CHAPTER 5
FROM PLASTIC WASTE INTO BRICKS

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5.1 INTRODUCTION

The 21st century has ushered in an era defined by remarkable technological advancements, industrial progress, and an unparalleled level of convenience that has woven itself intricately into the fabric of our daily lives. From the proliferation of smartphones that connect us across continents to the evolution of renewable energy sources that promise a greener future, human innovation has fundamentally reshaped how we live, work, and interact with the world around us (Javaid et al., 2022). Our cities have become sprawling centres of technology and innovation, where the skyline is punctuated by skyscrapers that stretch toward the heavens and transportation systems that crisscross the urban landscape (Ali et al., 2012). We find ourselves interconnected in ways unimaginable to previous generations, our lives enriched by the conveniences and luxuries that modernity affords us. However, amid this era of unprecedented progress and boundless possibilities, there emerges a stark and sobering reality, one that serves as a counterpoint to the achievements of our age. This reality is the monumental challenge of plastic waste, an issue that stands as a testament to the unintended consequences that often accompany progress (Dailin et al., 2022a).

The very same plastic products that have come to symbolise modern convenience, durability, and versatility are paradoxically entangled in a crisis of global environmental proportions (Kibria et al., 2023). The once-celebrated attributes of plastics, including their durability and resistance to decomposition, have inadvertently led to an ecological predicament that is felt across continents and habitats (Lee et al., 2022). As plastic waste accumulates in landfills that strain the limits of their capacity, as it drifts aimlessly in the currents of our oceans creating vast islands of debris, and as it infiltrates even the most delicate ecosystems, the urgent need to address this issue has reached critical levels (Kumar et al., 2021).

The environmental implications of plastic pollution have transcended localised concerns, giving rise to an international movement for change (Barrowclough et al., 2022). Scientists, researchers, innovators, and environmentalists united by a shared sense of responsibility have stepped forward to confront this challenge head-on. In response to this global call to action, a wave of transformative solutions is emerging – solutions that challenge traditional paradigms of waste management and envision a world in which waste becomes a resource rather than a burden. Among these solutions, one remarkable concept has emerged as a beacon of hope: the conversion of plastic waste into bricks (Miandad et al., 2019). This ingenious idea not only tackles the pressing issue of plastic pollution but also aligns harmoniously with the principles of circular economy and sustainable construction. It represents a turning point where the very material that has contributed to an environmental crisis could hold the key to its resolution. The significance of this concept lies not just in its technical feasibility but also in its symbolism as an alternative to consumption and disposal in a linear model (Chizaryfard et al., 2021). Transforming discarded plastic into durable bricks presents a tangible representation of the circular economy, a regenerative model aimed at minimising waste, extending product lifecycles, and optimising resource usage. It signifies a transition from the outdated paradigm of "take, make, dispose" to a new narrative of "reduce, reuse, repurpose".

The urgency of addressing plastic waste has highlighted the need for cross-disciplinary collaboration, bringing together experts from fields as diverse as material science, engineering, architecture, and environmental policy (Kumar et al., 2021). This collective effort underscores the gravity of the challenge at hand and reflects the determination to forge a path forward that is not bound by traditional boundaries. As we navigate the complexities of plastic waste conversion, we must also confront a range of challenges and considerations (Dailin et al., 2022b). Ensuring the structural integrity and safety of plastic-infused bricks, for instance, requires rigorous testing and experimentation (Sahani et al., 2022). Moreover, the diversity of plastic types and compositions poses a significant challenge in terms of quality control and standardisation. Questions surrounding the long-term durability and environmental impact of these bricks demand thorough assessment before widespread adoption can be considered (Karim et al., 2023).

The convergence of the 21st century advancements with the plastic waste crisis represents a unique moment in our history. It reminds us that progress must be guided by responsibility and foresight and that innovation should be harnessed not only for convenience but also for the betterment of our planet (Coman et al., 2020). The conversion of plastic waste into bricks encapsulates the essence of this transformative ethos: a shift from problems to solutions, from waste to resources, and from environmental challenges to opportunities for growth. It is a testament to human ingenuity, resilience, and our ability to reframe the narratives that shape our relationship with the world around us (Sahani et al., 2022). As we venture into the uncharted territories of sustainable construction and waste management, let us remember that our choices today will determine the legacy we leave for generations yet to come.

5.2 DIFFERENT TYPES OF PLASTIC WASTES

The world is awash with plastic, a versatile material that has permeated nearly every aspect of modern life. However, this widespread usage comes at a cost: the generation of a diverse range of plastic waste that