party report		>5% per year	>7% per year	>10% per year	Asset management, reliability maintenance

Goal 21: Export Income

Goal	Element	Judging criteria	Performance Measuring Criteria				
			Not Meeting	Target	Exceeding	Significantly Exceeding	Remarks
			<60%	60%	>61 -- <80%	>81% -<100	
Goal 21.1	RMG	Third party report	Below	>5% per year	>7% per year	>10% per year	Market diversification
Goal 21.2	Remittance	Third party report	Below	>5% per year	>7% per year	>10% per year	Skill transformation
Goal 21.3	Farm product	Third party report	Below	>5% per year	>7% per year	>10% per year	Industrial, agriculture, fisheries, dairy product

Political Parties - Few Reform guideline

- Set Do's and Don'ts for party workers.
- Determine development goals in party manifesto and Set achievement KPI.
- Exercise democracy, accountability, transparency within the party
- Ensure party workers participation in social development activities.
- Publish yearly performance report.
- Develop and practice party values.
- Unlock the creativity of youths and students.
- Lecture and speech to focus development roadmap.
- Enhance Interaction with social, political and institutional bodies.
- Accommodate subject matter expert in functional position.
- Ensure balance representation in Parliament election nomination.
- Launch out program aligning future development road map.
- Shadow Ministry

Conclusion: Organization and Institutions shall take this SMART road map as baseline document and practice in performance measure. Government, semi-government intuitions shall streamline their management system in line with transformation roadmap so does the Private organization to get maximum benefit of it. Strong non-government organization, institutional society shall be in forefront to research and analyze state of transformation road map compliance and share the report publicly through press and electronic media periodically.

Prospects and Limitations of Expansion of Irrigation in Bangladesh

A K M Anisur Rahman Siddiquee [1]

Abstract
Bangladesh possesses abundant water resources but faces challenges in harnessing them for efficient irrigation. This paper examines the current state of irrigation in the country, highlighting the gap between potential and actual irrigated areas. It discusses major irrigation projects, including the proposed Ganges Barrage Project and the Teesta River Comprehensive Management and Restoration project. The paper emphasizes the need for new projects and strengthened institutions to realize the full potential of irrigation for food security in Bangladesh.

Keywords: Bangladesh, irrigation, water resources, Ganges Barrage Project, Teesta River, agriculture, food security.

1 Introduction

Bangladesh is rich in naturally gifted water resources with its 907 active rivers [2], 373 haors [3], 23 ox-bow lakes (or baors) and 1,622 beels [4], some artificial lakes, and other wetlands also. It is fortunate that with the presence of such rivers and wetlands, the country is not a desert. As rainfall varies considerably in its place of occurrence as well as in its amount, crops cannot be raised successfully without artificial irrigation of fields. To utilize the water of these rivers and wetlands, irrigation infrastructures are needed. Irrigation may use groundwater and surface water, the latter being preferable.

2 Irrigation Coverage

According to 2020 BADC data, net cultivable area in Bangladesh is about 8,585,207 hectares (ha) where total irrigated area is 5,587,482 ha, which is about 65% of net cultivable area. Only 0.8 % of GDP of Bangladesh is expended in water resource sector. Irrigation is a tiny fraction of this sector.

Bangladesh Water Development Board (BWDB), Bangladesh Agricultural Development Corporation (BADC), Barind Multipurpose Development Authority (BMDA) and Local Government Engineering Department (LGED) implement irrigation projects. However their combined schemes is yet less than irrigation managed by farmers as shown in the following figure:

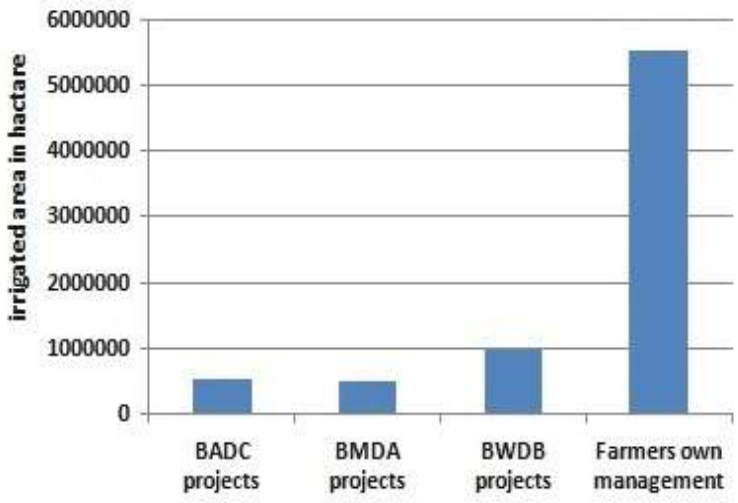

Figure: contribution of agencies in the country's irrigation (in 2020)

It is worth mentioning that irrigation managed by farmers is unplanned, expensive and inefficient.

2.1 Major funtioning irrigation projects

In the following table, major funtioning irrigation projects are listed (arranged chronologically):

Table: Major funtioning irrigation projects (upto 2020)

Project name, period	Agency	Location (district)	description
The Ganges-Kobadak Irrigation Project (G-K Project) Phase I: 1955-1970, Phase II: 1960-1981	Irrigation Dept (extinct), EPWAPDA (extinct), BWDB	Kushtia, Chuadanga, Jhenaidaha and Magura	provides irrigation facilities to 69,599 hactares (ha) of land by water lifted from the Ganges by pumps.
Buriteesta Irrigation Project 1960-1967	Irrigation Dept. (extinct), EPWAPDA (extinct), BWDB	Nilphamari	First Barrage in the then East Bengal was constructed under this project. Provides irrigation to 1,940 ha.
Sonaichhari FCDI 1963	BARD, BWDB	Comilla	provides irrigation to 4,390 ha and flood protection to 12,000 ha.
Chandpur Irrigation Project 1963-1978	Irrigation Department, EPWAPDA (extinct), BWDB	Chandpur and Lakshmipur	provides irrigation to 15,820 ha and drainage facilities to 53,000 ha.
Manu River Project 1975-1993	BWDB	Maulvibazar	provides irrigation to 10,252 ha by diverting water from the Manu river by a barrage
Karnafuli River Project 1975-1983	BWDB	Chittagong	provides irrigation to 8,095 ha.
Barisal Irrigation Project BIP Phase I: 1975-1980 Phase II: 1980-1982	BWDB	Barisal, Jhalokathi, Pirojpur	provides irrigation to 26085 ha.
Muhuri Irrigation Project 1977-1986	BWDB	Feni	provides irrigation to 10,308 ha.
Meghna-Dhonagoda Project 1979-1988	BWDB	Chandpur	provides irrigation to 4,875 ha.
Shovondondi Water Control Structure 1980-1981	BWDB	Chittagong	provides irrigation to 4,000 ha.
Katakhali Water Control Structure 1981-1983	BWDB	Chittagong	provides irrigation to 2,750 ha.
Teesta Barrage Project Phase I: 1981-1998, Phase II: 1998-2000	BWDB	Rangpur, Lalmonirhat and Nilphamari	provides irrigation to 40,500 ha.
Pabna Irrigation Project 1983-1992	BWDB	Pabna	provides irrigation to 2,502 ha.

The NWP (1999) states "the Local Government will implement flood control, drainage and irrigation (FCDI) projects having command areas of 1,000 hectares or less" Such small projects are not included in the Table.
In most of the projects, much of the area is not irrigated; example shown in the following Table.

Table: area without irrigation in irrigation projects (2020)

Project	Irrigable area in project area	Irrigated area in project area	% not irrigated in irrigable area
G-K Project	95,616	69,599	27%
Buriteesta Irrigation Project	2,151	1,940	10%
Teesta Barrage Project	83,008	40,500	51%
Pabna Irrigation Project	13282	2,502	81%

2.2 Widely discussed proposed irrigation projects

There is need to implement large-scale irrigation projects in northern and western part of the country. The projects listed in the table are much discussed.

Table: proposed irrigation projects

Project name, period	Agency	Location (district)	description
Teesta River Comprehensive Management and Restoration project	BWDB	Rangpur, Lalmonirhat and Nilphamari	
Ganges Barrage Project	BWDB	Districts of Greater Rajshahi, Faridpur, Kushtia, Pabna, Barisal, Khulna and Jessore.	If implemented, it could provide irrigation to 1.9 million ha land in Ganges Dependent Area.

2.2.1 Some information on proposed Teesta River Comprehensive Management and Restoration project

The Teesta originates from Tso Lhamo lake in Sikkim. After commissioning of Gajoldoba barrage in India, the minimum flow of the Teesta river in Bangladesh has declined from about 200 cumec to below 40 cumec. Furthermore, the Indian authorities are planning to build about 15 more diversionary structures on the upstream reaches of the Teesta and its tributaries. The river's flow at the Gajoldoba point will decrease in the future, shrinking further the dry season flow in Bangladesh [5].

In 1990 operation of the Teesta barrage started in Bangladesh. But due to decrease in flow the reservoir capacity needs to be enhanced. Md. Khalequzzaman wrote, “Being neglected and frustrated by India’s unilateral control of the natural flow of the river and by not being able to reach any agreement about water sharing, the government of Bangladesh has recently signed an agreement with a Chinese agency called Power China to borrow $853 million, and with their technical assistance to undertake the Teesta River Comprehensive Management and Restoration project [6]. Bangladesh foreign ministry spokesperson announced in 2023, “China has expressed interest to support development projects on the Bangladesh side of the Teesta River.” [7]

Experts opined that in case of unavailability of foreign assistance, the project can be implemented own technology and own financing. [8]

Teesta Barrage (Credit: Masnad, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons)

2.2.2 Some information on proposed Ganges Barrage Project

The reduced dry season flow has altered the hydrological pattern of Bangladesh part of the basin, inducing accelerated sedimentation in the Gorai River (a branch of the Ganges) and helping saline water to penetrate further inland from the sea. [9] The Mathabhanga, the Chandana-Barasia, the Baral and the Ichamati (Pabna) also suffer from less flow in the Ganges. With less and less flow, navigation facility is decreased, ground water depleted and arsenic contamination increased. Flow in the Mahananda is also decreasing. Mahananda barrage at Fulbari on Mahananda river was built by India only 1.3km u/s from the point of entry of the river into Bangladesh in Tentulia upazilla, Panchagarh District.

Amanur Rahman writes Bangladesh does not get its due share contained in the treaty signed in 1996 on the Ganges water distribution. [10]

To ensure the best utilization of the water that enters into Bangladesh the Ganges Barrage Project (GBP) was planned. From the available BBS data, it is estimated that in proposed tolal area under proposed GBP (5.188 million ha), 33% area is single cropped and 4.1% area fallow land. According to DAE, BADC and BMDA data, 78% irrigation is done by ground water and 22% irrigation is done by surface water in proposed tolal area under proposed GBP.

Detailed design of the barrage has been already completed by BWDB. In Dec 2010, the inter-ministerial Steering Committee of GBSP approved selection of barrage site at Pangsha in Rajbari district. The design has been reviewed by independent academic and international experts. The reservoir is designed is over 100 km long, with a pond area of 625 square km and capacity of 2890 million cubic meter. [11]

Anandabazar Patrika reported that India's Central Water Commission representatives visited Dhaka and Paksey in October 2017; meetings held between Technical Team from the Indian and Bangladesh side with Bhopal Singh of CWC and Abdul Hai Baqui of BWDB as heads of the teams respectively. The both side agreed that GBP will be good for both the countries. Water scarcity from Suti to Dhulian-Jalangi will be mitigated. But West Bengal CM Mamata Banerjee expressedr objection to the Ganges barrage project stating it may cause flooding in parts of the State. [12]

There is no reason for mistrust as the barrage site is so located that backwater does not cross the Indian territory. Design pond level of the proposed barrage is 12.5 meter PWD while danger level of the Ganges at Farakka is 18.50meter PWD. [13] There is no opinion from technical community that the barrage design might be faulty. Concern about backwater effect is mentioned in the newspaper report. In the location of the barrage, the river width will be constricted and flow velocity will be increased. The recent research at UNESCO-IHE on river morphodynamics shows that river bed level and corresponding water level is lowered upstream of a constriction in long term. [14]

Mr. Abdul Aziz, retired officer of BWDB, opined that the proposed GBP is not a project worth abandoning. [15] Although aborted in 2017, the GBP was included in Delta Plan 2100 with estimated cost US$ 5.15 billion.

Balancing surface water utilization with groundwater preservation is essential for long-term water security. In Perspective Plan 2010-2021, "Focus on surface water irrigation and stabilize a reduced use of groundwater" is mentioned as Long-term Water Resource Management Strategies. [16] Without GBP and TRCMRP this cannot be achieved.

3.2 Organizational strength in irrigation sector

According to Planning Commission, Ministry of Water Resources is the main institution for water management in the country. Its activities are implemented with help of BWDB and WARPO and some other organizations. Both organizations need to be strengthened. [17]

Faruqee and Yusuf mentioned, "The Water Development Board (BWDB), whose original mandate was to develop physical infrastructure like dams, embankments, canals, etc. is the best organization for design and implementation of major water projects." [18]

BWDB has its organizational problems also as Mahbubur Rahman Khan commented that BWDB "has been handicapped ever since the government curtailed its autonomy". [19] Due to curtailing incentives as compared to other government organizations, lack of motivation is present. As autonomy has been lost, there is demand for transforming BWDB into a department and encadrement of its officials. [20] Without strengthening BWDB with manpower, logistics and incentives, it is difficult to get better service.

Conclusion:

While Bangladesh boasts abundant water resources, uneven rainfall patterns necessitate irrigation. The current irrigation coverage is limited. Large-scale projects like the GBP and the TRCMRP offer promising solutions, but require overcoming political hurdles. Investing in robust irrigation infrastructure and strengthening water management institutions are crucial steps. By implementing new irrigation projects, Bangladesh can ensure its food security for future generations.

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ESG in Bangladesh: Unlocking Engineering Opportunities for a Sustainable Future

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Environmental, Social, and Governance (ESG) principles are rapidly gaining traction worldwide, and Bangladesh is no exception. As the country strives for economic growth and sustainable development, integrating ESG considerations into engineering practices is becoming increasingly crucial. This article explores the concept of ESG, its relevance to Bangladesh, and the potential benefits it offers in the engineering sector.

Understanding ESG

ESG refers to a set of non-financial factors that assess a company's sustainability and ethical impact.

- **Environmental:** Encompasses a company's impact on the environment, including carbon emissions, energy use, waste management, and resource conservation.
- **Social:** Evaluates a company's relationships with employees, customers, communities, and other stakeholders. This includes labor practices, diversity and inclusion, human rights, and community engagement.
- **Governance:** Focuses on a company's leadership, executive pay, audits, internal controls, and shareholder rights.

The Relevance of ESG in Bangladesh

Bangladesh faces unique challenges related to climate change, resource scarcity, and social inequality. Embracing ESG principles can help address these issues while fostering sustainable economic growth. In the engineering sector, ESG integration can lead to innovative solutions that benefit both businesses and society.

Benefits of ESG Integration in Engineering

1. **Risk Mitigation:** By proactively addressing environmental and social risks, engineering firms can avoid costly disruptions and reputational damage. For example, incorporating climate resilience into infrastructure designs can safeguard projects from natural disasters.
2. **Innovation and Efficiency:** ESG considerations can drive the development of new technologies and processes that are more efficient, sustainable, and cost-effective. This includes designing energy-efficient buildings, developing renewable energy solutions, and implementing circular economy principles.
3. **Enhanced Reputation and Brand Value:** Companies that demonstrate a commitment to ESG are often viewed more favorably by consumers, investors, and employees. This can lead to increased brand value, better access to capital, and a more engaged workforce.
4. **Regulatory Compliance:** As environmental and social regulations become more stringent, companies that have already integrated ESG principles will be better positioned to comply and avoid penalties.
5. **Attracting Talent:** Young professionals increasingly seek employers who align with their values. Demonstrating a strong ESG commitment can help engineering firms attract and retain top talent.

Applying ESG in Engineering in Bangladesh

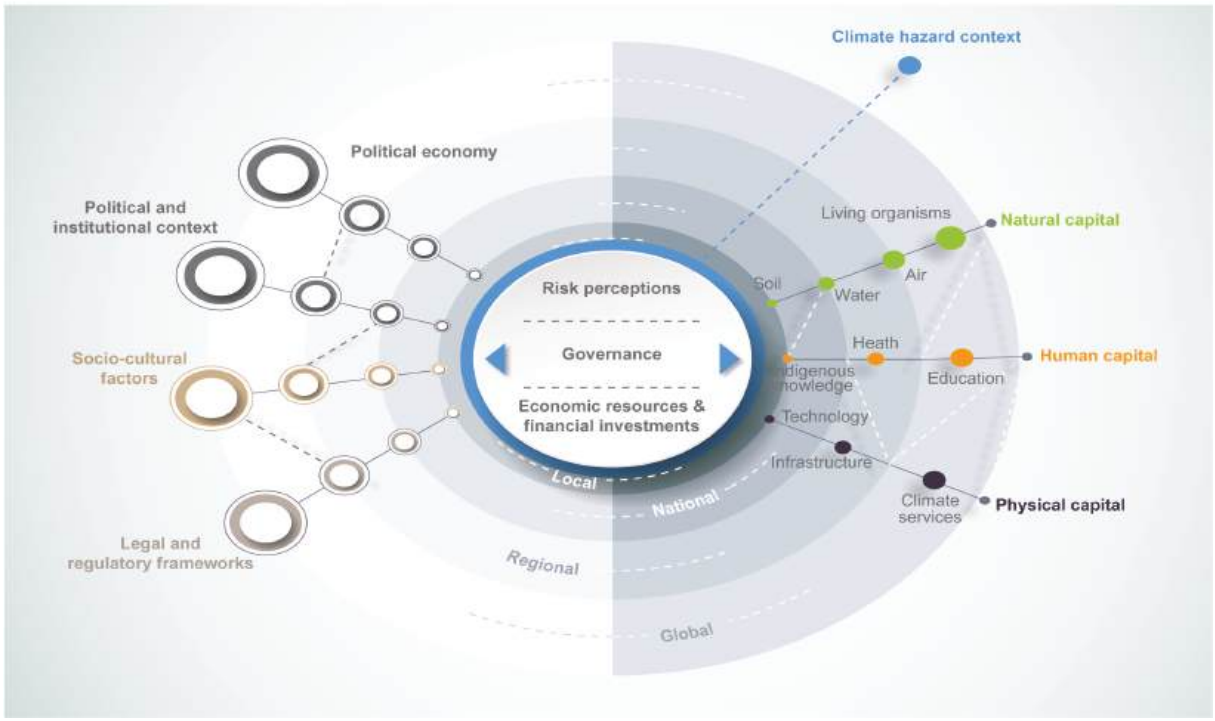
1. **Assess Current Practices:** Conduct an ESG audit to identify areas where improvements can be made. This could involve analyzing energy consumption, waste generation, labor practices, and community engagement.
2. **Set Clear Goals:** Establish measurable ESG targets aligned with the company's overall strategy. These could include reducing carbon emissions, increasing renewable energy use, or improving diversity and inclusion.
3. **Integrate ESG into Project Design:** Incorporate ESG considerations from the earliest stages of project planning. This could involve using sustainable materials, optimizing energy efficiency, and engaging local communities.
4. **Monitor and Report:** Track progress toward ESG goals and regularly report on performance. This transparency can build trust with stakeholders and attract investors.
5. **Collaborate** Partner with other organizations, including government agencies, NGOs, and academic institutions, to share knowledge and resources, and collectively address ESG challenges.

Key ESG Initiatives by the Bangladesh Government:

1. **National Adaptation Plan (NAP):** Bangladesh developed a comprehensive NAP to address climate change vulnerabilities and build resilience. This plan outlines strategies for adapting to rising sea levels, extreme weather events, and other climate-related risks.
2. **Nationally Determined Contributions (NDC):** Bangladesh submitted its NDC under the Paris Agreement, committing to reduce greenhouse gas emissions and enhance climate resilience. The NDC outlines specific targets for renewable energy adoption, energy efficiency, and afforestation.

3. **Delta Plan 2100:** This long-term plan focuses on integrated water resource management, sustainable agriculture, and climate-resilient infrastructure development in the Delta region. It aims to ensure food security, protect ecosystems, and mitigate the impacts of climate change.
4. **Renewable Energy Policy:** The government has set ambitious targets for renewable energy generation, aiming to increase its share in the energy mix. Initiatives include promoting solar power, biogas, and wind energy projects.
5. **Sustainable and Renewable Energy Development Authority (SREDA):** This agency is responsible for implementing renewable energy projects and promoting energy efficiency measures across the country.
6. **Bangladesh Climate Change Trust Fund (BCCTF):** This fund finances climate change adaptation and mitigation projects at the national and local levels. It supports initiatives such as cyclone shelters, early warning systems, and community-based adaptation programs.
7. **National Social Safety Net Program (NSSNP):** This program provides social protection to vulnerable populations, including cash transfers, food assistance, and skills development programs. It aims to reduce poverty and inequality, which are crucial social aspects of ESG.

Core components of an enabling environment for adaptation to climate change

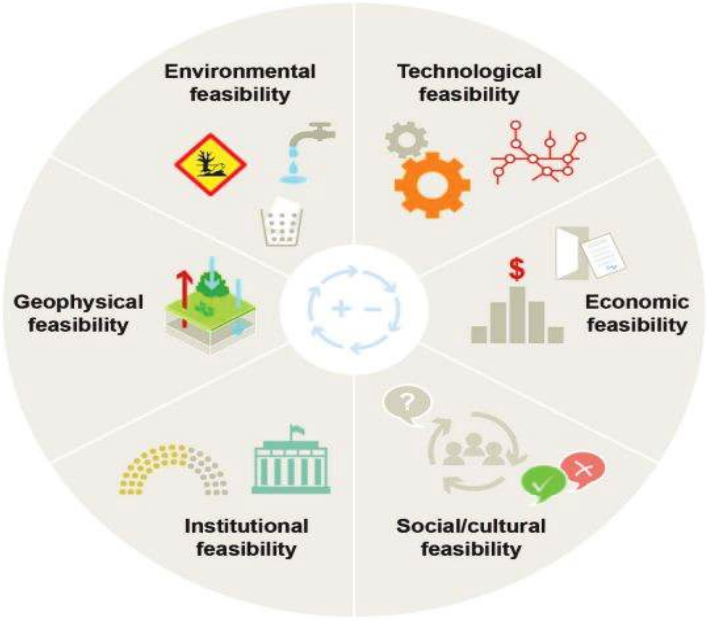


Implementation and Alignment with UN and IPCC:

- **Policy Integration:** The government is integrating ESG considerations into various sectoral policies, such as energy, agriculture, infrastructure, and industry. This ensures that sustainability is a core component of development planning.
- **Institutional Framework:** Institutions like the Ministry of Environment, Forest and Climate Change (MoEFCC) and the Department of Environment (DoE) play a crucial role in implementing and monitoring ESG initiatives. They collaborate with international organizations like the UN and IPCC to align national policies with global best practices.

- **Data Collection and Monitoring:** The government is strengthening data collection and monitoring systems to track progress on ESG goals. This includes monitoring greenhouse gas emissions, energy consumption, and social indicators like poverty and access to basic services.
- **International Cooperation:** Bangladesh actively participates in international climate negotiations and collaborates with development partners to access climate finance and technical expertise. This helps in aligning national efforts with global climate goals.

FAQ4.1: **The different feasibility dimensions towards limiting warming to 1.5°C**
Assessing the feasibility of different adaptation and mitigation options/actions requires consideration across six dimensions.



