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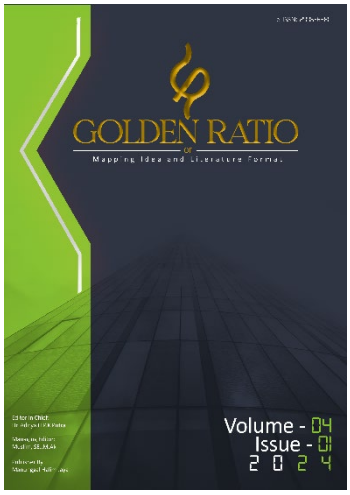

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MAPPING IDEA & LITERATURE FORMAT

Bridging the Gap: Tailoring Waste Management Strategies for Sustainable Outcomes in Developing Countries

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Abstract This research aims to explore the effectiveness of tailored waste management strategies in developing countries, drawing lessons from both successful models in similar economies and advanced practices in developed countries. By examining case studies like Teocelo, Veracruz in Mexico, and analyzing the ambitious waste management targets of the European Union, this study proposes a hybrid approach that integrates community-based strategies, formal and informal sector collaboration, and customized regional policies. Through qualitative and quantitative analysis, this research seeks to test propositions related to the adaptation of waste management strategies, the role of community engagement, and the potential for developing countries to leapfrog to sustainable waste management practices by learning from developed nations. The goal is to identify scalable and sustainable waste management practices that can address the unique challenges faced by developing countries, while also contributing to global environmental goals. This research contributes to the literature by offering a nuanced understanding of how developing countries can navigate the complexities of waste management by adopting, adapting, and innovating practices suited to their socio-economic and environmental contexts. By bridging the gap between the advanced waste management systems of developed countries and the emerging practices in developing nations, this study aims to provide actionable insights for policymakers, environmental managers, and community leaders working towards sustainable waste management solutions.

Keywords: Waste Management, Developing Countries, Sustainable Practices, Community Engagement, Circular Economy, Formal and Informal Sectors.

JEL Classification Code: Q53, O13, R11

1. INTRODUCTION

The comparison of waste management policies between developing and developed countries reveals several key differences and lessons learned. Developed countries, such as those in the European Union, have advanced waste management techniques and strict laws, leading to effective waste services and reduced health hazards (Srivastava 2016, Hoareau 2021). In contrast, developing countries often face challenges such as limited economic capacity, leading to a focus on improving disposal systems (Brunner 2007). Successful cases, such as Teocelo, Veracruz in Mexico, highlight the importance of community involvement and waste separation (Medina-Salas 2020). The evolution of waste management in developing countries underscores the need for new approaches and the importance of technology, economic feasibility, and environmental sustainability (Maalouf 2023). Challenges in sustainable industrial waste management in Asian countries include illegal waste disposal and the lack of regulation, awareness, funding, technology, and skilled manpower (Mallak). Integrated sustainable waste management, which considers both physical components and governance aspects, has shown significant improvement in performance in developing countries (Wilson 2013).

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In the intricate tapestry of global environmental challenges, waste management stands out as a critical thread interwoven with the sustainability of our planet. The disparity in waste management policies between developing and developed countries offers a rich field of study, highlighting not only the differences in approaches and technologies but also the lessons that can be mutually learned. This research aims to delve into the complexities of waste management across the spectrum of national development, seeking to understand how policies, practices, and outcomes vary between these two distinct groups of countries. Developed countries, with their advanced technological infrastructure and resources, have implemented sophisticated waste management systems that emphasize waste reduction, recycling, and energy recovery. These nations often adopt a circular economy approach, aiming to minimize waste and maximize the reuse and recycling of resources. On the other hand, developing countries face a myriad of challenges in managing waste effectively, including limited financial resources, lack of technical expertise, and inadequate infrastructure. However, these challenges are not insurmountable; they present an opportunity for innovation, adaptation, and the development of unique solutions tailored to local contexts.

The juxtaposition of waste management policies in developing and developed countries reveals a complex landscape of successes, failures, and ongoing challenges. By comparing these approaches, this research seeks to uncover the underlying principles that can guide more effective waste management practices globally. It explores the potential for technology transfer, policy adaptation, and international cooperation in bridging the gap between the waste management practices of developed and developing countries. This study not only aims to provide a comprehensive overview of the current state of waste management but also to identify actionable lessons that can be applied universally. Through this comparative analysis, we aspire to contribute to the global dialogue on sustainable waste management, offering insights that could inform policymaking, foster international collaboration, and ultimately, drive progress towards a more sustainable and waste-resilient world.

2. LITERATURE REVIEW PROCEDURE

In the evolving landscape of waste management, a symphony of efforts, challenges, and innovations plays across the globe, distinguishing the practices of developing countries from their developed counterparts. This narrative weaves through the findings of various scholars who have delved deep into the realm of waste management, uncovering the nuances that define and differentiate the global approach towards sustainable waste management. R. Srivastava, in 2016, laid the groundwork by emphasizing the urgent need for advanced waste management techniques and proper laws in developing countries. This study illuminated the necessity of effective waste management strategies, highlighting the dual nature of waste management techniques, and underscoring the importance of local authorities and public awareness in the nuanced dance of waste management practices. Srivastava's work stands as a beacon, signaling the necessity for synchronized strategies that cater to the environmental benefits and challenges posed by waste management techniques, particularly in developing nations.

