

# The Sustainability-Adoption Paradox: Why High Adopting MSMEs Report More Barriers - Evidence from Zimbabwe

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**Abstract:** The integration of Micro, Small, and Medium Enterprises (MSMEs) into the sustainability agenda is crucial for sustainable development, yet remains poorly understood in resource-constrained contexts. This study explores the complex interplay between sustainable practice adoption and perceived barriers among MSMEs in Zimbabwe. Through a cross-sectional survey of 312 enterprises, we identified a distinct hierarchy in the adoption of sustainable development practices: solar energy leads significantly (62.18%), substantially outdoing waste recycling (41.67%), water conservation (42.31%), and sustainable packaging (40.06%). While financial constraints (high costs: 50.3%; limited financing: 48.1%) and knowledge gaps (technical: 40.4%; information: 38.5%) were prevalent, the most critical finding reveals a central paradox: a strong positive correlation ( $r \approx 0.98$ ) between adoption intensity and barriers reported. High adopters (averaging 5.47 practices) cited significantly more obstacles than low adopters (0.64 barriers), particularly in technical knowledge (76.7% vs. 9.5%) and limited finance (73.3% vs. 30.5%). This suggests that barrier recognition and navigation are essential to the adoption process, not simply deterrents. The study concludes that standard intervention models are inadequate. We recommend a multifaceted strategy: leveraging solar energy as a strategic entry point, shifting training from theory to practical implementation support, developing integrated financial products, and implementing tiered support systems tailored to different adoption stages. These findings provide a comprehensive framework for policymakers and practitioners to bridge the intention-action gap and accelerate sustainable development in emerging economies.

**Keywords:** Sustainable Practices Adoption, MSMEs, Sustainability Barriers, Green Finance, Developing Economies, Environmental Sustainability

**JEL Classification:** M14, Q01, Q56

## 1 Introduction and Background

Sustainability (WCED, 1987) has become a major global goal that shapes fundamental current policies and economic direction. Micro, small, and medium-sized enterprises (MSMEs) play a key role in fulfilling this agenda, as recognised in the UN Sustainable Development Goals (SDGs) and the broader discussion on sustainable development (UN, 2015). The environmental dimension of entrepreneurship has gradually transformed from a marginal issue into an integral part of corporate practice through the introduction of the concept of corporate social responsibility (CSR) (OECD, 2001). While MSMEs are recognised as essential agents of economic development, their integration into the sustainability agenda remains a challenge, particularly in developing economies (Koe et al., 2024; Ceicyte-Pranskune, 2025). A significant amount of literature acknowledges the benefits of environmentally sustainable practices for MSMEs (Zuñiga-Collazos et

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al., 2025), however, a pervasive focus on short-term profitability often leads to the lack of broader socio-environmental impacts, thereby hindering progress towards the United Nations Sustainable Development Goals (Ohioma & Anwar, 2025). Existing research, however, is characterised by an acute weakness in that it often documents either the barriers to adoption, such as high costs, limited financing, and knowledge gaps, or the rates of practice adoption in isolation. This split approach does not explain the paradoxical relationship between the understanding of barriers and the adoption process. Preliminary findings from Zimbabwe suggest a landscape where specific practices like solar energy see significant uptake (62.18%), while others lag, all amidst widespread reporting of financial and knowledge constraints. This study suggests that the key to unlocking sustainable transformation lies not only in cataloguing these elements separately but in thoroughly examining the interplay between them. Therefore, this research moves beyond a descriptive account to quantitatively examine the adoption patterns of diverse sustainable practices and, most critically, to analyse the complex correlation between the intensity of adoption and the perception of barriers among MSMEs in Zimbabwe. By examining this dynamic, the study aims to provide a clear understanding that can form more effective, targeted interventions to address the intention-action gap in resource-constrained contexts.

## **2 Methods**

### **2.1 Research Design and Data Collection**

This study employed a quantitative, cross-sectional research design to investigate the adoption of sustainable practices and the challenges faced by MSMEs in Zimbabwe. A structured survey questionnaire was administered to a sample of 312 registered MSMEs across all ten provinces of the country, ensuring national representation. Data collection was conducted between March 2025 and June 2025, capturing a wide range of economic sectors, including wholesale and retail, manufacturing, agriculture, mining and quarry, accommodation and food services, and entertainment and culture.

