

Enhancing Efficiency in the Collection and Processing of Recovered Paper through Technology and Governmental Policies

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Enhancing Efficiency

- 1 The Problem
- 2 The Solution
- 3 Sensor-Based Sorting
- 4 Automation in Paper Collection
- 5 Data Analysis and Machine Learning

Technological Advancements in Paper Recycling

Government Policies and Paper Recycling

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Conclusion

The Problem

- **Efficiency**

- Inefficient paper collection and processing in India
- Resource wastage and environmental consequences

- **Cost-Effectiveness**

- Economic implications of low efficiency
- Opportunities for cost savings through improved efficiency
- Balancing cost-effectiveness with sustainability goals
- The role of technology and government policies in achieving cost-effectiveness



The Solution

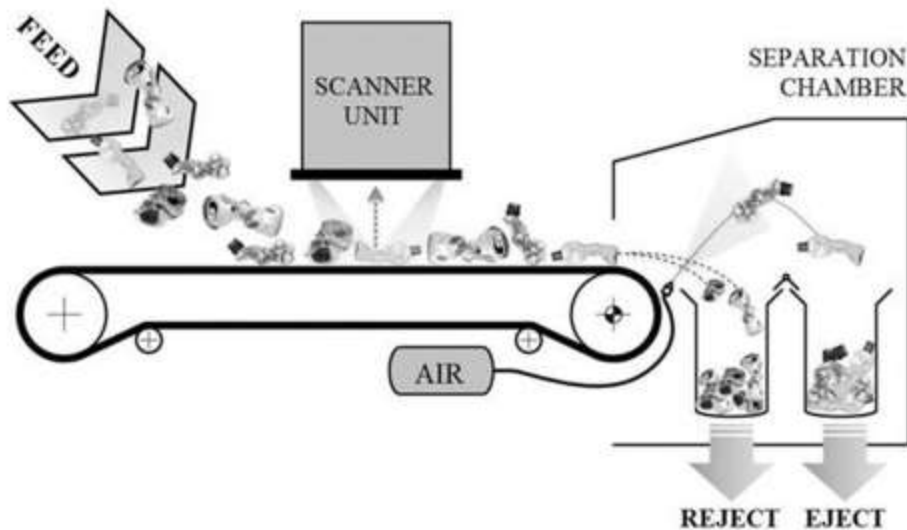
- **Technological Advancements**
 - Sensor-Based Sorting
 - Automation in Paper Collection
 - Data Analysis and Machine Learning
- **Governmental Policies**
 - Mandatory Recycling Programs
 - Financial Incentives



Sensor-Based Sorting [1]

- **Advanced Technology**

- Sensors can detect Paper Grades, and Contaminants
- Precision = Minimized Contamination
- Over 95% accuracy in identifying and sorting contaminants



Automation in Paper Collection [3]

- Increased Capture Rate
- Increased Collection Efficiency
- Reduced Contamination
- Enhanced Program Branding



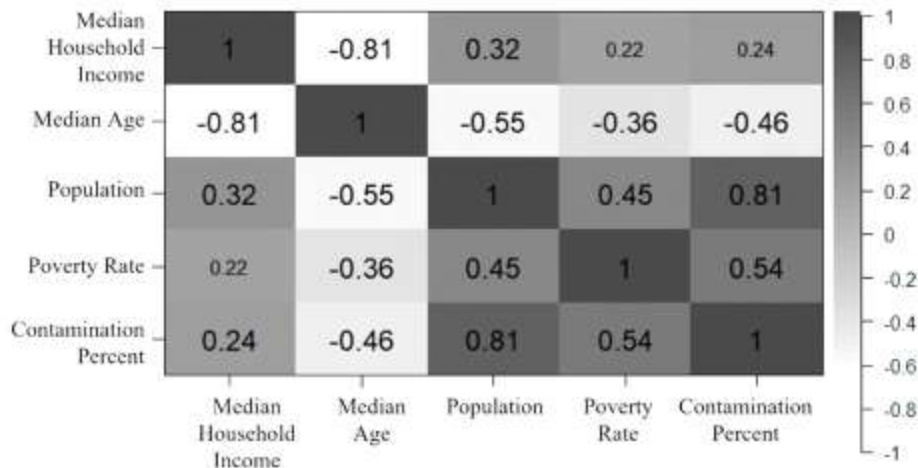
Data Analysis and Machine Learning [4]

- **Machine Learning**

- 20% Improvement in Efficiency using:
 - Optimal Sorting Strategies in real-time
 - Identifying all the factors that can result in higher contamination rates

- **Historical Data**

- Contamination Percentage Factors:
 - Median Household Income
 - Median Age
 - Population
 - Poverty Rate



Mandatory Recycling Programs [5]

- **Single-Stream Recycling**

- All recyclable materials (paper, plastic, glass, metal) are collected together in a single bin.
- May lead to contamination and reduced material quality.

- **Dual-Stream Recycling**

- Separates recyclables into two main categories, usually paper and containers.
- Reduces contamination compared to single-stream recycling.

- **Multi-Stream Recycling**

- Separates recyclables into multiple categories, such as paper, plastics, glass, and metals.
- Offers high material purity and quality.



Financial Incentives [6]

- Tax Incentives for Recycling Business
- Economic Motivation for Households
- Financial Repercussions



Financial Incentives [7]

- "Waste to Wealth"
- Sentinel Site in Saharanpur
- Increase in Recycling and Reuse of Paper Material
- More Programs Needed



Conclusion

- Technological Advancements
 - Decreased Contamination Percentage
 - Increased Collection and Sorting
 - Increased Costs
- Governmental Incentives
 - Increased Participation
 - Increase in Recycling Programs



References

- [1] J. Hlosta, "Schematic of the sensor-based sorting system - researchgate," Schematic of the sensor-based sorting system , https://www.researchgate.net/figure/Schematic-of-the-sensor-based-sorting-system_fig1_319077774 (accessed Oct. 1, 2023).
- [2] S. ENGINEERS, "Automating Recyclable Materials Collection," /waste/recycling/recyclingportalfiles/recyclingtechnicalassistance/ , <https://files.dep.state.pa.us/waste/recycling/recyclingportalfiles/recyclingtechnicalassistance/> (accessed Oct. 3, 2023).
- [3] Sept. 19 and C. and P. Affairs, "Let's talk trash: How and why to recycle right in Chandler," City of Chandler, <https://www.chandleraz.gov/blog/lets-talk-trash-how-and-why-recycle-right-chandler> (accessed Oct. 5, 2023).
- [4] T. Runsewe, H. Damgacioglu, L. Perez, and N. Celik, "Machine learning models for estimating contamination across different curbside collection strategies," Journal of Environmental Management, vol. 340, pp. 1–11, Aug. 2023. doi:10.1016/j.jenvman.2023.117855
- [5] O. A. Bafail and R. M. Abdulaal, "New approach for selecting a suitable recycling collection program for recovered paper and pulp recyclables using AHP-Topsis Techniques," Waste Management & Research: The Journal for a Sustainable Circular Economy, vol. 39, no. 11, pp. 1406–1413, 2021.
- [6] R.-S. A. Editor, "Should there be a financial incentive to recycle?," Silversurfers, <https://www.silversurfers.com/speakers-corner/financial-incentive-recycle/> (accessed Oct. 5, 2023).
- [7] "Waste to wealth mission: Invest India," Waste to Wealth Mission | Invest India, <https://www.investindia.gov.in/waste-to-wealth> (accessed Sep. 29, 2023).

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