SUSTAINABLE TRAINING IN DEVELOPING COUNTRIES: ANALYSIS OF CASE STUDIES

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ABSTRACT

This review study examines the potential of sustainable training programs in bridging the green skills gap within emerging economies. The research explores key factors influencing program effectiveness by analyzing successful case studies and gleaning insights from international organizations. The review highlights the need for customized, action-oriented training that equips participants with practical skills for environmentally responsible practices tailored to the specific contexts of emerging economies. Additionally, the study emphasizes the importance of integrating training initiatives with broader organizational transformation efforts. The analysis underscores the critical role of government policy frameworks in enabling sustainable training through measures such as national green skills mandates, financial incentives, and fostering multi-stakeholder collaboration. This review concludes by offering best practices for designing and implementing sustainable training programs and proposes policy recommendations to unlock their transformative potential for a greener future in emerging economies.

KEYWORDS: *developing country, green skill, green training program, policy framework, sustainable training.*

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1. INTRODUCTION

The pursuit of economic development in developing countries often comes at a significant environmental cost. Striking a balance between these two priorities is crucial, and sustainable training programs offer a promising solution. These programs equip workforces with the skills and knowledge necessary to implement environmentally friendly practices, potentially leading to a win-win scenario for organizations and the environment. However, the effectiveness of such programs in the context of developing countries remains relatively unexplored.

While existing research has demonstrated the positive impact of sustainable training on organizational performance in general, there is a notable gap in understanding its specific application within developing economies. Current studies often focus on isolated case studies, limiting a comprehensive understanding of the diverse approaches, challenges, and benefits across various contexts.

This review seeks to answer the question: How can sustainable training programs in developing countries be designed and implemented effectively to foster economic growth and promote environmental responsibility?

This study employs a multifaceted approach to bridge this gap, analyzing existing qualitative research alongside insights from international development organizations. This approach allows for

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identifying common themes, challenges, and successful strategies in implementing sustainable training across various sectors within developing economies.
The anticipated outcome of this research is to generate valuable insights for organizations, policymakers, and educators in developing countries. By outlining successful approaches, potential challenges, and the broader societal benefits of sustainable training, this study aims to equip stakeholders with the knowledge necessary to design and implement effective programs. Ultimately, this can foster economic growth while promoting environmental responsibility in these nations.

2. METHODOLOGY

This literature review combines systematic and narrative approaches to understand sustainable training programs in developing countries comprehensively. Building on the systematic review by Stefanelli et al. (2019) which identified 51 qualitative studies focused on "environmental training" and "green training," 22 studies were selected for in-depth analysis due to their specific focus on developing countries.
To further enrich the analysis, 14 additional articles and resources from international and local organizations were included. This approach balances the systematic review's rigor with the narrative review's flexibility, allowing for the integration diverse perspectives from research and practice. The combined methodology ensures a thorough examination of sustainable training programs, highlighting their implementation and impact in developing contexts.

3. LITERATURE REVIEW

The business landscape in developing countries is rapidly evolving, with organizations facing increasing pressure to operate sustainably by minimizing their environmental impact while maximizing profitability. In this context, sustainable and green training programs are emerging as strategic investments that offer a win-win solution for both the environment and the bottom line. This review delves into how organizations in these countries implement sustainable training, highlighting the diverse approaches, challenges, and cost-effective benefits these initiatives offer.
This study examines 22 articles from a systematic review by Stefanelli et al. (2019). The original review analyzed 51 articles published between 1981 and 2018, sourced from the Scopus and Web of Science databases. The review focuses explicitly on articles related to "environmental training" and "green training," emphasizing studies conducted in developing countries such as Brazil, Iran, Pakistan, China, Mexico, Turkey, Jordan, India, Malaysia, Indonesia, Morocco, Ghana, and the Central African Republic. The research exclusively considers qualitative studies employing case study methodologies.
This updated review expands its scope by incorporating 14 additional articles and drawing on insights from international organizations and those focused on developing countries. This multifaceted approach ensures a comprehensive examination of the critical aspects of sustainable training in these contexts.
Research consistently demonstrates the positive impact of sustainable training on organizational performance. For example, studies by Pham et al. (2020) and Lambini et al. (2021) highlight how implementing sustainable practices, such as waste reduction and energy efficiency, leads to substantial cost savings for businesses. For instance, companies in Pakistan, India, and Brazil have reported significant reductions in operational costs and improved efficiency through sustainable training initiatives (Begum & Arshi, 2020; Maclean et al., 2013). These cost savings can then be reinvested in the business, fostering growth and innovation.
The benefits of sustainable training extend beyond immediate cost savings. By embracing these practices, organizations enhance their competitiveness in the global market. Consumers and investors increasingly prioritize sustainable practices, making them crucial for success. Maclean et al. (2020)

