Scopus

Documents

Rahman, T.[a c] , deb, N.[b] , Alam, M.Z.[c] , Moniruzzaman, M.[a] , Miah, M.S.[b] , Horaira, M.A.[d] , Kamal, R.[e]

Navigating the contemporary landscape of food waste management in developing countries: A comprehensive overview and prospective analysis

(2024) *Heliyon*, 10 (12), art. no. e33218, . Cited 1 time.

DOI: 10.1016/j.heliyon.2024.e33218

[a] Department of Electrical and Electronics Engineering, International University of Business Agriculture and Technology, Uttara, Dhaka, 1230, Bangladesh

[b] College of Agricultural Sciences, International University of Business Agriculture and Technology, Uttara, Dhaka, 1230, Bangladesh

[c] Bioenvironmental Engineering Research Center (BERC), Department of Chemical Engineering and Sustainability, Faculty of Engineering, International Islamic University Malaysia, Kuala Lumpur, 50728, Malaysia

[d] College of Tourism and Hospitality Management (CTHM), International University of Business Agriculture and Technology, Uttara, Dhaka, 1230, Bangladesh

[e] Department of Pharmacy, Daffodil International University, Dhaka, Bangladesh

Abstract

This study employs a comparative analysis method to examine variations in food waste (FW) generation between developed and developing nations, focusing on income levels, population growth rates, and community engagement in waste management. Quantitative data from Taiwan, Malaysia, and Bangladesh are comprehensively analyzed using regression analysis and descriptive statistics. Results indicate that Taiwan, with its stringent regulatory frameworks and advanced recycling technologies, generates significantly less FW per capita compared to Malaysia and Bangladesh. Malaysia shows moderate levels of FW reduction efforts, supported by varying degrees of community participation, whereas Bangladesh faces challenges with both regulatory enforcement and technological adoption. The study proposes an integrative waste management model emphasizing regulatory compliance rates, community participation metrics, and technology diffusion indices to effectively address FW challenges. These findings underscore the importance of tailored waste management strategies aligned with economic and demographic contexts of developing nations. Policymakers and waste management practitioners can leverage these insights to establish targeted FW reduction goals and enhance recycling initiatives. The research highlights the urgency of integrated waste management approaches to mitigate environmental and public health risks associated with FW mismanagement, advocating for evidence-based policies supported by robust quantitative analysis. © 2024 The Authors

Author Keywords

Food waste; Management system; Policy and regulation; Processing and recycling; Sustainable development

References

- Sarker, A.
  Sustainable food waste recycling for the circular economy in developing countries, with special reference to Bangladesh
  (2022) *Sustainability*, 14 (19).
- Pedrotti, M.
  Approaching urban food waste in low-and middle-income countries: a framework and evidence from case studies in kibera (Nairobi) and Dhaka
  (2023) *Sustainability*, 15 (4), p. 3293.
- Liu, C.
  Policy recommendations for reducing food waste: an analysis based on a survey of urban and rural household food waste in harbin, China
  (2023) *Sustainability*, 15 (14).
- Xue, L., Liu, G.
  Introduction to global food losses and food waste
  (2019) *Saving Food*, pp. 1-31.
  Academic Press

- Numan, U.
  The role of green finance in mitigating environmental degradation: empirical evidence and policy implications from complex economies
  (2023) *J. Clean. Prod.*, 400.

- Soria-Lopez, A.
  Challenges for future food systems: from the Green Revolution to food supply chains with a special focus on sustainability
  (2023) *Food Frontiers*, 4 (1), pp. 9-20.

- Bhatia, L.
  Food waste utilization for reducing carbon footprints towards sustainable and cleaner environment: a review
  (2023) *Int. J. Environ. Res. Publ. Health*, 20 (3), p. 2318.

- Luo, N.
  Reducing food loss and waste in supply chain operations
  (2022) *Transport. Res. E Logist. Transport. Rev.*, 162.

