INNOVATIVE APPROACHES FOR EWASTE RECYCLING AND RESOURCE RECOVERY WITH REFERENCE TO DAVANGERE CITY (KARNATAKA)

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Introduction

In Davangere state of Karnataka, the rapid accumulation of E-Waste is a pressing concern, challenging the city's commitment to environmental sustainability. This study is dedicated to uncovering innovative E-Waste recycling and resource recovery methods that resonate with the city's specific conditions. Amidst a global uptick in E-Waste, propelled by swift technological turnover, Davangere finds itself at a crucial juncture, where effective waste management strategies are vital for maintaining ecological integrity and economic health. This research will conduct an in-depth analysis of Davangere's E-Waste generation, disposal patterns, and regulatory frameworks to build a holistic view of the issue at hand. It will also engage in stakeholder mapping to understand the dynamics within the E-Waste management network. A key aspect of the study is fostering community engagement and education to raise consciousness about the repercussions of improper E-Waste handling. Innovative recycling initiatives, such as interactive exhibits and specialized collection mechanisms, are explored as potential solutions to Davangere's unique E-Waste challenges. The study's ultimate ambition is to enhance the city's E-Waste practices, advocating for eco-friendly recovery and the safe processing of hazardous materials, thus steering Davangere towards a more sustainable and resilient future.

Objectives

- The primary objective of this project is to conduct a comprehensive assessment of the current E-Waste phenomenon in Davangere city.
- Another crucial aim is to identify and analyze the key stakeholders involved in the E-Waste management ecosystem within the locality.
- To develop effective strategies aimed at community engagement and education regarding the proper disposal and management of E-Waste.
- Lastly, the project endeavors to propose innovative recycling techniques

specifically tailored to address the challenges of E-Waste management in Davangere city

Methodology: Stage 1: literature review:Establish foundational understanding of E-Waste management, recycling techniques, stakeholder engagement, and community education

Stage 2: Data sampling methods: To implement Stratified Random Sampling for E-Waste, categorize by waste type, sectoral volume, and location. Randomly select samples from each category to represent the city's E-Waste profile. This approach ensures a comprehensive analysis of the E-Waste management system.

Stage 3: Data collection: Primary data collection: Field surveys, interviews, and questionnaires from diverse stakeholders in Davangere city, including residents, businesses, government entities, and recycling facilities.

Stage 4: Data analysis techniques for individual objectives:

• Extent of E-Waste:

Statistical Tools: Descriptive statistics

Method: Calculate percentages, means, and other descriptive measures to summarize and analyse.

• Factors Influencing Adoption:

Statistical Tools: Regression analysis Method: Use regression analysis to assess the relationship between independent variables (factors influencing adoption) and the dependent variable (adoption decision)

• Health and Wellbeing Impacts:

Statistical Tools: T-tests, ANOVA Method: For assessing the health and wellbeing impacts of E-Waste, statistical tools such as T-tests and ANOVA can be applied. These tests will enable the comparison of health indicators between different groups exposed to E-Waste, helping to evaluate the potential health effects linked to E-Waste exposure.

Innovative recycling techniques: Research and evaluate suitable methods for Davangere's E-Waste profile through collaboration with experts and leveraging existing initiatives

Result and Conclusion
➢ In Davangere, the community is well-informed about E-Waste recycling, with a strong consensus on the shared responsibility of government, manufacturers, and consumers. While information is predominantly sourced online and from local authorities, there's a readiness to support E-Waste management initiatives, albeit actual participation is conditional on convenience.

➢ A sustainable mindset is evident, with 61% of the community engaging in the reuse of electronics and creative upcycling, particularly of electronic components into decorative items. This reuse culture is balanced by a 53% disposal rate when devices cease functioning. Despite a moderate awareness level, there's a unanimous call for action in E-Waste management and a recognition of its importance for environmental conservation.

➢ The community's high engagement and active participation in E-Waste management activities, coupled with a strong online presence for upcycling ideas,

demonstrate a commitment to environmental stewardship and sustainable practices.