highlights how integrating sustainability into operations can create a competitive edge and improve public perception. Tretyakova and Kotomina (2020) also emphasize that sustainable training fosters organizational resilience and adaptability, which are crucial for navigating dynamic market environments. This adaptability allows businesses to respond effectively to changing regulations, consumer preferences, and technological advancements.

Developing countries often face resource constraints, making sustainable training pivotal in optimizing resource use within these contexts. Tang et al. (2017) argue that sustainable human resource development through lifelong learning is essential for economic growth and sustainability. Organizations can achieve significant cost savings by optimizing energy and water use and reducing their environmental footprint (Maclean et al., 2017). This benefits the environment and improves resource security for future operations.

However, sustainable training programs are not without challenges. The cultural context plays a vital role in determining the effectiveness of training initiatives (Kaya, 2013). Programs must be designed sensitively to local customs and knowledge systems to ensure relevance and maximize impact (Mahmood et al., 2022). Additionally, securing a long-term commitment from leadership and funding for these programs can be significant hurdles.

The transformative potential of sustainable training extends beyond its economic and organizational benefits. These programs can cultivate a sense of environmental stewardship among employees, encouraging them to adopt sustainable practices both in the workplace and in their personal lives. For example, case studies such as the Bac Thang Long Economic Technical Vocational Training College (BTL) in Vietnam exemplify this impact (Maclean et al., 2017). BTL not only equips students with the skills needed for green jobs but also fosters a sense of environmental responsibility, which is crucial for promoting long-term environmental sustainability.

Moreover, sustainable training initiatives can contribute to social equity within developing countries by empowering individuals and communities. Programs like those at BTL provide equitable access to training for disadvantaged youth, underscoring the fundamental role of education in promoting sustainable livelihoods and fostering a more just and equitable society (Maclean et al., 2013). Thus, sustainable training programs can be powerful tools for inclusive development, ensuring that environmental sustainability benefits are widely shared.

The successful implementation of sustainable training programs in developing countries necessitates a nuanced understanding of the cultural context. A "one-size-fits-all" approach is unlikely to yield optimal results. Kaya (2013) emphasizes the importance of culturally sensitive approaches to education for sustainable development. Training programs must be designed with sensitivity to local customs, values, and knowledge systems to resonate with participants and foster a sense of ownership over the learning process. For instance, incorporating traditional practices for resource management or environmental conservation can enhance the relevance and effectiveness of sustainable training initiatives.

Mahmood et al. (2022) argue that integrating local knowledge and practices strengthens the acceptance and impact of sustainable training programs. Indigenous communities often profoundly understand their local environment and have developed sustainable practices over generations. By incorporating this local knowledge into training programs, organizations can leverage existing expertise and ensure that solutions align with the specific challenges and opportunities within the local context.

4. KEY CONCEPTS IN GREEN TRAINING

The reviewed case studies (Afshari et al., 2011; Jabbour et al., 2010; Shafique et al., 2018; Teixeira et al., 2016) offer valuable insights into green training approaches in developing countries, revealing several key foundational elements essential for effective green skills development. One of the central themes emerging from these studies is the importance of customization in green training programs.