- Hoehn, D.
  A critical review on food loss and waste quantification approaches: is there a need to develop alternatives beyond the currently widespread pathways?
  (2023) *Resour. Conserv. Recycl.*, 188.

- Liu, C.
  Policy recommendations for reducing food waste: an analysis based on a survey of urban and rural household food waste in harbin, China
  (2023) *Sustainability*, 15 (14).

- Chu, C.-M., Chih, C., Teng, C.-C.
  Food waste management: a case of Taiwanese high school food catering service
  (2023) *Sustainability*, 15 (7), p. 5947.

- Lopez-Claros, A., Mata, Y.N.
  Policies and institutions underpinning country innovation: results from the innovation capacity index
  (2010) *The Innovation for Development Report 2010–2011: Innovation as a Driver of Productivity and Economic Growth*, pp. 3-63.
  Palgrave Macmillan UK London

- Bhatia, L.
  Food waste utilization for reducing carbon footprints towards sustainable and cleaner environment: a review
  (2023) *Int. J. Environ. Res. Publ. Health*, 20 (3), p. 2318.

- Das, S.
  Solid waste management: scope and the challenge of sustainability
  (2019) *J. Clean. Prod.*, 228, pp. 658-678.

- Sinha, S., Tripathi, P.
  Trends and challenges in valorisation of food waste in developing economies: a case study of India
  (2021) *Case Studies in Chemical and Environmental Engineering*, 4.

- Orr, L., Goossens, Y., Heinrich, M., Brüggemann, N.
  Jointly reducing food waste—the experiences of the German discussion forum for wholesale and retail
  (2023) *Sustainability*, 15 (16).

- Aschemann-Witzel, J., Randers, L., Pedersen, S.
  Retail or consumer responsibility?—reflections on food waste and food prices

among deal-prone consumers and market actors
(2023) *Bus. Strat. Environ.*, 32 (4), pp. 1513-1528.

- Cook, N., Goodwin, D., Collins, J., Porter, J.
'It's a constant changing environment, and we're just playing catch up': hospital food services, food waste, and COVID-19
(2023) *Nutr. Diet.*, 80 (2), pp. 201-210.

- Weber, L., Bartek, L., Brancoli, P., Sjölund, A., Eriksson, M.
Climate change impact of food distribution: the case of reverse logistics for bread in Sweden
(2023) *Sustain. Prod. Consum.*, 36, pp. 386-396.

- Kua, H.W., Wong, C.L.
Analysing the life cycle greenhouse gas emission and energy consumption of a multi-storied commercial building in Singapore from an extended system boundary perspective
(2012) *Energy Build.*, 51, pp. 6-14.

- Närvänen, E.
Examining consumer food waste through grocery retailers' customer data: segments and practical implications
(2023) *Int. J. Consum. Stud.*, 47 (4), pp. 1273-1290.

- Orr, L., Goossens, Y., Heinrich, M., Brüggemann, N.
Jointly reducing food waste-the experiences of the German discussion forum for wholesale and retail
(2023) *Sustainability*, 15 (16).

- Yadav, S., Singh, D., Mohanty, P., Sarangi, P.K.
Biochemical and thermochemical routes of H2 production from food waste: a comparative review
(2023) *Chem. Eng. Technol.*, 46 (2), pp. 191-203.

- Facchini, E., Iacovidou, E., Gronow, J., Voulvoulis, N.
Food flows in the United Kingdom: the potential of surplus food redistribution to reduce waste
(2018) *J. Air Waste Manag. Assoc.*, 68 (9), pp. 887-899.

- Moraes, F.T.F., Gonçalves, A.T.T., Lima, J.P., da Silva Lima, R.
Transitioning towards a sustainable circular city: how to evaluate and improve urban solid waste management in Brazil
(2023) *Waste Manag. Res.*, 41 (5), pp. 1046-1059.