Parallelly, the tale of Teocelo, Veracruz in Mexico, as narrated by Lorena De Medina-Salas et al. in 2020, showcases a beacon of success amidst the challenges faced by developing countries. This narrative unfolds the community's commitment to environmental care, painting a vivid picture of a successful waste management model that thrives on the participation of its inhabitants since the year 2000. This model, characterized by the separation of organic and inorganic waste and a collective effort towards environmental stewardship, offers a glimmer of hope and a potential pathway for other communities grappling with waste management challenges. P. Brunner and J. Fellner in 2007, challenge the conventional waste hierarchy of prevention, recycling, and disposal, arguing that these strategies may not suit regions with limited spending capacity on waste management. Their insights call for a tailored approach, where improving disposal systems such as complete collection and upgrading to sanitary landfilling are deemed more appropriate. This perspective not only critiques the one-size-fits-all approach to waste management but also highlights the importance of customizing strategies based on the economic capacities of each region. Venturing into the realm of sustainable technology, Carol Emilly Hoareau et al. in 2021, elevate the discourse by examining the waste management systems of

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European Union member states. Their analysis brings to light the significance of sustainable municipal solid waste management, tying it to global environmental goals and showcasing the EU's ambitious targets for recycling and landfill reduction by 2030. This narrative underscores the exemplary role of EU member states in championing sustainable development and waste management, setting a precedent for the rest of the world.

As the narrative unfolds, A. Maalouf and P. Agamuthu in 2023, chart the dramatic increase in municipal solid waste generated in developing nations over the last five decades. Their work not only highlights the burgeoning challenge of waste management in these regions but also emphasizes the importance of finding new, integrated, and sustainable waste management approaches that align with the Sustainable Development Goals. Their insights point towards a future where the principles of the circular economy could guide the development of more sustainable waste management systems in developing countries. Through the lens of these scholars, the narrative of waste management traverses the spectrum from challenges to successes, from conventional approaches to innovative solutions, and from localized efforts to global strategies. This rich tapestry of research and findings offers a comprehensive overview of the state of waste management across the globe, underscoring the urgent need for synchronized, innovative, and tailored strategies that bridge the gap between developing and developed nations. It is a narrative that calls for collaboration, innovation, and a steadfast commitment to environmental stewardship as the world marches towards a more sustainable and waste-resilient future.

3. CONCLUSION AND PROPOSITION

Based on the synthesized narrative and interpretations of existing research on waste management practices across developing and developed countries, the following hypotheses/propositions are proposed for future research:

Proposition 1: Implementing community-based waste management strategies, akin to the successful model observed in Teocelo, Veracruz, Mexico, can significantly enhance waste segregation and recycling rates in developing countries.

Proposition 2: Adapting waste management strategies based on the economic capacities and specific regional characteristics of developing countries will lead to more sustainable and effective waste management systems compared to adopting a one-size-fits-all approach.

Proposition 3: The integration of formal and informal sectors in waste management, leveraging the strengths of both, will improve recycling rates and environmental outcomes in developing countries.

Proposition 4: The adoption of EU's ambitious waste management and recycling targets by developing countries, tailored to their unique socio-economic contexts, can significantly reduce landfill dependency and promote a circular economy.

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Table 1: Mapping Literature

Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
Waste Management : Developed and Developing Countries	R. Srivastava	2016	Advanced waste management techniques and proper laws are required in developing countries.	The main findings include the necessity of effective waste management strategies, the dual nature of waste management techniques, and the importance of local authorities and awareness in developed countries, as well as the need for advanced techniques and proper laws in developing countries.	The "state of the art" in waste management according to R. Srivastava (2016) involves the need for effective strategies to control waste production and disposal, the recognition of both environmental benefits and negative impacts of waste management techniques, and the importance of laws, local authorities, and public awareness in developed countries. Additionally, there is a focus on the requirement of advanced techniques and proper laws in developing countries, along with the need to minimize waste and utilize it instead of dumping.	The novelty in R. Srivastava (2016) lies in its emphasis on the need for synchronized waste management strategies, the discussion of environmental benefits and negative impacts of waste management techniques, and the focus on the role of laws, local authorities, and awareness in waste management. Additionally, it highlights the specific requirements for waste management in developing countries.
Waste Management: Developed and Developing	R. Srivastava	2016	Advanced waste management techniques and proper laws are required in developing countries.	The main findings include the necessity of effective waste management strategies, the dual nature of waste management techniques, and the importance of local authorities and awareness in developed countries, as well as the need for advanced techniques and proper laws in developing countries.	The "state of the art" in waste management according to R. Srivastava (2016) involves the need for effective waste management strategies, consideration of both environmental benefits and negative impacts of waste management techniques, and the importance of laws, local authorities, and awareness in waste management. It also highlights the requirement for advanced techniques and proper laws in developing countries and the need to minimize waste through avoidance methods and utilization.	The novelty in R. Srivastava (2016) lies in its emphasis on the need for synchronized waste management strategies, the discussion of environmental benefits and negative impacts of waste management techniques, and the importance of improvisation of laws and advanced techniques in waste management in both developed and developing countries.
A Successful Case in Waste Management in Developing Countries	Lorena De Medina-Salas, Eduardo Castillo-Gonz ¡lez, Mario Rafael Giraldi-D az, V.	2020	The inhabitants of Teocelo, Veracruz in Mexico have been contributing to waste	The main findings include the challenges faced by developing countries in waste	The "state of the art" in Lorena De Medina-Salas, Eduardo Castillo-Gonz ¡lez, Mario Rafael Giraldi-D -	The novelty in the paper is the successful case of waste management in Teocelo,