Challenges and Future Directions:

Despite significant progress, Bangladesh faces challenges in implementing ESG principles due to resource constraints, institutional capacity limitations, and competing development priorities. However, the government's commitment to ESG is evident, and ongoing efforts are focused on:

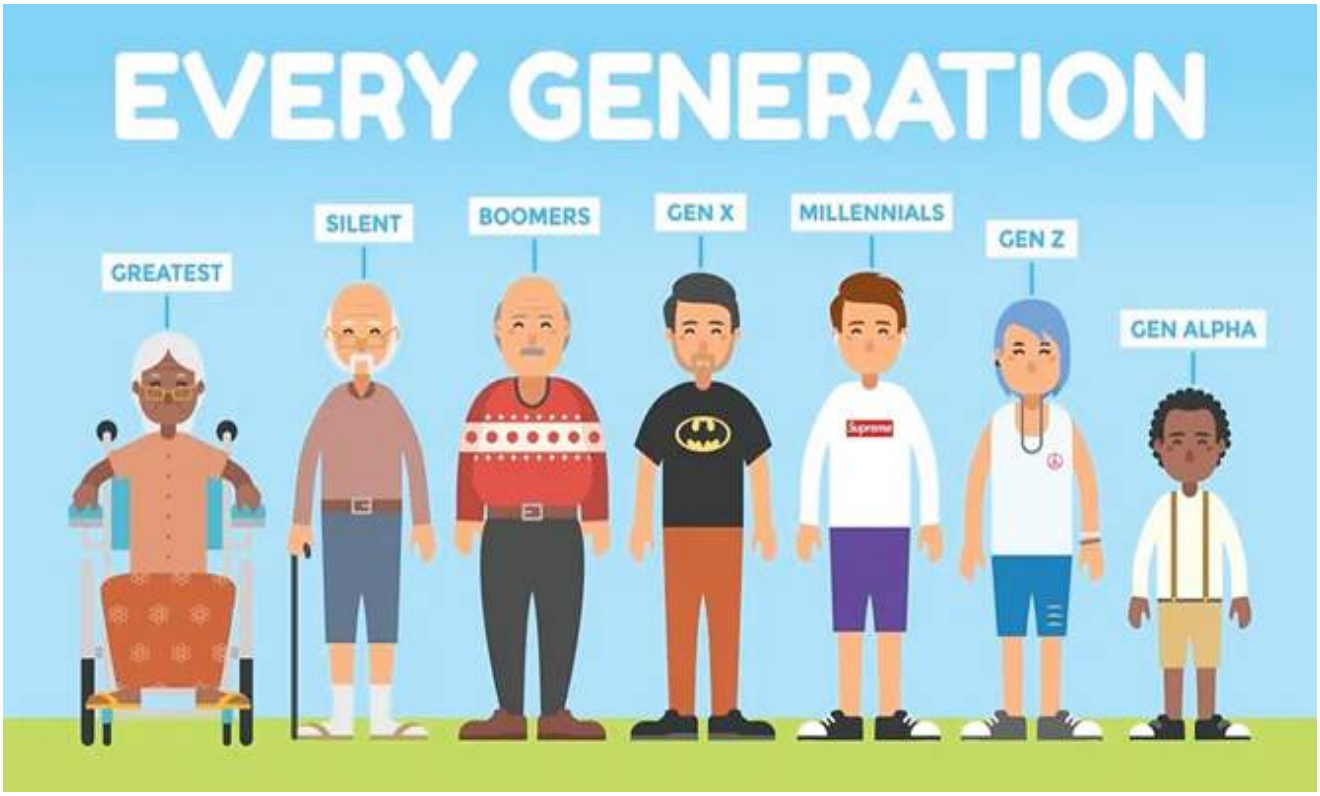
- **Strengthening governance:** Improving transparency, accountability, and stakeholder engagement in decision-making processes.
- **Enhancing capacity building:** Providing training and resources to government agencies, local communities, and businesses to implement ESG practices effectively.
- **Promoting private sector engagement:** Encouraging businesses to adopt ESG principles through incentives, regulations, and partnerships.

Conclusion

Integrating ESG principles into engineering practices is not just a moral imperative; it's a strategic business decision. In Bangladesh, where sustainability is critical for long-term development, embracing ESG can unlock a wealth of opportunities for the engineering sector. By adopting a holistic approach that considers environmental, social, and governance factors, engineering firms can create a brighter, more sustainable future for themselves and the nation. By continuing to prioritize ESG integration, Bangladesh can achieve its sustainable development goals, build resilience to climate change, and create a more equitable and prosperous society.

Generation Categories and Their Behavior in Practical Decision-Making

Understanding generational behavior is essential in marketing, management, and social planning. Each generation has unique characteristics, shaped by the socio-economic conditions of their formative years, which influence their decision-making processes. This article explores five generational categories, focusing on their behavior and actions when making practical decisions.



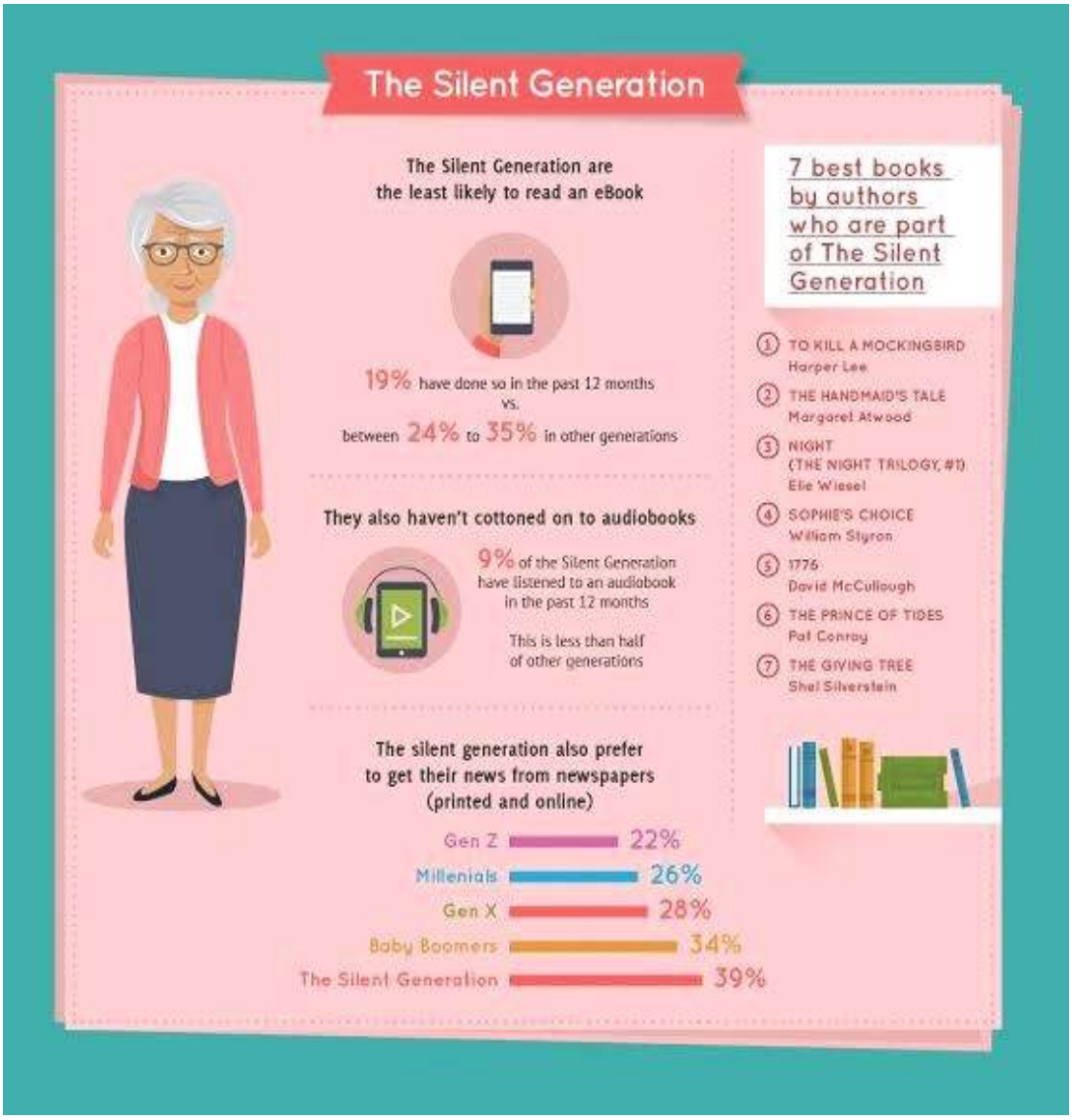
- G.I. (born 1901-1924), 4.5 million
- Silent (born 1925-1945), 26.2 million
- Baby Boomer (born 1945-1965), 65.6 million
- Generation X (born 1966-1979), 65.2 million
- Generation Y/ **Millennials** (born 1980-1995) 18+, 52.0 million
- Two-thirds of the remaining 75 million are Gen Y who are under 18
- The remaining one-third (25 to 30 million) is Generation Z.

(i) The Silent Generation (77+ years old, born before 1945)

The Silent Generation grew up during times of economic hardship, such as the Great Depression and World War II. These experiences have instilled in them a sense of frugality, resilience, and a preference for stability. When making decisions, this group tends to prioritize security and tradition. They are less likely to take risks and more inclined to rely on tried-and-true methods. Their financial decisions often emphasize savings and conservative investments, and they value long-term relationships and loyalty to brands and institutions.

Behavior and Decision-Making:

- **Risk Aversion:** Prefer low-risk options, particularly in financial matters.
- **Loyalty:** Strong brand and relationship loyalty.
- **Pragmatism:** Decisions are often based on practical needs and proven outcomes.

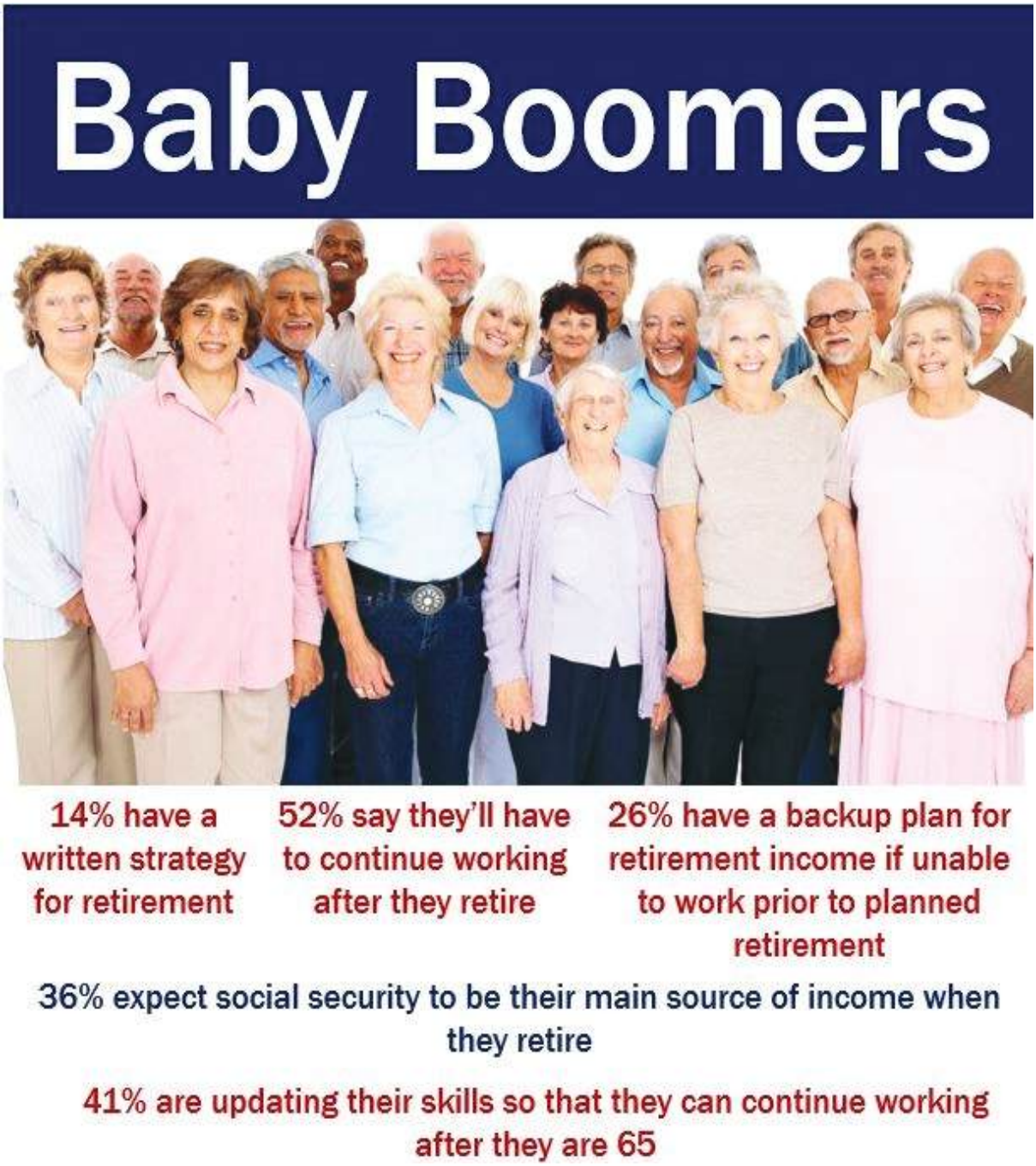


(ii) Baby Boomers (57-77 years old, born 1945-1965)

Boomers came of age during a period of post-war prosperity and social change. They witnessed the rise of consumerism, civil rights movements, and technological advances. This generation values hard work, success, and individualism. In decision-making, Boomers are often driven by a desire for personal fulfillment and status. They are willing to spend money on quality products and experiences but are also becoming increasingly focused on health and retirement planning as they age.

Behavior and Decision-Making:

- **Status-Conscious:** Decisions often reflect a desire for status and success.
- **Health-Focused:** Increasing emphasis on health-related decisions.
- **Experience-Oriented:** Value experiences, especially travel and leisure.



(iii) Generation X (43-56 years old, born 1966-1979)

Generation X, often referred to as the "latchkey generation," grew up during times of social and economic change, including the rise of dual-income households and the digital revolution. They are known for their independence, skepticism, and adaptability. Gen Xers are pragmatic and resourceful, often seeking a balance between work and life. They value authenticity and tend to make decisions based on a blend of practicality and personal values. Financially, they are focused on securing their future, often juggling savings, investments, and the costs of raising families.

Behavior and Decision-Making:

- **Pragmatic:** Emphasize practicality and efficiency in decision-making.
- **Independence:** Value autonomy and control over their decisions.
- **Work-Life Balance:** Seek decisions that support a balanced lifestyle.

(iv) Millennials (27-42 years old, born 1980-1995)

Millennials are the first generation to come of age in a fully digital world, which has profoundly influenced their behavior and decision-making. They are highly connected, value convenience, and are accustomed to instant access to information. This generation is often mission-driven, with a strong preference for brands and decisions that align with their values, particularly in areas like sustainability and social justice. Financially, Millennials are more cautious due to the economic challenges they faced during the Great Recession, leading to delayed major life decisions like buying homes or starting families.

Behavior and Decision-Making:

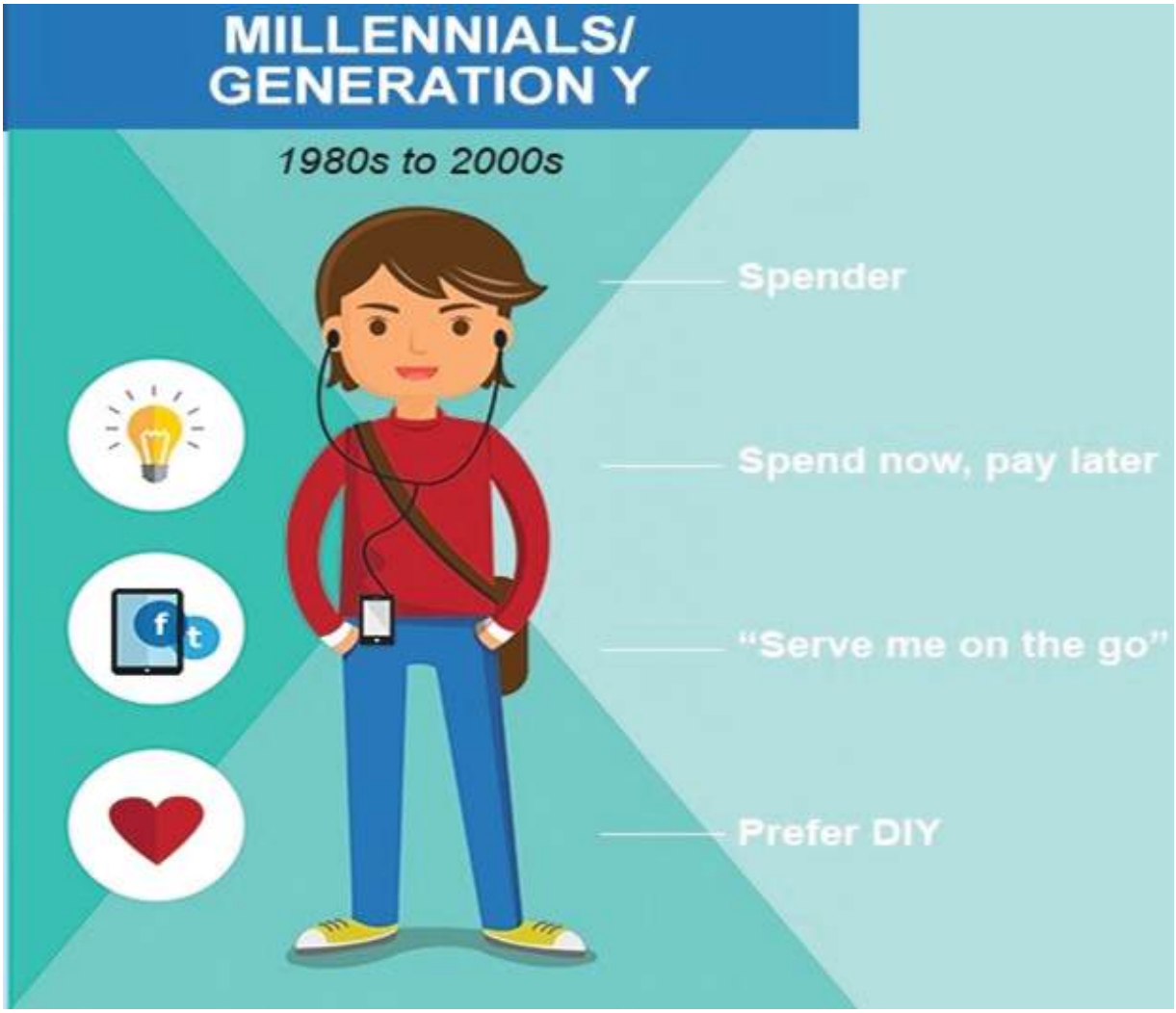
- **Value-driven:** Decisions are often guided by personal values and social impact.
- **Tech-Savvy:** Rely heavily on digital tools for decision-making.
- **Financial Caution:** Tend to be cautious with major financial commitments.

(v) Generation Z (10-27 years old, born 1996-2012)

Generation Z is the true digital native generation, having grown up with smartphones and social media. They are highly individualistic and entrepreneurial, strongly emphasizing authenticity and self-expression. Gen Zers are pragmatic, favoring realistic choices over romantic ones. They are highly skeptical of traditional institutions and are more likely to seek out independent and diverse sources of information. Their decision-making is influenced by a desire for security in an uncertain world, often making them cautious yet innovative in their approaches.

Behavior and Decision-Making:

- **Realistic:** Favor practical and realistic choices.
- **Independent:** Prefer making independent decisions, often outside traditional frameworks.
- **Digital Natives:** Rely on digital platforms for information and decision-making.



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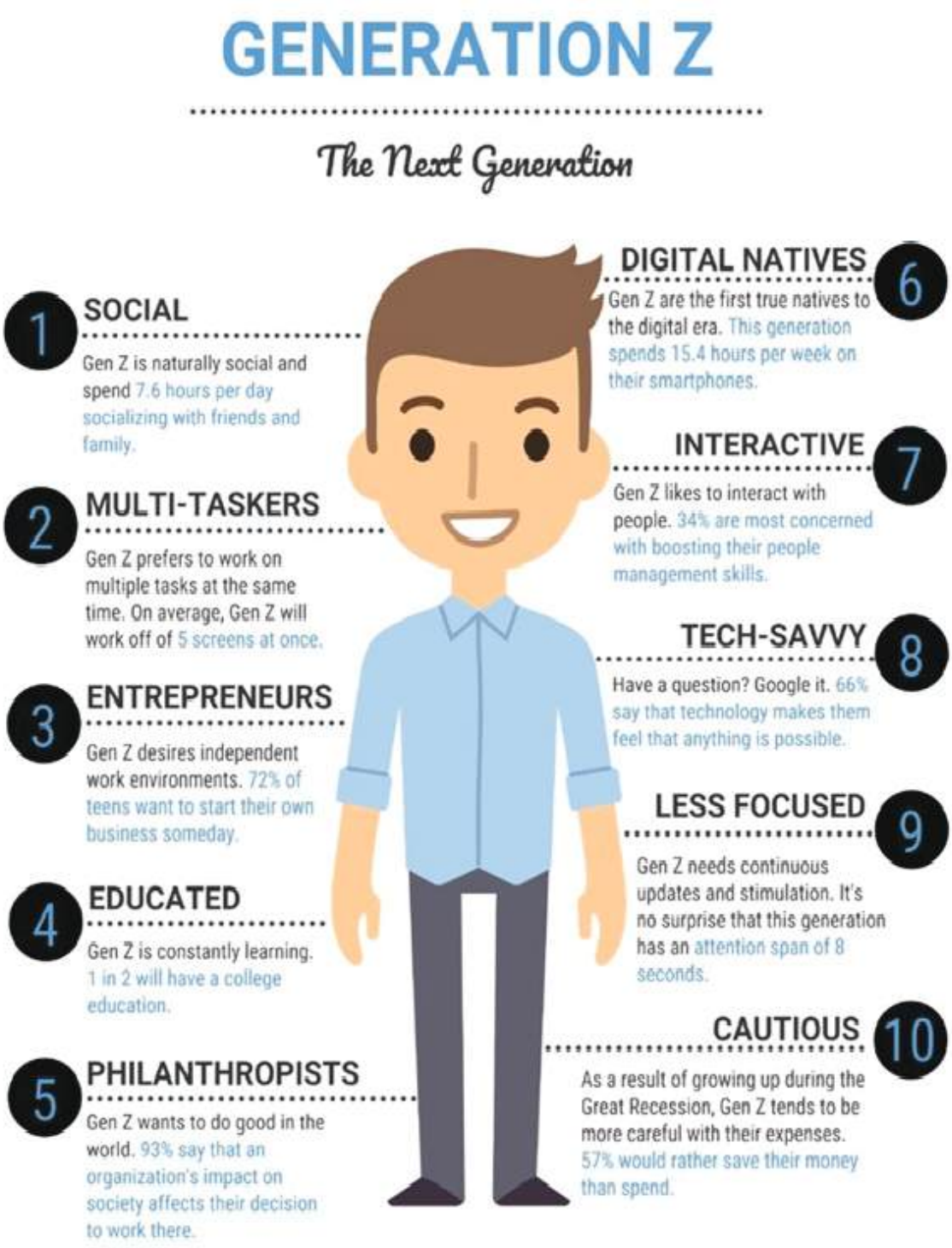
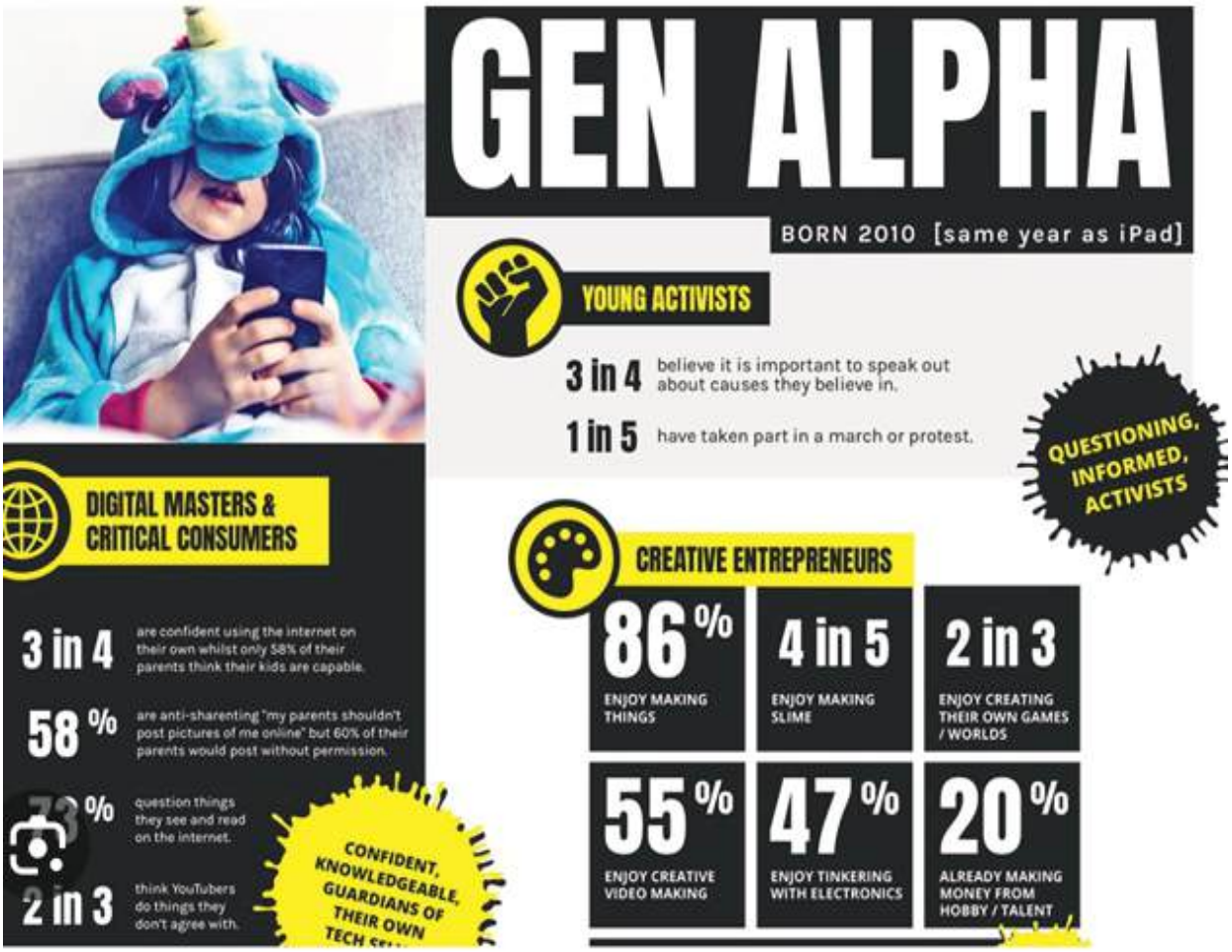


Generation Alpha (born 2010-2024) and Generation Beta (born 2025 onward) are the youngest generations, growing up in a world saturated with technology and rapid societal changes. Their unique experiences and environments shape distinct decision-making patterns with practical implications.