Rather than adopting a one-size-fits-all approach, these programs should be meticulously tailored to the specific needs of the industry, the organization, and the environmental challenges specific to the developing region (Neto et al., 2014; Srivastava & Shree, 2019; Unnikrishnan & Hegde, 2007; Yong & Mohd-Yusoff, 2016). This tailored approach ensures that training is relevant and impactful, addressing different organizations' unique circumstances.

Beyond merely raising awareness about environmental issues, the case studies emphasize the importance of equipping employees with practical, actionable skills that enable them to implement sustainable practices in their daily work (Neto et al., 2014; Tang et al., 2018; Unnikrishnan & Hegde, 2007; Yong et al., 2016). This focus on practical application, rather than just theoretical knowledge, is critical for driving real change within organizations and ensuring that green initiatives are effectively integrated into operational practices.

Furthermore, integrating green training across all organizational levels is crucial for achieving maximum impact (Aragão & Jabbour, 2017; Darmawan et al., 2023; Neto et al., 2014; Teixeira et al., 2012). Successful green training programs are not limited to lower-level employees but extend to equipping leaders with the knowledge and skills necessary to champion sustainability initiatives within their organizations. This holistic approach ensures that sustainability becomes a core component of the organization's culture and strategic direction, leading to comprehensive and sustained environmental transformation.

Another critical factor in the case studies is stakeholder collaboration in successfully implementing green training programs (Chen et al., 2017; Neto et al., 2014; Teixeira et al., 2016). Collaboration, or multi-stakeholder partnerships, involves the participation of governments, educational institutions, and businesses. Governments can provide policy frameworks, financial incentives, and capacity building, while educational institutions play a vital role in developing and delivering green training programs and integrating sustainability principles into curriculums.

5. OPTIMIZING LEARNING OUTCOMES

Effective green skills development is a matter of policy implementation and heavily relies on the thoughtful design of training programs and the strategic integration of technology. While policy frameworks set the stage, the actual impact on skill acquisition and organizational change is determined by how well these training initiatives are designed and delivered, as evidenced by various case studies (Chen et al., 2017; Teixeira et al., 2016).

A critical factor in ensuring the effectiveness of training programs is the ongoing evaluation through impact assessments. Research by Jabbour et al. (2017) and Erdogan and Tosun (2009) suggests that impact assessments are often touted as essential, sometimes underutilized, or poorly executed. This can lead to a disconnect between the intended outcomes of training programs and their actual impact. Without rigorous and regular assessments, there is a risk that training programs may stagnate or fail to adapt to evolving environmental and organizational needs (Darmawan et al., 2023). Therefore, impact assessments' actual value lies in their ability to measure success and their potential to drive continuous improvement in training design.

The design of the learning environment is another area that requires critical attention. Although tailored environments are recognized as essential for effective learning, there is often a gap between theoretical design and practical implementation. For example, Afshari et al. (2011) and Teixeira et al. (2012) emphasize the importance of aligning the learning environment with specific objectives. However, many organizations still default to generic training models that may not fully engage participants or address the unique challenges of green skills development. Furthermore, Unnikrishnan and Hegde (2007) highlight that even well-designed programs can fail to achieve meaningful skill retention and application without carefully considering the target audience's needs.

Technology integration, mainly using advanced tools like the Internet of Things (IoT), presents a promising avenue for enhancing training outcomes, as Chen et al. (2017) demonstrated in their study

of a Pakistani training program. However, the adoption of such technologies is not without its challenges. While IoT and similar innovations offer opportunities for real-time, data-driven learning experiences (Tang et al., 2017), they also require significant investment in infrastructure, training for trainers, and ongoing technical support. There is also the risk that the focus on technology could overshadow the fundamental pedagogical principles that should guide training design. Therefore, while technology can enhance learning, it should be seen as a complement to, rather than a replacement for, sound educational practices.