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
	. F. ¡ndez-Rosales, Carlos Manuel Welsh Rodr guez		management in different ways since the year 2000.	management, successful cases due to environmental policies, common waste burning practices in rural areas, and the successful waste management model in Teocelo, Veracruz. The community's commitment to environmental care is also highlighted.	az, V. . F. ¡ndez-Rosales, Carlos Manuel Welsh Rodr guez (2020) involves challenges in waste management in developing countries, successful waste management practices in certain localities, and the importance of environmental care for current and future generations.	Veracruz, Mexico, where the inhabitants have been contributing to waste management in different ways since the year 2000, separating their waste into organic and inorganic fractions and managing them accordingly. The paper also highlights the importance placed on environmental care by the inhabitants for both current and future generations.
Setting priorities for waste management strategies in developing countries	P. Brunner, J. Fellner	2007	The waste hierarchy of prevention, recycling, and disposal is not an appropriate strategy for regions spending 1-10 capita-year-for waste management in less developed regions.	The main findings include that the waste hierarchy of prevention, recycling, and disposal is not suitable for regions with limited spending capacity on waste management. Instead, improving disposal systems like complete collection and upgrading to sanitary landfilling is recommended. Additionally, incineration and mechanical waste treatment are not suitable methods for waste management in such regions. It is suggested that each region determines its economic capacity for waste management and designs its waste management system accordingly.	The "state of the art" in P. Brunner, J. Fellner (2007) is the comparison of waste management systems in affluent and less developed regions, highlighting the limitations of the 'waste hierarchy' approach in regions with limited spending capacity and recommending the improvement of disposal systems as a cost-effective method to achieve waste management objectives. The paper also emphasizes the need for each region to determine its economic capacity for waste management and design its system accordingly.	The novelty in P. Brunner, J. Fellner (2007) is the recommendation to tailor waste management systems based on the economic capacity of each region, rather than applying traditional waste hierarchy concepts or methods widely used in developed countries.

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
Sustainable Technology in Developed Countries: Waste Municipal Management	Carol Emilly Hoareau, Noraziah Ahmad, Maria Nuid, Rubiyatno, D. N. Khoi, R. A. Kristanti	2021	The waste management systems of European Union member states can be considered exemplary.	The main findings of the paper emphasize the significance of sustainable municipal solid waste management in the context of global environmental goals, the challenges and environmental concerns associated with waste management, and an overview of the primary waste management technologies used in the EU.	The state of the art in the paper revolves around the emphasis on sustainable development and waste management, including the prohibition of landfills in some EU countries and the goal to recycle 65 percent of municipal waste and limit landfills to a maximum of 10% by 2030. The paper also highlights the exemplary waste management systems in EU member states.	The novelty in the paper lies in its emphasis on sustainable development, waste prevention, and the promotion of a circular economy in the EU, as well as the specific targets set for recycling and landfill reduction by 2030. The implementation of the 2008 Waste Framework Directive and the 2018 Circular Economy Package are also highlighted as novel approaches to waste management and sustainable development.
Waste management evolution in the last five decades in developing countries – A review	A. Maalouf, P. Agamuthu	2023	The amount of municipal solid waste generated in developing nations in the last five decades has increased from about 0.64 billion Mt in 1970 to 2 billion Mt in 2019.	The main findings are: - The amount of municipal solid waste (MSW) in developing countries has significantly increased from 1970 to 2019. - The importance of finding new waste management (WM) approaches in developing nations is highlighted, emphasizing the need for policies and strategies to address the re-defined WM trends. - The paper presents changes in technology, economic and environmental feasibility aspects to achieve an	The "state of the art" in A. Maalouf, P. Agamuthu (2023) involves an increase in municipal solid waste (MSW) generation in developing countries over the last five decades, the importance of finding new waste management approaches, holistic changes in technology, economic and environmental feasibility aspects, specific focus on various waste management issues, and investigation of drivers for the way forward including circular economy.	The novelty in A. Maalouf, P. Agamuthu (2023) lies in its presentation of a novel estimation of the amount of municipal solid waste generated in developing nations over the last five decades, as well as its emphasis on finding new waste management approaches and highlighting major trends that redefine waste management in these countries. It also presents holistic changes in technology, economic and environmental feasibility aspects to achieve an integrated sustainable waste