Generation Alpha:

- Digital Natives: Alphas are the first generation to be entirely born in the 21st century. They are highly adept with technology, influencing their decision-making processes. They value speed, convenience, and visual appeal.

- Influenced by Peers and Online Communities: Alphas rely on their social circles and online communities for information and validation, shaping their choices, particularly in areas like fashion, entertainment, and social causes.
- Instant Gratification: Accustomed to on-demand content and services, Alphas tend towards immediate rewards and solutions. This can lead to impulsive decisions and a focus on short-term gains.
- Social Responsibility: Many Alphas are concerned about global issues like climate change and social justice. They seek brands and products aligned with their values, factoring ethical considerations into their decisions.



TOP Trends for Brands Targeting Families with Children Alpha:

- Parents are increasingly purchasing products and services that appeal to children.
- Children are increasingly becoming the CEOs of households, directing the entire household's direction and values.
- The creativity of the alpha generation in the digital space is turning into real income and influencing peers.
- The world is becoming and will continue to be "Kid-first."
- More and more brands will change the design and presentation of their services and products to make them more appealing to children.
- Industries traditionally not focused on children will also strive to attract children's attention.
- Progressive worldviews, behaviors, and values are things that children will inevitably pass.

Characteristics and Needs of the Beta Generation (G-AI):

Generation Beta, born between 2025 and 2039, is emerging as a distinct cohort. Individuals born from 2025 onwards will constitute the Beta Generation, also known as Gen AI. Predictions about this generation's characteristics and needs point to a defining trait of digital intuition. Growing up immersed in artificial intelligence and advanced digital ecosystems, this generation is expected to seamlessly navigate between the physical and virtual worlds, inhabiting a realm of interactive experiences.

The pervasive influence of artificial intelligence will likely drive a demand for greater personalization. As Engr. Md. Al-Emran Hossain observes brands must recognize that for the Beta Generation, everything from education systems to consumer products will need to be tailored to individual needs, desires, and preferences.

Key Characteristics

The Beta will mature in a world deeply entwined with AI and technology. This reality will shape Generation Beta's characteristics in several ways:

- **Blurred Work-Life Lines:** AI automation may disrupt traditional career paths, leading to flexible, project-based work. This could result in "always-on" work cultures, demanding adaptation and potentially affecting work-life balance.
- **Endless Creativity, powered by AI:** Exposed to AI-generated content, Beta will think creatively, using AI tools for design, storytelling, and problem-solving. Imagine personalized educational tools adapting to individual learning styles or AI-powered tutors crafting engaging experiences.
- **Learning Beyond Walls:** With 80% of the Beta Generation engaged in online learning, AI will personalize education. Imagine interactive simulations, AI-powered tutors adjusting difficulty, and instant access to information beyond textbooks. However, concerns about distraction and online safety need careful consideration.
- **Smartphone Savvy, But Stressful:** Intensive smartphone usage will shape Beta's communication and information consumption. While AI-powered apps can offer convenience and knowledge, anxieties around social media comparisons and information overload might be prevalent.
- **Socially Conscious Employees:** Witnessing the impact of technology on society may make Generation Beta expect responsible corporate behavior. They may choose employers dedicated to sustainability, ethical data practices, and positive social impact.

Challenges and Opportunities

- **Information Overload:** Navigating a vast sea of information and discerning fact from fiction will be a significant challenge for Betas.
- **Data Privacy:** Growing up in a world where data is constantly collected and analyzed, Betas will need to be vigilant about protecting their personal information.
- **AI Dependence:** Over-reliance on AI tools could potentially hinder the development of critical thinking and problem-solving skills.
- **Adaptability:** Rapid technological advancements will demand continuous learning and adaptation throughout Betas' lives.

Though pinpointing specifics is tricky, key trends hint at the education awaiting Generation Beta.

- Personalised learning takes center stage, swapping rigid curriculums for AI-powered platforms that adapt to individual needs. Imagine virtual tutors adjusting lessons or VR simulations tailored to student interests.
- Collaboration and communication become even more critical in a job market reshaped by automation. Classrooms foster these skills through active participation, project-based learning, and global connections.

- The lines between formal and informal learning blur. Gamification, microlearning bursts, and readily available online resources supplement traditional instruction. Picture students learning history through immersive games, coding through bite-sized tutorials, or science through citizen science initiatives.
- Finally, the focus shifts from rote memorization to critical thinking and problem-solving. This information-rich world demands the ability to analyze, evaluate, and creatively solve problems. Imagine classrooms buzzing with debate, questioning, and real-world application of knowledge – students tackling environmental challenges or proposing solutions to local issues.

Practical Implications Alpha and Beta:

- **Businesses and Marketers:** Catering to Alpha and Beta generations requires understanding their unique preferences and values. Brands need to be authentic, transparent, and tech-savvy while offering personalized and socially responsible products.
- **Educators:** Fostering critical thinking and digital literacy skills is essential for Alphas and Betas to navigate a world with abundant information and AI-powered tools. Encouraging independent thought and ethical decision-making is crucial.
- **Parents:** Guiding and supporting Alpha and Beta children through their decision-making processes is essential. Open communication, setting healthy boundaries with technology, and promoting self-awareness can help these generations make informed and responsible choices.

Strategies for Managing Different Generations in the Workplace:

1. Promote communication and collaboration among generations: Encourage the exchange of experiences and knowledge among employees of different generations, creating an environment where everyone can learn from each other.
2. Develop adaptive and inclusive leadership: Leaders should be prepared to meet the expectations and needs of different generations, promoting an inclusive work environment adaptable to changes.
3. Flexibility and balance between personal and professional life: Companies should offer work environments that allow for balancing these two spheres, including flexible schedules, remote or hybrid work, and an organizational culture that values the well-being and quality of life of employees.
4. Invest in professional development and continuous learning: Provide opportunities for professional growth, such as training, courses, and mentoring programs, and encourage the exchange of knowledge and experiences among the different generations within the company.

5. Value diversity and inclusion: Promote diversity at all levels of the organization and implement inclusive practices that allow the participation and integration of employees from all generations.
6. Encourage innovation and creativity: Create a culture that values collaboration, problem-solving, and the pursuit of innovative and efficient solutions, leveraging the unique skills and perspectives of each generation.

Conclusion

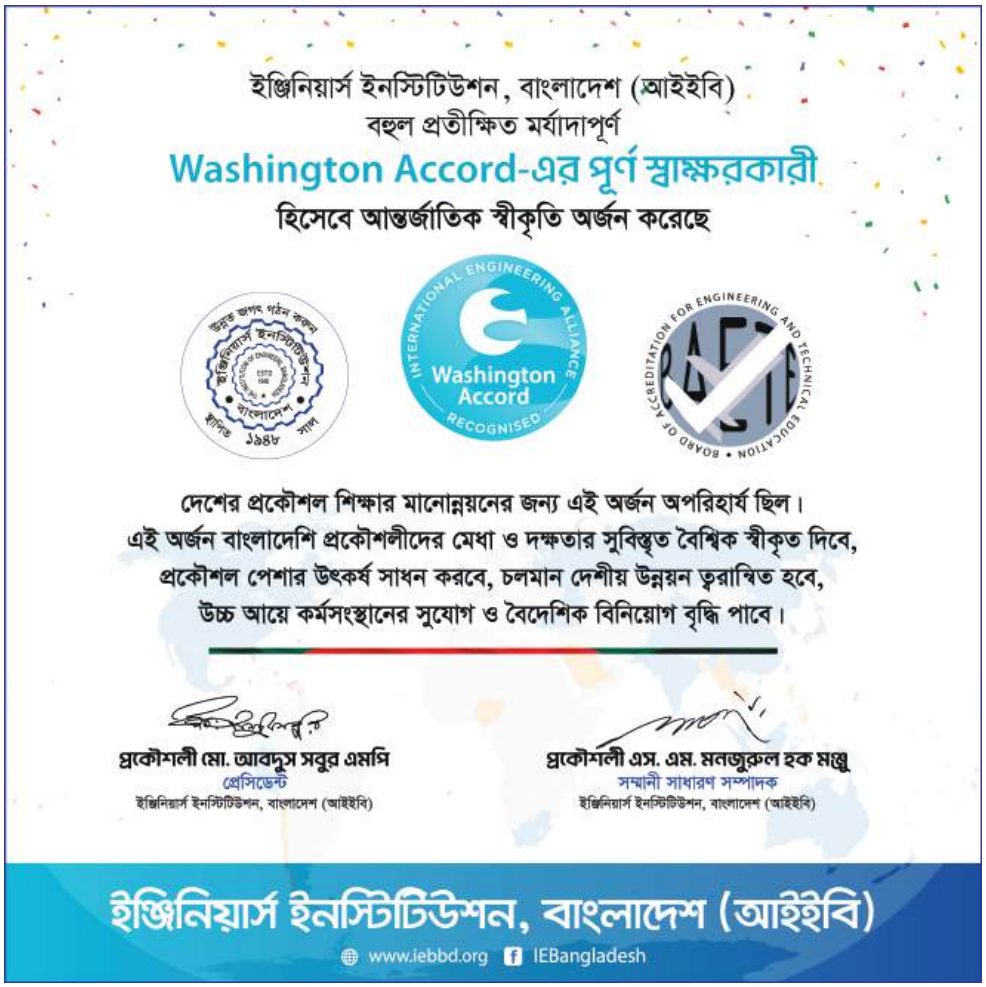
Each generation's unique experiences shape their behavior and decision-making processes. Understanding these generational differences is crucial for businesses, policymakers, and individuals seeking to interact with or market to different age groups. By recognizing these patterns, one can tailor strategies that resonate with the specific needs and values of each generation, leading to more effective communication and decision-making outcomes.

A Proud Moment for Bangladesh: Celebrating the Institution of Engineers, Bangladesh (IEB) as a Full Signatory of the Washington Accord

Engr. Shawkat Ali Khan
(CUET-CIVIL ENGG), MIEAust (Australia), MIEB, MSOE (UAE)
Structural Engineer (Unlimited Floors), Dubai Municipality
Enlisted Structural Engineer, CDA

We stand today on the threshold of a monumental achievement, one that fills every Bangladeshi with immense pride and joy—the Institution of Engineers, Bangladesh (IEB) has been granted full signatory status in the Washington Accord. This momentous recognition places IEB among an elite group of prestigious engineering institutions worldwide, affirming the international equivalence of Bangladeshi engineering education. It is not just an accomplishment for the engineering community but a landmark achievement for the entire nation.

At the outset, we extend our heartfelt thanks and deepest appreciation to all the Bangladeshi engineering professionals who have played a pivotal role in this journey, Specifically, A F M Saiful Amin and the team on the IEB's BAETE-Board of Accreditation for Engineering and Technical Education for your efforts. Their dedication, whether from within Bangladesh or from distant lands such as Australia, the USA, and beyond, has been instrumental in making this dream a reality. These individuals, with their relentless pursuit of excellence and commitment to upholding the highest standards, have paved the way for this extraordinary success.



Source: IEB Website

The Washington Accord: A Beacon of Global Engineering Excellence

The Washington Accord is an international agreement between bodies responsible for accrediting engineering degree programs. Originally signed in 1989, this multilateral agreement is among the most respected global benchmarks in engineering education. The signatories of the Accord are tasked with accrediting or recognizing tertiary-level engineering qualifications within their jurisdictions, collectively working to assist the mobility of professional engineers across borders.

The Accord is specifically focused on academic programs that deal with the practice of engineering at the professional level. It acknowledges that accreditation of engineering academic programs is a key foundation for the practice of engineering across its member countries. By outlining mutual recognition between participating bodies, the Accord ensures that accredited engineering degree programs are recognized as meeting a standard that is benchmarked globally.

The Elite Club: Signatories of the Washington Accord as per

Currently, there are twenty-five full signatories of the Washington Accord, each representing the highest standards of engineering education in their respective countries. These countries are:

1. **Korea**: Represented by the Accreditation Board for Engineering Education of Korea (ABEEK)(2007)
2. **Russia**: Represented by the Association for Engineering Education of Russia (AEER) (2012)
3. **Malaysia**: Represented by the Board of Engineers Malaysia (BEM) (2009)
4. **China**: Represented by the China Association for Science and Technology (CAST) (2016)
5. **South Africa**: Represented by the Engineering Council South Africa (ECSA) (1999)
6. **New Zealand**: Represented by Engineering New Zealand (EngNZ) (1989)
7. **Australia**: Represented by Engineers Australia (EA) (1989)
8. **Canada**: Represented by Engineers Canada (EC) (1989)
9. **Ireland**: Represented by Engineers Ireland (EI) (1989)
10. **Hong Kong, China**: Represented by The Hong Kong Institution of Engineers (HKIE) (1995)
11. **Chinese Taipei**: Represented by the Institute of Engineering Education Taiwan (IEET) (2007)
12. **Singapore**: Represented by the Institution of Engineers Singapore (IES) (2006)
13. **Sri Lanka**: Represented by the Institution of Engineers Sri Lanka (IESL) (2014)
14. **Japan**: Represented by JABEE (2005)
15. **India**: Represented by the National Board of Accreditation (NBA) (2014)
16. **United States**: Represented by the Accreditation Board for Engineering and Technology (ABET)(1989)
17. **Turkey**: Represented by the Association for Evaluation and Accreditation of Engineering Programs(MÜDEK) (2011)
18. **United Kingdom**: Represented by the Engineering Council United Kingdom (ECUK) (1989)
19. **Bangladesh**: Represented by The Institution of Engineers Bangladesh (IEB) (2023)
20. **Costa Rica**: Represented by the Colegio Federado de Ingenieros y de Arquitectos de Costa Rica(CFIA) (2020)
21. **Mexico**: Represented by the Consejo de Acreditación de la Enseñanza de la Ingeniería (CACEI)(2022)
22. **Pakistan**: Represented by the Pakistan Engineering Council (PEC) (2017)
23. **Peru**: Represented by the Instituto de Calidad y Acreditacion de Programmes de Computation, Ingenieria y Technologia (ICACIT) (2018)

24. **Philippines**: Represented by the Philippine Technological Council (PTC) (2023)
25. **Indonesia**: Represented by the Indonesian Accreditation Board for Engineering Education (IABEE) (2022)

In addition, there are provisional signatories, recognized as having the appropriate systems and processes in place to develop towards full signatory status, including:

1. **Chile**: Represented by Agencia Acreditadora Colegio De Ingenieros De Chile S A (ACREDITA CI)
2. **Thailand**: Represented by the Council of Engineers Thailand (COET)
3. **Myanmar**: Represented by the Myanmar Engineering Council (MengC)
4. **Saudi Arabia**: Represented by the Education and Training Evaluation Commission (ETEC)
5. **Nigeria**: Represented by the Council for the Regulation of Engineering in Nigeria (COREN)
6. **Mauritius**: Represented by the Institution of Engineers Mauritius (IEM)

The Washington Accord's Impact on Engineering Education and Practices in Bangladesh

The Washington Accord's focus on the mutual recognition of accredited engineering programs is crucial for the globalization of engineering qualifications. By setting a benchmark for professional engineering education, the Accord ensures that engineers educated in signatory countries meet a standard of knowledge and practice that is recognized internationally. This mutual recognition is not just symbolic; it has real, tangible benefits for graduates and professionals alike.

When the Institution of Engineers, Bangladesh (IEB) becomes a full signatory of the Washington Accord, Bangladeshi engineering graduates will experience several significant benefits. These benefits extend across various aspects, including global recognition, employment opportunities, educational standards, and mobility. Here's a detailed exploration of these advantages:

Source: LinkedIn

1. **Global Recognition of Engineering Degrees**
   - **Equivalence with International Standards:** As a full signatory of the Washington Accord, the IEB's accredited engineering programs will be recognized as meeting international standards. This means that a degree from an accredited Bangladeshi institution will be considered equivalent to degrees from other signatory countries, such as the United States, United Kingdom, Canada, Australia, and many others.
   - **Easier Access to Global Opportunities:** Graduates will find it easier to pursue further education or professional opportunities abroad, as their qualifications will be readily recognized and accepted in these countries without the need for additional assessments or bridging programs.

2. **Enhanced Employment Opportunities**
   - **Access to International Job Markets:** With the global recognition of their degrees, Bangladeshi engineers will be more competitive in the international job market. Companies and organizations in signatory countries will recognize their qualifications, giving them access to a wider range of job opportunities.
   - **Higher Earning Potential:** Engineers with internationally recognized qualifications often command higher salaries. By having their degrees recognized across multiple countries, Bangladeshi engineers may secure better-paying jobs both within Bangladesh and abroad.
   - **Professional Development:** Being part of a global network of recognized engineers also means access to a broader range of professional development opportunities, including international conferences, workshops, and seminars.

3. **Improved Educational Standards in Bangladesh**
   - **Curriculum Development:** To meet the standards required by the Washington Accord, engineering programs in Bangladesh will need to align their curricula with global best practices. This could lead to significant improvements in the quality of education, with a greater emphasis on practical skills, innovation, and research.
   - **Institutional Performance:** Achieving and maintaining Washington Accord standards will push Bangladeshi institutions to improve their overall performance, including faculty qualifications, student support services, and infrastructure. This will create a more robust and effective educational environment for future engineers.
   - **Continuous Improvement:** The Washington Accord requires regular reviews and continuous improvement from its signatories. This means that engineering programs in Bangladesh will be subject to ongoing evaluation, ensuring that they remain competitive and up-to-date with global trends and technological advancements.

4. **Increased Mobility and Flexibility**
   - **Seamless Transition for Further Studies:** Graduates wishing to pursue postgraduate studies in other signatory countries will benefit from the automatic recognition of their undergraduate degrees. This makes the application process smoother and reduces the need for additional qualifications or bridging courses.
   - **Cross-Border Professional Mobility:** Engineers often need to move across borders for various projects. With Washington Accord recognition, Bangladeshi engineers can work in other signatory countries without needing to re-qualify or undergo additional accreditation processes. This is especially beneficial for multinational companies and international projects.

- **Collaboration Opportunities:** Being part of the Washington Accord community facilitates collaboration with institutions and professionals from other signatory countries. This can lead to joint research projects, exchange programs, and shared resources, further enhancing the skills and knowledge of Bangladeshi engineers.

5. **Contribution to National Development**
   - **Skill Enhancement:** The overall improvement in educational standards will produce more skilled and knowledgeable engineers, who can contribute more effectively to national development projects in Bangladesh.
   - **Attracting Foreign Investment:** The recognition of Bangladeshi engineering qualifications by the Washington Accord can make the country a more attractive destination for foreign investment, particularly in engineering-intensive sectors like infrastructure, energy, and manufacturing.
   - **Reducing Brain Drain:** While some graduates may seek opportunities abroad, the enhanced recognition and quality of Bangladeshi engineering programs could also encourage talent to remain in the country, helping to build and strengthen local industries.

6. **Boost to the Engineering Profession in Bangladesh**
   - **Professional Prestige:** Achieving Washington Accord signatory status will enhance the prestige of the engineering profession in Bangladesh. Engineers will be viewed as meeting the highest international standards, which can elevate the status of the profession and inspire more young people to pursue careers in engineering.
   - **Networking and Collaboration:** Bangladeshi engineers will have greater access to international engineering bodies, allowing them to network and collaborate with peers worldwide. This can lead to sharing knowledge, technology transfer, and joint problem-solving efforts on global engineering challenges.

The Journey to Full Signatory Status

The journey to becoming a full signatory of the Washington Accord was not an easy one. It required a demonstration of the robustness and equivalency of IEB's accreditation processes and educational standards to those of existing signatories. The process involved a rigorous review conducted by a team of experts from the Accord's member bodies, evaluating whether IEB met the necessary criteria.

Provisional signatory status was granted to IEB in 2016, marking the beginning of its journey toward full recognition. Over the subsequent years, IEB worked tirelessly to develop and refine its accreditation processes, ensuring that they met the highest international standards. This dedication culminated in 2023, Source: Official Website of Washington Accord. However, Official Recognition on June 12, 2024, in the International Engineering Alliance Meetings (IEAM) 2024, held in Gurugram, Delhi NCR, India, IEB-BAETE was inducted to the Washington Accord. The decision was unanimously approved by 23 full-signatories of the Washington Accord) when IEB was granted full signatory status, a testament to the hard work and commitment of everyone involved.

A New Era for Bangladeshi Engineering

The recognition of IEB as a full signatory of the Washington Accord marks the beginning of a new era for Bangladeshi engineering. It signals to the world that Bangladesh is committed to maintaining and upholding the highest standards of engineering education. This achievement will undoubtedly open up new

opportunities for Bangladeshi engineers, both at home and abroad, while also driving the continued development and improvement of engineering education in the country.

Conclusion

The inclusion of the Institution of Engineers, Bangladesh (IEB) as a full signatory of the Washington Accord is a historic milestone that reflects the nation's commitment to excellence in engineering education. This achievement not only elevates the global standing of Bangladeshi engineers but also sets a new standard for educational quality within the country. It opens doors to countless opportunities for our engineers on the international stage, enhances the mobility and recognition of our degrees, and contributes to the overall development of Bangladesh.

As we celebrate this proud moment, we must also recognize that this is just the beginning. With this newfound recognition comes the responsibility to maintain and further enhance our standards, ensuring that Bangladesh continues to produce world-class engineers who can drive innovation, lead in global projects, and contribute meaningfully to the nation's progress. Together, let us embrace this new era with dedication and determination, fostering a future where Bangladeshi engineers are not only recognized but also revered worldwide.