5.1 Specific training examples

In developing sustainable practices across various industries, tailored training programs have proven essential in addressing specific organizational needs and goals. Thematic training in Boiral et al. (2021), exemplifies the importance of breaking down low-carbon practices into targeted modules. This method allows organizations to focus on areas relevant to their operations, promoting more effective skill development. For instance, by utilizing e-learning platforms, organizations can reduce travel emissions (Ray et al., 2022), while the use of reusable training materials (Hossain et al., 2019) and the incorporation of content that encourages eco-friendly behaviors within the workplace (Boiral et al., 2021) further contribute to a reduced carbon footprint. Such strategies mitigate environmental impact and foster a culture of sustainability among participants.

Similarly, Green Human Resource Management (Green HRM) practices, as discussed in the context of Erdogan and Tosun (2009), integrate sustainability principles into various HRM functions, including recruitment, training, and reward systems. This comprehensive approach ensures that sustainability is embedded across all organizational practices rather than being confined to isolated training programs. By mainstreaming sustainability throughout HRM, organizations create a pervasive culture of environmental responsibility, aligning all aspects of their operations towards unified sustainability goals (Jabbour et al., 2010). This holistic integration enhances the effectiveness of sustainable training initiatives, driving the organization's sustainability objectives more effectively.

As Neto et al. (2014) observed in Brazil, leadership training plays a crucial role in promoting a top-down approach to sustainability. When leaders are equipped with the knowledge and skills necessary to champion sustainability initiatives, they can guide their organizations toward more sustainable practices. This leadership sends a strong message to employees, creating an environment where green practices are supported and encouraged (Yong & Mohd-Yusoff, 2016). Leadership involvement is critical, as it helps institutionalize sustainability within the organizational culture and ensures that these practices are maintained over the long term (Jabbour et al., 2014).

Employee training remains a common yet vital approach in equipping workers with the practical skills required to implement sustainable practices in their specific roles. For example, in India and Malaysia, training programs have focused on eco-design for product developers (Unnikrishnan & Hegde, 2007) and sustainable waste management practices for sanitation workers (Yusoff et al., 2018). These programs ensure that employees are aware of sustainability principles and capable of applying them directly in their daily tasks, which is essential for the overall effectiveness of green initiatives (Srivastava & Shree, 2019).

In Brazil, project-specific training has been identified as an effective method for aligning training efforts with the specific goals of eco-innovation projects (Neto et al., 2014). By tailoring training to the needs of particular projects, organizations can maximize the return on investment and ensure that newly acquired skills are immediately applied to achieving the project's environmental objectives (Darmawan et al., 2023). This approach underscores the importance of context-specific training in driving successful sustainability outcomes (Yong et al., 2019).

Training in production techniques, as seen in China and Malaysia, offers another example of how targeted training can lead to significant environmental and economic benefits. Focusing on cleaner production methods, such programs help companies minimize waste and enhance energy efficiency, ultimately reducing costs and minimizing their environmental footprint (Mishra, 2017; Tang et al.,

2017). This dual benefit highlights the critical role that training in production techniques plays in sustainable business practices (Yusoff et al., 2018).
The construction industry, particularly in India, has benefited from sustainable training initiatives. Training workers to use recycled materials and energy-efficient building practices promotes a more sustainable construction approach, reducing the industry's overall environmental impact (Unnikrishnan & Hegde, 2007). This focus on sustainability in construction is crucial, given the significant environmental footprint of traditional building practices (Gangadharan, 2006).
Finally, in the agricultural sector, training programs in Palestine have focused on sustainable practices such as water conservation and organic farming methods (Zaid et al., 2018). These initiatives not only contribute to environmental sustainability but also have the potential to improve crop yields and enhance the livelihoods of farmers (Shafique et al., 2018). This dual impact underscores the importance of sustainable agriculture training in promoting both environmental and economic benefits in developing regions (Grindle & Hilderbrand, 1995).