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
				integrated sustainable WM system in developing countries, with a specific focus on various aspects such as open-burning, open-dumping, informal recycling, food waste, plastic pollution, and waste collection, all in reference to Sustainable Development Goals. Additionally, it investigates drivers for the way forward, including the circular economy.		management system, with a specific focus on various aspects such as open-burning, open-dumping, informal recycling, food waste, plastic pollution, and waste collection with reference to Sustainable Development Goals. Furthermore, the paper investigates drivers for the way forward, including the concept of circular economy.
Overview of Waste Management Performance of Industrial Sectors by Selected Asian Countries: Current Practices and Issues	S. Mallak, F. Elfghi, Premkumar Rajagopal, V. Vaezzadeh, Marziye Fallah	-	Landfill disposal is the most practiced method for handling industrial solid wastes among Asian countries.	The main findings of the paper are the prevalence of landfill disposal for industrial solid wastes in Asian countries and the main hindrances to sustainable industrial waste management in these countries.	The "state of the art" in the paper involves discussing the challenges faced by low-income and developing Asian countries in managing industrial waste sustainably, the common method of landfill disposal for industrial solid waste, the increase in illegal industrial waste disposal due to land scarcity, and the identified hindrances to sustainable industrial waste management.	The novelty in the paper lies in its focus on the challenges and approaches in sustainable solid waste management in Asian countries, particularly the increase in illegal industrial waste disposal and the lack of attention to waste minimization as a sustainable strategy.
Integrated sustainable waste management in developing countries	David C. Wilson, C. Velis, L. Rodić	2013	Integrated sustainable waste management examines both the physical components (collection, disposal and recycling) and the governance aspects in developed countries.	-	-	-
Waste Disposal and Pollution Management	J. A. Awomeso, A. Taiwo, A. Gbadebo, A. O. Arimoro	2010	Poor industrial waste disposal systems are basic features in rural	The main findings of the paper include the need for	The state of the art in waste management in developing	The novelty in the paper lies in its emphasis on the

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
in Urban Areas: A Workable Remedy for the Environment in Developing Countries			settlements, semi-urban areas and urban centers of the developing world.	proper waste management and efficient waste disposal techniques in developing countries, the recommendation for private participation in waste management and the encouragement of composting of organic wastes, and the emphasis on the importance of understanding the types and sources of waste for effective waste management.	countries involves a multi-faceted approach that includes simple yet efficient waste disposal techniques, recycling and waste reduction at the source, challenges in waste collection and disposal, use of biological waste recycling agents, effectiveness of user charges technique, and the importance of adequate information and training.	necessity of proper waste management, efficient waste disposal techniques, and the introduction of appropriate technologies and facilities for environmental protection in developing countries. It also highlights the importance of providing adequate information and training on waste disposal techniques and new technologies.
Environmental management of urban solid wastes in developing countries : a project guide	S. Cointreau	1982	The establishment of an acceptable standard of collection and disposal service delivery is discussed in the project guide.	The main findings include a summary of current Bank objectives, policies, and project requirements related to solid waste management, reflection of lessons and experience gained from the World Bank solid waste projects, and discussion of various aspects such as technology selection, action plans, financial resources, regulatory support, public education, and case studies on refuse collection and disposal activities in developing countries.	The "state of the art" in S. Cointreau (1982) is the planning and implementation of solid waste management improvements in urban areas, incorporating lessons and experience from World Bank projects, establishment of standards for waste collection and disposal, technology selection, phased action plans, institutional arrangements, financial resources, regulatory and enforcement support services, public education and participation programs, and incentives/disincentives for project success. It also includes information on solid waste generation rates and compositions for countries of various economic development levels, as well as case studies on	The novelty in S. Cointreau (1982) lies in its comprehensive approach to planning and implementing solid waste management improvements, incorporating lessons from World Bank projects, and providing information on solid waste generation rates, compositions, and case studies in developing countries.