The Definition of High-rise Building: Perspective Bangladesh

Engr. Mohammad Nazmul Islam

Introduction:

The term "high-rise building" does not have universally accepted definition. However, it can be generally described as follows:

- ✓ [1]*"Any structure where the height can significantly impact evacuation"*
- ✓ *"For most purposes, a high-rise building is considered to be around seven stories or more. In some cases, seven stories are the threshold, while in others, it's defined as more than seven stories. The definition can also be based on a building's linear height, measured in feet or meters, rather than the number of stories."*
- ✓ *"A high-rise structure is typically defined as one that exceeds the maximum reach of available firefighting equipment. This is usually set between 75 feet (23 meters) and 100 feet (30 meters), or about seven to ten stories, depending on the distance between floors."*

The specific height at which a building is classified as a high-rise is determined by the fire and building codes of the relevant country, region, state, or city. When a building exceeds this specified height, fires must generally be fought from inside the building by fire personnel, rather than from the outside using hoses and ladders. To facilitate movement within such buildings, elevators are typically used as the primary means of vertical transportation.

High-rise building definition:

In the past, there were strict height restrictions for building construction in Bangladesh. For instance, the Bengal Municipal Act 1932 (now repealed) stated, *"No building shall be erected or raised to a greater height than sixty feet (six storeys) measured from the level of the center of the street in front"* [Schedule-VI, Rule-17]. This rule limited buildings to six stories, reflecting concerns over safety, structural capabilities, and urban planning during that era. However, due to technological advancements, these restrictions are now a thing of the past.

The first attempt to define a high-rise building in Bangladesh appeared in the 1993 edition of the Bangladesh National Building Code (BNBC), which described a high-rise building as *"any building that is more than 6 storeys or 20 meters high"*. Although the Imarat Nirman Bidhimala of 1984 (Building Construction Rule 1984, hereafter referred to as BCR 1984) does not explicitly define a high-rise building, but it does mandate specific requirements for higher buildings, stating that *"buildings more than 6 storeys high shall have a fire lift, a suitable firefighting system, and an emergency exit"* [Rule-21/1984]. Similarly, BCR 1996 also does not provide a specific definition for high-rise buildings but reiterates the rules from BCR 1984 in a more detailed manner. It also adds that *"buildings more than 6 storeys shall comply with the BNBC 1993 or have an appropriate firefighting system approved by the fire service and civil defence department"* [Rule-25(c)/1996].

In 2003, an act was passed in parliament called the Fire Prevention and Extinguishing Act 2003. This act defines a high-rise building as "any building more than 6 storeys" [Section 2(h)].

Section 7 of this act specifically mandates obtaining clearance from the Fire Service and Civil Defense (FSCD) for high-rise buildings: *"Notwithstanding anything contained in any other law currently in force, no design for the construction of a high-rise or commercial building shall be approved, nor shall any modifications to an approved design be made, without the clearance of the Director General."*

The Dhaka Imarat Nirman Bidhimala 2006 (hereafter referred to as DBCR 2006) defines a high- rise building as any structure more than 6 storeys or 20 meters in height [Section 2(62)]. It also includes a special clause in Section 26(c) requiring strict adherence to the Fire Prevention and Extinguishing Act of 2003. Up to this point, everything remained consistent.

However, on May 29, 2008, the Ministry of Housing and Public Works revised DBCR 2006 and published DBCR 2008. This revision introduced significant changes to the definition of high-rise buildings, which did not align with current practices and industry standards and contradicted the law enacted by parliament. In Section 2(63) of DBCR 2008, it is stated:

"High-rise building means any building which is more than 10-storey or 33 m high. building appurtenances like stair head room, lift machine room or overhead tank will not be considered in determining the height."

Furthermore, the DBCR 2008 explicitly undermines the BNBC 1993 by introducing a new Rule No. 68: *"Primacy of the Rules: In the event of any conflict or inconsistency between these rules and the code, these rules shall prevail. However, in matters not explicitly mentioned in these rules, the provisions of the code shall apply."* In the proposed DBCR 2023, also repeat the same in rule number 76.

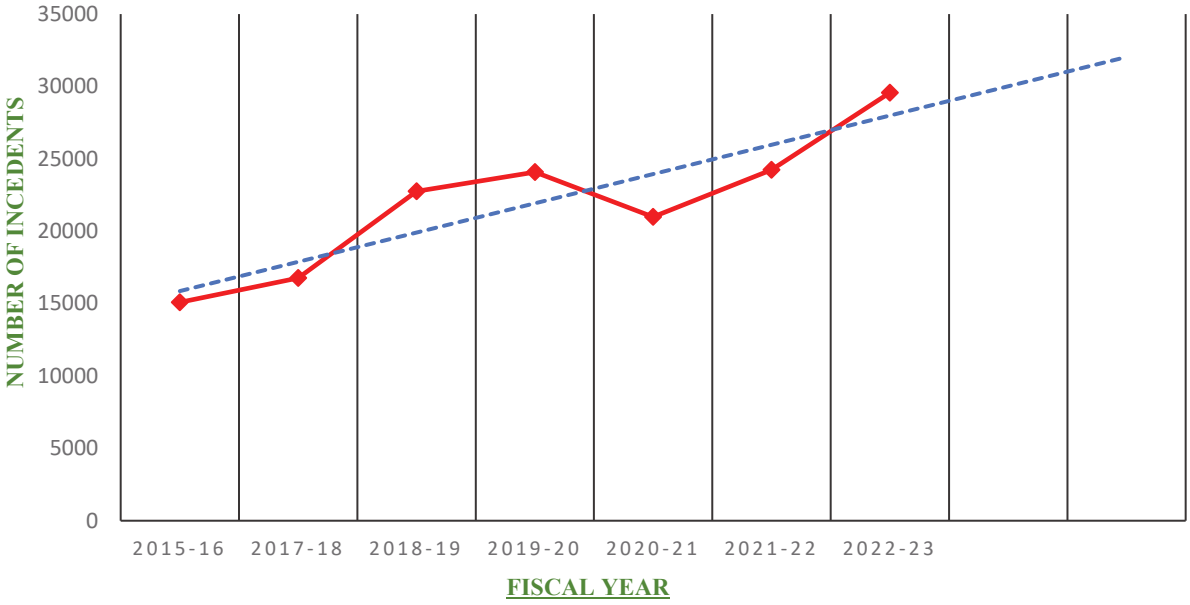
In the latest Gazetted BNBC 2020, the definition of a high-rise building is the same as the one in the DBCR 2008.

"High-rise building means any building which is more than 10-storey or 33 m high from reference datum. Building appurtenances like overhead water tank, machine room, communication tower etc will not be considered in determining the height."

Fire hazard data in Bangladesh:

Year	Fire incidents
2015-16	15089
2017-18	16772
2018-19	22762
2019-20	24074
2020-21	20991
2021-22	24233
2022-23	29570
Source: Annual report (FSCD)	

FIRE INCIDENTS IN BANGLADESH



An increasing trend in fire incidents highlights the importance of strengthening fire safety measures and implement stringent policy and regulation as well as effective public awareness campaigns.

Conflicting Regulations and Lax Compliance:

Fire safety in Bangladesh specially in Dhaka remains a pressing issue, with many building owners exploiting conflicting legal definitions of high-rise buildings to avoid compliance with fire safety regulations. According to urban experts, these conflicting definitions contribute significantly to the city's fire safety challenges.

The Fire Prevention and Extinction Act 2003 defines any structure with over six storeys as a high- rise, requiring building owners to obtain a No Objection Certificate (NOC) from the Fire Service and Civil Defence (FSCD). However, many building owners neglect to obtain the NOC, as the Building Construction Rules or BNBC state that the certificate is not mandatory for buildings with fewer than ten storeys. This discrepancy in the legal definitions of a high-rise has led to a lack of uniformity in safety measures across the city.

The survey on buildings in Dhaka, conducted by Rajuk's Detailed Area Plan (DAP) in 2016, revealed that there are approximately 16,930 buildings over six storeys in the city. Of these, only 5,024 buildings have received the necessary approvals and clearances from the FSCD. In fact, around 84 percent of high-rise buildings (defined as those above six storeys) in Dhaka are considered risky due to inadequate fire safety measures.

Despite the Fire Prevention and Extinction Act being adopted in 2003, the Bangladesh National Building Code (BNBC) 2020 was passed without consultation with the Fire Service. On May 16, 2019, the FSCD issued a strong recommendation to the Ministry of Housing and Public Works, urging a redefinition of what constitutes a high-rise building. However, under the sway of corrupt realtors, this crucial advice was disregarded.

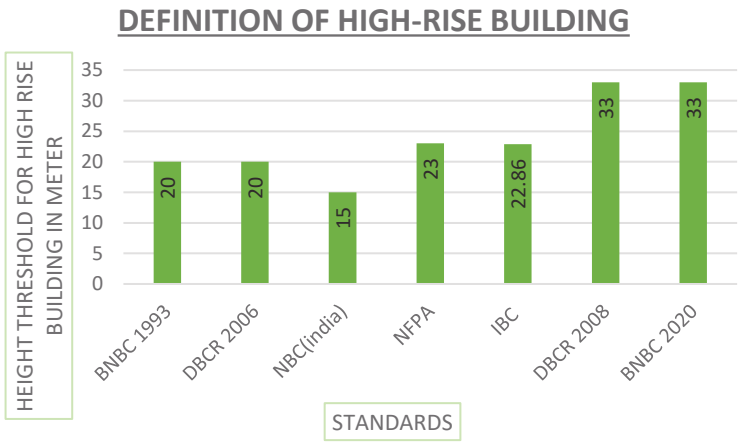
In a statement published by The Daily Star on March 4, 2024, the Chief Town Planner of Rajuk noted, "It was primarily agreed at an inter-ministerial meeting that buildings above six storeys would be recognized as high-rise. However, progress was stalled due to pressure from other stakeholders." This lack of consensus has created a regulatory gap, allowing building owners to bypass essential fire safety regulations.

International practice of high-rise definition:

Definitions of high-rise buildings can vary significantly across codes, standards, and countries. As fire protection practices and technology advance, these definitions evolve to reflect the latest safety measures. Here are three globally recognized definitions that put life safety at the forefront: NFPA, IBC, and the Indian Code.

Organization	Definition of High-Rise Building
National Fire Protection Association (NFPA)	Building with an occupiable floor greater than 75 ft (23 m) above the lowest level of fire department vehicle access.
International Building Code (IBC 2024)	Building with an occupied floor or occupied roof located more than 75 ft (22860 mm) above the lowest level of fire department vehicle access.
National Building Code of India	Building 15 m or above in height.

The following graph illustrates the evolving definitions of high-rise buildings, comparing those in Bangladesh with international standards. It highlights how the criteria for high-rise buildings have developed over time and shows the differences between local definitions and global benchmarks.



Conclusion:

The definition of a high-rise building in the BNBC 2020 or DBCR 2008 appears to compromise on crucial life safety concerns and conflicts with existing Bangladeshi law. Furthermore, it diverges substantially from international standards and best practices, potentially undermining the effectiveness of fire safety measures and emergency response strategies. This misalignment could pose significant risks and challenges in ensuring the safety and well-being of occupants in high-rise structures.

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Knowledge Sharing Session: 33

Topics: The current flood: Cause analysis, impact and resolution

Date: 1st September, 2024

Introduction:

In August 2024, Bangladesh was struck by a devastating flood, particularly impacting the eastern regions of Sylhet, Feni, Cumilla, Noakhali, and Khagrachari. The scale of this disaster has captured significant attention from engineers and experts, underscoring the urgent need for a comprehensive exploration of its causes, effects, and potential solutions. To address this critical issue, BEAWorld has dedicated its 33rd technical session to **"The Current Flood: Cause Analysis, Impact, and Resolution."**

Honorable Engr. Rafiqul Islam, P.Eng., Chief Editor of *Synergy* magazine, moderated the session. And he has chosen the subject matter expert for the discussion of the selected topics is none other than renowned water and climate expert, Professor Dr. Ainun Nishat, a figure of national and international prominence. As a former Vice Chancellor and Emeritus Professor of BRAC University and a former Professor of Water Resource Engineering at BUET, Dr. Nishat brings unparalleled expertise to this topic. Engr. Rafiqul Islam warmly welcomed Dr. Nishat, expressing deep gratitude for his participation and invaluable insights. The session moderator addresses the reason for choosing this highly relevant and timely issue, emphasizing that it is particularly important for engineers, as understanding the data, information, and logic behind the problem is crucial for them.

Engr. Rafiqul Islam also introduced Engr. Moazzem Hossain, President of the Bangladesh Society and Advisor to BEAWorld, along with Engr. Rezaur Rahman, the founder of BEAWorld, co-founder Engr. Amjad Hossain Khan, and all other distinguished participants.

Following this introduction, Engr. Rezaur Rahman delivered his welcome speech, acknowledging the contributions of Engr. Rafiqul Islam Talukder and Dr. Ainun Nishat. He highlighted the importance of the session's topic and noted that the discussion would be live-streamed on YouTube, making it accessible to engineers around the world. He concluded by emphasizing the session's significance and expressing his appreciation to all participants.

After briefing the webinar rules, the moderator gives the floor to the honorable speaker to start the presentation.

The Presentation and discussion of the key point:

"Greetings to everyone. I am delighted to be speaking today and I'm very grateful for this opportunity. Over the past few days, I have been keeping quiet regarding the ongoing flood situation. During the peak period of the flood, especially in the Cumilla and border areas, eight to ten television channels and several newspapers approached me for comments. I provided them with what I believe is technically correct information, though it brought me some trouble. However, I am not afraid to speak the technical truth.

What saddens me the most is when even technical professionals speak along political lines. Engineers should approach problems logically, but often I hear them mix politics into their explanations. After saying something, they will agree with me, only to later express uncertainty.

Our political thinking overshadows technical reasoning. Political agendas take precedence over technical solutions, which I find troubling. Just yesterday, I read an article about Egypt deploying soldiers to Somalia because Ethiopia has constructed a massive dam on the Blue Nile. The Blue Nile, one of the two tributaries of the Nile River, originates in Ethiopia. Egypt and Sudan, being downstream countries are worried about the impact this dam will have on their water supply. Ethiopia argues that it will help control flooding, especially in Sudan, but Egypt refuses to accept this because they want to retain control.

In the world of water rights, there's often no justice. Recently, I came across an article about how water disputes between India and Pakistan over the Indus River are being managed. Having studied water-related conflicts for 40 years, I can foresee that if there's ever a war between India and Pakistan, it will likely be over water. Similarly, any future conflict between Egypt, Ethiopia, and Sudan will also be about water. In fact, Egypt has already mobilized its army, even though it doesn't share a direct border with Ethiopia. To deal with this, Egypt has struck a deal with Somalia and deployed troops there. I bring this up because upstream countries always dominate the downstream ones when it comes to water. The country downstream is often left to suffer the consequences.

The first thing we need to consider is how we use our language. We often raise our voices for the Bengali language in February but forget its significance in our day-to-day discourse.

In Bangladesh, the term 'bund' has caused confusion. The English word for 'bund' could be translated as 'dam,' 'embankment,' 'barrage,' 'sluice gate' and 'regulator.' These five terms refer to five different types of engineering structures. Some are parallel to the river, while others are perpendicular to the river. A structure parallel to the river cannot function perpendicularly, and vice versa. This is our first confusion.

The second confusion is that 'embankment' in Bengali is translated as 'bund' according to various dictionaries. I believe the term 'bund' should be used to denote the proper concept.

But now we will mainly focus on dams, embankments, and barrages. These are three totally different things, but due to language confusion, we tend to mix them up.

There's also a bit of confusion regarding the word 'embankment'. The word 'embankment' has five equivalent terms. 'Embankment' is a British term, while 'levee' is a French word. If Napoleon Bonaparte hadn't lost to the Duke of Wellington, the English general, many years ago, we would all be speaking French instead of English, and the word 'levee' would be used. Another term is the German word, and if Hitler had won, we would all be using the word 'dike'. The Dutch use a word called 'polder'. So, 'embankment' is a British word, 'dike' is a German word, 'levee' is a French word, 'polder' is a Dutch word, and our term is 'bund', which is used in India. Here, we use the word 'bādh'. These five words mean the same thing in these five countries, but using our creativity, we have assigned them to five different types of infrastructure.

Lastly, I'll define what exactly constitutes a flood. Many people think of any waterlogged area as a flood, but the technical definition is more precise. I feel distressed if one-fourth of Bangladesh doesn't submerge every year because it is essential for the country's biodiversity, its fish, and its plant life. There are areas in the Haor regions and the Chalan Beel that need to remain submerged. It pains me when places like Arial Beel, which once submerged and sustained the economy of the Munshiganj and Manikganj areas, no longer exist. We blocked and destroyed this Beel, but if it could be revived, the landowners would economically benefit because fish, turtles, mussels, and even pearls could thrive there.

Economically, wetlands are more attractive, but in Bangladesh, wetlands have no legal value. Our law recognizes three types of land: residential, agricultural, and fallow. Forest land is under the Forest Department, distinct from the district administration. There are two separate registers for regular lands and forest lands, the latter often being encroached upon by powerful individuals. The transformation of land use for the first three types of land requires the permission of the district administration. However, there is no legal value for wetlands, and draining them is often seen as progress, though it leads to other issues, like the loss of water retention capacity.

Let's go back to the definitions. 'Inundation plus damage is equal to flood.' As engineers, we understand that inundation refers to damage, and if damage occurs due to inundation, then it becomes a flood. Thus, if inundation doesn't result in damage, it isn't considered a flood; it is just inundation.

Now, let's move to the third point: when, how, and why floods occur. Inundation is acceptable if it is under control, but when it exceeds certain levels, it turns into a flood. For example, the low-lying areas between Ashulia, Mirpur, and Sabars can experience water depths of five, seven, ten, or fifteen feet during the rainy season. This wouldn't be considered a flood; it's just inundation because there is no crop or economic loss. However, if such an area is flooded in December, January, February, or March with three feet of water, it causes severe damage. The boro rice fields would be ruined, and brick kilns would be damaged, leading to economic losses.

Understanding the difference between urban and rural areas is crucial. Fifty years ago, with a population of 100 to 120 million, there were about 20 million people in urban areas and 100 million in rural areas. Our economy was agricultural-based, with 80% of people employed in farming. In the next ten years, the population will reach 200 to 220 million, with 120 million in urban areas and 80 million in rural areas.

So, what have we been thinking for this village all these years? The village produces food, and the government of Bangladesh still thinks in terms of food security, from the point of view that food is necessary. Now, 50 to 60 years ago, before 1968, before high-yield rice was produced, before 1971, 72, 73, our land's yield was five maunds per bigha, half a ton per hectare. Today, with high-yield rice, we are producing 20, 25, even 30 maunds per bigha, and we've reached five to six tons per hectare. It's easy to get four tons now. From the same land that produced 5 million metric tons of food in 1947, we produced 9 million metric tons in 1972, and today, we are producing 37 to 38 million metric tons. Sometimes, it even reaches 40 million tons with some effort. This is due to our focus on food security, which we prioritized earlier.

That's why we initially paid attention to flood protection in rural areas, and now, about 80% of Bangladesh has flood control systems in place. but urban areas haven't received as much attention. We are now starting to focus on this. When floods occur, they cause more damage as water levels rise. There are four factors to consider: when it happens, where it happens, the depth of the water, and the extent of the affected area.

Timing is crucial. Urban areas cannot handle inundation. For instance, in Dhaka, a small amount of rain can lead to severe flooding. As the leader of the team that developed the national climate change adaptation plan, we have issued red alerts for Dhaka and other cities, warning that even a small amount of rain could cause major problems.

In Dubai recently, there was severe flooding, and rural areas don't exist there. In Dhaka, if 100 millimeters of rain falls, 60% of the city can flood. We are preparing for scenarios where 300 to 400 millimeters of rain could fall, which could flood 80% of Dhaka. The highest area in Dhaka, such as Biswa Road and parts of Baridhara, Gulshan, and Banani, may remain above water, but the airport would be submerged.

So, the situation in the city is of one kind, while the problem in the village is related to crops. In rural areas, people don't worry about water for three or four days because rice doesn't get damaged if submerged for five to seven days. Fifty, sixty, or seventy years ago, the rice that used to grow in wetlands could thrive with the water. Now we have stopped the process of rice being submerged in that water. However, silty water causes some problems. Issues arise with fish, cattle, and goats. We need to address these issues effectively.

Now, I will proceed based on that definition—meaning the process of submersion, as I mentioned earlier, rural areas will be submerged. In the past, the entire Bangladesh was classified based on this likelihood of submersion. The classification was as follows:

- **F0**: Areas that do not flood (e.g., the red soil regions of Gazipur or the highlands of Rajshahi).
- **F1**: Areas that occasionally experience flooding.
- **F2**: Areas that flood intermittently.
- **F3**: Areas that flood annually to some extent.
- **F4**: Low-lying areas near beels and haors, which are prone to regular and significant submersion.

Earlier, when Engr. Rafiqul Islam was mentioning his pain seeing the flood in Sirajganj, it was because from 1966 to 1970, with the funding from USAID, we constructed an embankment, meaning a bund, from Gaibandha to Bhagabari ghat—covering Gaibandha to Bogura, Sirajganj, and all the way to hurashagar. Today, the people in that area have almost forgotten about the flood's impact. Even more so, people in the Cumilla region have forgotten. Why have they forgotten?

Now, if we try to control the process of submerging in water for increasing agricultural production, from nature's point of view, it's bad; from an economic point of view, we are confused.

How can it be done? Let's go back to those five terms. A dam can be built where there are hills on both sides, and across the flow of water, a structure is placed to hold back the monsoon water. Where do we have such dams in Bangladesh? There are two: one in Kaptai and another in Foy's Lake. The one at Foy's Lake was built by the British to supply water to the railway, but now it's a recreational area. However, the main dam was built in Kaptai in 1962. In Kaptai, the water of the Karnaphuli River is held back, preventing water from flooding downstream. Before 1962, there were severe floods every year in the Rangunia region of Chittagong city. After 1962, such severe floods have not occurred frequently; only four or five times has there been some flooding. This year, the gate of the Kaptai Dam had to be opened by just six inches for seven days, but if the entire gate had been opened, there could have been a severe flood in the Chittagong region.

For such floods, if we try to retain the entire river's water, like how Pakistan retains all water with the Mangla Dam and Tarbela Dam, and generates hydropower from it, similarly, in the upper reaches of the Gomti River, there is a small dam in Damboor. It is not very high, but it generates a small amount of hydropower and sells some of it to Bangladesh. The dam's capacity to retain water depends on how big the dam is. For instance, in America, there is the Hoover Dam, and near Beijing, there is a flood control dam. They have built it so high that it can retain any amount of rainfall, and they have not had to open it for 70 to 80 years. This is the type of dam that tries to retain excess rainwater under any circumstances, but if the water exceeds the capacity, it must be released.

Another method is to divert a river's water to another side. For example, during the Mughal era, they used to divert water from the Balu River or the Shitalakkhya River to the Turag River when there was excess water. There are similar diversions in the Feni region, like the connection between the Kahuya River and the Muhuri River. When there was too much water in the Kahuya River, it would flow into the Muhuri River, and if there was excess water in the Muhuri River, it would flow back towards the Kahuya River and in the Gafargaon - mymensingh regions such diversions were made by our ancestors about 400 years ago.

For holding back water in hilly areas, we can build dams. But what can we do in flat areas like ours? We can build bund to prevent river water from overflowing into floodplains and wetlands. The English term for this is 'embankment.' If we build an embankment parallel to a river, such as from Tongi to Ashulia, Ashulia to Mirpur, Mirpur to Kalyanpur, and Kalyanpur to Midford, it would serve as a barrier. This embankment wouldn't have gates, and the idea of having gates on such embankments is entirely unrealistic. To clear the internal rainwater, we could install pipes through the bottom of the bund or set up a concrete structure with switches or regulators.

So, we Bangladeshis have adapted some foreign terms into our own. For example, 'embankment' is a British term, 'levée' is French, and we also have our own Bengali term for its bund. However, we use the term 'levée' more often when constructing roads. If it's near the sea, we call it a 'dike,' and if we encircle an area with an embankment, it's called a 'polder.' In Bangladesh, we have terms for different types of infrastructure that prevent water from overflowing, but unfortunately, in Bangladesh, embankments are also referred to as 'bund,' and 'dam' is used refer to as bund.

The third type of structure is a 'barrage,' which has no role in flood control.