6. CHALLENGES AND SUCCESS FACTORS IN GREEN TRAINING

Green training programs have the potential to equip workforces with the skills required for a sustainable future, especially in developing countries where environmental and economic challenges are intertwined (Jabbour et al., 2010; Shafique et al., 2018; Teixeira et al., 2016). However, the successful implementation of these programs is often impeded by significant obstacles that must be carefully navigated. This section critically examines the recurring challenges and identifies the key factors contributing to green training initiatives' effectiveness.
A primary challenge in implementing green training programs is the limited availability of resources, particularly financial ones. Developing countries often face budgetary constraints that hinder the development, delivery, and maintenance of such programs (Mishra, 2017; Neto et al., 2014; Unnikrishnan & Hegde, 2007; Yusoff et al., 2018; Zaid et al., 2018). The shortage of qualified trainers with expertise in green practices and proficiency in adult learning methodologies further exacerbates this issue. Without sufficient funding and skilled personnel, the potential impact of green training programs is significantly reduced.
In addition to resource limitations, a lack of worker awareness about environmental issues presents another significant barrier. Employees in some contexts may have limited understanding of the importance of sustainable practices, which can hinder their engagement with training content and their ability to apply newly acquired skills in practical settings (Grindle & Hilderbrand, 1995; Rawashdeh, 2018; Unnikrishnan & Hegde, 2007; Yong & Mohd-Yusoff, 2016). This disconnect between knowledge and action underscores the need for training programs that impart knowledge and foster a deep understanding and commitment to sustainability among participants.
Resistance to change is another pervasive challenge. Shifting established work practices and mindsets can be difficult, particularly when employees view new procedures as disruptive or time-consuming (Yong & Mohd-Yusoff, 2016). Organizational leaders may also be reluctant to embrace changes or invest in green training if they perceive the benefits as long-term or unclear. This resistance can stall the adoption of sustainable practices and limit the overall effectiveness of green training initiatives.
Despite these challenges, several factors have been identified as critical to the success of green training programs. Effective policies and financial incentives governments provide play a crucial role in encouraging the adoption of these programs. For example, Brazil's government has implemented policies that mandate green training, while India's Skill India Mission offers financial incentives to support such initiatives (Srivastava & Shree, 2019; Teixeira et al., 2016). These measures demonstrate a governmental commitment to sustainability and provide companies with the necessary resources to train their workforce effectively.
Collaboration among various stakeholders is another success factor consistently highlighted in the literature. Partnerships between governments, educational institutions, NGOs, and the private sector

can enhance the development and implementation of green training programs by pooling resources, expertise, and perspectives (Aragão & Jabbour, 2017; Chen et al., 2017; Darmawan et al., 2023; Jabbour et al., 2017; Neto et al., 2014; Teixeira et al., 2012; Yong & Mohd-Yusoff, 2016). Such collaborations ensure that training programs are comprehensive and effective in meeting the needs of all stakeholders involved.

Furthermore, the training programs' design is pivotal to their success. Programs that are meticulously tailored to the specific needs of the industry, organization, and environmental context are more likely to yield lasting results (Aragão & Jabbour, 2017; Chen et al., 2017; Darmawan et al., 2023; Jabbour et al., 2017; Neto et al., 2014; Srivastava & Shree, 2019; Tang et al., 2017; Teixeira et al., 2016; Unnikrishnan & Hegde, 2007). This customization ensures that the training directly applies to the work environment, maximizing its impact on skill development and environmental outcomes.

7. BEST PRACTICES IN SUSTAINABLE TRAINING IN DEVELOPING COUNTRIES

Effective sustainable training in developing countries requires a nuanced approach that accounts for each region's unique cultural, economic, and environmental contexts. A "one-size-fits-all" strategy does not address these regions' diverse challenges. The SDG Learning, Training & Practice Report underscores the importance of contextualized learning, which advocates for training content tailored to local needs (Khaled et al., 2021). This can be achieved by incorporating materials in local languages, utilizing case studies that reflect region-specific environmental issues, and collaborating with local NGOs to ensure the training resonates with the community. Such an approach not only enhances the relevance of the training but also fosters a deeper connection between the participants and the content, increasing the likelihood of successful implementation.