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
					refuse collection and disposal activities in developing countries.	
Benchmarking approaches and methods in the field of urban waste management	Walter Leal Filho, Luciana Londero Brandli, Harri Moora, Jolita Kruopienė, Åsa Stenmarck	2016	The wide range of approaches and available technologies in the field of urban waste management are not being fully used.	The main findings of the paper are: - Despite the importance of solid waste management in the urban environment, there is much room for improvement in the ways in which many municipalities across the world handle the issue. - The ever-growing amounts of solid waste being produced across the world, especially in developing countries, are mostly due to problems such as lack of policies and financing, as well as the non-availability of irregular services. - There is a general lack of governance in the field of urban waste management, which makes it difficult to use waste management systems for improved urban ecological infrastructure.	The state of the art in Walter Leal Filho, Luciana Londero Brandli, Harri Moora, Jolita Kruopienė, Åsa Stenmarck (2016) indicates that there is a need for improvement in the ways municipalities across the world handle solid waste management. There is also a lack of research specifically focusing on integrated urban waste management, underutilization of available technologies, and a general lack of governance in the field. The paper also highlights experiences from Latin America, Asian countries, and the European Union new Member States, particularly the Baltic States.	The novelty in the paper lies in its focus on the need for improvement in solid waste management in municipalities across the world, particularly in developing countries. It also emphasizes the lack of research on integrated urban waste management and the underutilization of available technologies in this field. Furthermore, it highlights the general lack of governance, making it difficult to use waste management systems for improved urban ecological infrastructure.
Waste Management in Developing Asia	A. Ray	2008	A high degree of bilateral, regional, or multilateral cooperation may be a better option for these countries.	The main findings of the paper are that economic growth takes precedence over waste management in developing Asian countries, and cooperation among countries is suggested as a	The "state of the art" in waste management in Asia is characterized by a focus on economic growth over waste management and a recommendation for international cooperation to develop modern waste management models.	The novelty in A. Ray (2008) lies in its emphasis on the need for greater international engagement in waste management, its critical examination of the factors behind increasing trade in

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
				better option for developing appropriate waste management capacities and techniques.		recyclable wastes, and its suggestion of cooperation among countries as a better option for developing appropriate waste management capacities.
Planning for Future Waste Management Operations in Developing Countries	P. Rushbrook, E. E. Finnecy	1988	The preparation of a thorough and effective plan is a lengthy task if done manually.	The main findings of the paper are: - Waste management facilities must be appropriately designed, engineered, and managed to meet rising expectations of environmental improvement. - The use of computer models can assist in the preparation of thorough and effective waste management plans.	The "state of the art" in waste management in P. Rushbrook, E. E. Finnecy (1988) involves the need for appropriately designed and engineered disposal facilities in response to rising environmental expectations, as well as the potential benefits of using computer models to assist in waste management planning. There are also existing waste management models used by waste managers for plan production and updates.	-
Waste management plan for higher education institutions in developing countries: The Continuous Improvement Cycle model	Enelton Fagnani, José Roberto Guimarães	2017	The proposed methodology is perfectly suitable for developing countries with high efficiency and low cost.	The Waste Management Plan based on Continuous Improvement Cycle is simpler and more suitable for inexperienced managers, leading to significant reductions in recyclable material wasted, particularly paper. The methodology is well-suited for developing countries, offering high efficiency and low cost, leading to greener universities.	The "state of the art" in the paper includes the discussion of waste management in higher education institutions, implementation of a Waste Management Plan based on Continuous Improvement Cycle, comparison of different scenarios before and after the implementation of the plan, percentage changes in recyclable material wasted and paper waste, management of chemical waste and construction waste, discussion of environmental awareness aspects, difficulties, and solutions, and the suitability of the	The novelty in the paper lies in the introduction of a Waste Management Plan based on Continuous Improvement Cycle tailored for higher education institutions in developing countries, emphasizing its simplicity, suitability for inexperienced managers, and cost-effectiveness. The discussion of environmental awareness aspects and solutions further adds to its novelty. (novelty: high)

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
					proposed methodology for developing countries.	
Waste mismanagement in developing countries: A case study of environmental contamination	Navarro Ferronato, V. Torretta, M. Ragazzi, E. Rada	2017	Solid waste management in developing countries represents a dangerous issue due to environmental impacts and human illnesses triggered by waste releases in water bodies and by the practice of the open burning, which are mostly underestimated by the governments.	The main finding of the paper is that solid waste management in developing countries, particularly in low-middle income countries like Bolivia, poses significant environmental and social challenges due to the release of waste in water bodies and open burning, which are often underestimated by governments. The lack of economic funding, public awareness, technological facilities, and know-how exacerbates the situation, leading to low hopes of improvement.	The "state of the art" in Navarro Ferronato, V. Torretta, M. Ragazzi, E. Rada (2017) is the dangerous issue of solid waste management in developing countries due to environmental impacts and human illnesses, exacerbated by lack of economic funding, public awareness, technological facilities, and know-how. The paper also proposes a field work in a Bolivian city as an example of current solid waste management activity and provides estimations about environmental impacts along with suggestions.	The novelty in Navarro Ferronato, V. Torretta, M. Ragazzi, E. Rada (2017) lies in its proposal of field work within a Bolivian city as an example of current solid waste management activity in a low-middle income country, highlighting environmental and social issues. It also provides estimations about environmental impacts and suggestions.
A Practical Approach to Future Municipal Solid Waste Management in Developing Countries-A Closer Look at Georgetown, Guyana	A. Závodská	2009	A quick, practical, cost-effective, and environmentally sound checklist could be followed by solid waste planners in developing countries.	The main findings of the paper are the development of a conceptual methodology for MSWM strategies in developing nations and the creation of a ten-point checklist for solid waste planners in developing countries.	The "state of the art" in A. Závodská (2009) is the development of a conceptual methodology for MSWM strategies in developing nations, emphasizing the need for practical solutions due to limited data and funding. The paper also provides a ten-point checklist for solid waste planners in developing countries and compares the MSWM situation in Guyana with that in the United States.	The novelty in A. Závodská (2009) lies in the development of a rapid assessment tool in the form of a ten-point checklist for solid waste planners in developing countries, which is quick, practical, cost-effective, and environmentally sound. This tool addresses the need for MSWM strategies in developing nations with limited and constrained data.