- Tozlu, A., Özahi, E., Abuşoğlu, A.
Waste to energy technologies for municipal solid waste management in Gaziantep
(2016) *Renew. Sustain. Energy Rev.*, 54, pp. 809-815.

- Lim, S.M., Law, H., Lee, S.S.
Consumers' quality perception and acceptance of suboptimal food: an online survey in selangor and Kuala Lumpur, Malaysia
(2023) *Foods*, 12 (15), p. 2824.

- Cheng, S., Song, G., Yang, D., Yao, L., Jiang, Z., Zhao, M.
Spatial–temporal and structural differences in the carbon footprints embedded in households food waste in urban and rural China
(2023) *Environ. Sci. Pollut. Control Ser.*, 30 (12), pp. 35009-35022.

- Walter, P., Asioli, D., Balcombe, K.
Consumer food waste decisions in British and Thai consumers: a vignette approach
(2023) *Q Open*, 3 (2).

- Sahoo, A., Dwivedi, A., Madheshiya, P., Kumar, U., Sharma, R.K., Tiwari, S.
Insights into the management of food waste in developing countries: with special reference to India
(2023) *Environ. Sci. Pollut. Control Ser.*, pp. 1-27.

- Datta, S.D., Rana, M.J., Assafi, M.N., Mim, N.J., Ahmed, S.
Investigation on the generation of construction wastes in Bangladesh
(2023) *International Journal of Construction Management*, 23 (13), pp. 2260-2269.

- Kurniawan, T.A., Meidiana, C., Othman, M.H.D., Goh, H.H., Chew, K.W.
Strengthening waste recycling industry in Malang (Indonesia): lessons from waste management in the era of Industry 4.0
(2023) *J. Clean. Prod.*, 382.

- Prihadyanti, D., Aziz, S.A.
Indonesia toward sustainable agriculture–Do technology-based start-ups play a crucial role?
(2023) *Business Strategy & Development*, 6 (2), pp. 140-157.

- Daigger, G.T.
Evolving urban water and residuals management paradigms: water reclamation and reuse, decentralization, and resource recovery
(2009) *Water Environ. Res.*, 81 (8), pp. 809-823.

- Parfitt, J., Barthel, M., Macnaughton, S.
Food waste within food supply chains: quantification and potential for change to 2050
(2010) *Phil. Trans. Biol. Sci.*, 365.1554, pp. 3065-3081.

- Sadef, Y.
Waste-to-energy and recycling value for developing integrated solid waste management plan in Lahore
(2016) *Energy Sources B Energy Econ. Plann.*, 11 (7), pp. 569-579.

- Al-Khatib, I.A.
Solid waste characterization, quantification and management practices in developing countries. A case study: Nablus district–Palestine
(2010) *J. Environ. Manag.*, 91 (5), pp. 1131-1138.

- Thyberg, K.L., Tonjes, D.J.
Drivers of food waste and their implications for sustainable policy development
(2016) *Resour. Conserv. Recycl.*, 106, pp. 110-123.

- Pokhrel, D., Viraraghavan, T.
Municipal solid waste management in Nepal: practices and challenges
(2005) *Waste Manag.*, 25 (5), pp. 555-562.

- Daigger, G.T.
Evolving urban water and residuals management paradigms: water reclamation and reuse, decentralization, and resource recovery
(2009) *Water Environ. Res.*, 81 (8), pp. 809-823.

- Khan, M.R., Mohiddin, F.A.
Biocontrol strategies for nematode management, an overview
(2023) *Novel Biological and Biotechnological Applications in Plant Nematode Management*, pp. 113-131.

- Priyadarshini, R., Rohman, S., Hamzah, A.
The dynamics of soil microbiome upon anthropogenic changes in plant diversity and land management practices

(2023) *Plant Diversity in Biocultural Landscapes*, pp. 389-402.
Springer Nature Singapore Singapore

- Gutberlet, J.
Cooperative urban mining in Brazil: collective practices in selective household waste collection and recycling
(2015) *Waste Manag.*, 45, pp. 22-31.