Beyond the content itself, engaging a broad range of stakeholders is crucial for the success of sustainable training programs. As Feeney et al. (2022) emphasize, involving employees, local communities, and NGOs in the training process fosters a collaborative environment that is essential for the co-creation of effective programs. This collaborative approach ensures that the needs and perspectives of all stakeholders are considered, leading to a greater sense of ownership and commitment to the long-term success of the training initiatives. By engaging a diverse group of stakeholders, organizations can build a supportive network that reinforces the training objectives and facilitates sustainable change.

Furthermore, sustainable training must extend beyond traditional classroom settings to include a variety of methods that cater to different learning preferences and enhance knowledge retention. The Principles of Effective Governance for Sustainable Development suggest that interactive workshops, e-learning modules, and on-the-job mentoring can be more effective than conventional lectures (*Home | Public Institutions (un.org)*, 2024). Additionally, incorporating innovative techniques such as gamification or virtual reality experiences can significantly boost engagement among younger employees. These diverse training methods make the learning process more engaging and ensure that the skills and knowledge gained are more effectively integrated into daily practices.

The ongoing nature of sustainable training necessitates regular monitoring and evaluation to ensure its effectiveness. Sustainable training should not be viewed as a one-time event but as an ongoing process that evolves with the organization's needs. As suggested by the SDG Learning, Training & Practice Report, continuous assessment involves tracking changes in employee behavior, measuring progress toward environmental goals, and employing creative data visualization techniques to showcase results (Khaled et al., 2021). These evaluations are critical for identifying areas where training programs can be refined and improved, ensuring they remain relevant and practical.

Leadership commitment is another vital component in fostering a culture of sustainability within organizations. When top management actively participates in and champions sustainable training, it sets a powerful example for the rest of the organization. Feeney et al. (2022) highlight the importance of leadership in motivating employees to embrace sustainable practices. CEOs and managers can

demonstrate their commitment by participating in training programs, promoting sustainable initiatives, and incorporating environmental considerations into their decision-making processes. This top-down approach legitimizes the training efforts and encourages a company-wide shift toward sustainability.

8. POLICY RECOMMENDATIONS

The case studies reviewed (Jabbour et al., 2010; Shafique et al., 2018; Teixeira et al., 2016) underscore the transformative potential of green training programs in developing countries. However, the realization of this potential hinges on establishing robust policy frameworks that not only encourage but also mandate the adoption of sustainable practices. National policies that mandate green training programs, such as those implemented in Brazil (Teixeira et al., 2016), are compelling. These mandates signal a government's commitment to sustainability and serve as catalysts for equipping the workforce with the necessary skills for a greener future. The role of national policies is critical in ensuring that sustainability becomes an integral part of workforce development across various sectors.

Moreover, financial incentives play a pivotal role in fostering the adoption of green training, particularly for resource-constrained small and medium-sized enterprises (SMEs). India's Skill India Mission provides a noteworthy example, where financial incentives have been instrumental in encouraging companies to invest in training their employees in sustainable practices (Srivastava & Shree, 2019). Such incentives help offset the costs associated with training programs, making them more accessible and attractive to businesses that might otherwise lack the resources to prioritize sustainability.

The success of green training programs also relies heavily on fostering collaboration among various stakeholders. The case studies highlight that partnerships between governments, educational institutions, NGOs, and the private sector are essential for developing and implementing effective training programs (Chen et al., 2017; Jabbour et al., 2017; Neto et al., 2014; Teixeira et al., 2012; Yong & Mohd-Yusoff, 2016). These collaborations allow the pooling of resources and expertise, leading to more robust and impactful training initiatives. Additionally, such partnerships can extend the reach of these programs, ensuring they impact a broader range of participants across different sectors. Each stakeholder group brings unique strengths, from the policy and regulatory frameworks governments provide to the practical implementation skills offered by the private sector and NGOs. Green training programs' overall effectiveness and sustainability are significantly enhanced by leveraging these strengths.

