



NDMA Pakistan
National Seminar
Sustainable Smart Construction Solutions -
Disaster Resilient Approach
12 Dec 2024

Strategic Intent

- Enhance disaster resilience of infrastructure through sustainable construction practices
- Foster multi-stakeholder collaboration to strengthen national infrastructure against climate-induced challenges
- Leverage modern advanced technologies, innovative methods and global best practices for sustainable construction solutions
- Promote robust implementation of building codes for enhanced disaster resilience
- Prioritize awareness and adoption of modern construction methodologies to mitigate disaster risks

National Seminar on Sustainable Smart Construction Solutions - Disaster Resilient Approach
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1. **Context**

- a. Pakistan ranks as the **5th most vulnerable country to climate change and natural disasters** such as floods, earthquakes and extreme weather events. This heightened vulnerability makes it imperative to explore strategies for disaster-resilient construction, which can not only safeguard lives but also ensure rapid economic recovery in post-disaster scenarios.
- b. In light of this pressing need, **NDMA Pakistan** organized a **National Seminar on Sustainable Smart Construction Solutions – Disaster Resilient Approach** to promote discussions on sustainable and resilient construction solutions. The event brought together **industry experts, builders, developers, engineering organizations and academia experts** to collaboratively devise solutions for disaster-resilient infrastructure tailored to Pakistan's socio-economic and geographical diversity. The **session was held at National Emergencies Operations Centre (NEOC), HQ NDMA, Islamabad.**
- c. This seminar, organized under the **“Build Back Better”** framework, provided a platform for stakeholders from various sectors to deliberate on challenges, solutions and opportunities for creating a resilient future. Special emphasis was laid on **integrating advanced technologies, adopting sustainable materials and tailoring global best practices** to Pakistan's unique geographical and socio-economic context.

2. **Highlights**

- a. **Economic Impacts of Disasters:** The seminar highlighted significant disaster impacts, referencing the **\$14.9 billion loss from the 2022 floods with 60% attributed to infrastructure damages.**
- b. **Global Perspectives:** Insights from international case studies emphasized the economic benefits of pre-emptive investment in disaster-resilient infrastructure, where **\$1 invested saves \$6 in reconstruction efforts.**
- c. **Technological Integration:** Discussions included leveraging **artificial intelligence and data analytics for infrastructure audits** and pre-disaster impact modeling.

RESTRICTED3. **Key Outcomes**

- a. It brought together the *industry experts, leading builders, developers, engineering organizations and academia experts* to discuss the following: -
 - i. ***Innovative Construction Techniques:*** Exploration of disaster-resilient construction methodologies tailored for various building types and geographic conditions in Pakistan.
 - ii. ***Global Best Practices:*** Adaptation of international lessons to local contexts, ensuring practical implementation in Pakistan's infrastructure development
 - iii. ***Policy and Incentive Recommendations:*** Drafting recommendations for enhancing building codes, compliance mechanisms and incentivizing sustainable practices.
 - iv. ***Technology and Data Utilization:*** Advocating the use of machine learning and artificial intelligence platforms for enhancing infrastructure resilience.
 - v. ***Capacity Building:*** Strengthening collaboration between academia, the private sector and government entities to advance research and development in disaster resilient sustainable construction practices.
- b. Seminar provided a *crucial platform to discuss problems with conventional construction practices*, future opportunities and steps for adopting the disaster resilient construction practices.
- c. Establishment of *robust mechanisms for retrofitting vulnerable infrastructure*
- d. Promotion of *smart construction practices (Modular Construction Technique)* and maintaining a balance between cost-efficiency and resilience.
- e. Strengthening compliance with *disaster-resilient building codes and bylaws*.
- f. Developing a *cohesive policy framework* to foster interdisciplinary collaboration.
- g. The ***seminar featured notable speakers who presented innovative ideas and shared their expertise***, including: -
 - i. **Mr. Hafeez Abdul Rehman (DRR Expert, NESPAK):** *Insights into geotechnical challenges and disaster risk mitigation.* The speaker highlighted the critical need for mandatory geo-hazard assessments and mitigation reports to be part of construction projects. This includes integrating land-use controls, identifying safe havens and ensuring long-term stakeholder satisfaction. Recommendations also included continuous updates to building codes, enforcement at all levels and retrofitting vulnerable structures to