The sampling strategy employed a multi-stage approach. First, stratified sampling was employed to ensure proportional representation across major economic sectors. Furthermore, a systematic random sampling technique was employed to select individual MSMEs within each stratum. Solvin's formula determined the sample size of 312 to be representative of the national MSMEs population, providing a reliable basis for analysis. The questionnaire was tested with a pilot group of 25 MSMEs to ensure clarity, contextual information, and reliability.

The survey instrument was developed by a comprehensive analysis of the literature on sustainability in the MSMEs sector. It was designed to capture data across several key domains. Firstly, sustainable practice adoption measured the implementation of six specific practices: solar or renewable energy, waste recycling, water conservation, eco-friendly packaging, energy-efficient equipment, and other sustainability initiatives. The selection of the six sustainable practices was based on their regular identification in the literature as the most common and impactful interventions for MSMEs seeking to improve their environmental footprint (Klewitz & Hansen, 2014; Jabbour et al., 2019). The MSMEs adoption status was denoted as "Yes" for entrepreneurs who practised and "No" for entrepreneurs who did not implement any sustainability practice. Secondly, the implementation barrier assessed the prevalence of six major barriers, these are high costs, lack of information, limited access to finance, technical knowledge gaps, regulatory restrictions and other. The six implementation barriers were chosen as they represent the most consistently reported obstacles in previous studies on MSME sustainability adoption (Klewitz & Hansen, 2014 ; Dressler, 2023). Thirdly, green finance knowledge categorised respondents into three levels, that is, knowledge, no knowledge, and heard but not sure. Lastly, demographic and firmographic data collected information on gender, sector, and other relevant characteristics.

### **2.2 Data Analysis**

The data was analysed using R statistical software (version 4.4.2). The analysis was conducted in three sequential stages. Firstly, descriptive statistics were calculated to characterise the adoption rates of individual sustainable practices, the prevalence of barriers, and the demographic profile of the sample. The analysis of the total number of practices adopted and challenges was also conducted to identify central tendencies and patterns. Secondly, bivariate analysis, which used cross-tabulations with chi-square tests to examine the correlation between categorical variables, such as adoption patterns by gender and green finance knowledge level. This led to the identification of significant relationships without implying causality. Lastly, correlational and comparative analysis were employed to examine the central paradox of the study, the relationship between the total number of practices adopted and the total number of barriers cited was examined. Furthermore, the profiles of low adopters who implement zero (0) to one (1) practices and high adopters who implement

between four (4) to six (6) practices were systematically compared across all barrier types to identify significant differences in their perceived challenges.

### 2.3 Ethical Considerations

The study adhered to strict ethical standards. All participants received informed consent prior to survey administration. Participants were informed of the study's purpose, their right to withdraw, and the measures implemented to ensure anonymity and confidentiality. The data was kept secure and anonymised prior to the analysis.

## 3 Research Results

### 3.1 Sustainability adoption analysis

Based on the adoption rates analysis, the findings reveal different patterns in sustainability practice adoption among the MSMEs in Zimbabwe, see table 1. Solar energy emerges as the most widely adopted practice with a significant 62.18% adoption rate, significantly outperforming other sustainability practices. In contrast, waste recycling (41.67%), energy-efficient equipment (43.27%), and water conservation (42.31%) reveal moderate adoption levels within a narrow range of 41-44%. Packaging sustainability practices have the second-lowest adoption rate at 40.06%, while "other" sustainability practices have a significant increase at only 30.45%. The higher proportion of solar adoption suggests that there is greater accessibility, perceived benefits, or targeted promotion of renewable energy solutions compared to other sustainability practices. These results suggest a clear hierarchy of sustainability adoption, with energy-related interventions receiving superior implementation over waste management and conservation practices. The findings are consistent with the literature ; Nwokolo et al., 2023).

