CPiR Current Problems in Research

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Editorial Article

Existing Barriers in Research and Rehabilitation

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Articles History: **Received:** 6 March 2025; **Revised:** 8 April 2025; **Accepted:** 16 April 2025; **Published:** 18 April 2025

Keywords: Arterial Roads, Plastic Waste, Marshall Stability, Corrosion, Magnesium Cements

Summary

We are thrilled to introduce the 2025 edition of the Current Problems in Research Journal. This first volume highlights the ongoing challenges in research and rehabilitation. Rehabilitation challenges extend beyond reconstruction, emphasizing improvement to build greater resilience for future research issues.

Traffic flow in weaving areas presents a complex analytical challenge, necessitating both macroscopic and microscopic modeling approaches. In this context, Majid and Tofiq Al Barznji [1] conducted a comprehensive review, outlining current methodologies and future directions for analyzing and optimizing weaving areas on urban arterial roads. Their study emphasizes macroscopic and microscopic traffic flow models that capture critical elements of vehicular motion, including speed variations, lane-changing behavior, bottleneck effects, roadway design, traffic density, and driver interactions within weaving zones. The findings suggest that the proposed analytical framework offers a systematic approach for urban planners and traffic engineers to enhance operational efficiency, improve roadway safety, and achieve sustainable traffic management outcomes. However, further empirical validation is required to refine the framework, particularly through the integration of emerging technologies such as connected autonomous vehicles (CAVs) and intelligent transportation systems (ITS). The adoption of these innovations could significantly enhance the scalability of traffic management solutions, contributing to safer, more efficient, and environmentally sustainable urban mobility systems.

The increasing generation of plastic waste has escalated into a global environmental crisis, necessitating immediate, innovative, and sustainable solutions. Addressing this issue, Mahi et al. [2] explored the development of innovative sustainable concrete by incorporating plastic waste and evaluating its fresh and hardened properties. Their study examined the impact of plastic waste inclusion on the mechanical and durability properties of concrete, utilizing various forms such as polyethylene terephthalate (PET) and polypropylene (PP) at different incorporation levels. Experimental investigations assessed key

parameters, including compressive strength, tensile strength, flexural strength, and durability characteristics. The findings indicate that while the addition of plastic waste enhances the ductility and reduces the density of concrete, it also results in a decrease in strength parameters. This research highlights the potential of plastic-reinforced concrete as a sustainable construction material, providing a dual benefit of waste reduction and resource conservation, thereby contributing to environmentally responsible infrastructure development.

The increasing demand for sustainable road construction materials has driven extensive research into asphalt modification using industrial and agricultural waste. In this context, Mior Sani [3] investigated the potential of palm oil fuel ash (POFA), garnet waste, and sawdust as individual modifiers to enhance the volumetric and mechanical properties of asphalt mixtures. The study incorporated these waste materials at varying proportions (0%, 3%, 6%, and 9%) and evaluated their impact through the Marshall stability test, focusing on key volumetric properties such as voids in total mix (VTM), voids in the mineral aggregate (VMA), and voids filled with asphalt (VFA). The findings highlight the feasibility of using POFA, garnet waste, and sawdust as sustainable alternatives in asphalt mixtures, offering cost-effective solutions while reducing reliance on virgin materials. The modified asphalt mixtures demonstrated satisfactory volumetric and mechanical performance, making them suitable for road applications, particularly in low to medium traffic pavements. The successful incorporation of these waste materials into asphalt pavements not only supports sustainable infrastructure development but also ensures compliance with engineering standards and road performance requirements.

Corrosion in reinforced concrete structures poses a significant challenge in structural engineering, impacting durability, performance, and maintenance expenses. To address this issue, Mahi et al. [4] conducted a study on the causes, effects, and sustainable strategies for mitigating corrosion in reinforced concrete. Their research examines various preventive measures, emphasizing the role of supplementary cementitious materials such as silica fume, fly ash, and ground granulated blast furnace slag in enhancing durability by reducing permeability and chloride penetration. The study findings suggest that integrating corrosion-resistant materials with proactive maintenance strategies and real-time monitoring can significantly extend the lifespan of reinforced concrete structures while minimizing long-term repair expenditures. This research contributes to the advancement of sustainable and cost-efficient corrosion prevention techniques, offering valuable insights for engineers, researchers, and infrastructure professionals.

The construction industry continues to be one of the largest contributors to global CO_2 emissions, with the production of Portland cement accounting for approximately eight percent of total emissions, according to Mahi et al. [5]. In their study, four types of magnesium-based cements—Reactive Magnesia Cement (RMC), Magnesium Phosphate Cement (MPC), Magnesium Oxychloride Cement (MOC), and Magnesium Oxysulfate Cement (MOS)—were explored as alternative binders due to their inherent carbonation capability, which enables the absorption of CO_2. They concluded that all magnesium cement offer

advantages such as rapid setting times, high early strength, fire resistance, and enhanced durability. Additionally, the use of alternative cementitious composites (ACC) improved sustainability through carbonation reactions that formed stable carbonates, thereby reducing overall CO_2 emissions.

The comprehensive research presented in this inaugural issue aims to deepen the understanding and engagement of researchers and practitioners in addressing existing barriers in research and rehabilitation. By highlighting key challenges, this work seeks to foster innovative solutions, promote interdisciplinary collaboration, and enhance practical applications in the field. Through critical analysis and discussion, the issue contributes to advancing knowledge and improving rehabilitation strategies, ultimately supporting more effective and sustainable outcomes.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflicts of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

Ramadhansyah Putra Jaya: writing, reviewing and editing. **Norhidayah Abdul Hassan:** writing, re-viewing and editing. **Reza Pahlevi Munirwan:** writing, re-viewing and editing.

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