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- enhance resilience.
- ii. **[Ms. Myra Ali \(Chief Operating Officer, Infrastructure Development Authority Punjab\)](#)**: *Focused on incorporating sustainability in large-scale infrastructure projects.* The speaker highlighted the effectiveness of disaster-resilient facilities and energy-efficient buildings. Community-centric developments with integrated green spaces and sustainable materials were showcased as vital for social cohesion and improving the quality of life.
 - iii. **[Dr. Muhammad Usman \(Head of Structures Department, NUST\)](#)**: *Advanced research on sustainable construction materials and 3D concrete printing.* The speaker discussed about the potential of 3D concrete printing for rapid and cost-effective shelter construction. Scalable and customizable designs, mobile printing units and sustainable practices were debated as transformative solutions for disaster-affected areas with significant time and cost advantages.
 - iv. **[Mr. Shahzad Umer \(Head of Business Development, MARS Pakistan Pvt. Ltd.\)](#)**: *Introduced cost-effective housing solutions for rapid post-disaster recovery.* An innovative solution for creating quickly deployable and portable structures that cater to diverse needs. With their ability to adapt to various applications, Foldable Spaces presented a sustainable and innovative approach to addressing modern challenges in accommodation and infrastructure development.
 - v. **[Dr. M. Usman Hassan \(Head of Construction Engineering & Management Department, NUST\)](#)**: *Explored AI-driven construction automation and its implementation for disaster resilient construction.* The expert explained his research work regarding a web-based system for real-time structural health reporting. This innovative platform evaluates damages, cracks, stresses and other parameters, providing immediate status updates via WhatsApp and detailed GIS-based reports through email. The system can guide safe evacuation, shut off utilities and enhance emergency preparedness for critical infrastructure in all phases of disasters.
 - vi. **[Mr. Emad ur Rehman \(CEO, Vogue Engineering Services Pvt. Ltd.\)](#)**: *Highlighted modular and prefabricated construction techniques to enhance resilience.* The presenter proposed the adoption of standardized construction

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methods tailored to specific zones and sub-zones across Pakistan. Recommendations included pre-designated construction layouts, fixed pricing for housing projects and pre-approved constructors to ensure rapid post-disaster response. Additional strategies such as rainwater harvesting, permeable pavements and centralized data for predictive modeling were discussed as essential for disaster mitigation.

- vii. **[Dr. Zeeshan Ullah \(Director Building, National Energy Efficiency and Conservation Authority\)](#)**: *Discussed energy-efficient building designs and the development of Energy Conservation Building Code (ECBC-2023)*. The speaker highlighted the integration of the ECBC-2023 into national building code and emphasized energy efficiency measures. Recommendations included benchmarking building energy use, launching a rating system for public buildings and encouraging behavioral changes to reduce energy consumption. An estimated 35% energy savings can be achieved by replacing inefficient appliances.
- h. There is a ***rising demand and expectations from global community*** from Pakistan to strengthen its infrastructural ***sustainability and resilience***.
- i. All nations prioritize disaster resilience, Pakistan ***must adopt innovative strategies*** and best practices to safeguard its critical infrastructure and ensure sustainable development.
- j. A cohesive ***national synergy*** is imperative to facilitate meaningful collaboration among ***leading developers, builders, architects, government organizations, academia experts, consultancies and engineering organizations***.
- k. NDMA remains committed to advancing this agenda through continued collaboration with all stakeholders, ensuring that ***the vision of a resilient and sustainable Pakistan*** becomes a reality.

RESTRICTED***Table 1: Participating Stakeholders of the Seminar***

Category	Organization
Builders / Developers	DESCON Engineering
	Kingcrete Builders
	Etimaad Engineering Ltd.
	Paragon Constructors
	Qavi Engineers (Pvt.) Ltd.
	HENAN D.R. Construction Group
	Association of Builders & Developers of Pakistan
	Pak Gulf Construction Ltd.
	MARS Pakistan (Pvt.) Ltd.
	Vogue Engineering Services (Pvt.) Ltd.
	EMAAR Pakistan
	China Civil Engineering Construction Corporation
	Kohistan Builders & Developers
	Landmark Group
Organizations / Institutions	Ministry of Climate Change & Environmental Coordination
	Infrastructure Development Authority Punjab (IDAP)
	Pakistan Engineering Council (PEC)
	National Engineering Services Pakistan (NESPAK)
	Pakistan Council of Architects and Town Planners (PCATP)
	National Energy Efficiency and Conservation Authority
	National University of Sciences & Technology (NUST)
	Military College of Engineering (MCE)
	National University of Technology (NUTECH)