To ensure the long-term success and sustainability of green training initiatives, it is crucial to invest in building the capacity of government agencies responsible for overseeing these programs. Effective oversight and implementation require well-resourced agencies with the ability to develop comprehensive training materials, train trainers, and monitor the effectiveness of the programs (Neto et al., 2014). This capacity-building is essential for maintaining the momentum of green training efforts and ensuring that they deliver results over time.

Beyond these core recommendations, additional considerations are vital for policymakers aiming to optimize the impact of green training programs. Sector-specific strategies should be developed to address different industries' unique needs and challenges. This targeted approach ensures that policies and incentives are aligned with the realities of each sector, enhancing their relevance and effectiveness. Furthermore, investing in research and development is critical for evaluating the long-term impact of green training programs on environmental outcomes, skill development, and economic growth. Such research can provide valuable insights into current initiatives' success and inform future program design.

Finally, knowledge sharing is essential to scaling the success of green training programs. Facilitating the exchange of best practices and successful models between developing countries can accelerate

the adoption of practical strategies and foster a global movement toward sustainability. By implementing these policy recommendations and fostering a collaborative environment, policymakers can create an enabling landscape for green training programs to thrive in developing countries. This, in turn, will empower workforces with the skills necessary for a sustainable future, benefiting both the environment and the economy.

9. RESULTS AND CONCLUSIONS

This research investigated the potential of sustainable training programs to bridge the green skills gap in developing countries. The findings illuminate these programs' critical role in equipping workforces with the necessary knowledge and skills to navigate the transition toward a greener economy.

The research yielded a multifaceted understanding of sustainable training programs in developing countries. Key findings highlight the following:

The research confirms the positive impact of training programs on building green skills. Participants demonstrated increased adoption of sustainable practices, improved resource efficiency, and reduced environmental impact across various sectors. Case studies documented increased implementation of renewable energy technologies, waste reduction strategies, and sustainable practices within various industries and developing countries.

This review identified several vital challenges hindering the widespread implementation of these programs. Limited resources emerged as a significant barrier, particularly in budget-constrained government agencies. Additionally, a lack of awareness among workers regarding the benefits of green practices presented another hurdle. Moreover, resistance to change within established industries proved a persistent challenge.

In addition, several key factors contribute to sustainable training programs' success. Effective policy frameworks, including national mandates and financial incentives, were found to be instrumental in driving program adoption. Strong collaboration between government agencies, educational institutions, and the private sector fostered a supportive program development and implementation environment. Additionally, well-designed training programs tailored to developing countries' specific needs and contexts proved highly effective. This included utilizing culturally relevant content and incorporating practical skill-building exercises alongside theoretical knowledge.

The research identified impactful best practices employed in successful sustainable training programs. Contextualized learning, achieved through culturally relevant content and localized case studies, resonated strongly with participants. Engaging stakeholder collaboration, where diverse groups contributed their expertise, ensured comprehensive program development, and fostered long-term sustainability. Utilizing various training methods, including classroom instruction, hands-on workshops, and online learning platforms, catered to diverse learning styles and maximized program reach. Finally, robust monitoring and evaluation practices enabled continuous improvement and program refinement based on data-driven insights.

In conclusion, this research underscores the transformative potential of sustainable training programs in propelling developing countries towards a greener future. By equipping workforces with the necessary skills and fostering a culture of environmental responsibility, these programs empower individuals and contribute to achieving global climate goals. The identified success factors and best practices provide valuable insights for policymakers, educators, and industry leaders to bridge the green skills gap and pave the way for a more sustainable future.

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