**Table 1** Adoption summary

| Sustainable Practice       | Adopters | Non-Adopters | Adoption Rate |
|----------------------------|----------|--------------|---------------|
| Solar                      | 194      | 118          | 62.18         |
| Waste Recycling            | 130      | 182          | 41.67         |
| Packing                    | 125      | 187          | 40.06         |
| Energy Efficient Equipment | 135      | 177          | 43.27         |
| Water Conservation         | 132      | 180          | 42.31         |
| Other                      | 95       | 217          | 30.45         |

Source: Own processing

### 3.2 Gender sustainability adoption analysis

Based on gender analysis, MSMEs genders demonstrate similar adoption patterns across sustainability practices, see table 2. Females have a significantly higher average adoption rate of 2.64 practices compared to males 2.54 practices, indicating near-equivalent engagement levels. However, this consistency spreads to specific practices, for example, with solar adoption at 63.0% for males versus 61.6% for females, and waste recycling at 42.5% for males compared to 41.1% for females, revealing no substantial gender-based disparities in sustainability practice adoption. These trends are consistent with the literature (Pistilli et al., 2023).

**Table 2** Adoption by gender

| Gender | Average practices | Solar rate | Waste rate |
|--------|-------------------|------------|------------|
| Male   | 2.54              | 63.0       | 42.5       |
| Female | 2.64              | 61.6       | 41.1       |

Source: Own processing

### 3.3 Adoption by green finance knowledge level

**Table 3** Adoption by green finance knowledge level

| Green finance knowledge | Average practices | Number of respondents |
|-------------------------|-------------------|-----------------------|
| High knowledge          | 2.75              | 134                   |
| No knowledge            | 2.49              | 126                   |
| Heard, but not sure     | 2.46              | 52                    |

Source: Own processing

The analysis shows a clear positive relationship between green finance knowledge and sustainability practice adoption, see table 3. Respondents with the highest level of green finance knowledge demonstrate the greatest adoption intensity, averaging 2.75 practices per person, significantly higher than those with no knowledge (2.49) or those who have heard but are not sure (2.46). This gradient pattern suggests that financial literacy in green initiatives is a key factor for implementing sustainability measures, with knowledge gaps potentially leading to barriers to broader environmental practice adoption. Recent literature suggests that understanding green financial mechanisms is a critical enabler towards sustainability practices (Liu et al., 2025).

### 3.4 Practice Combinations Analysis

**Table 4** Most common practice combinations

| Pattern         | YNNNN<br>N | NNNNN<br>N | YNNNY<br>N | YYYYY<br>Y | YNNYN<br>N | NNNNY<br>N | NYYYY<br>Y | YNNYY<br>N | YYYYY<br>N | NNYNN<br>N |
|-----------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Number of MSMEs | 34         | 22         | 19         | 17         | 15         | 13         | 11         | 10         | 10         | 9          |

