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Impact of Kaizen Cost Technique on Performance in Diverse Goods Manufacturing Sectors

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ABSTRACT

Purpose: The present study aims to examine the influence of Kaizen costing practices on organizational performance across manufacturing industries in India. It further compares performance outcomes between consumer goods and capital goods sectors to determine whether sectoral differences influence the effectiveness of Kaizen implementation.

Design/Methodology/Approach: The research adopted a mixed-method approach integrating quantitative and qualitative techniques. Primary information was collected through structured questionnaires administered across selected manufacturing firms, while secondary sources and industry reports supported the analysis. Independent sample t-tests were employed to compare performance indicators before and after Kaizen implementation across manufacturing categories.

Findings: The findings indicate that firms implementing Kaizen costing experienced improvements in operational efficiency, productivity, and cost performance. Prior to implementation, consumer goods firms demonstrated slightly stronger performance outcomes than capital goods firms; however, these differences reduced after Kaizen adoption, suggesting a convergence in performance across sectors.

Research Limitations: The study is constrained by its sector-specific focus and cross-sectional research design. Future studies may incorporate longitudinal approaches and broader industrial coverage to examine the long-term effects of Kaizen implementation.

Managerial Implications: The findings suggest that managers should view Kaizen costing as an organization-wide improvement philosophy rather than only a cost reduction mechanism. Firms can strengthen competitiveness by integrating Kaizen principles into operational and quality management practices.

Originality/Value: The study contributes to the existing literature by examining Kaizen costing across different manufacturing categories within the Indian context. It provides comparative evidence regarding sectoral performance differences and offers additional insights into Kaizen as a broader strategic capability rather than merely a cost-control approach.

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Introduction

Over the past few decades, western firms have increasingly integrated continuous improvement programs to actively cultivate long-term competitive advantages through broad, enterprise-wide workforce participation (Sabater & Garcia, 2011). In an increasingly competitive and globalized business environment, manufacturing organizations face continuous pressure to improve operational efficiency, reduce costs, enhance product quality, and maintain sustainable competitive advantage. Standard cost accounting frameworks often rely on backward-looking metrics that clash with strategic shop-floor goals, forcing progressive organizations to turn to Kaizen costing as a proactive, continuous tool for eliminating waste and stabilizing profit margins (Modarress et al., 2005).

In the modern globalized economy, standard business models are rapidly losing relevance, making dynamic cost management a critical prerequisite for the baseline survival of small enterprises (Pesotskiy & Grigoreva, 2023). Using quantitative tools such as Data Envelopment Analysis (DEA) enables organizations to identify distinct peer groups and assign weights, providing a mathematical roadmap that shows inefficient firms exactly which inputs and outputs to adjust to achieve optimal performance (Mishra & Pal, 2017). Using quantitative tools such as Data Envelopment Analysis (DEA) enables organizations to identify distinct peer groups and assign weights, providing a mathematical roadmap that shows inefficient firms exactly which inputs and outputs to adjust to achieve optimal performance (Mishra & Pal, 2017). While Kaizen serves as a broad, overarching philosophy of continuous, everyday improvement across an organization, Kaizen costing translates this mindset into a practical accounting tool explicitly focused on manufacturing phase cost reductions (Ramezani, 2014).

To address these challenges, organizations have increasingly adopted contemporary management accounting and operational improvement techniques such as Activity-Based Costing (ABC), Target Costing, Lean Manufacturing, Total Quality Management (TQM), and Kaizen Costing. Among these approaches, Kaizen costing has gained considerable attention for its emphasis on continuous, incremental improvement involving employees at all organizational levels. Derived from the Japanese philosophy of "Kaizen", which literally means "change for the better".

Although the international literature highlights the benefits of Kaizen costing, empirical evidence from emerging economies remains relatively limited. In particular, research on the effectiveness of Kaizen costing in the Indian manufacturing sector remains sparse. India represents one of the world's largest and fastest-growing manufacturing economies, characterized by substantial diversity across industrial sectors, production systems, and organizational structures. Consequently, understanding how Kaizen costing influences organizational performance in this context is both theoretically and practically important.

Moreover, existing studies have largely examined Kaizen implementation in manufacturing organizations as a homogeneous phenomenon, providing limited attention to sector-specific differences. Consumer goods manufacturers generally operate in high-volume production environments characterized by standardized processes and shorter product life cycles, whereas capital goods manufacturers often face complex production requirements, customized products, and longer development cycles. These differences may influence the manner in which Kaizen costing practices are implemented and the extent to which performance benefits are realized.