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
Comparative analysis of solid waste management in 20 cities	David C. Wilson, L. Rodić, A. Scheinberg, C. Velis, G. Alabaster	2012	The informal sector in many developing country cities delivers recycling rates that are comparable with modern Western systems.	The main findings include the diversity of successful waste management models, the importance of reliable data and governance, and the critical role of the informal sector in waste management in developing countries.	The state of the art in waste management includes the recognition of diverse successful models, the importance of reliable data, the emphasis on governance and technology, and the need to leverage the existing strengths of the city. Additionally, the critical role of the informal sector in waste management in many developing countries is highlighted, showcasing its cost-saving benefits and potential for win-win solutions.	The novelty in the paper lies in its emphasis on the diversity of successful waste management models, the importance of good data, the need to focus on governance as well as technology, and the critical role of the informal sector in waste management in developing countries.
Planning for future waste management operations in developing countries	P. E. Rushbrook, E. E. Finnecy	1988	The preparation of a thorough and effective plan is a lengthy task if done manually.	The main findings of the paper include the need for adaptation of waste management methods to prevailing circumstances, common needs that must be addressed by all nations for better waste management, and the importance of appropriately designed and engineered disposal facilities to meet rising environmental expectations.	The state of the art in waste management is described as needing to be adapted to the specific circumstances of each location, with no single correct method for proper waste management. Adequate knowledge of the types and quantities of waste, as well as its sources and producers, is necessary. Forecasting future waste circumstances is difficult, requiring an administrative mechanism for up-to-date data. Rising environmental expectations necessitate appropriately designed and managed disposal facilities. The use of computer models to assist in the preparation of waste management plans is also mentioned.	The novelty in the paper lies in the discussion of rising expectations of environmental improvement and the need for appropriately designed disposal facilities, as well as the introduction of the benefits of using computer models to assist in waste management planning.
Waste Mismanagement in Developing	Navarro Ferronato, V. Torretta	2019	Open dumping and open burning are the main	The main findings are that the environmental impacts of	-	-

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Title	Authors	Year	Abstract summary	Main findings	State of the art	Novelty
Countries: A Review of Global Issues			implemented waste treatment and final disposal systems in low-income countries.	solid waste mismanagement are pervasive worldwide, and the inclusion of the informal sector can be a viable way to improve recycling rates and reduce waste inflow into final disposal sites in developing countries. Future management plans require specific collection and treatment solutions for each type of waste produced in municipal areas.		
Solid waste characterization, quantification and management practices in developing countries. a case study: Nablus district - Palestine.	Issam A Al-Khatib, Maria Monou, Abdul Salam F Abu Zahra, Hafez Q Shaheen, Despo Kassinos	2010	Solid waste management is one of the most challenging issues faced by developing countries that suffer from serious pollution problems caused by the generation of large waste quantities.	The main findings are: - Per capita waste generation rates varied between different localities although trends were similar. - The majority of waste was organic (65.1% by weight), suggesting a strong resource recovery potential in terms of animal feed or compost. - SWM operators highlighted problems with disposing in unsanitary landfills, ineffective solid waste fees system, increasing solid waste quantities and lacking equipment and experienced personnel. To enhance sustainable SWM, public awareness, funding, expertise, equipment and facilities and other provisions currently	The "state of the art" in Issam A Al-Khatib, Maria Monou, Abdul Salam F Abu Zahra, Hafez Q Shaheen, Despo Kassinos (2010) is the presentation of a case study on solid waste management in the Nablus district - Palestine, including surveys, field investigations, waste measurements, and characterizations. It also highlights the composition of waste, issues faced by SWM operators, and the need for provisions to enhance sustainable SWM.	The novelty in the paper lies in its focus on the waste generation rates and composition in the Nablus district, along with the challenges faced by SWM operators and the proposed solutions to enhance sustainable SWM.