Conclusion

The community in Davangere showcases a proactive and responsible approach to E-Waste management, balancing convenience with environmental stewardship. Their sustainable practices, characterized by significant reuse and upcycling. Although participation is influenced by convenience and awareness levels are moderate, the unanimous call for action and the strong online presence for upcycling ideas highlight the community's dedication to environmental conservation.

- ➢ Develop a digital platform to track and analyze E-Waste data, providing insights into waste volume, types, and recycling rates. This can help in identifying trends and areas for improvement.
- ➢ Implement mobile E-Waste collection units that can travel to different neighbourhoods, making it convenient for residents to dispose of their electronics responsibly.
- ➢ Organize community workshops focused on repairing and refurbishing old electronics, which can extend their lifespan and reduce waste.
- ➢ Set up facilities equipped with advanced technology to safely extract valuable materials from E-Waste, ensuring their reuse in manufacturing new products.
- ➢ Collaborate with tech companies to create take-back schemes where consumers can return end-of-life electronics for proper recycling or refurbishment.
- ➢ Launch comprehensive educational campaigns using social media, local events, and school programs to raise awareness about the importance of E-Waste recycling.
- ➢ Introduce incentive-based programs that reward individuals and businesses for proper E-Waste disposal, encouraging participation in recycling efforts.
- ➢ Host competitions for designing products with a focus on sustainability, encouraging innovation in reducing E-Waste through design.
- ➢ Work with local authorities to advocate for stronger E-Waste management policies and regulations that support recycling and proper disposal.
- ➢ Organize technology fairs showcasing eco-friendly electronics and innovations in E-Waste management, promoting a culture of sustainability.
- ➢ Exhibit E waste sculptures and art installations in public places.

Proposed model:

- ➢ Collection: E-waste is collected from various sources, including drop-off centers, collection drives, or direct pick-up from organizations and individuals
- ➢ Storage: The collected e-waste is then stored in a facility until it is ready to be processed.
- ➢ Sorting, Dismantling, and Shredding: The e-waste is sorted into various categories. Items that can be reused or refurbished are separated. The rest is dismantled, and materials like plastic and metal are shredded into smaller pieces.
- ➢ Mechanical Separation: After shredding, the e-waste undergoes mechanical separation. This can include magnetic separation to remove ferrous metals

and water separation to sort out different materials based on density.

By using these materials decorative items, animal sculptures, jewellery and accessories, home decors like lamps, picture frames, clocks and furniture, fashion items(bags, clothing accessories),functional gadgets, toys and games, musical instruments, educational kits, office supplies, Garden and outdoor items, gifts and souvenirs can be prepared.

Recovery: Finally from left out items, valuable materials such as gold, silver, copper, and palladium are recovered from the separated components if available. These can be used in the manufacturing of new products.

Scope for Future Study

➢ The future of E-Waste management in Davangere city presents a multifaceted opportunity for growth and innovation. Embracing technological advancements such as AI and machine learning can revolutionize the efficiency of e-waste processing and recovery. A critical examination and development of policies will be essential to ensure compliance and encourage sustainable practices. Public-private partnerships stand to bolster the infrastructure, while health and environmental impact studies in these areas will provide the necessary data to inform safer disposal methods.

➢ The adoption of circular economy models can significantly reduce the generation of e-waste by promoting product longevity and recyclability. Engaging the community through effective strategies is vital for increasing awareness and participation in e-waste management. Furthermore, market analysis for recovered materials will shed light on the economic aspects of recycling operations.

➢ By comparing local practices with global best practices, Davangere can identify innovative solutions and areas for improvement. Enhancing e-waste collection efficiency and conducting life cycle assessments of electronic products will contribute to a more sustainable e-waste management system, ready to meet the challenges of today and tomorrow.

➢ The increasing demand in the electronics industry necessitates future research into identifying recyclable raw materials and reducing the use of non-recyclable ones. This research should aim to pinpoint recyclable materials suitable for electronics manufacturing and develop strategies to minimize the use of non-recyclable materials