During the monsoon, rivers overflow completely, meaning the water level is high in the rainy season but low in the winter. If I want to utilize the water that's available, for example, the Brahmaputra has plenty of water on both sides, but there's no way to use it because the water is 50 to 60 feet deep. Pumping it out would be very troublesome. A barrage, like the Farakka Barrage or the Teesta Barrage, is used to keep the river full up to its banks. The purpose is to maintain the river at full capacity. With the Teesta Barrage, for example, we aim to keep the water at its maximum level and use the water for irrigation through canals on both sides.

so, the main advantage of a dam is flood control for a country and hydropower production. Hydropower production can be economically justified. I have been negotiating water with India for a long time. We always said that they should join us in building a dam, and we would share the expenses. To my knowledge, the Bangladesh government is willing to invest one billion dollars. If we can build a dam with Nepal, we can get cheap hydropower. For instance, the cost of hydropower from Kaptai Dam is 50 paisa per unit, while we are buying from Adani at 15, 16, or 18 taka per unit. If I were given the responsibility, I could technically set up 100,000 megawatts in Arunachal and Assam, and the cost of electricity would be no more than 60 or 70 paisa. The problem is that such reservoirs flood extensive areas. The Kaptai Dam controls floods in our lowlands and produces 250 to 300 megawatts of electricity, but in return, it has disrupted peace and created security issues.

Now, from a damage point of view, if there is a risk of flooding, the primary way to reduce the damage is through flood forecasting and warning. To do this forecasting and warning, two types of information are needed: one is the forecast of the amount of rainfall, which is prepared by the meteorological department. Our meteorological department has the capacity, but unfortunately, it is controlled by the armed forces and is a subject matter of the Defense Ministry. Therefore, they are afraid to do anything due to fear of high-ranking generals.

India provides rainfall forecasts for 13 to 14 river basins to Bangladesh, and this forecast must be shared with Bangladesh because both Bangladesh and India are signatories to the World Meteorological Organization. As a result, rainfall information and forecasts are transferred in real-time from India to Bangladesh.

I will come back to this point. The second forecast needed is the river's condition. Those who studied hydrology with me at BUET might recall the muskingum method I taught, which explains how water level increases at one point in a river can propagate downstream. For instance, if I pour a bucket of water in one place, it might raise the level by 10 inches, but 500 feet away, it might be just 2 or 3 inches. The flow gradually decreases, but it takes time.

The current state of river water and forecasts for what might happen in the next two, three, or four days are provided by the Water Development Board. The forecasts are generated by the meteorological department and the Water Development Board. The Water Development Board creates flood forecasts and the meteorological department provides rainfall forecasts.The executive engineers of BWDB sent the report to DC, ministries, and major newspaper editors by 12:00 PM each day. There is no confidentiality, but the meaning of this information is often misunderstood.

The language used by the meteorological department for forecasts is written in the same way it was 100 years ago. For example, today's forecast for Dhaka might say that occasional scattered showers are possible with light to moderate rainfall and occasional thunderstorms. This does not require expertise; anyone can write it. But there is some possibility of non-occurrence. The forecast might mention that some areas in Dhaka, Mymensingh, Rajshahi, and Rangpur divisions could experience rain. If there is a depression in the country, like the current one affecting Telangana and Andhra Pradesh in India, causing severe rain in Delhi, it could also lead to some rain in Bangladesh. Timing is very important. When it rains in Chaitra and Baishakh, the fields and vegetation are dry, and rainwater gets trapped in the soil and vegetation. If anyone remembers interception loss, most of the rainwater seeps into the ground and does not overflow. However, in August, when everything is saturated, even a small amount of rain causes a lot of runoffs, leading to larger flood impacts. Additionally, for those who studied hydrology with me, it is related to the rate of rainfall. One inch of rain over 24 hours versus one inch of rain in one hour has a huge difference in runoff. Heavy rainfall over a short period can flood an entire area.

Predicting rainfall accurately for two or three days is very challenging. Americans can provide forecasts reasonably well for seven to ten days, while India's meteorological department provides five to seven-day forecasts for depressions. Recently, in late April, India issued warnings with a red alert for Tripura and an orange alert for Mumbai due to severe rain causing flooding in low-lying areas. In contrast, our meteorological department might only say heavy rain is possible with gusty winds, without providing clear warnings. The meteorological department's warnings are often ignored. I frequently check weather reports, including those from India, to get a better idea. The data from the meteorological department is used by the Water Development Board to run their hydrodynamic models MIKE 11 and MIKE 21 and forecast what might happen over the next three days. Unfortunately, this forecaster uses a strange term called 'danger threshold' when creating forecasts. The danger threshold refers to whose danger? The danger is related to that embankment. If you want to check the forecast, please note the website: www.ffwc.gov.bd. You will find the entire forecast there. By examining it, you can see the condition of the river near your home.

They provide forecasts for about 64 continuous points, whether it's for coastal areas, Dinajpur, Rangpur, Sylhet, or Dhaka city. You can understand this, but they provide forecasts with colors on the map: green means no danger, yellow, orange, and red indicate increasing levels of concern. However, nobody understands what these colors mean. Our forecasting system is good, but it needs to be communicated to the general public. I have been shouting about this for the past 20-25 years. We have many community radios now—14 to 18 radios operated by NGOs in local languages. They provide forecasts in Sylheti in Sylhet, in the local language of Barisal, Rajshahi, Chittagong, etc. The forecasts should be given in local languages.

When you visit America, whether you're staying at someone's house or at a hotel, the first thing they do after waking up is turn on the TV to check the weather forecast. They give forecasts for the next 6 hours, 12 hours, or 24 hours, and they're usually quite accurate. Similarly, we can also provide fairly accurate forecasts. And for this forecast, as I mentioned, we need data from 13-14 points from India. Currently, it's being said that India's data is not sufficient for us, so we need to discuss with them to get the necessary data.

Now let's look back at history. In March 1972, Bangladesh was just a few months old, having gained independence on December 16, with March 26 being our Independence Day. However, we gained actual power in March. Just three months later, the then Prime Minister of Bangladesh and the Prime Minister of India discussed how the relationship between the two countries could be strengthened and what could be done for Bangladesh. At that time, floods were the biggest threat to Bangladesh in 1972. If you were involved in water management or active in the streets during the 60s or 70s, you would have seen slogans demanding the implementation of the Krug Mission Report.

Bangladesh then asked India to collaborate on water management, and the Joint Rivers Commission was set up in March. The first meeting took place on the 22nd of March, and the commission was given five responsibilities: four related to flood management, including overall water management, and the fifth was separate flood forecasting management. A separate committee was set up to handle flood forecasting, though I never attended it, but I have a good idea of what they do. They hold meetings periodically, and they even had one last December. Now they are saying, if you want to meet, let's meet. They are giving us what we've asked for, but sometimes our requests are flawed. However, that's no reason to have conflicts with India. So, this is the situation. What do we need to do now? What we need is to analyze this year's flood and move forward accordingly.

This year's flood is unusual because our understanding of rainfall in our country has been challenged. I watch BBC News almost every night, five minutes before 7:00, 8:00, or 9:00, when they show the weather report. They display a few slides, starting with North America, then South America, Europe, the Middle East, our region in Asia, East Asia, and then Australia and New Zealand. Anyone can watch it, and if you watch today, you'll see that the wind is moving from the south towards the northeast. As it moves northeast and reaches the mountains and the foothills of the Himalayas, it causes rainfall. This is why it rains heavily from the end of April and into May, which leads to flash floods.

When Mr. Redcliffe drew the map of East Pakistan, which is now Bangladesh, you'll notice that the entire map shows flat terrain in the north and east of Bangladesh. Just across the border, the terrain changes to hilly regions like the hills of Assam, Meghalaya, and Mizoram, isn't it?

This time, due to a low-pressure system, there has been heavy rainfall, and at the same time, it was either a new moon or a full moon, which also contributed to the rain. As a result, Sylhet, Habiganj, Moulvibazar, Brahmanbaria, Cumilla, Feni, and Noakhali, and further down Khagrachari, all experienced heavy rainfall.

If you conduct a frequency analysis, you'll find that this could be the worst rainfall in a thousand years, which is why they issued a red alert in Agartala, India. On our side, it was referred to as heavy or light rain, but our flood forecast was accurate. However, no one understood its significance.

Now we are unnecessarily blaming the upstream gate being opened. If the gate hadn't been opened and the dam had broken, the floodwaters in Cumilla city would have risen to the third floor. That dam was built 35 years ago. We have repeatedly told India to manage it together, and I am a witness to this, but India refused. This is stubbornness of the upstream country, as I mentioned. Due to the dam, the 120-kilometer area upstream from Agartala, India, has been free from flooding for the past 35 years, the floodwaters that once surged downstream from the upstream regions have not caused major flooding in Cumilla, Feni, or Laksam, where even the Gomti River has not experienced significant flooding. The residents of Comilla have nearly forgotten what a flood is. The last major flood occurred in 1993 when there was water in the river, and someone broke the embankment—though I know who was responsible, I'll leave that aside. The recent heavy rainfall has mostly affected areas without dams, except for the Gomti River. In the regions that experienced the rainfall—such as Kushiara in Sylhet, Manu in Moulvibazar, Khowai in Habiganj, and several rivers in Brahmanbaria—there are many rivers. One example is the Haora River, which flows from Agartala to Ashuganj. There are also rivers like Langla. Below the Gomti, rivers such as Feni and Muhuri. Excessive water flowed through the Gomti, and Muhuri River also carried heavy flows, with the worst flooding occurring in the Muhuri River.

All the rivers I mentioned, including the Gomti, had embankments on both sides. However, due to mismanagement by the Water Development Board, these embankments weakened, and each one eventually broke. The breaches caused the floodwaters to spread across vast areas, submerging them.

At the mouth of the Little Feni River, near the sea in Companiganj, there was a large regulator with around 22 or 24 gates. About seven or eight days ago, it was completely destroyed by water pressure and washed into the sea.

The regulator is a structure similar to a barrage, designed to raise the water level upstream, but there is no reservoir. The regulator is located near the sea and close to where another river meets, with vertical gates that we keep closed. When these gates open automatically, we call them 'sluices.'

Now, my concern is that within the next three or four days, there will be either a new moon or full moon, and until this regulator is repaired, for the next three to four years, saltwater will flow into large parts of Noakhali, Laksam, and some areas of Cumilla.

So, the infrastructure we have built needs regular maintenance. Flood forecasting should be made comprehensible to people through non-structural measures. There is a global movement towards creating insurance mechanisms because we believe that this excessive rainfall is due to climate change. I believe this is indeed caused by climate change, and a mechanism called Loss and Damage is being developed. I don't know when it will happen, but discussions will take place this November.

So, the issue is that the excessive rainfall has occurred because of abnormal weather patterns. The reason for the excessive rainfall is that the upstream embankments have broken, and even in the downstream areas, the embankments have failed. In fact, the urban areas have suffered severe damage, and today many villages have seen significant destruction of homes, roads, and bridges. The fields have been severely affected; Aman paddy that was recently planted has rotted.

The solution is to repair the roads as quickly as possible and improve the communication infrastructure. No external help is needed for this; the Bangladeshi government has sufficient funds—300 to 400 crore takas would be enough. Additionally, we need to ensure that high-quality Aman paddy seedlings are distributed to everyone.

Flooding can occur in any year. As I mentioned earlier, it's normal for about 25% of the area to be submerged. We become worried when it reaches 40% or 50%, and we need to monitor which areas are affected and when.

While we are quite advanced in flood management, we need to make this information more accessible to the general public and improve administrative systems. I think my time is up. Thank you, everyone."

QA Session:

Following the comprehensive and perceptive presentation delivered by Dr. Ainun Nishat, the audience was enthralled and captivated by the environment. Everyone was deeply engaged and curious to know more from the international expert present. Engr. Rafiqul Islam, the session moderator, skillfully managed participant interactions, ensuring a smooth flow of questions. However, due to time limitations, not all questions could be addressed. Only 12 questions from 10 participants were allowed.

Q1: What is cloudburst?

A: Two terms have come into use: one is "atmospheric river," which refers to a stream of air flowing over a region like a river, carrying significant moisture. When this moisture accumulates suddenly, it results in intense rainfall, often referred to as a "cloudburst." In some areas, this type of rainfall is described as a river of clouds. For example, in Cumilla, where the maximum monthly rainfall might typically be 500 millimeters, it rained 450 to 500 millimeters in just two days. This is what we call a cloudburst. Due to climate change, both atmospheric rivers and cloudbursts will become more frequent. This year several cloudbursts have occurred in the U.S.

Q2a: If we had access to prior forecasts, what kinds of preemptive actions could have helped reduce the damage?

A: The first thing is that when we receive a forecast, we must know what actions to take immediately. Bangladesh is actually one of the most advanced countries in the world in disaster management. Our government has a document called the "Standing Orders on Disaster" (SOD), which can be downloaded from the website of the Ministry of Disaster Management. Since I have been working in this field for many years, I can tell you that when there is a major flood in another country, they often come to us to learn, as Bangladesh is considered very advanced in disaster management.

In the manual, it clearly states what steps should be taken when a forecast is received. For example, sometimes the secretary or the director-general of the ministry calls me, saying, "Sir, we have received a bad forecast, what should we do?" I immediately inform them which areas might be affected, and they can issue an alert for that region. Also, we ensure that embankments do not break because, to date, floods have occurred due to embankments breaking, not because they overflowed. So why would an engineered structure fail? This is a major issue.

At the same time, we face four types of floods, which complicates things. One is caused by tidal surges from the sea during cyclones, like Aila and Sidr. Another is urban flooding, where rainwater cannot drain out. There is also flash flooding, where rain in hilly areas rapidly flows down, and finally, river floods, when rivers overflow. Our main floods come from flash floods and overflowing rivers. If we get forecasts in advance like in America, identify weak spots, we can have sandbags ready to protect them.So, if experts can communicate forecasts in a way that decision-makers understand, many proactive measures can definitely be taken.

Q2b: It may be entirely political; India has taken certain actions that seem to be having a significant impact on our floods—what is your remarks?

A: The political aspect of this is that, as I mentioned earlier, the upstream country often holds significant power. Globally, only a few countries like Mozambique and Lesotho treat downstream nations fairly, mainly because of Nelson Mandela's influence. In most other places, the relationship between upstream and

downstream countries is strained because the upstream country typically does not want to share data or care about what happens downstream.

In the case of India, if we had received data from them, it would have made a significant difference. In fact, until 1998, we proposed that India can provide us with advanced data and allow their engineers to work with our flood forecasting office to see how we handle things. Interestingly, both our countries use the same forecasting models, but due to their arrogance, cooperation hasn't moved forward.

One thing to understand is that in the dry season, the infrastructure, like the Teesta Barrage, is used to divert water from the river. India withdraws 40% to 50% of the water from the Ganges during dry seasons, but during the rainy season, the dam's purpose is not to divert water but to manage floodwaters. This dam benefits both the upstream and downstream countries, but political problems arise because of issues like land acquisition and the negative impact on large areas.

So, yes, this issue does have a political dimension. While I agree that upstream countries can be blamed during the dry season when they withdraw water without sharing it, in the monsoon season, cooperation between the two nations could help mitigate flood damage. However, the real harm occurs during the dry season.

Q3: Wouldn't it be essential to clear the river channel sections through dredging, as the current river profile used in hydrodynamic models might no longer match reality?

Today, I deliberately avoid discussing dredging or river reclamation. In the past 10 years, we've funneled thousands of crores of taka into dredging projects, only to fill some people's pockets with no real benefit. If dredging is not done systematically, the amount of sediment, not just silt, that flows down from upstream will refill the riverbeds within two or three years. Merely performing so-called dredging won't maintain the river's water-carrying capacity.

The Bangladesh Inland Water Transport Authority (BIWTA) has bought 40 or 50 dredgers—what has come of it? Nothing. The private sector owns 50 to 60 dredgers, and quietly these dredging contracts are awarded. They dig holes in the river, pile the sediment on the banks, and within two years, it's filled up again.

I've seen dredging in China, in Europe, and there, it's done alongside proper river management. The river basin is managed in such a way that the river can carry away the excess sediment that arrives each year. Our government agencies have spent thousands of crores in the name of dredging with zero benefit.

Q4: What is the main reason for our Joint River Commission's inefficacy—our own reluctance or incompetence? And who are the key players behind this situation?

First Question: The issue with the Joint River Commission is that it does not really work. The reason is that the Joint River Commission is a statutory body established to provide advice between the two countries. Since April 1974, it has been restructured from an advisory body to a negotiating entity. Even if the Joint River Commission reaches a decision, it still needs to be discussed between the governments of the two countries. In our country, when the Joint River Commission's decisions are discussed, the same people go and discuss them. However, without a decision at the Prime Minister's level in India, nothing happens. The decision must go through the Ministry of Foreign Affairs, then the Ministry of Water Resources, and finally to the Joint River Commission. They get stuck in the process because they have no vested interest. They are active where they have a stake, such as transit within our country or selling electricity, but they are less active when it comes to other issues. They are working on building a port at Ashuganj through the Sundarbans or the Meghna River, and in about 10 years, small ships with drafts of less than 15 or 18 feet will directly reach Ashuganj. Then Containers will be taken to Agartala by train. This will start next year or the year after. They

focus on their areas of influence, but we do not have the same level of influence or capability. There are issues of skill, foreign policy, and the Ministry of Foreign Affairs.

The most concerning issue is that the new caretaker government and its advisors sometimes make statements that reveal a lack of understanding. For example, one advisor recently claimed that we saved 15,000 crore Taka on the Padma Bridge construction, but as an advisor on the project, I know where the savings were and where the excess costs occurred. It's clear that their understanding is limited. Currently, there are many problems with the Joint River Commission. The young member, who has a Ph.D. in river studies, may have theoretical knowledge, but the discussions are controlled by the Foreign Office and are conducted through bilateral negotiations.

Q5: Can we manage or control flood flushes by rationing the water in a dam?

Okay, your concept is theoretically correct. But now it needs to be given dimensions. The dimension is not about five tons or ten tons, it's about where I'll build the dam, not the embankment; it's across the river, like in Kaptai. In the village named Kaptai, there are hills on both sides, and I'll build a dam 108 feet high from the riverbed. It will be able to hold back the rainwater coming from upstream, meaning it can store the entire monsoon's water. After storing it, what will it do? The term is penstock. A tunnel will carry the water from the dam to the riverbed level, and from there, it will turn turbines to generate electricity. It will release water in a controlled manner throughout the year for power generation, ensuring there is no downstream flooding. That's the benefit that Dumboor Dam brought to Comilla and Agartala. This is something that needs to be done in the upstream hilly areas. Now, since the biggest benefit of the dam is hydroelectricity, we try to store as much water as possible. During the monsoon, the chief engineer of the dam, or the engineers managing it, monitor the rain and water levels. They will only release water as a last resort when it becomes dangerous to not release it. For example, if the water level is 108 feet, and I release it when it reaches 100 feet, knowing that more rain will push it to 107 or 108 feet, but it doesn't rain later in the season (like in 2021, 2020, or 2019), then I'll lose the benefit of the 8 feet of head difference. That's why we try to store the maximum amount of water in the dam to prevent floods downstream. However, when dam safety is a concern, they release the water. The height of the dam and how much water it can store depends on the calculations, and Kaptai can hold a good amount.

Today, you might not like what I'm going to say next. As I mentioned, in March 1972, experts from India and Bangladesh met. At that time, I had just graduated from BUET and become a lecturer. Since I had seen the documents, I know that during that meeting, Indian representatives suggested to Bangladesh that we should prioritize which rivers to tackle first. At that time, the Farakka project had not been completed, and India mentioned that they were ready to proceed with the Barak River, even though the Tipaimukh project had not yet started. Bangladesh agreed to this, and on March 22, 1972, it was agreed that a reservoir would be constructed on the Barak River to control flooding in the Kachar and adjacent Surma Valley areas, including the Surma and Kushiyara regions of Bangladesh.

Later, in 1972-73, experts from both countries met again. India proposed a site for the project, and Bangladesh suggested a slightly upstream location, which is the Tipaimukh site. All of this is documented. Bangladesh proposed the upstream site to ensure more water and power generation. In 1974, a joint team was appointed for construction, with a team leader at the Superintending Engineer level. However, in August 1975, as the design work was about to start, relations between the two countries deteriorated. You know why this happened.

So, today when Bangladesh says that controlling these rivers in the Sylhet region—Surma and Kushiyara, along with their tributaries—is necessary, the Tipaimukh issue comes up. But in Bangladesh, mentioning

Tipaimukh often leads to criticism. I've heard a lot about this. Meanwhile, India laughs and says that we were ready to move forward together, but it was Bangladesh that stepped back.

When I visited Moulvibazar recently, local officials said a dam in the region would help regulate river flow, increase flow in the dry season, reduce floods during the monsoon, and improve navigation. Globally, NGOs like Arundhati Roy and Vandana Shiva in India, and some NGO leaders in Bangladesh, oppose dams without understanding the permanent solutions they offer for flood control. Dams are the only permanent solution for floods, coordinated embankment management and forecasting with India could help. At this moment, after the floods of 1987-88, we were able to convince India to coordinate the dams on the Teesta River in northern Bengal. There are dams on both sides—one in India and one in Bangladesh. The coordination of the embankments was completed in 2001-02, meaning that floodwaters from India flow into Bangladesh, but the barrages at Gajoldoba in India and in Bangladesh are not sufficient to hold back the floodwaters. However, the flood intensity in Teesta has reduced somewhat due to the reservoirs being constructed upstream in Sikkim.

In 2011, an agreement was made between the two heads of state of Bangladesh and India to manage the rivers based on a basin-wide approach. If the current government can move forward with this, there is hope for the future. I strongly reiterate that there is no alternative to dams, no alternative to coordinated embankments, and that an integrated forecasting system can help. Insurance is only an option for those who can afford the premiums. There are many theoretical approaches, but the three key solutions I mentioned are: dam construction, coordinated embankment management, and coordinated forecasting. The same applies to flood management in coastal areas.

What I want to say is that these solutions must come through political resolution. We know the technical solutions, but they need to be facilitated diplomatically. There is no place for legal aspects in this; we often talk about laws, about international water laws (UN watercourse convention 1997), this is finalized in 21 May 1997 and effective at 17 August 2024 has not yet been adopted by Bangladesh, India, Nepal, or Bhutan. The legal experts who cite this law are unaware that it is not in effect. The complete solution must come politically, facilitated by diplomats. There is no role for legal experts, but the technical people will lay the groundwork.

Q6: Is there technology that can collect river sediment during floods for use in brick kilns, reducing reliance on agricultural soil?

A: Thank you, that's an interesting question. The reason I mentioned it is because, suppose there's a small river, 200 feet wide. What they usually do in the name of dredging is leave out 50 feet on each side and dig a bit in the middle 100 feet. Then they pile up the dredged soil on the 50-foot areas on both sides, raising the banks or narrowing the river further, and either the contractor or the executive engineer in charge, or the local administrator like the UNO or DC, sells this soil. Who do they sell it to? They sell it to the brick kilns. So, this is happening, but the state isn't benefiting from it at all.

I have seen in China that they dredge rivers in an organized way, whereas here we do it haphazardly. In Chandpur, a sand thief who was also a Union Parishad chairman was killed by the people. What he used to do was dig a massive hole in one spot to extract sand. This process needs to be done in a scientific manner.

If we look at history, even before British rule, meaning before 1757, the local landlords used to physically dredge rivers, and the extracted soil was used to fill low-lying areas, build roads, and other projects. So, dredging has been a part of Bangladesh's history since ancient times. The Bengalis first settled on highlands, and now we have historical evidence showing that the earliest settlements were in the Narsingdi area, which is part of the Madhupur tract, and then they moved to what is now the Barind region. When they started living in floodplains, river dredging became part of the social system. But now we dredge rivers for personal benefit.

The natural system can easily be restored. We need to establish a proper cross-section for rivers and dredge them continuous fashion, instead of doing it randomly here and there. If we use the right technology, it will definitely be beneficial.

Q7. How might strategies like the Mississippi River Basin's drainage system be applied to address the flood challenges caused by the Farakka Barrage or similar issues in the Bangladesh context?

In Mississippi, it's only 320 kilometers? I guess it's actually around 5000 to 7000 kilometers long, extending all the way upstream to Dubuque city in Iowa. Their engineering structures start near the city and extend all the way down the Mississippi and Missouri rivers to Louisiana at the southern end. I've observed how they managed flood control at both ends using methods from the Tennessee Valley Authority (TVA), which managed the Tennessee River.
In Bangladesh, this method was used for flood control management in 1964. However, for constructing the necessary infrastructure, all the sites for these structures would be in India. To retain monsoon water, you would need to address it either in Nepal, in rivers like the Karnali and Koshi, or in the Sankosh River upstream of the Dhorola and Dudkumar rivers in Bhutan, or in the Jamuna and Saraswati rivers in Himachal Pradesh. Thus, for the technical solutions where engineering structures need to be built, we have no control over these locations.