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				lacking or inappropriate must be provided.		
Comparative analysis of solid waste management in cities around the world	David C. Wilson, L. Rodic-Wiersma, A. Scheinberg, G. Alabaster	2010	The informal recycling sector in many developing country cities deliver recycling rates comparable to modern Western systems.	The paper presents a new data set on waste management in 20 cities, provides process flow diagrams for each city, and emphasizes the importance of the informal recycling sector in developing country cities.	The state of the art in this paper is the use of a new data set to analyze waste generation rates, waste composition, and benchmark indicators for key drivers/components of an integrated and sustainable waste management system. It also emphasizes the significance of the informal recycling sector in many developing country cities.	The novelty in the paper lies in the use of a new data set for analysis, the application of process flow diagrams as a representation tool, and the recognition of the importance and benefits of the informal recycling sector in developing country cities.
Waste Recycling in Malaysia: Transition from Developing to Developed Country	M. Janaki, M. Durga	2015	Sustainable waste management has become an important priority for policy makers and other relevant stakeholders of Malaysia as the country prepares to project itself as a developed nation.	-	The paper provides an analysis of the current waste management practices in Malaysia, emphasizing the challenges and the government's efforts to address them. It aims to provide insights for policymakers, waste management strategists, local administrators, and researchers to formulate sustainable policies and identify further areas of study in the field.	The novelty in M. Janaki, M. Durga (2015) lies in its analysis of the current waste management practices of Malaysia, along with the problems and prospects associated with it, and its attempt to assist in formulating sustainable policies and identifying further areas of study in the relevant field.
Managing solid wastes in developing countries	J. Holmes	1984	The use of technology to solve problems in developing countries is covered.	The main findings of the paper are the focus on decision making, technology, and environmental priorities in waste management in developing countries, considering diverse economic, social, and environmental conditions, as well as the	-	The novelty in J. Holmes (1984) lies in its focus on waste management in developing countries, considering decision making, technology, and environmental priorities, and the inclusion of practical case studies to demonstrate the use

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				inclusion of practical case studies demonstrating the use of technology to solve waste management problems in these settings.		of technology to solve problems in this context.
Urban solid waste management in the developing world with emphasis on India: challenges and opportunities	Vaibhav Srivastava, Sultan Ahmed Ismail, Pooja Singh, Rajeev Pratap Singh	2014	The lack of infrastructure for collection, transportation, treatment, and disposal of solid waste has made the situation exasperating in most developing countries.	The main findings of the paper are the global nature of the municipal solid waste management problem and the opportunities it presents for mitigating negative impacts and meeting various demands.	The "state of the art" in the paper discusses the challenges and opportunities in urban solid waste management in developing countries, particularly India. It emphasizes the lack of infrastructure, financial resources, and technical expertise as major challenges, while also highlighting the potential for energy generation, employment opportunities, and soil health improvement as positive aspects.	The novelty in the paper lies in its focus on the challenges and opportunities in urban solid waste management in developing countries, particularly India. It emphasizes the potential opportunities in solid waste management, which goes beyond just addressing the negative impact of waste.
Solid Waste Management in Asian Developing Countries: Challenges and Opportunities	Y. Dhokhikah, Y. Trihadiningrum	2016	Solid waste management was country specific.	The main findings of the paper are: - Solid waste management (SWM) was assessed using technical and social approaches. - SWM was found to be country specific, and decentralization is considered the most appropriate management approach.	The "state of the art" in Y. Dhokhikah, Y. Trihadiningrum (2016) is the review of existing solid waste management practices in Asian developing countries, the identification of current problems, and the proposal of alternative solutions, with an emphasis on the country-specific nature of solid waste management and the recommendation for decentralized management approach.	The novelty in Y. Dhokhikah, Y. Trihadiningrum (2016) lies in the proposal of alternative solutions and the identification of decentralization as the most appropriate management approach for solid waste in Asian developing countries.
Waste to Energy in Developing Countries	Amit Jain	2011	The guide unravels how governments, scientists, and engineers plan to tackle the waste management problem.	The book provides an analysis of technical problems and solutions, policies, rules, and regulations issued by different	The "state of the art" in Amit Jain (2011) is an analysis of the techno-commercial response to waste problems in developing countries,	The novelty in Amit Jain (2011) is the comprehensive analysis of waste management issues in developing countries,

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				countries, especially India, on waste management. It covers the adequacy, deficiencies, and challenges associated with waste management issues. The book also assesses the options, both global and personal, for dealing with the threat of waste management and includes in-depth information and lifestyle tips about what individuals can do to help.	covering technical problems and solutions, policies, rules, and regulations related to waste management, with a focus on India. It also assesses global and personal options for dealing with the threat of waste management and provides in-depth information and lifestyle tips for individuals to contribute to solving the problem.	including technical, policy, and personal perspectives, and providing lifestyle tips for individuals to contribute to solving the problem.
Solid waste management challenges for cities in developing countries.	Lilliana Abarca Guerrero, Ger Maas, William Hogland	2013	Solid waste management is a challenge for the cities' authorities in developing countries.	The main findings include a comprehensive list of stakeholders and influential factors affecting waste management systems in developing countries, emphasizing the practical utility of the information for planning and implementing waste management systems in cities.	-	The novelty in Lilliana Abarca Guerrero, Ger Maas, William Hogland (2013) lies in providing a comprehensive analysis of stakeholders and factors influencing waste management systems in developing countries, introducing the ISWM model, and documenting the impact of technical and legal factors on waste management.
Effective Solid Waste Management Practices in Developing Countries: Problems and Prospects	H. Audu, S. Iyeke, A. Aladenika	2020	Uncontrolled dumping and improper waste handling cause a variety of problems.	The main findings are related to reviewing fundamental issues in solid waste management, underestimation of waste generation, and the importance of source reduction in waste management.	The state of the art in H. Audu, S. Iyeke, A. Aladenika (2020) includes a review of fundamental issues related to solid waste management, addressing problems such as underestimation of waste generation, the importance of source reduction, proper waste storage, bulk movement of waste to transfer stations, various waste	The novelty in H. Audu, S. Iyeke, A. Aladenika (2020) lies in its comprehensive review and proposed suggestions for addressing fundamental issues associated with solid waste management. It provides a detailed analysis of various aspects of waste management and proposes