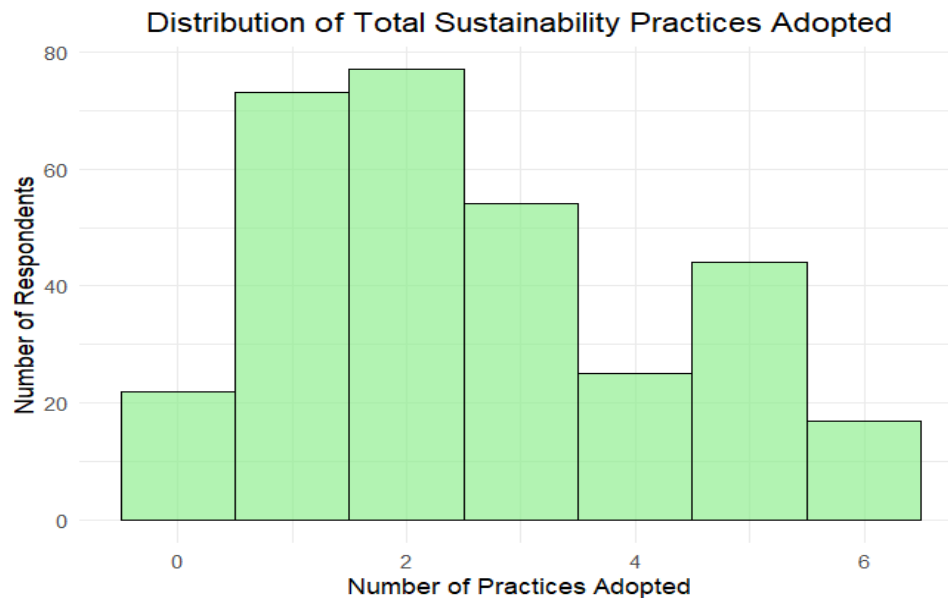
Source: Own processing

According to the practice combination analysis, the findings reveal distinct adoption patterns among the MSMEs, see tab 4. The most common approach is selective adoption, with "YNNNNN" (solar-only) being the predominant pattern among 34 entrepreneurs, indicating many MSMEs focus exclusively on solar energy implementation. Notably, two contrasting extremes emerge with 22 respondents who adopted no sustainability practices ("NNNNNN"), while 17 implemented all six practices ("YYYYYY"), indicating differentiated engagement levels. The dominance of solar-inclusive combinations across the top patterns highlights its role as either an entry point or priority practice, with most entrepreneurs adopting between one to three practices rather than comprehensive sustainability portfolios.

### 3.5 Analysis of the distribution of total sustainability practices adopted

Based on the distribution of sustainability practices adopted by MSMEs in Zimbabwe, the figure 1 shows a relatively right-skewed pattern with most entrepreneurs adopting between 2 and 4 practices. The distribution peaks around 2 and 3 practices adopted, indicating this range is the typical engagement level, while fewer respondents are at the extremes of either no adoption (zero practices) or comprehensive adoption (six practices). This bell-shaped distribution with a central tendency suggests that most MSMEs employ a selective, moderate portfolio of sustainability measures rather than embracing all available practices or completely abandoning environmental efforts. Again, this trend is consistent with literature (Aragón-Correa & Sharma, 2003)

**Figure 1** Distribution of total sustainability practices adopted



Source: Own processing

### 3.6 Analysis of challenges in adopting sustainability practices

According to the challenge prevalence analysis, financial barriers become the primary obstacles to sustainability adoption, with high costs cited by 50.3% of MSMEs and limited financing by 48.1%. Knowledge-related challenges follow closely, as technical knowledge gaps (40.4%) and information deficiencies (38.5%) affect substantial portions of the entrepreneurs. Regulatory issues are the least cited barrier at 34.0%, suggesting that while institutional factors matter, economic constraints are the primary impediment to effective practice implementation among respondents. This trend is consistent with the literature (Zuñiga-Collazos et al., 2025; Nautiyal et al., 2025).

### 3.7 Analysis of challenges faced by MSMEs

Based on the distribution of challenges faced, table 5 reveals a left-skewed pattern, indicating that most entrepreneurs cite multiple barriers to sustainability adoption. The distribution peaks two to three challenges, with very few MSMEs reporting no challenges (zero) or facing all six potential barriers simultaneously. This concentration in the mid-range suggests that sustainability adoption is typically hindered by a combination of two to three interrelated obstacles rather than single dominant barriers or comprehensive constraint scenarios. This finding aligns with a growing body of research suggesting that MSMEs typically navigate a 'web of constraints' rather than isolated barriers (Costache et al., 2021)

**Table 5** Distribution of total challenges faced by MSMEs

| Number of challenges cited | 0  | 1   | 2  | 3  | 4  | 5  | 6 |
|----------------------------|----|-----|----|----|----|----|---|
| Number of MSMEs            | 14 | 117 | 62 | 34 | 28 | 49 | 8 |

Source: Own processing

### 3.8 Correlation

The analysis shows a remarkable paradox in sustainability adoption patterns. A higher Pearson correlation coefficient ( $r = 0.98$ ) indicates an exceptionally strong and positive linear relationship between the number of practices adopted and challenges faced, with non-adopters (zero practices) achieving only 0.64 challenges while comprehensive adopters (six practices) report 5.47 challenges on average, see tab 6. Low adopters have significantly fewer barriers in all categories, particularly technical knowledge (9.5% vs 76.7%) and limited finance (30.5% vs 73.3%), see tab 7. On the contrary, high adopters paradoxically report significantly more obstacles, suggesting they are more aware of or willing to acknowledge

implementation barriers despite their successful adoption, probably indicating that overcoming challenges is integral to achieving higher sustainability implementation levels.

