

# Frontiers of Multidisciplinary Studies for Global Sustainability



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# **Frontiers of Multidisciplinary Studies for Global Sustainability**

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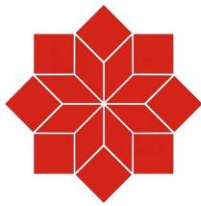
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## CONTENTS

Chapter No	Chapter Titles	Page No
1	Emerging Trends in Consumer Behaviour and Their Impact on Organizational Strategy  <b>P. Vinodhini, R. Priyadharshini</b>	1-8
2	Mechanical and Thermal Evaluation of Nanocomposite Coatings for Wheelchair Components  <b>S. Baskar, M. Sivaram Krishnan, V. Sivakumar, S. Surendar, K. Gopalakrishnan</b>	9-20
3	Internet of Things (IoT) Applications in Resource Efficiency and Circular Economy  <b>V. Vardhini</b>	21-31
4	Goodput Aware Load Distribution for Real-Time Traffic over Multipath Networks Using Spectrum Sensing in Cognitive Radio  <b>M. Monisha, P. Vijayalakshmi, M. Meena, B. Sahaai Madona</b>	32-41
5	Eggplant Peel Extract Reinforced Chitosan Composite Films for Food Packaging Application  <b>Sanuja S., Sowmya S., Kowsalya J.</b>	42-55
6	Versatile Ionic Liquids: Bridging Biomass Dissolution and Battery Material Innovation  <b>Sowmya S., Sanuja S.</b>	56-70

## Chapter 3

# Internet of Things (IoT) Applications in Resource Efficiency and Circular Economy

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### Abstract

The increasing environmental pressure resulting from rapid industrial growth, urbanization, and linear “take-make-dispose” consumption patterns underscores the urgent need for sustainable and regenerative alternatives. The Circular Economy (CE) framework has emerged as a transformative model aimed at decoupling economic growth from resource depletion by promoting principles of reuse, repair, recycling, and regeneration. Within this framework, the Internet of Things (IoT) has become a key technological enabler that supports the shift toward circularity. By connecting physical assets through sensors, networks, and intelligent analytics, IoT enables continuous monitoring of resource flows, predictive maintenance of equipment, and optimization of production processes. This paper explores the synergistic relationship between IoT and circular economy practices, analyzing how digital connectivity can enhance resource efficiency across diverse sectors such as manufacturing, energy, agriculture, and urban systems. Examples include IoT-enabled waste management systems that track material recovery, precision agriculture that minimizes input use, and smart grids that balance renewable energy generation with consumption. Furthermore, IoT facilitates innovative circular business models such