And I want to emphasize that technical decisions will be guided by discussions on technical matters if the two countries engage in them. However, the primary discussion is political. This political dialogue is facilitated diplomatically. Water discussions go beyond just water issues and encompass the broader interests and relationships between the two countries.

To put it briefly, in 1996, some possibilities emerged, and India made two demands: they wanted transit rights through our territory and control over the insurgent groups operating in our region, such as ULFA, Bodoland, Tripura, and Nagaland. In return, Bangladesh agreed to these terms. Bangladesh had two demands: one was to receive water from the Ganges, and the other was to control the insurgent groups coming from Tripura who were causing disruptions.

So, negotiations are always on political matters, but the guidelines for those negotiations need to be established technically. However, Political leaders should listen to what technical experts say. Unfortunately, our political leaders, due to their political weaknesses, cannot proceed based on technical discussions. Instead, they tend to raise legal issues and complicate matters further, while India introduces environmental issues, creating additional complexities. Consequently, wherever a river flows through two countries, there is always a bitter relationship between the upstream and downstream regions. For example, when the USA is upstream of Mexico, Mexico is dissatisfied; when Canada is upstream of the USA, the USA accommodates Canada. The only exception is Egypt, but now Ethiopia has broken that arrangement.

And on the Mekong River, the World Bank, ADB, and others are working together politically. This river flows through six countries, with four of them being the main ones: Laos, Cambodia, Thailand, and Vietnam. They have reached an agreement, but the major part involves China and Myanmar have 3% of the area. China is making positive progress but does not relinquish control, which is why some progress is being made there. However, it's important to understand that political decisions govern everything.

Q8: What advice would you offer on flood management in Bangladesh, considering past approaches and the current situation? Which strategy do you believe is crucial for the future?

Now, a bit of historical context is needed, and it will take me a moment to answer this point. First, when the flood occurred in 1988, submerging the entire country, the Secretary at that time took an initiative. He instructed the Water Development Board to compile a comprehensive report on flood control, integrating all

discussions, reports, and work done by consultants, from the CRUD mission to the master plan, etc. Under the supervision of the Chief Engineer of Planning, the Board prepared a detail report.

During the preparation of this report, the then dictator went to India, where a joint team from Bangladesh was formed, as well as teams in Nepal, Bhutan, and China, resulting in a total of five reports: one from Bangladesh and one from each of these four countries. However, when the water level was still high, Daniela, the wife of the French President Mitterrand, visited Dhaka and was advised to leave quickly because the airport would soon be submerged. The last plane left with Daniela, but she went to New York instead of France. At the G7 meeting there, she urged the world to do something for Bangladesh.

Thus, the five reports were: one with India, one with Nepal, one with Bhutan, one with China, and Bangladesh's own report. The French prepared a report, Japan asked why they were lagging and prepared a report, and America questioned why they should be excluded and prepared a report as well. Among these, the fourth report was from UNDP, making it four donor agency reports and one from neighboring countries, with Bangladesh's own report making a total of nine.

The UN General Assembly passed a resolution assigning the task to the World Bank to integrate all the knowledge into a single report.

At that time, our NGO community, many of whom are now powerful individuals suggested that we should live with the flood. However, the concept of living with the flood was not understood; it meant enduring the flood during the monsoon, managing irrigation in winter, and receiving food relief during shortages. The French suggested completely eliminating the flood from Bangladesh, while UNDP proposed a middle path.

A committee was set up with experts from nine studies, and a document called the Flood Action Plan was created, primarily by British expert Steve Jones and myself. Each sentence in the document was either written by him or me, and one person's writing was edited by the other. After that, the government did not accept the proposal to live with the flood, stay on elevated platforms, and cultivate flood-resistant crops like half-ton per hectare rice.

But at that time, we develop the technology for building embankments and coordinated the embankment with India through discussions, including talks about embankment proposals. That document is still on the table.

Now, if the new government continues to make a fuss about environmentalists' views, nothing significant will happen; we will continue to be submerged by floods. However, you've reminded me about the nine reports, so I've recalled those. We know the technical options for what needs to be done anew, but these need to be filtered through a political lens to develop a program. With proper international and national experts for brainstorming, we could produce this report within three months. France had assisted in producing many reports at that time, some of which France itself might not even know, such as multi-criteria analysis for project finalization, and guidelines for intangible benefits. French and Dutch experts collaborated on this. So, we have plenty of resources in our archives; there's no need to reinvent the wheel. But who will bell the cat? We need to identify the person who will take on this responsibility, gather their strength, and ensure they have the courage. The bell must be rung, and it should be placed around our neighbor's neck. Without political power, nothing will be accomplished. In four or five years, floods will still occur, and due to climate change, floods and droughts will become annual events in 15, 20, or 30 years. Today, I spoke about this issue. In 30 years, I might not be here, but those of you who are still around should verify this with predictions about the future.

Q9. Is there potential to develop an early warning system for flash floods in Bangladesh to minimize losses?

A: Two things: first, you used the word 'loss.' Globally, there's a major discussion on 'loss and damage' from natural disasters. These are two distinct terms—'loss' refers to quantifiable damage, while 'damage' refers to non-quantifiable impacts. For example, the loss and damage in the Sylhet, Brahmanbaria, Cumilla, and Feni regions weren't caused by us but by excessive rainfall. If we can prove that this was due to climate change, developed countries would be obliged to compensate us. However, this debate hasn't been fully resolved yet, and there will likely be further discussions in November.

The key point is that we have a flood forecasting system from April to November and a year-round system for tidal surge forecasting. The Meteorological Department provides forecasts for tidal surges, and making these forecasts understandable to the public is what we call a 'warning.'

For example, imagine you're visiting Paris and crossing the street with a French friend who suddenly tells you in French to hurry up because a car is coming from the opposite direction. Since you don't understand French, you miss the warning even though the forecast was correct, and you end up getting hit by the car. The forecast was accurate, but you didn't understand the warning.

Our flood forecast, year-round cyclone forecast, and tidal surge forecast are provided by the Meteorological Department. During the monsoon season, from April to November, the Water Development Board provides flood forecasts. However, the language in which these forecasts are given is not easily understood by the public.

Now, to make the forecast more long-term, universities like MIT, Harvard, and others, in collaboration with Bangladeshi NGOs, are conducting extensive research. They are collecting data and conducting various studies. But when they come to talk to me, I tell them that currently, the forecast is accurate for three days. I need it to be accurate for 15 days, ideally three months, because I need to know whether I should plant crops or not. Even a five-day or seven-day forecast would be helpful.

So, we don't have an effective warning system, although the forecasts are quite good. The forecasts need to be converted into warnings, and the technical language must be translated into terms that are understandable to the general public. Currently, the Meteorological Department can't do this because it operates under the Ministry of Defense, which is not the case in most other countries. For some reason, the Water Development Board is also hesitant to change the language of the forecast.

So, I believe that this recent event, which hasn't occurred in 40 or 50 years—neither in Feni, Cumilla, nor in the Noakhali region, and only somewhat in the Sylhet area with less damage—requires the government to form a task force to investigate the cause. One of you asked me whether it's possible to manage the rainwater for this purpose. Of course, it is; that's the long-term solution. But I'm unsure whether the political process in Bangladesh, or whether intellectuals and politicians, will find this acceptable. The first step is to clearly explain the terminology to them in plain Bangla. They don't understand, and they often confuse terms like 'dam' and 'embankment,' and 'barrage' and 'dam,' creating a big mess.

Q:10 Shouldn't the Water Development Board have a monitoring cell to address embankment cracks before the monsoon? Could monthly reports and follow-up actions significantly protect villages?

A: Your suggestion or observation is very accurate; there is no alternative. Every year, when forecasts for floods or tidal surges are issued, I speak with the Secretary of Disaster Management or other officials, emphasizing that monitoring embankments and identifying weak areas at the start of the season could help prevent problems. However, it seems this has not been done. In Bangladesh, each Executive Engineer is responsible for a specific area and provides reports on that area, but these reports are not always effective.

This year, the Water Development Board will face severe criticism soon because the regulator of the Little Feni River has broken, and the embankment of the Muhuri River has also failed. However, they seem so thick-skinned that criticism doesn't faze them.

affecting the tidal system and rising sea levels. The entire Sundarbans is submerged, and coastal areas like Satkhira, Bagerhat, Khulna, and Barguna, including low-lying areas such as Koyra and Shyamnagar, are also under water. Despite the urgency in areas near Dhaka, such as Comilla, and the need for media attention, I am unable to make any changes regarding the floods happening in the southwestern region.

Conclusion of the session:

The moderator then handed over the floor to the special guest, Engr. Moazzem Hossain, President of the Bangladesh Association, UAE, and honorable advisor of BEAWORLD, to deliver his speech.In his speech, Engr. Moazzem Hossain acknowledged the insightful answers provided by Prof. Dr. Nishat and appreciated the questions raised during the session. He expressed deep gratitude for the speaker's valuable experiences and knowledge, stating that the information gained throughout the discussion has become a significant asset for everyone involved.

Engr. Moazzem noted that, instead of focusing solely on political or other issues, there was a clear opportunity to delve into the reports and insights provided by the speaker, which could serve as a foundation for addressing smaller-scale challenges related to the country's rivers.

For instance, he had highlighted the idea of using diversion canals during the rainy season to redirect water from smaller rivers. He also mentions to the example of Kaptai Lake, which was an excellent case study which was thoroughly explained both the benefits and the consequences of the Kaptai Lake project, adding that although such large-scale facilities are rare due to the country's terrain, smaller implementations could be feasible and beneficial.

Engr. Moazzem referred to the areas of Tongi and Ashulia, pointing out that these areas are often flooded, except during the dry season when there are primarily brick kilns and scattered settlements.

The special guest underscored the critical need to document and preserve the speaker's precise observations and reports, emphasizing the significant value of the insights provided. He pointed out that since the initial proposals surfaced around 1972, followed by discussions in 1988 and renewed optimism in 1996, these documents have grown in importance over time. He added that if these documents are not classified as controlled copies, they should be made available to everyone. In his view, these documents would not only serve as a protective asset for the present generation but also provide inspiration and guidance for future generations. Engr. Moazzem also viewed the relationship with the speaker as more than just that of a teacher and students; he considered the speaker a guardian and mentor. He expressed hope that future generations would carry forward the work initiated by the speaker and elevate it to greater heights, ultimately bringing positive outcomes for the country. In conclusion, Engr. Hossain expresses his sincere thanks for the expert’s invaluable contributions today. He looks forward to applying these insights to advance efforts and address challenges effectively.

The moderator then invites Engr. Amzad Hossain khan for his concluding remarks and bringing the end to the session.

In his concluding remarks, Engr. Amzad Hossain Khan extends his heartfelt thanks to the distinguished guest, Professor Dr. Ainun Nishat, for enriching the 33rd session with his invaluable insights. He also expresses gratitude to all participants, particularly the special guest and the moderator of the session. Engr. Khan wishes good health and longevity to all attendees and looks forward to future interactions.

Transcripted by: Engr.Mohammad Nazmul Islam

Report on Webinar topic:

Reverse engineering of components to reduce carbon emission by refurbishing components

Date: July 13, 2024

Speaker:

Engr. Chilamparasan Chinnapandi
Territory Manager, Castolin Eutectic
Middle East FZE

Moderator:
Engr. Dr. Md. Easir Arafat Khan
Associate Professor
Department of Chemical Engineering, BUET

Session Charman:
Engr. Rafiqul Islam Talukder, PEng
Chief of Editor, Synergy
Advisor & Head of BEAWorld Webinar committee
Vice Charman OSB, IEB & Dubai Chapter

Chief Guest:
Engr. Maniruzzaman Sarkar Mohon
Honorable Advisor-BEAWorld,
Manager Operation, DEWA, UAE
Chairman, IEB, Dubai chapter, UAE

Introduction

Bangladeshi Engineers and Architects Worldwide, a knowledge-sharing online platform, has chosen "Reverse Engineering of Components to Reduce Carbon Emission by Refurbishing Components" as the topic for its 31st session. This session is part of the platform's ongoing initiative to raise awareness about climate change, with a specific focus on reducing the carbon footprint of industry-based products. By exploring the role of reverse engineering in refurbishing components, this session aims to highlight innovative strategies for sustainability and emphasize the importance of extending the life of industrial equipment to achieve significant environmental benefits.

In this session, Engr. Chilam from Castolin Eutectic, a global company specializing in wear and tear protection solutions, discussed how refurbishing components can reduce carbon emissions. Around 29 engineers from different parts of the world, including Bangladesh, UAE, KSA, and Qatar, joined the session.

The session was moderated by Engr. Dr. Easir Arafat Khan, who started the meeting at 09:30 BD time with participant introductions and a short bio of the speaker, Engr. Chilam. The presence of Session Chairman Engr. Rafiqul Islam Talukder and Chief Guest Engr. Maniruzzaman Sarkar Mohon made the webinar session more effective and valuable.

Discussion

The webinar focused on the role of reverse engineering in refurbishing components to reduce carbon emissions. Engr. Chilam, an expert in wear and tear protection solutions shared insights and experiences, highlighting the environmental benefits and technical aspects of refurbishing industrial components through reverse engineering.

The key benefits of reverse engineering as follows:

1. **Extended Equipment Lifespan:** Enhancing the durability of equipment to reduce the need for replacements.
2. **Energy Efficiency:** Improving the performance of refurbished components to consume less energy.
3. **Reduced Downtime:** Minimizing unexpected breakdowns to ensure continuous and efficient operations.
4. **Resource Optimization:** Conserving materials by refurbishing existing components instead of manufacturing new ones.
5. **Lower Manufacturing Emissions:** Reducing the carbon footprint associated with the production of new equipment.

In addition to discussing reverse engineering of components, Dr. Chilam introduced Castolin Eutectic's products and state-of-the-art technologies, which are pioneers in reverse engineering. He emphasized their specialized welding, wear protection, and coating services and solutions.

Castolin Eutectic pioneered the invention of the low-temperature brazing process for cast iron, a significant breakthrough in metalworking and repair. This process enables the joining of metals previously considered difficult or impossible to weld or braze. Cast iron body repair being one of their unique specialties, positioning them as unparalleled in industrial solutions.

Castolin also developed a welding electrode solution suitable for all known and unknown materials, as well as dissimilar joints, akin to a "one medicine solution for all diseases." This innovation revolutionized Maintenance and Repair (M&R) services and captured the attention of the industry.

Their HVOF and HVTS coating processes have become popular for enhancing equipment reliability and efficiency, especially in petrochemical and refinery sectors in Africa and the Middle East.

Additionally, Castolin's innovation in introducing "Hydrogen-fueled Gas Welding Technology" to replace conventional oxy-acetylene gas cylinders promotes clean energy in manufacturing processes.

During the session, the Chief Guest advised the implementation of solar power in Castolin Eutectic's business processes to further their commitment to sustainable practices.
After a one-hour lecture, the moderator opened the floor for a 15-minute Q&A session. In Q&A session, some participants asked about facilities and resources availability in Bangladesh to the needs of industry and manufacturing sectors. Session chairman advised to conduct a market survey of Castolin products and services to identify opportunities in Bangladesh and mobilize the resources accordingly.

Following this, the organizer, Engr. Amzad Hossain, Founder Engr. Rezaur Rahman, and Advisor Engr. Maniruzzaman Sarkar Mohon delivered their concluding speeches. The moderator then invited the Session Chairman, Engr. Rafiqul Islam Talukder, for his concluding remarks, bringing the session to an end.

Conclusion

To reduce carbon emissions from industries such as the process industry, petrochemical industry, and power plants, reverse engineering can create a significant positive impact. By refurbishing components, industries can reduce their carbon footprint, thereby mitigating the adverse effects of global warming and climate change. The session concluded with the powerful slogan: "Reverse Engineering for Reversing Climate Change."

References: Youtube links: https://www.youtube.com/watch?v=s7t8ZYm8AoA
Website: https://www.beaworldwide.com/

Organizer Team: Engr. Rezaur Rahman
Engr. Amzad Hossain
Report Prepared by Engr. Nazmul Islam

Sustainability requirement in UAE: Awareness program in the year of sustainability

Engr. Rezaur Rahman and Engr. Al Emran Hossain

Introduction:

The UAE's declaration of 2023 and 2024 as the "Year of Sustainability" highlights its commitment to promoting sustainable practices across various sectors. In line with this vision, a focused initiative has been developed to raise awareness about sustainability principles, extending its reach to audiences in Bangladesh as well. This article explores the key highlights of a recent webinar organized by BEAWorld on May 24, 2024, which developed into sustainable building practices.

The event was led by Engr. Rezaur Rahman, founder of BEA World and a Quality and Pearl-qualified professional, alongside Engr. Md. Al-Emran Hossain, Advisor of BEA World, Editorial Member of Synergy, and President of the Bangladesh Green Building Academy and ASHRAE Bangladesh Chapter. Their combined expertise provided valuable insights into the Pearl Rating System and its comparison with the globally recognized LEED (Leadership in Energy and Environmental Design) standards, emphasizing their applications and benefits, especially in the context of Bangladesh. This article aims to highlight the discussion points from the webinar and shed light on the growing importance of sustainable practices in the built environment.

Building rating system in UAE:

Sustainability refers to the practice of meeting the needs of the present without compromising the ability of future generations to meet their own needs. Estidama, which means "sustainability" in Arabic, is a sustainability initiative launched by the Abu Dhabi Urban Planning Council (UPC) to guide sustainable development in the emirate of Abu Dhabi.

The key component of this initiative is the **Pearl Rating System (PRS) which** is specifically designed for th environmental, social, and cultural context of Abu Dhabi and the Middle East. This is applicable for desig and construction rating.

This is similar to LEED (Leadership in Energy and Environmental Design) developed by US green building council (USGBC) which is applicable for construction rating only. In UAE context LEED is used in Dubai.

While both LEED and the Pearl Rating System aim to promote sustainable building practices, LEED has global reach with a focus on a wide array of sustainability criteria, whereas the Pearl Rating System is regio specific and tailored to address the unique environmental challenges of the Middle East, particularly wat conservation and energy efficiency in hot climates. This makes the Pearl Rating System more suited for projec in the UAE and similar regions.

Pillers of ESTIDAMA:

The **Estidama** initiative, with its **Pearl Rating System**, is based on four main pillars that guide its approach to sustainability. These pillars are designed to promote balanced and sustainable development specifically tailored to the environmental and cultural context of the UAE. The four pillars of Estidama are:

1. Environmental Sustainability
2. Economic sustainability
3. Social Sustainability
4. Cultural Sustainability

Figure 1: The Four Pillars of Estidama

Global perspective of sustainability initiative:

The United Nations 2030 Agenda for Sustainable Development is a global action plan adopted by all UN member states in 2015. It outlines 17 Sustainable Development Goals (SDGs) with 169 associated targets to be achieved by 2030. These goals aim to address the world's most pressing challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice.

The UAE's ambitious journey toward sustainability:

The UAE's sustainability goals are aligned with the UN 2030 Agenda for Sustainable Development Goals (SDGs), but they also have specific initiatives and strategies that are tailored to their national priorities and vision. The UAE actively supports the global SDGs and has incorporated them into its own national agenda, called the UAE Vision 2021 and the recently updated UAE Centennial 2071 plan.

UAE Initiatives Supporting the SDGs:

- **Year of Sustainability**: The UAE has declared 2023 and 2024 as the "Years of Sustainability" to focus on raising awareness and implementing sustainable practices at all levels.
- **Masdar City**: A model for sustainable urban development, Masdar City aims to become one of the world's most sustainable cities, reflecting goals like SDG 11 (Sustainable Cities and Communities).
- **Estidama and the Pearl Rating System**: The UAE has developed region-specific sustainability frameworks like Estidama, which complement the global objectives of the SDGs with a focus on sustainable building and development tailored to the UAE's desert climate.
- **Commitment to Sustainability:** Both the UN SDGs and the UAE's initiatives focus on achieving sustainability in economic, environmental, and social dimensions. The UAE supports all 17 SDGs and has integrated them into its national development strategies.
- **Climate Action and Clean Energy:** Like the UN's focus on combating climate change (SDG 13) and promoting affordable and clean energy (SDG 7), the UAE has committed to initiatives such as reduce carbon emission 40% by 2023 and the UAE Net Zero by 2050 Strategic Initiative and significant investments in renewable energy projects.
- **Inclusive Growth and Well-being:** Both emphasize reducing inequality, improving quality of life, promoting gender equality, and ensuring well-being for all citizens, aligning with goals such as SDG 3 (Good Health and Well-being) and SDG 5 (Gender Equality).

- **Long-term Vision**: The UAE has a broader time horizon with the **UAE Centennial 2071**, which extends beyond the 2030 target of the SDGs, aiming to make the UAE one of the best countries in the world by its centennial year.

Sustainability and conferences of parties (COP):

The Conference of the Parties (COP) is the supreme decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC). The COP is responsible for monitoring and reviewing the implementation of the UNFCCC and its various agreements, including the Kyoto Protocol and the Paris Agreement. The meetings serve as a platform for countries to negotiate and make collective decisions on how to address global climate change. The purpose is to limit the climate change.

COP serves as a pivotal platform for fostering sustainability by addressing climate change, promoting collaboration, and aligning global policies with sustainable development goals. COP meetings play a crucial role in advancing global sustainability efforts, particularly in the context of climate change.

Following is the summary of major milestones COP meetings:

COP meetings	Year	Host Country	Major outcome
COP 01	1995	Berlin,Germany	The first COP took place in Berlin, where countries discussed the implementation of the UN Framework Convention on Climate Change (UNFCCC) and laid the groundwork for future negotiations.
COP 03	1997	Kyoto,Japan	The Kyoto Protocol was adopted, establishing legally binding obligations for developed countries to reduce greenhouse gas emissions.
COP 21	2015	Paris,France	The Paris Agreement, a landmark accord that aims to limit global temperature rise below 2 degrees Celsius above pre-industrial levels and pursue to limit the temperature increase to 1.5 degrees Celsius.
COP 28	2023	Dubai,UAE	Signaling to the beginning to the end of fossil fuel. The Loss and Damage Fund to support vulnerable countries affected by climate change

The progress is too slow across all areas of climate action from reducing greenhouse gas emission to strengthening resilience to a changing climate to getting the financial and technological support to vulnerable nations. Countries responded with a decision on how to accelerate action across all areas by 2030.

Pearl rating system:

The Pearl Rating System has different levels, ranging from 1 to 5 pearls, with higher ratings indicating a greater commitment to sustainability. This system is mandatory for all new buildings and communities in Abu Dhabi and is closely aligned with the emirate's vision for sustainable growth. And LEED has certification levels are Certified, Silver, Gold, and Platinum, indicating increasing levels of sustainability achievement.

The Pearl Rating System's credit structure is designed to promote sustainable development in Abu Dhabi by rewarding projects that go above and beyond the minimum standards in sustainability practices. The system is divided into multiple categories, each of which contains a set of specific credits that projects can earn. The categories are focused on the region's unique environmental, social, and economic needs. Here's a breakdown of the credit categories within the Pearl Rating System:

Credit Levels and Ratings:

- Projects earn credits by meeting specific requirements in each category, and the total number of credits determines the overall rating.
- The ratings range from **1 Pearl to 5 Pearls**, with higher levels indicating a greater commitment to sustainability.
    - **1 Pearl**: Minimum requirements for sustainable design.
    - **2 Pearls and above**: Require additional sustainability measures, with 2 Pearls being the minimum requirement for all government-funded projects in Abu Dhabi.
    - **5 Pearls**: Represents the highest level of sustainability, showcasing exemplary performance in all areas.