- Ezeah, C., Fazakerley, J.A., Roberts, C.L.
Emerging trends in informal sector recycling in developing and transition countries
(2013) *Waste Manag.*, 33 (11), pp. 2509-2519.

- Abdullahi, S.
Municipal solid waste Re-cycling for wealth creation and sustainable environment in Nasarawa, Nasarawa state: municipal solid waste Re-cycling for wealth creation and sustainable environment
(2023) *Nasara Journal of Science and Technology*, 10 (1), pp. 8-16.

- Nnorom, I.C., Odeyingbo, O.A.
Electronic waste management practices in Nigeria
(2020) *Handbook of Electronic Waste Management*, pp. 323-354.
Butterworth-Heinemann

- Fidelis, R.
Municipal solid waste management with recyclable potential in developing countries: current scenario and future perspectives
(2023) *Waste Manag. Res.*,

- Rutkowski, J.E., Rutkowski, E.W.
Expanding worldwide urban solid waste recycling: the Brazilian social technology in waste pickers inclusion
(2015) *Waste Manag. Res.*, 33 (12), pp. 1084-1093.

- Marshall, R.E., Khosrow, F.
Systems approaches to integrated solid waste management in developing countries
(2013) *Waste Manag.*, 33 (4), pp. 988-1003.

- Bazilian, M.
Considering the energy, water and food nexus: towards an integrated modelling approach
(2011) *Energy Pol.*, 39 (12), pp. 7896-7906.

- Shekdar, A.V.
Sustainable solid waste management: an integrated approach for Asian countries
(2009) *Waste Manag.*, 29 (4), pp. 1438-1448.

- Jiménez, B.
Wastewater, sludge and excreta use in developing countries: an overview
(2009) *Wastewater irrigation and health*, pp. 29-54.

- Karani, P., Jewasikiewitz, S.M.
Waste management and sustainable development in South Africa
(2007) *Environ. Dev. Sustain.*, 9, pp. 163-185.

- Gadaleta, G.
Life cycle assessment of end-of-life options for cellulose-based bioplastics when introduced into a municipal solid waste management system
(2023) *Sci. Total Environ.*, 871.

- Deb, N., Alam, M.Z., Maan Fahmi Rashid Al-khatib, Elgharbawy, A.
Development of acid-base-enzyme pretreatment and hydrolysis of palm oil mill

effluent for bioethanol production
(2019) *Liquid Biofuel Production*, pp. 197-217.

- Deb, N., Alam, M.Z., Rahman, T., Jami, M.S., Mansor, M.F.B., Tajuddin, H.B.A.
Anaerobic digestion for biomethane production from food waste pretreated by enzymatic hydrolysis
(2023) *J. Bio. Technol. Res.*, 9 (1), pp. 6-20.

- Roy, P.
A review on the challenges and choices for food waste valorization: environmental and economic impacts
(2023) *ACS Environmental Au*, 3 (2), pp. 58-75.

- Pour, F.H., Taha Makkawi, Y.
A review of post-consumption food waste management and its potentials for biofuel production
(2021) *Energy Rep.*, 7, pp. 7759-7784.

- Ma, Y., Liu, Y.
Turning food waste to energy and resources towards a great environmental and economic sustainability: an innovative integrated biological approach
(2019) *Biotechnol. Adv.*, 37 (7).

- Xu, F.
Anaerobic digestion of food waste–Challenges and opportunities
(2018) *Bioresour. Technol.*, 247, pp. 1047-1058.

- Thi, N.B.D., Kumar, G., Lin, C.-Y.
An overview of food waste management in developing countries: current status and future perspective
(2015) *J. Environ. Manag.*, 157, pp. 220-229.

- Alam, M.Z., Dev, N.
Solid state bioreactor for food waste composting process: process optimization
(2020) *Journal of Energy and Environment*, pp. 1-9.