**Table 6** Adoption challenge analysis

| Total practices adopted | 0     | 1    | 2    | 3    | 4    | 5    | 6    |
|-------------------------|-------|------|------|------|------|------|------|
| Average challenges      | 0.636 | 1.25 | 1.87 | 2.74 | 2.96 | 4.18 | 5.47 |
| Number of MSMEs         | 22    | 73   | 77   | 54   | 25   | 44   | 17   |

Source: Own processing

**Table 7** Low adopters Vs High adopters challenge profile

| Challenge           | Low Adopters (0-1 Practices) | High Adopters (4-6 Practices) |
|---------------------|------------------------------|-------------------------------|
| High cost           | 41.0                         | 62.8                          |
| Lack of information | 25.3                         | 55.8                          |
| Limited finance     | 30.5                         | 73.3                          |
| Technical knowledge | 9.47                         | 76.7                          |

Source: Own processing

### 3.9 Implications of practices

This study proposes a multifaceted approach for accelerating sustainability adoption among MSMEs, advocating for, firstly, utilising solar energy's high adoption as a strategic entry point to introduce bundled sustainable solutions. Secondly, strengthening training beyond theoretical knowledge to provide practical, hands-on implementation support that addresses the complex barriers that high adopters successfully navigate. Thirdly, developing integrated financial products that combine affordable credit with technical assistance to overcome the compound challenges of high cost and limited finance. Lastly, implementing tiered support systems tailored to the specific needs of non-adopters, the selective majority, and comprehensive adopters. This coordinated approach is essential for overcoming the documented intention-action gap and transforming widespread market interest into tangible green implementation.

## 4 Conclusions

This study provides a comprehensive examination of the sustainability adoption landscape among MSMEs in Zimbabwe, extending beyond a simple cataloguing of practices and barriers to reveal their critical interplay. The findings indicate a clear hierarchy of adoption, with solar energy becoming a dominant entry point due to its perceived benefits and accessibility, while other practices, such as waste recycling and water conservation lag. This selective adoption pattern, where most MSMEs maintain a moderate portfolio of two to three practices, emphasises a pragmatic approach rather than an ideological approach to sustainability.

The study's most significant theoretical contribution is to uncover and quantify the central paradox of sustainability adoption: the strong positive correlation between adoption intensity and the number of obstacles reported. This challenges conventional models that assume barriers solely hinder action. Instead, our findings suggest that barrier recognition and navigation are crucial to the adoption process itself. High adopters are not those who have fewer obstacles, but rather those who successfully engage in and overcome a complex web of financial, technical, and informational obstacles. This understanding calls for a shift in theoretical frameworks from those that view barriers as simple limitations to those that account for the vigorous process of problem-solving and resource mobilisation in resource-constrained environments.

These findings require a move beyond one-size-fits-all interventions. The evidence strongly supports the necessity for a complex approach that leverages solar energy as a strategic gateway, develops integrated financial products that combine credit with technical assistance, and shifts training programs from theoretical knowledge dissemination to practical implementation support. Crucially, support must be tailored to the distinct needs of non-adopters, the select majority, and comprehensive adopters.

For future research, longitudinal studies are needed to examine the evolution of barrier perception and overcoming throughout the adoption process. Qualitative analysis of the cognitive and behavioral strategies employed by high adopters could provide valuable insights into successful navigation mechanisms. Finally, implementing this analytical framework in other emerging economies would demonstrate its generalizability and further refine our understanding of the

sustainability intention-action gap. Finally, accelerating the green revolution of MSME sectors in developing economies depends on acknowledging that the path to sustainability is not obstacle-free, but rather defined by the systematic identification and removal of the very barriers that indicate commitment and progress.

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