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					treatment techniques, and different methods of waste disposal. The paper also discusses the role of sanitary landfills in isolating waste from the environment until it is safe.	likely suggestions to alleviate these issues, making it novel in the field of solid waste management.
Sustainable solid waste management in developing countries : waste management	H. Ogawa	2008	Solid waste management projects have been carried out in developing countries in collaboration with external support agencies in the last 20 years.	The main findings of the paper are that several solid waste management projects have been conducted in developing countries with the collaboration of external support agencies, and some of these projects have resulted in lasting impacts on the improvement of solid waste management in those countries.	The "state of the art" in H. Ogawa (2008) is the implementation of solid waste management projects in developing countries with the support of external agencies, and the varying degrees of success in producing lasting impacts.	The novelty in H. Ogawa (2008) is the successful implementation of solid waste management projects in developing countries with the support of external agencies, leading to lasting impacts on improvement.
Analysis of barriers and success factors affecting the adoption of sustainable management of municipal solid waste in Nigeria.	Chukwunonye Ezeah, Clive L Roberts	2012	The need for a sustained public education program on waste prevention and reuse as the panacea to waste problems in Nigeria is a major social/environmental challenge in the country.	The main findings of the study are the need for a sustained public education programme on waste prevention and reuse as the solution to waste problems in Nigeria, and the case for adapting globally successful waste management best practices and strategies to suit local conditions.	The "state of the art" in Chukwunonye Ezeah, Clive L Roberts (2012) involves surveying respondents in Abuja, Nigeria, using SPSS for data analysis, and advocating for a sustained public education program on waste prevention and reuse, as well as the adaptation of globally successful waste management best practices to local conditions.	The novelty in this paper lies in its emphasis on the need for sustained public education on waste prevention and reuse as a solution to waste problems in Nigeria, as well as its advocacy for the adaptation of globally successful waste management best practices to suit local conditions.
Sustainable recycling of municipal solid waste in developing countries.	Alexis M Troschinetz, James R Mihelcic	2009	The factors driven by all three dimensions of sustainability were those requiring the greatest collaboration with other factors.	The main findings are: - The average MSW generation rate in developing countries was 0.77	The "state of the art" in Alexis M Troschinetz, James R Mihelcic (2009) is the factors influencing recycling of MSW in developing countries, the collaborative nature	The novelty in Alexis M Troschinetz, James R Mihelcic (2009) lies in the identification of specific factors influencing recycling

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				kg/person/day, with recovery rates ranging from 5-40%. - The waste streams in the case studies consisted of varying percentages of recyclables and organics. - Factors influencing recycling of MSW in developing countries include government policy, finances, waste characterization, household education and economics, MSWM administration and personnel education, local recycled-material market, technological and human resources, and land availability. Collaborative relationships among these factors greatly influenced the success of sustainable MSWM. Stakeholder involvement correlated with the three dimensions of sustainability: environment, society, and economy. The factors requiring the greatest collaboration with other factors were waste collection and segregation, MSWM plan, and local recycled-material market.	of sustainable MSWM, and the correlation between stakeholder involvement and the dimensions of sustainability.	of municipal solid waste in developing countries and the emphasis on the collaborative nature of sustainable municipal solid waste management. Additionally, the paper highlights the correlation between stakeholder involvement and the three dimensions of sustainability.
Municipal Solid Waste Management Challenges and Problems for Cities	M. Zohoori, Ali Ghani	2017	A decentralized system can help solve the apparently intractable challenges and problems of waste	- Solid waste management poses significant challenges for cities in developing	-	The novelty in M. Zohoori, Ali Ghani (2017) lies in its emphasis on the need for

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in Low-Income and Developing Countries			management in low-income developing country cities in a socially favorable, economically viable, and environmentally sound manner.	countries, particularly low-income ones, due to factors such as population growth, rapid urbanization, and limited resources. - The inappropriate disposal of waste presents serious risks to public health and the environment, leading to various health issues and environmental degradation. - There is a need for feasible solutions to improve municipal solid waste services and address the ongoing challenges in waste management in developing countries.		holistic and integrating methods for waste management in developing countries, as well as its recognition of the potential contribution of the unofficial segment and the proposal for a decentralized system to address waste management challenges.

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