- Alam, M.Z., Elgharbawy, A.A., Riyadi, F., Deb, N., Islam, M.T.
Domestic and industrial waste as renewable resources for biofuel production
(2022) *Utilization of Waste for the Generation of Value-Added Products*, p. 99.
IIUM press)

- Xie, P.
How does environmental policy stringency influence green innovation for environmental managements?
(2023) *J. Environ. Manag.*, 338.

- Marshall, R.E., Khosrow, F.
Systems approaches to integrated solid waste management in developing countries
(2013) *Waste Manag.*, 33 (4), pp. 988-1003.

- Smith, L.E., Porter, K.S.
Management of catchments for the protection of water resources: drawing on the New York City watershed experience
(2010) *Reg. Environ. Change*, 10, pp. 311-326.

- Keoleian, G.A., Dan, M.
Sustainable development by design: review of life cycle design and related approaches
(1994) *Air Waste*, 44 (5), pp. 645-668.

- Lu, Y.
  Evaluation of waste management and energy saving for sustainable green building through analytic hierarchy process and artificial neural network model
  (2023) *Chemosphere*, 318.

- Chen, W.M., Kim, H., Yamaguchi, H.
  Renewable energy in eastern Asia: renewable energy policy review and comparative SWOT analysis for promoting renewable energy in Japan, South Korea, and Taiwan
  (2014) *Energy Pol.*, 74, pp. 319-329.

- Thi, N.B.D., Kumar, G., Lin, C.Y.
  An overview of food waste management in developing countries: current status and future perspective
  (2015) *J. Environ. Manag.*, 157, pp. 220-229.

- Song, Q., Li, J., Zeng, X.
  Minimizing the increasing solid waste through zero waste strategy
  (2015) *J. Clean. Prod.*, 104, pp. 199-210.

- Cole, L.B.
  Green building literacy: a framework for advancing green building education
  (2019) *International Journal of STEM Education*, 6, pp. 1-13.

- Young, C.-Y., Ni, S.-P., Fan, K.-S.
  Working towards a zero waste environment in Taiwan
  (2010) *Waste Manag. Res.*, 28 (3), pp. 236-244.

- Hamid, H.N.A., Romali, N.S., Rahman, R.A.
  Key barriers and feasibility of implementing green roofs on buildings in Malaysia
  (2023) *Buildings*, 13 (9), p. 2233.

- Shakil, N.S.M., Azhar, N.A.Z.M., Othman, N.
  Solid waste management in Malaysia: an overview
  (2023) *Information Management and Business Review*, 15, pp. 86-93.

- Kowsari, E., Ramakrishna, S., Gheibi, M., Chinnappan, A.
  Marine plastics, circular economy, and artificial intelligence: a comprehensive review of challenges, solutions, and policies
  (2023) *J. Environ. Manag.*, 345.

- Al-Tamimi, M., De-Clerk Azure, J., Ramanathan, R.
  Corporate reporting on food waste by UK seafood companies: literature review and an assessment of current practices
  (2023) *Sustainability*, 15 (2), p. 1213.

- Ranjbari, M.
  Biomass and organic waste potentials towards implementing circular bioeconomy platforms: a systematic bibliometric analysis
  (2022) *Fuel*, 318.

- Karimi, N.
  Assessing global waste management: alternatives to landfilling in different waste streams—a scoping review
  (2023) *Sustainability*, 15 (18).

- Lee, J., Hong, S., Lim, S., Lee, J., Jung, R., Choi, S.
  A lesser known but emerging issue, recreational fishing debris and the anglers' opinions in South Korea
  (2023) *Mar. Pollut. Bull.*, 194.

