Chapter 1
Utilizing Technology for Sustainable Resource Management Solutions: An Introduction

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ABSTRACT

This chapter investigates components of sustainable resource management that are aligned with the book's theme. A strategic paradigm of the literature serves as the foundation for the investigation. In that regard, to comprehend the issue's complexities, the writers delved into earlier studies. In addition, to confirm and refine the keywords related to sustainable resource management, they utilized expert data mining. Both methodologies supported the findings that follow. Specifically, the study suggests that among academic, scientific, and policymaking circles, sustainability has become one of the most utilized buzzwords. Secondly, the findings also uncovered that the business community has refocused its efforts on sustainability as evidenced by the increased development and public release of sustainability reports. Finally, the results also showcase the growing interest by the aforementioned stakeholders as they pursue "sustainable solutions" – and in many capacities through a technology lens. Taking all of these variables into consideration, this chapter argues a compelling case for an organised effort (amongst the multiple stakeholders) to employ technology to deliver effective resource management solutions – and sets the stage for the multidisciplinary chapters that follow.

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INTRODUCTION

To address issues with global resource management, the interplay of technology and sustainability has become increasingly important (Duchin & Levine, 2019; Varela et al., 2023). With rising demands on the planet's finite resources, it is more essential than ever to offer workable and sustainable alternatives (Whelchel et al., 2018). Global challenges associated with growing populations and urbanisations are currently putting an unparalleled burden on our natural resources (Crichton et al., 2018.; Singh et al., 2024). As such, to reduce the pressure on our resources and create an environment for a more sustainable future, technology must be integrated.

Large-scale data has become widely used and has expanded quickly in recent years. It has presented challenges as well as new opportunities for studying technology growth trends (Singh & El-Kassar, 2019). In the domains of environmental management and sustainable natural resources, there are currently sizable databases which include a significant amount of fragmented, yet significant data. However, to address important scientific and societal concerns, these datasets are shared globally. The rate at which humanity has produced material riches since the start of the Industrial Revolution is unparalleled. In that regard, research (cf., Omer, 2008; Crichton et al., 2018) has shown that people frequently overlook the repercussions of these developments, which may give rise to problems like excessive energy use, poverty, and damage to the environment. However, with these challengs in mind, smart technologies can become one solution. In recent years, there have been several opportunities for innovative techniques in various engineering applications owing to the rapid advancement of information technology (IT) (Gao et al., 2015). For example, recent technological advancements like data analytics, the Internet of Things, and artificial intelligence are beneficial to resource management (Elijah et al., 2018). These Improvements may allow for increased productivity, improved efficiency, and intelligent decision-making that lower the detrimental effects of resource depletion, poverty, and environemntal degradation alike. A thorough knowledge of natural systems, human demands, and economic variables is necessary to tackle the complex issue of sustainable resource management. And technology is proving to be a powerful tool that can tackle the difficulties associated with resource management by processing big datasets, analysing intricate relationships, and offering insights (Hashem et al., 2015). However, we posit that resource management needs to be done collaboratively as our planet is so interrelated. Moreover, international collaboration is fuelled by technology as it facilitates the sharing of knowledge, best practices, and original ideas among several parties. This mutual reliance encourages collaborative efforts to achieve global sustainable resource management.

In keeping with that collaborative spirit, firstly, this research study explores the topic of “Utilising Technology for Sustainable Resource Management Solutions”, and secondly, the value of doing so collaboratively. To begin, we look at the several facets of using technology to sustainable resource management issues. The investigation comprises factor exploration, expert mining, and a strategic paradigm of literature review. The intent is that our research will shed light on the transformative potential of technology in mitigating environmental issues and advancing resource management approaches that align with long-term sustainability goals.