Table 1: Pearl Building Rating Levels

Requirement	Pearl Rating Achieved
All mandatory credits	1 Pearl
All mandatory credits + 60 credit points	2 Pearl
All mandatory credits + 85 credit points	3 Pearl
All mandatory credits + 115 credit points	4 Pearl
All mandatory credits + 140 credit points	5 Pearl

Credit Categories:

Table 2: Maximum Credit Points Available for each Section

Credit Section	Maximum Credit Points
IDP - Integrated Development Process	13
NS - Natural Systems	12
LB - Livable Buildings	37*
PW - Precious Water	43*
RE - Resourceful Energy	44
SM - Stewarding Materials	28
IP - Innovating Practice	3
TOTAL	**177***

1. **Integrated Development Process (IDP):**
   - Emphasizes collaboration among all stakeholders from the early design stage to project completion.
   - Encourages a holistic approach to integrating sustainability practices throughout the project.
2. **Natural Systems (NS):**
   - Focuses on protecting and enhancing the natural environment.
   - Credits are awarded for strategies that minimize site disruption, preserve native vegetation, and promote biodiversity.
3. **Livable Buildings (LB):**
   - Aims to improve the quality of indoor and outdoor environments.
   - Credits are granted for enhancing thermal comfort, ensuring good indoor air quality, and creating spaces that promote occupant well-being.
4. **Precious Water (PW):**
   - Targets water conservation as a critical concern in the arid climate of the UAE.
   - Credits are available for reducing potable water use, improving water efficiency, and using water recycling systems.
5. **Resourceful Energy (RE):**
   - Encourages energy efficiency and the use of renewable energy sources.
   - Projects earn credits for reducing energy demand, optimizing energy use, and implementing renewable energy technologies.
6. **Stewarding Materials (SM):**
   - Focuses on the selection and use of sustainable materials in construction.
   - Credits are earned for using recycled, regional, and low-impact materials and minimizing waste generation.

7. **Innovating Practice (IP):**
    - Recognizes innovative approaches to sustainable design and construction that go beyond standard practices.
    - Projects can earn credits by implementing groundbreaking sustainability strategies that lead to measurable environmental benefits.

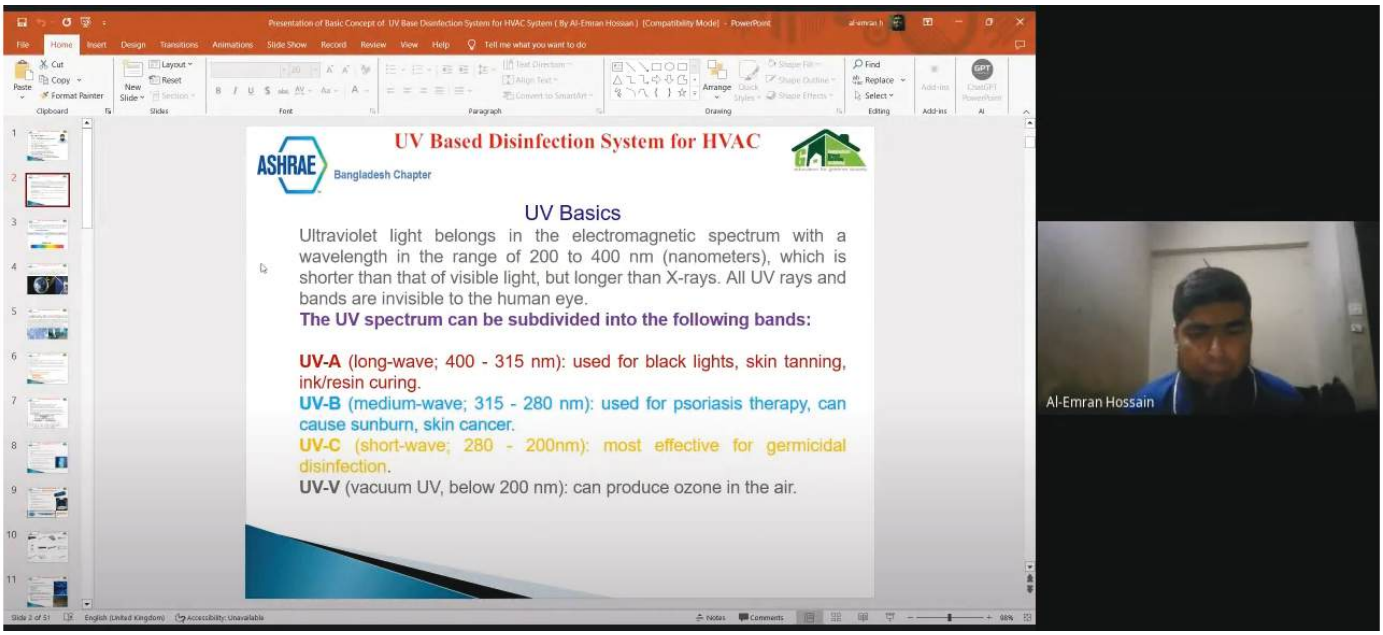
Conclusion:

The UAE's approach to sustainability is comprehensive, forward-looking, and integrated into its national development strategy. It focuses on balancing economic growth with environmental preservation and social well-being. The UAE has taken several proactive steps to position itself as a global leader in sustainability, addressing key issues such as climate change, renewable energy, resource efficiency, and sustainable urban development. The UAE's holistic approach to sustainability demonstrates its commitment to environmental stewardship while ensuring economic growth and societal progress. This strategy not only aligns with the nation's long-term goals but also positions it as a model for sustainable development in the region and beyond.

Knowledge Sharing Session on UV base disinfection for HVAC System

On 11th May 2024 BEAWORLD arranged a session on UV base disinfection for HVAC system where Bangladesh Green Building Academy President Engr Al Emran Hossain presents.

He highlights on different pollutants like Airborne, microorganisms and VOC associated with HVAC systems. This is very important for maintaining indoor air quality of Pharmaceutical and Hospital applications. HEPA filters can manage Airborne and Microorganisms pollutants but for VOC, UV base solution is a must. He mentioned the design aspect in connection with UV light band selection across the Duct.



The session was conducted by Engr. Amjad Hossain Khan while Engr. Rafiqul Islam Talukder, P. Eng chaired as the Chief Guest.

BEAWORLD advisors presented in the meeting are Engr. Moazzem Hossain Engr. Khaja Ahmed, Engr. Liaquat Ali Khan, Engr. Rezaul Karim. Founder and Organizer Engr. Rezaul Karim also presented in the meeting.

Recommendations:

1. Central air conditioning system is preferable over Split AC Highrise building in particular.
2. Hospital and Pharmaceutical must follow UV base disinfection along with HEPA filters.
3. Other than Hospital and Pharmaceuticals, vast majority of people are exposed to Airborne pollutants, biological pollutants and VOC both indoors and outdoors.
4. Centralized Chilled water plants proposed for a particular zone help to save electricity consumption and atmosphere warming out of Split AC. Engr. Moazzem Hossain offers his technical support.
5. OSB, IEB support is requested for OHSA certification required for different projects in Bangladesh.
6. BEAWORLD shall consider this paper for presentation during the next physical workshop.
7. SYNERGY will publish the news in connection with UV base disinfection solution.

Preservation of the Ozone Layer is Crucial for Reducing Global Warming

On September 5, 2024, a letter was published in the "Correspondence" section of the prestigious science journal Nature, where Professor Durwood Zaelke, founder and director of the Institute for Governance and Sustainable Development in Washington, emphasized that the Montreal Protocol should not be considered a "zombie." In Haitian-French folklore, a "zombie" refers to a reanimated corpse brought back to life through magic.

Professor Zaelke's letter was a response to an article published on August 15, 2024, in the same journal by four eminent researchers from Australia, the Netherlands, and Sweden. In their article, the researchers argued that the International Whaling Convention—signed almost eight decades ago—has lost its relevance, and many international agreements, including this one, should be considered "zombies" and terminated. The authors highlighted that approximately 3,000 environmental agreements have been made to date, many of which have fulfilled their objectives, making it pointless to continue spending millions of dollars annually to maintain their secretariats. Specifically, the authors referenced the 1987 Montreal Protocol for the protection of the ozone layer, stating that its objectives have either been achieved or will soon be accomplished. Therefore, they suggested that the remaining tasks of the Protocol be transferred to the United Nations Framework Convention on Climate Change (UNFCCC).

In response, Professor Zaelke argued that the Montreal Protocol remains relevant and must be kept in force. The Protocol has played a crucial role in protecting the ozone layer by banning nearly 100 harmful chemicals. It has prevented millions of skin cancer-related deaths, with estimates suggesting that by enhancing its activities, it could prevent around 2 million deaths per year caused by ultraviolet (UV) radiation. The Protocol also curbs the production of fluorinated gases and prevents the destruction of forests, which act as carbon sinks, by halting damage caused by UV rays. These actions are vital in mitigating the risk of global temperatures rising by 2.5 degrees Celsius within this century.

It is worth noting that there are ongoing discussions to regulate nitrous oxide under the Protocol, which, if implemented, would further contribute to both ozone layer protection and global warming reduction.

For these reasons, the theme for this year's (2024) International Day for the Preservation of the Ozone Layer is: “Montreal Protocol: Advancing Climate Action.” The key message behind this theme is that the Montreal Protocol remains a vital tool in combating both ozone depletion and global warming—two critical environmental crises that pose severe threats to all living organisms. The expansion of the Protocol and its effective implementation in all countries are imperative for the environment and the survival of life on Earth.

According to the United Nations, since 1995, International Ozone Layer Protection Day has been observed annually on September 16. Prior to this, scientists began to contemplate the ozone layer's significance in the 1930s. In 1930, British mathematician and geophysicist Sydney Chapman first proposed a theory concerning the ozone layer surrounding the Earth, known as the Chapman Mechanism. Later, in 1974, Professor Frank Sherwood Rowland and Dr. Mario J. Molina of the University of California identified long-lived halocarbon compounds like chlorofluorocarbons (CFCs) as primary culprits in ozone depletion (the Rowland-Molina Hypothesis), sparking intense discussions on the potential consequences of ozone layer degradation. In 1977, the global community crafted an action plan to prevent ozone depletion at a conference in Washington, D.C.

In 1985, three British scientists—Joseph Charles Farman, B.G. Gardiner, and J.D. Shanklin— published groundbreaking research in Nature on the ozone hole over Antarctica, igniting widespread concern. The destruction of the ozone layer threatened the existence of life itself, prompting urgent international efforts. These efforts culminated in the Vienna Convention (1985, effective in 1988) and the Montreal Protocol (September 16, 1987, effective in 1989). Additional amendments such as the London Amendment (1991, effective in 1992), the Beijing Amendment (1999, effective in 2002), and the Kigali Amendment (2016, effective in 2019) have significantly reduced the production of ozone-depleting substances (ODS). However, the need for the Montreal Protocol has not yet diminished.

The ozone layer, located approximately 10–15 km above the Earth's surface in the troposphere and extending up to about 50 km in the stratosphere, is essential for the survival of all life forms. A normal ozone layer, typically around 300 DU (Dobson Units) or 3 mm thick, prevents harmful ultraviolet radiation—particularly UV-C (100–280 nm wavelength) and UV-B (280–315 nm wavelength)—from reaching the Earth's surface. This protects humans, marine life, vegetation, and crops. When the ozone layer in a particular area is reduced to less than 100 DU, scientists declare the formation of an ozone hole, allowing harmful UV rays to penetrate and harm living organisms.

Chlorine and bromine-containing gases, such as CFCs, halons, methyl chloride, and HCFCs, are major causes of ozone depletion. These chemicals were once widely used in refrigerators, air conditioners, aerosols, foams, fire extinguishers, inhalers, and dry cleaning. Research has shown that a single chlorine atom can destroy over 100,000 ozone molecules, and bromine is 45 times more harmful to the ozone layer than chlorine.

In addition to these chemical gases, recent studies have identified wildfires, artificial satellites (CubeSats or nanosatellites), and volcanic eruptions as contributors to ozone depletion. It is noteworthy that global warming—primarily driven by human activities—is largely responsible for wildfires, and humans also create artificial satellites. Therefore, by regulating human activities, many environmental problems, including ozone depletion, can be satisfactorily resolved. Experts believe that expanding and implementing the Montreal Protocol will not only protect the ozone layer but also contribute to solving the global warming problem.

According to data provided on the International Ozone Secretariat’s website, statistics on the use of ozone-depleting substances in Bangladesh are available up to 2022, whereas developed countries have records up to 2023. As of December 31, 2022, Bangladesh has received a total of USD 14,217,528 for activities related to ozone layer protection. The detailed descriptions of these activities should be available on the "Ozone Cell" page linked with the Department of Environment. To enhance monitoring of ozone-depleting substances, it is necessary to appoint an adequate number of personnel in the Department of Environment.

Courtesy: Engr. Mohammad Sorforaz Hossain Khan, Translated by: Engr. Shawkat Ali Khan

STUDENT's LEADERSHIP BUILDING FORUM

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In 1987, the United Nations Brundtland Commission defined sustainability as, '*the ability to maintain or support a process over time, while also meeting the needs of the present without compromising the ability of future generations to meet their own needs*'.

Q.1 How does Energy and Water Efficiency contribute to Sustainability?
Energy Efficiency is Using less energy for the same output conserves natural resources like coal, oil, and gas and Water Efficiency is Water-saving technologies reduce demand on freshwater sources, preserving this essential resource. Few efficient and cost-effective ways to reduce energy and water use without changing user behaviors or practices is to use energy and water efficient products. Conserving water reduces the energy needed to treat, transport, and heat water, which can lead to lower greenhouse gas emissions. These emissions can harm water supplies by increasing pollution, which can make water unsafe to drink or use for agriculture.

Q.2 Explain the 3R principles and how can we apply 3R's in our daily practices?
The 3Rs stand for Reduce, Reuse, and Recycle. These three small words are pivotal to managing waste and helping to combat climate change. Reduce means to make smaller/less in amount, Reuse means to use something again, either for its original purpose or repurposed for a different task and Recycle means to collect and treat discarded materials to produce reusable materials. Some ways in which we can use them in our daily lives are" Buying products with less packaging, avoiding single-use plastics, reusing plastic water bottles as watering cans, using reusable food storage containers, Bringing reusable shopping bags to the store. UAE has already implemented several initiatives to promote the 3Rs, such as the National Agenda for Waste Reduction and the Dubai Municipality's Zero Waste project. Bangladesh has also embraced the 3Rs approach to waste management through various initiatives and programs aimed at minimizing waste and promoting sustainable practices. Bangladesh has a robust recycling sector. Scrap collectors, known as "tokai," collect recyclable materials, which are then processed and reused in various industries.

Q.3 How can we minimize fossil fuel consumption?
Fossil fuels are non-renewable energy sources that come from the remains of plants and animals that lived millions of years ago. They are formed when these organisms die and are buried under layers of rock, where they decompose over time into carbon-rich deposits. Canada rely on fossil fuels to heat their homes and not just in Canada, all over the world, people are using fossil fuel and soon enough we will run out of it. Since it is a very important recourse, we have to find a way to reduce our use of it. One main way we can replace it is by using electrical appliances. Like by replacing your gas water heater with a heat pump water heater or trade your gas stove for an induction stove or replace your gas fireplace with an electric one.

Q.4 Cite best examples of Sustainability practices.
Environmental sustainability practices incorporate wise resource use as a core principle of daily activities to reduce emissions, prevent pollution and waste, and reduce energy use. Few good examples of sustainability are solar energy, (Harnessing the solar energy to reduce pollution in the environment) and Crop Rotation, (Planting different types of crops on the same land on a rotational basis for improving soil fertility).

Q.5 How can we address our community interest while taking economic projects?
Addressing community interests while undertaking economic projects for sustainability involves integrating social, economic and environmental considerations into the project planning and implementation process. There are many ways in which we can address our community goals and interest through economic projects. For example, I want to make a school or a park for my community. I would have to address to my community how it would benefit them and our economy. Community Representation, (Include local leaders and representatives in decision-making bodies to ensure the community's voice is heard), Regular Updates(Provide the community with regular updates on project progress, objectives, and potential impacts through newsletters, public meetings, and online platforms.), Education Programs, (Offer educational programs to inform the community about the benefits of sustainability and how the project contributes to long-term environmental and economic health.)

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Q.1 How does Energy and Water Efficiency contribute to Sustainability?
Energy and water efficiency contribute to sustainability by effectively exploiting 2 of the most essential resources in such a way that they are not deprived from upcoming generations.

Efficient use of energy involves the use of alternate energy forms such as solar energy and wind energy which helps the natural, nonrenewable sources of energy from being depleted. This also reduces the amount of greenhouse gas emissions, and lowers the environmental impact.

Effective water use minimizes the waste of fresh water, and helps in its preservation. As a result, less energy and effort would be needed for water treatment.

Q.2 Explain the 3R principles and how can we apply 3R's in our daily practices?
Sustainability is all about utilizing and conserving resources in such a way that the future generations are not compromised. This type of development can be achieved by the 3 R principles which include reducing, reusing, and recycling.

Reducing is the act of minimizing the amount of waste, which can be achieved through moderation or by resorting to eco-friendly alternatives. For instance, digitally storing and sharing information significantly reduces the need for paper.

Reusing involves the use of a resource for multiple purposes rather than disposing it after a single use. Every day, we use water for baths, sinks, and other kitchen appliances. This water is relatively clean, and can be reused for other purposes such as cleaning floors, flushing toilets, and even watering plants.

Recycling is the process of converting waste materials into a useable form. For example, seeds of fruits and vegetables can be recycled by planting them instead of disposing them off.

Q.3 How can we minimize fossil fuel consumption?

Fossil fuels are nonrenewable, and burning them is detrimental to the environment. Due to their limited supply, we must consider renewable energy sources such as solar power and wind power. In our day-to- day lives, we can minimize the harmful effects of burning fossil fuels by opting for bicycles and electric scooters rather than cars, going for public transport when possible, and carpooling, which involves travelling in a single vehicle. All these can help reduce the amount of carbon emitted to the environment.

Q.4 How can we address our community interest while taking economic projects?

To address community interests while undertaking economic projects, it's important to introduce sustainable practices that benefit both the environment and the local population. Some ways to achieve this is by implementing waste reduction strategies and developing efficient energy and water management systems to minimize resource consumption. Establishing proper water treatment facilities to filter and transform used water into reusable forms, ensuring water conservation and quality.

Promoting cycling by creating dedicated tracks, which will encourage the use of bikes and reduce CO2 emissions. Additionally, incorporating parks and green spaces can enhance the community's quality of life by providing recreational areas and improving air quality.

Q.5 Cite best examples of Sustainability practices.

Sustainability deals with efficient use of resources, low carbon emissions, and preservation of nonrenewable resources. One of the best examples of such practices involves the transition to solar energy, which is a renewable, eco-friendly form of energy. This reduces the dependence on fossil fuels. Investing in buildings that have proper, efficient energy and water systems can contribute greatly towards sustainability. Additionally, the widespread use of electric cars is important since such vehicles run on clean, renewable energy. These are some of the examples of sustainability practices that must be adopted in order to achieve zero carbon emissions.

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Q.1 How does Energy and Water Efficiency contribute to Sustainability?

Efficient use of energy and water allows us to conserve resources and reduce the depletion of them, ensuring they are available for future generations. Water efficiency reduces the strain on freshwater ecosystems and minimizes pollution from wastewater. Efficient energy and water use can also lead to significant cost savings for households, businesses, and governments. These savings can be reinvested in other essential services.

Q.2 Explain the 3R principles and how can we apply 3R's in our daily practices?

The principles of the 3 R's -Reduce, Reuse, and Recycle- are foundational to waste management and sustainability. They aim to minimize waste, conserve resources, and reduce environmental impact.

To apply Reduce to our lives, we can:

- Choose durable, long-lasting goods over disposable ones (for example: stainless steel water bottles instead of plastic)
- Save energy by turning off lights and appliances when not in use
- Plan meals and make shopping lists to avoid food waste

To apply Reuse to our lives, we can:
- Use reusable bags, bottles, and containers
- Repair broken items instead of replacing them
- Use both sides of paper before recycling it

To apply Recycle to our lives, we can:
- Participate in electronic waste recycling programs for old gadgets
- Sort recyclables from trash (paper, plastics, glass, and metals)
-Buy products made from recycled materials

Q.3 How can we minimize fossil fuel consumption?
When reading this question, it would make sense to completely eliminate fossil fuel consumption. However, minimizing it is better since it can result in job loss and developing countries that rely on fossil fuels may suffer from the sudden switch from fossil fuels to electrical.

We can minimize fossil fuel consumption by transitioning into renewable energy like solar, wind, hydro, and geothermal energy. We can upgrade the building efficiency by improving insulation, windows, and heating/cooling systems in buildings, and adopt energy-efficient lighting and appliances. We can introduce carbon taxes and set strict emissions standards for vehicles, power plants, and industries to reduce fossil fuel use and pollution. We can encourage the use of electric and hybrid vehicles, we can encourage practices like turning off lights and appliances when not in use, and reducing water heating temperatures, and we can encourage industries to adopt sustainable manufacturing practices, including the use of renewable energy and recycling. encourage companies to design products with longer lifespans and easier repairability. We can educate the public about the benefits of reducing fossil fuel consumption and how they can contribute.

Q.4 How can we address our community interest while taking economic projects?
Actively involve community members in the planning and decision-making process, hold public meetings, surveys, and forums to gather input and feedback. Keep the community informed about the goals, progress, and potential impacts of economic projects. Conduct thorough environmental, social, and economic impact assessments to understand the potential effects on the community, use these assessments to guide project planning and adjustments. Design projects to provide direct benefits to the community, such as job creation, improved infrastructure, or enhanced services, ensure that economic projects are sustainable and environmentally friendly, minimizing negative impacts and contributing positively to the community. Partner with local organizations, businesses, and leaders to align the project with community needs and priorities. Focus on the long-term benefits and sustainability of the project, considering how it will affect future generations in the community.

Q.5 Cite best examples of Sustainability practices.
Tesla Gigafactory, USA, a lithium-ion battery and electric vehicle subassembly factory in Nevada powered by renewable energy sources, aiming to achieve net-zero energy. The factory supports the production of electric vehicles, promoting clean energy adoption.
Masdar City, Abu Dhabi, UAE, a planned city project in Abu Dhabi focusing on sustainability designed to be carbon-neutral and zero-waste, it utilizes renewable energy sources, sustainable building materials, and innovative waste management systems.

Toyota, Japan, a leading automotive manufacturer pioneered hybrid technology with the Prius and aims for zero CO2 emissions from its vehicles and operations by 2050. Invests in hydrogen fuel cell technology and promotes recycling and sustainable manufacturing processes.

Sariyah Bint Shamiul
Rosary Private School
Located in Muweilah, Sharjah

Q.1 How does Energy and Water Efficiency contribute to Sustainability?

Energy efficiency: We use energy carelessly without realizing the harm that it causes to the environment. For example:

Global warming: Using energy contributes to global warming. This is due to the process of burning fossil fuels to get energy. When the fossil fuels are burning, they release a gas called carbon dioxide. CO2 is one of the most harmful greenhouse gases. As we already know, greenhouse gases are a layer which covers the Earth's atmosphere. It allows sunlight to pass through it, while trapping the heat that comes from the sunlight. Overtime, the atmosphere is getting hotter and hotter, due to greenhouse gases.

Supply and demand: Many people use energy without realizing that it isn't unlimited. You see; to get energy, we need to burn fossil fuels. One of the main fossil fuels are coal. This coal takes millions of years to produce, and yet, we use it as if they only take a few days to produce. We need to realize that fossil fuels are limited, therefore, we cannot be using energy carelessly.

Destruction of the environment: Fossil fuels are obtained through mining and digging. This destroys the natural environment around us. It also causes water pollution. The harmful chemicals extracted while digging can dissolve into streams, which harms aquatic life.

So, what can we do to prevent all of this from happening?

We can use energy efficiently. Energy efficiency means using less energy to do a task that would have the same result if you had used more energy. By reducing our use of energy, we can prevent all these problems from happening. One way or another, using energy carelessly will affect our planet Earth. People don't use energy efficiently because they think it won't make much of an impact on the world. But, day by day, we are slowly realizing, that the Earth is getting hotter and hotter, and we are not doing anything to stop it. So, try your best to use your energy wisely in order to save our planet!

Water efficiency: Water efficiency means using water in a responsible manner and making sure it doesn't go to waste. One way to do this is by using the same water used to wash vegetables to water the plants. Many people don't realize that water is a limited resource. Out of all the water in the world, only 3% of it is freshwater. The rest is salt water. So, we need to be wise about our usage of water. The lesser amount of water that we use, the more water available in the rivers, lakes, etc. That water can also be used by wildlife to survive.