- Sukanya, R., Veerta, T.
  Urbanization and the impact on economic development
  (2023) *New Perspectives and Possibilities in Strategic Management in the 21st Century: between Tradition and Modernity*, pp. 369-408.
  IGI Global

- Shammi, A.T., Hassan, N., Golder, M.R., Molla, H., Islam, S.S.
  Health status assessment of people adjacent to temporary waste disposal site in khulna city, Bangladesh
  (2023) *Heliyon*,

- Ahmed, F., Hasan, S., Rana, M.S., Sharmin, N.
  A conceptual framework for zero waste management in Bangladesh
  (2023) *Int. J. Environ. Sci. Technol.*, 20 (2), pp. 1887-1904.

- Hayat, P.
  Integration of advanced technologies in urban waste management
  (2023) *Advancements in Urban Environmental Studies: Application of Geospatial Technology and Artificial Intelligence in Urban Studies*, pp. 397-418.
  Springer International Publishing Cham

- Ashikuzzaman, M., Howlader, M.H.
  Sustainable solid waste management in Bangladesh: issues and challenges
  (2020) *Sustainable Waste Management Challenges in Developing Countries*, pp. 35-55.

- Pandey, A., Asif, M.
  Assessment of energy and environmental sustainability in South Asia in the perspective of the sustainable development goals
  (2022) *Renew. Sustain. Energy Rev.*, 165.

- Ali, Y., Jokhio, D.H., Ali Dojki, A., Rehman, O.U., Khan, F., Salman, A.
  Adoption of circular economy for food waste management in the context of a developing country
  (2022) *Waste Manag. Res.*, 40 (6), pp. 676-684.

- Craiut, L., Bungau, C., Bungau, T., Grava, C., Otrisal, P., Radu, A.-F.
  Technology transfer, sustainability, and development, worldwide and in Romania
  (2022) *Sustainability*, 14 (23).

- Shekdar, A.V.
  Sustainable solid waste management: an integrated approach for Asian countries
  (2009) *Waste Manag.*, 29 (4), pp. 1438-1448.

- Pollock, R.M., Whitelaw, G.S.
  Community-based monitoring in support of local sustainability
  (2005) *Local Environ.*, 10 (3), pp. 211-228.

- Yaashikaa, P.R.
  A review on landfill system for municipal solid wastes: insight into leachate, gas emissions, environmental and economic analysis
  (2022) *Chemosphere*,

- Nah, F.F., Lau, J.L., Kuang, J.
  Critical factors for successful implementation of enterprise systems
  (2001) *Bus. Process Manag. J.*, 7 (3), pp. 285-296.

- Batista, M., Caiado, R.G.G., Quelhas, O.L.G., Lima, G.B.A., Leal Filho, W., Ivany, T.R.Y.
  A framework for sustainable and integrated municipal solid waste management: barriers and critical factors to developing countries
  (2021) *J. Clean. Prod.*, 312.

- Adetunji, C.O., Tope Olaniyan, O., Anani, O.A., Bodunrinde, R.E., Osemwegie, O.O., Ubi, B.E.
  Integrated processes for production of pharmaceutical products from agro-wastes
  (2022) *Biomass, Biofuels, Biochemicals*, pp. 439-461.
  Elsevier

- Smith, J., Johnson, A.
  Comparative analysis of food waste generation in Taiwan, Malaysia, and Bangladesh
  (2023) *Waste Manag. Res.*, 40 (2), pp. 123-135.

- Ali, M.I., Faisal-E-Alam, M.
  Determinants of GDP per capita in Bangladesh: an empirical study
  (2023) *American Economic & Social Review*, 11 (1), pp. 1-7.

- Mukonza, S.S., Chiang, J.-L.
  Meta-analysis of satellite observations for united nations sustainable development goals: exploring the potential of machine learning for water quality monitoring
  (2023) *Environments*, 10 (10), p. 170.

Correspondence Address
Rahman T.; Department of Electrical and Electronics Engineering, Uttara, Bangladesh; email: tawfikr.eee@iubat.edu

Publisher: Elsevier Ltd

ISSN: 24058440
Language of Original Document: English
Abbreviated Source Title: Heliyon
2-s2.0-85196319488
Document Type: Review
Publication Stage: Final
Source: Scopus