Q.2 Explain the 3R principles and how can we apply 3R's in our daily practices?

Reduce: This means we strive to produce less waste. This leads to us reducing the number of unnecessary products we buy. We can also reduce the amount of packaging we use. Although it may seem unnecessary, it is extremely important! Reducing the amount of waste you produce is the first option you should take in order to promote sustainability. If you are unable to do that, the next option is to reuse.

Reuse: If you are unable to reduce the waste you produce, the next option is to reuse the waste. This means finding ways to utilize items that you would have thrown away. This is a highly effective way to decrease the amount of waste you produce. You could do this at home by using old clothes as rags or towels, carrying around reusable shopping bags, using magazines as wrapping paper, etc.

Recycle: If you are unable to reduce your waste or reuse it, your last resort is to recycle it. This is the process of converting scrap/waste materials into new products that can be used. You could do this by turning an old metal can into a pot for plants, turning cardboard scraps into a house for your children, etc.

Q.3 How can we minimize fossil fuel consumption?

- **Using renewable energy**. Wind turbines and solar panels are a fantastic way to reduce fossil fuels. They are also becoming more affordable!
- **Transportation.** Instead of driving cars, there are many more environmentally friendly options. Some of them include walking, biking, using public transport, etc. You could even consider using electrical vehicles, although they are not the most budget friendly option.
- **Air dry your clothes.** Instead of using a dryer, use a clothing rack to air dry your clothes.
- **Use natural light.** During the daytime, keep the curtains and/or blinds open to avoid wasting energy.
- **Spread the word.** Make your friends, family, and colleagues aware of the dangers of fossil fuels and how important it is to switch to renewable energy sources.

Q.4 How can we address our community interest while taking economic projects?

An economic project is a big plan to help make something better for everyone. Addressing community interests means understanding the wants and needs of the community. When you are planning a project for the whole community, you need to understand what your community requires and needs. This way, you can include as many people's wishes as possible in the project. By involving your community in the decision-making process, you can create something that the entire community can appreciate and enjoy.

Q.5 Cite best examples of Sustainability practices.

There are many different sustainable practices. Here are some of the best and most effective ones:

- **Using more wind power.** It is an effective alternative which doesn't produce greenhouse gases or burn fossil fuels.
- **Conserving energy.** Turn off the lights when you leave the room, unplug appliances which are not currently in use, air dry your clothes, etc.
- **Shopping with reusable bags.** Instead of using plastic bags, which are extremely harmful to the environment because of the long time it takes to decompose, try using bags which are made from sturdy materials like cloth.
- **Conserving water.** Turn off the water tap when you're not using it, take shorter showers, water your fruits and vegetables in a bowl instead of washing them individually under running tap water, etc.
- **Growing your own food.** This reduces your carbon footprint, reduces the use of chemical fertilizers, increases biodiversity, provides you fresh and healthy food, etc.

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How does Energy Efficiency contribute to Sustainability?

SYNERGY BETWEEN ENERGY AND WATER EFFICIENCY AS PILLARS OF SUSTAINABILITY

In the face of an increasingly deteriorating environment, the push for sustainability has gained more urgency than ever before. There are many strategies that can be employed to secure a sustainable future but among them, energy and water efficiency are the most significant. Fostering global environmental and economic objectives necessitates intertwining these two components. This article discusses the significance of improving energy and water efficiency in achieving sustainability and why it is important to adopt them in shaping a resilient future.

- **What does Energy Efficiency Mean?**

Energy used in doing work can be saved by using less of it for performing tasks or producing same results. This can be achieved through various means such as embracing modern technologies, improving infrastructure and modifying behavioural practices. The possibilities for energy-efficient solutions are limitless including LED lighting, high efficiency appliances, smart grids and renewable sources of energy.

We lower greenhouse gas emissions by consuming less energy which is essential for climate change mitigation efforts. The lesser amount of carbon dioxide and other harmful pollutants emitted into air depends on how much fewer fossil fuels we burn due to reduced consumption of energy.

- **The Role of Water Efficiency**

Water efficiency involves using less water to accomplish the same tasks or achieve the same outcomes. This can be achieved through improved technology, better management practices, and more sustainable consumption habits. Examples include low-flow fixtures, water-efficient irrigation systems, and advanced water recycling and reuse technologies.

Water is a finite resource, and its scarcity poses a significant challenge, particularly in arid regions and areas facing drought conditions. Efficient water use helps to conserve this precious resource, reduces the energy required for water treatment and distribution, and minimizes the environmental impact associated with water extraction.

- **Energy and Water Efficiency at the Interchange**

Linking energy and water use together is one of the vital factors to examine because while generating and transmitting power, a lot of water must be used and similarly, when treating water there is always a need for considerable amounts of energy by different methods such as conventional power plants that consume cooling water or treatment facilities which consume electricity in purifying drinking supplies. As a result, improvements in productivity in either field have cumulative advantage yielding substantial environmental and economic rewards.

- Saving Energy and Water Simultaneously: Many times, embracing energy efficient technologies leads to reduction in consumption of water. For example, efficient cooling.

- Mitigating Climate Impact: By addressing both energy and water efficiency, we tackle two major contributors to environmental degradation. Reduced energy consumption translates to lower greenhouse gas emissions, while efficient water use lessens the strain on water sources and ecosystems.

Conclusion

Energy and water efficiency are not isolated concepts but integral components of a sustainable future. By focusing on these areas, we not only reduce environmental impact and economic costs but also enhance the resilience of our societies. The synergy between energy and water efficiency underscores the importance of a holistic approach to sustainability, one that recognizes the interconnectedness of our resource systems and the need for comprehensive solutions.

Explain 3R principles and how can we apply 3R in our daily practices.

Embracing the 3R Principles: A Guide to Reducing, Reusing, and Recycling in Daily Life

The situation when our environment is at danger and we do not have infinite resources so it is high time we started using sustainable practices. The applicable framework that promotes environmental stewardship is exemplified by the 3R principle represented by Reduce, Reuse and Recycle. They provide a simple way of minimizing waste as well as conserving resources.

- **Reduce: Cutting Down on Waste**

The principle: To begin with, reducing the amount of waste generated forms step one in the 3R hierarchy. This means that you should be mindful about your consumption and strive to avoid wasting even before it happens. Through reduction, the demand for resource materials, energy costs and spaces for dumping sites decreases thus reducing on our impact towards mother-nature.

Practical Applications:

1. Mindful Consumption: Before making a purchase, consider if the item is truly necessary. Opt for quality over quantity to ensure longevity and reduce the frequency of replacements.
2. Energy Efficiency: Use energy-efficient appliances, light bulbs, and practice habits such as turning off lights and unplugging devices when not in use. This reduces energy consumption and lessens the strain on power plants.
3. Water Conservation: Adopt water-saving practices like fixing leaks, taking shorter showers, and using water-efficient fixtures. Reducing water use decreases the energy needed for water treatment and distribution.

- **Rethink: Squaring Away the Life of Products**

The principle: The second principle, reuse, is based on the idea of finding new uses for things instead of throwing them away. Reuse is about extending the lifespan of different products thereby minimizing need for new resource and making less environmental pollution that would otherwise happen if you manufacture or dispose it.

Practical Applications:

1. **Repurpose and Upcycle:** Get creative with stuff you want to throw away. For example, you can use old jars as storage containers; torn clothes may be transformed into cleaning rags whereas wooden pallets can be turned into furniture.
2. **Second-Hand Shopping:** Purchase second-hand items such as clothing; electronics or even furniture. Usually, these stores charge less than their actual worth price which decreases demand for new products.

- **Recycle: Proper Disposal of Waste**

The principle: The final component of the 3R hierarchy is recycling—the process of converting waste materials into new products. Recycling helps divert waste from landfills, conserves natural resources, and reduces pollution by decreasing the need for raw materials and energy consumption.

Practical Applications

1. **Know what to recycle:** It is essential to be aware of the guidelines for recycling in the area in which one lives because they may differ. You can recycle paper, cardboard, glass and plastic as per the recycling process given by your local government.
2. **Proper Sorting:** The recyclables should be clean and without contaminants. Thus, food containers must be rinsed before being thrown into recycling bins, to avoid pollution.

- **Daily life built on 3R principles**

1. Incorporating 3R principles into daily life requires a change of minds and dedication towards sustainable development. More strategies which can help you do this include:
2. Educate and Inspire: Inform your family and friends about the 3R principles. You will have more impact if other people too adopt these behaviors.
3. Set goals: Make personal or family targets for reducing waste and reuse items wisely as well as recycling efficiently. You need to monitor your progress and celebrate important milestones so as to remain motivated.

Conclusion

The 3R principles— Reduce, Reuse, and Recycle—offer a practical and impactful approach to environmental conservation. By focusing on reducing waste, finding new uses for items, and recycling materials, we can collectively contribute to a healthier plane

How can we minimize fossil fuel consumption?
Minimizing Fossil Fuel Consumption: A Path Toward a Sustainable Future

As we now know, climate change is a grave issue facing the whole global community. It has thus become necessary to minimize the consumption of fossil fuel which was primarily responsible for greenhouse gas emissions that made temperatures to go up eventually leading to physical and biological harm. This is a question of not only environmental necessity but also an economic and social obligation to shift from our current energy sources. Here are some effective ways to curb the dependency on these fossil fuels:

- **Adopt Renewable Energy Sources**

In order to lessen the amount of fossil fuels that we consume, it is of utmost importance for us to make a transition into using renewable sources of power. Solar, wind, hydroelectric and geothermal energy have always been clean substitutes that can be used as an alternative in supplying electricity to residences, companies as well as other transportation systems

1. **Solar Power:** Solar panels can be installed on residential and commercial buildings to harness energy from the sun. Innovations in solar technology, such as more efficient panels and solar batteries, continue to improve feasibility and cost-effectiveness.
2. **Wind Power:** Wind turbines convert wind energy into electricity. Both onshore and offshore wind farms are expanding rapidly, contributing to a significant share of clean energy.
3. **Hydro Power:** Hydroelectric plants use flowing water to generate electricity. While large-scale dams have environmental impacts, smaller-scale hydro projects and run-of-river systems are more sustainable options.

4. **Geothermal Energy:** Utilizing the Earth's internal heat, geothermal systems can provide consistent and reliable power with minimal environmental impact.

- **Encourage Behavioral Changes**

Individual and collective actions play a crucial role in reducing fossil fuel consumption.
Conservation: Simple actions, such as reducing energy use, minimizing travel, and opting for energy-efficient appliances, can collectively make a significant impact.

Education and Advocacy: Raising awareness about the benefits of reducing fossil fuel consumption and advocating for policies that support clean energy can drive systemic change.
Electrification of various sectors can reduce reliance on fossil fuels, especially when the electricity comes from renewable sources.

Heating and Cooling: Heat pumps, which use electricity to move heat rather than generating it through combustion, can efficiently provide heating and cooling for homes and businesses.

Conclusion

Minimizing fossil fuel consumption is not a single-step process but a multifaceted approach involving technology, policy, and behavior changes. By adopting renewable energy sources, enhancing energy efficiency, promoting electrification, supporting sustainable practices, encouraging behavioral changes, and advocating for strong policies, we can make meaningful progress toward a more sustainable future

How can we address our community interest while taking economic projects?
Balancing Community Interests with Economic Projects: A Pathway to Inclusive Growth

In order for people to have better quality of life, be employed, and be involved in advancement, there has to be something going on in terms of finances. Be that as it may, community interests need to be taken into consideration when planning and executing projects on economics so as not to make them exclusive as well as non-sustainable. This task could require a careful balance which adopts what locals want alongside the urge for economic development. To reach this middle ground between entrepreneurs and locals, consider the following:

- **Engage in Inclusive Planning**

The first step in aligning economic projects with community interests is inclusive planning. This involves engaging various stakeholders from the outset to understand their perspectives, needs, and concerns.

1. **Community Consultations:** Organize public meetings, surveys, and workshops to gather input from local residents. This helps identify their priorities and potential impacts of the project.
2. **Stakeholder Analysis:** Identify and interface with all concerned parties like local enterprises, non-profit institutions and government bodies in order to have a full comprehension of what the community desires.

- **Conduct Thorough Impact Assessments**

Economic projects can have far-reaching effects on communities, both positive and negative. Conducting thorough impact assessments helps identify these effects and develop strategies to mitigate any adverse outcomes.

1. **Social Impact Assessments:** Evaluate how the project will affect the community's social fabric, including potential displacement, changes in social dynamics, and impacts on local services.
2. **Environmental Impact Assessments:** Assess how the project will impact the local environment, including natural resources, wildlife, and air and water quality.

- **Ensure Economic Benefits are Shared**

Economic projects should be designed to provide tangible benefits to the local community. This can be achieved through various strategies that ensure the economic gains are widely distributed.

1. **Local Hiring:** Prioritize hiring local workers and contractors to boost employment and support local businesses.
2. **Training and Development:** Offer training programs to equip local residents with the skills needed for new job opportunities created by the project.

- **Evaluate Long-Term Outcomes**

Finally, assess the long-term outcomes of economic projects to ensure they continue to meet community needs and interests over time.

1. **Post-Implementation Reviews:** Conduct evaluations after the project is completed to assess its impact on the community and identify areas for improvement.
2. **Long-Term Planning:** Develop strategies for ongoing support and adaptation to address evolving community needs and ensure sustained benefits.

Conclusion

When working on economic projects that serve community interests, there has to be a concerted approach balanced with inclusive planning, impact assessments as well as sustainable practices. Developers and planners can come up with economically driven projects by working with relevant stakeholders, ensuring fairness in the distribution of the benefits, enhancing transparency as well as promoting community engagement. These kinds of approaches not only minimize any potential conflicts but also create a platform for lasting beneficial ties between the communities served by these programs and their respective economic development initiatives.

Cite best examples of Sustainability practices.

Leading the Way: Exemplary Sustainability Practices from Around the World

In an era where environmental concerns are at the forefront of global issues, sustainability has become a critical focus for governments, businesses, and communities. Numerous organizations and initiatives around the world are setting high standards with innovative and effective sustainability practices. Here are some of the best examples of sustainability in action, showcasing how diverse strategies can lead to significant environmental and social benefits.

- **Masdar City, United Arab Emirates**

Masdar City in Abu Dhabi is a planned urban development designed to be a model of sustainability:

1. **Zero Carbon Emissions:** The city is designed to have zero carbon emissions, relying on renewable energy sources such as solar power.
2. **Sustainable Transportation:** Masdar City features electric and autonomous vehicles to reduce reliance on fossil fuels and minimize pollution.
3. **Energy Efficiency:** The city incorporates advanced building designs, including passive cooling and energy-efficient systems, to reduce energy consumption.

- **Google's Renewable Energy Investments**

Google has made significant strides in integrating sustainability into its operations:

1. **Renewable Energy:** The company has been purchasing 100% renewable energy for its data centers and offices since 2017. It continues to invest in renewable energy projects globally.
2. **Sustainable Design:** Google's campuses feature green building designs, including energy-efficient lighting, climate control systems, and sustainable materials.

4. **Carbon Offsetting:** Google offsets its carbon emissions through various projects and initiatives, aiming to reduce its overall carbon footprint.

- **The Green School, Bali, Indonesia**

The Green School in Bali is a prime example of integrating sustainability into education:

1. **Eco-Friendly Campus:** Features bamboo buildings, natural ventilation, and renewable energy sources.
2. **Curriculum Integration:** Incorporates sustainability education into its curriculum, emphasizing environmental stewardship.
3. **Community Involvement:** Engages students and local communities in sustainability projects and practices.

- **Toyota's Hybrid and Hydrogen Vehicles**

Toyota has been a pioneer in sustainable automotive technology:

1. **Hybrid Technology:** The Toyota Prius was one of the first mass-produced hybrid vehicles, improving fuel efficiency and reducing emissions.
2. **Hydrogen Fuel Cells:** The Toyota Mirai is a hydrogen fuel cell vehicle that emits only water vapor, contributing to cleaner transportation solutions.

Conclusion:

Diverse and novel methods are being employed to advocate for environmental care and optimal use of available resources, as demonstrated by these sustainability practices. Such practices, which include renewable energy initiatives, sustainable town planning, eco-aware consumer products and some educational schemes, present useful lessons on how to attain sustainability in the future. Organizations and communities can play their part in ensuring that our planet is healthier through such best practices, while making the world a fairer place.

Abdullah Tahsin
BSC of Mechanical Engineering
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Q1. How does Energy and Water Efficiency contribute to Sustainability ?

The use of sustainable energies makes it possible to diversify energy sources and take advantage of natural resources and phenomena to produce other types of energy. Water is at the core of sustainabl development and is critical for socio-economic development, healthy ecosystems and for human survival itself. It is vital for reducing the global burden of disease and improving the health, welfare and productivity of populations.

Q2. Explain 3R principles and how can we apply 3R in our daily practices.

3R stands for Reduce, Reuse and Recycle, is a conservative process meant to reduce waste and take sustainable measures.

1. **Minimize Consumption:** Buy only what you need, avoiding unnecessary purchases. This helps reduce waste and saves money.
2. **Opt for Minimal Packaging:** Choose products with minimal or no packaging. Bulk purchasing can also help reduce packaging waste.
3. **Conserve Energy and Water:** Turn off lights, unplug electronics when not in use, and take shorter showers. Use energy-efficient appliances and fixtures.
4. **Repurpose Items:** Find new uses for old items. For example, use glass jars for storage, old t-shirts as cleaning rags, and boxes for organizing.

5. Buy Second-Hand: Purchase used clothing, furniture, and electronics. This extends the life of products and reduces demand for new ones.

Q3. How can we minimize fossil fuel consumption?

1. **Transition to Renewable Energy:** Solar and Wind Power: Install solar panels or wind turbines where feasible to generate electricity from renewable sources.
2. **Green Energy Providers:** Choose electricity providers that offer renewable energy options.
3. **Upgrade to Energy-Efficient Appliances:** Use appliances and electronics with high energy efficiency ratings (like ENERGY STAR-certified products).
4. **Improve Home Insulation:** Insulate walls, roofs, and windows to reduce heating and cooling needs.
5. **Electric and Hybrid Vehicles:** Consider purchasing electric or hybrid vehicles that use less or no gasoline.
6. **Public Transportation:** Use buses, trains, or other forms of public transport instead of personal vehicles.
7. **Carpooling and Ride-Sharing:** Share rides with others to reduce the number of vehicles on the road.
8. **Biking and Walking:** For short trips, choose biking or walking instead of driving

Q4. How can we address our community interest while taking economic projects ?

1. Community Engagement and Participation
2. Transparency and Communication
3. Impact Assessment and Mitigation.

Q5. Cite best examples of Sustainability practices.

1. Iceland's Geothermal and Hydroelectric Energy
2. Costa Rica's Renewable Energy Commitment
3. Sweden's Recycling and Waste Management
4. The Netherlands' Vertical Farming

Najib Mahfuz
The Westminster School Dubai

Hi this is Najib Mahfuz, I am studying at The Westminster School Dubai. Here are the answers to the Sustainability related Questions for Synergy Magazine volume-II

Q1. How does Energy and Water Efficiency contribute to Sustainability ?

Being more energy efficient reduces greenhouse gas emissions and slows down climate change. Water efficiency is equally important as it helps save the vital resource for future generations.

Q2. Explain 3R principles and how can we apply 3R in our daily practices.

The 3R principle is an important concept in environmental sustainability. It stands for Reduce, Reuse, and Recycle. Reducing means to use less in the first place, which in turn reduces the wastage of resources. Reuse means to repurpose items instead of getting rid of them, this reduces pollution as they would have been thrown in a landfill or burned. Recycling means processing old items and extracting their materials, then making new products using them. This saves energy as it reduces the need for raw materials.

Q3. How can we minimize fossil fuel consumption?

Minimizing fossil fuel consumption is very important and there are many ways we can achieve this. The most important one to me is switching off appliances when not in use, it's a small gesture but it can have a long lasting effect in the long run. Other ways to reduce fossil fuel consumption is to walk or use public transport when traveling short distances rather than using a car. Following the 3R principles also contribute to the reduction of fossil fuel consumption.

Q4. How can we address our community interest while taking economic projects ?

To address our community interest we must let the community engage in decision making so that they actively build their community's future.

Q5. Cite best examples of Sustainability practices.

One of the best examples of sustainability practices is using renewable energy such as solar, wind, or hydro energy to power homes and industries. Another important sustainability practice is to plant trees, which will remove carbon dioxide from the air and provide more energy, enhancing air quality.

News Updates

BEAWORLD: A Hub for Engineering Innovation and Collaboration

Introduction: In an era marked by rapid technological advancements, BEAWORLD stands as a unique and vibrant platform where engineers and architects converge to discuss the latest trends, share groundbreaking ideas, and solve technical challenges. With its diverse community and specialized focus on engineering, BEAWORLD has become an essential cluster for professionals across various Engineering and Architectural sectors, fostering a collaborative environment that drives innovation.

Key Focus Areas of BEAWORLD: BEAWORLD's platform is structured to cater to a wide array of engineering disciplines, ensuring that members from different backgrounds can contribute and access valuable insights. The platform focuses on several key areas:

1. **Emerging Technologies:** From the Internet of Things (IoT) to Artificial Intelligence (AI) and renewable energy solutions, BEAWORLD encourages discussions around emerging technologies that are transforming industries. Experts regularly share their research, product prototypes, and insights, making the forum a fertile ground for innovation.
2. **Problem-Solving and Knowledge Sharing:** One of the core strengths of BEAWORLD lies in its problem-solving community. Engineers facing technical challenges can post queries and receive detailed feedback from experienced professionals. The culture of knowledge sharing is prevalent, with users exchanging design tips, troubleshooting methods, and solutions to complex problems.
3. **Industry-Specific Discussions:** BEAWORLD hosts specialized subforums dedicated to various industries such as architecture, computer, civil, mechanical, and electrical engineering. These industry-specific discussions provide members with tailored information and the latest updates relevant to their field of expertise.
4. **Engineering Education and Mentorship:** The platform is not only for seasoned professionals but also for students and early-career engineers. BEAWORLD has an active mentorship program, where veterans offer guidance on career development, provide resources for skill improvement, and review academic projects. BEAWORLD's dedicated team led by the Students' Leadership Building Committee and Webinar Committee are relentlessly working in making
5. **Collaborative Projects and Competitions:** The collaborative nature of BEAWORLD extends beyond discussions to real-world applications. Members are encouraged to participate in joint projects, competitions, and hackathons organized through the platform. These initiatives foster teamwork and creativity, allowing engineers to push the boundaries of what's possible in their respective fields.

Recent Highlights: In the past few months, BEAWORLD has seen significant activity in several domains:

- **Green Engineering Solutions:** A dedicated section on sustainable engineering practices has gained traction, with topics ranging from green building materials to carbon-neutral manufacturing processes.
- **Robotics and Automation:** With automation becoming a critical focus for industries, BEAWORLD's discussions on robotic systems and AI integration have garnered considerable attention.
- **Students' leadership program:** The platform has hosted vibrant discussion and debate programs to develop the leadership quality and to foster community engagement among the students of various ages and grades. A dedicated team led by the Students' Leadership Building Committee is relentlessly working in making it a great success.

Engagement and Community Growth: Since its inception, BEAWORLD has attracted a growing number of Bangladeshi Engineering professionals and students worldwide. The forum's moderators actively curate content to ensure quality discussions; their engagement model has led to a highly interactive and supportive community. Moreover, 2 separate committees, one named Webinar Committee and other one named Connectivity Committee, led by few energetic and enthusiast professionals are working behind the scenes to fill the gap in knowledge and connectivity issues among Bangladeshi Engineers and Architects.

Looking Ahead: As BEAWORLD continues to grow, its role as a catalyst for innovation in the engineering world becomes even more critical. In the coming days, the platform aims to expand its global reach, offering more virtual workshops, webinars, and industry events to facilitate learning and networking. BEAWORLD is also developing plans for strategic partnerships with leading engineering institutions and organizations, creating even more opportunities for members to engage with cutting-edge research and technological advancements.

Conclusion: BEAWORLD is an evolving platform that empowers engineers to collaborate, innovate, and stay ahead in a fast-paced, technology-driven world. Whether you are an experienced professional or a newcomer to the engineering field, BEAWORLD offers invaluable resources, a supportive community, and the opportunity to make a meaningful impact in the industry.

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