Against this background, the present study investigates the impact of Kaizen costing on organizational performance in selected Indian manufacturing firms. Specifically, the study compares performance outcomes between consumer goods and capital goods manufacturing organizations before and after the implementation of Kaizen costing practices. By examining sectoral differences and evaluating the effectiveness of Kaizen costing across diverse manufacturing environments, the study contributes to the growing body of literature on continuous improvement and strategic cost management. Furthermore, it provides practical insights for managers seeking to enhance organizational competitiveness through systematic and sustainable improvement initiatives.

The study contributes to the literature in three important ways. First, it extends empirical evidence on Kaizen costing within the context of an emerging economy. Second, it provides comparative

insights into the differential effects of Kaizen costing across consumer goods and capital goods sectors. Third, it integrates perspectives from continuous improvement, Lean Manufacturing, and strategic cost management literature to explain how Kaizen practices influence organizational performance outcomes.

Review of literature

In an extensive study tracking over 5,000 quality circles across 95 organizations, Sillince et al., (1996) found no statistically significant evidence linking direct executive or middle management intervention to quality circle success, noting instead that management's primary value lies simply in maintaining baseline representation on steering committees.

In an extensive empirical study of 385 Australian manufacturing firms, Terziovski & Sohal (2000) demonstrated that the structural size of an organization – measured by annual turnover and total employee count – has no statistically significant impact on the ultimate success or performance of a Continuous Improvement (CI) initiative. Instead, their findings revealed that organizational performance is positively correlated with the percentage of unique, customer-designed products, suggesting that flexible, highly customized manufacturing environments are uniquely positioned to leverage the operational benefits of continuous improvement frameworks (Terziovski & Sohal, 2000).

Prashar (2017) addresses a critical gap in small and medium-sized enterprise (SME) sustainability literature by demonstrating that energy optimization cannot rely solely on localized technological interventions. By embedding specific Energy Saving Activities (ESAs) into a structured Plan-Do-Check-Act (PDCA) lifecycle, the author establishes an Energy Management System (EnMS) tailored to resource-constrained environments. The framework effectively transitions energy conservation from an ad-hoc, reactionary maintenance task to a core managerial function.

A central tenet of early comprehensive operations literature is that technical production shifts must be accompanied by an equivalent evolution in employee deployment and corporate culture. Merli (1990) emphasized that implementing advanced structural methodologies, such as just-in-time systems, demands a highly coordinated framework of human integration, continuous problem-solving training, and cross-functional team responsibilities. Imai (1986) argues that significant cost reduction and quality improvements can be unlocked by empowering frontline workers to systematically identify and eliminate waste (muda). This direct, shop-floor focus provides a vital strategic pathway for resource-constrained organizations, demonstrating that frontline vigilance and structured problem-solving are frequently more effective than heavy financial investment in new technologies (Imai, 1986). To effectively deploy continuous improvement within specific industrial sectors, organizations must first navigate a highly diverse landscape of operational methodologies. Chotaliya & Mehta (2021) reviewed the application of Kaizen principles in personal life and highlighted how continuous improvement practices can enhance individual productivity, self-discipline, and overall quality of life. Their study demonstrated that the Kaizen philosophy extends beyond industrial settings and can be effectively applied to personal development and behavioral improvement (Chotaliya & Mehta, 2021).

Chotaliya & Mehta (2022) conducted a comprehensive review of Kaizen techniques and classified various tools used for continuous improvement across organizations. The study emphasized that structured Kaizen methodologies facilitate waste reduction, process optimization, and operational efficiency, thereby supporting sustained organizational performance improvements (Chotaliya & Mehta, 2022).

Although previous studies have established the role of Kaizen and continuous improvement practices in enhancing operational efficiency, productivity, and quality performance across manufacturing organizations (Terziovski& Sohal, 2000; Prashar, 2017; Modarress et al., 2005), three important gaps remain. First, empirical evidence on Kaizen costing from emerging economies, particularly India, remains limited. Second, most existing studies examine Kaizen implementation at the organizational level without distinguishing between different manufacturing sectors. Consequently, little is known about whether Kaizen costing generates comparable performance outcomes in consumer goods and capital goods industries, which differ

substantially in production complexity, product characteristics, and operational processes. Third, prior research has largely focused on operational improvement and quality enhancement, while comparatively fewer studies have examined Kaizen costing as an integrated strategic cost management mechanism influencing overall organizational performance. The present study addresses these gaps by providing comparative evidence from Indian manufacturing firms and evaluating performance differences across consumer goods and capital goods sectors before and after Kaizen implementation.

The figure in the framework Kaizen costing as the independent variable that directly influences organizational performance through several mediating dimensions. These dimensions include process efficiency and waste reduction, employee involvement and learning, and cost control with operational discipline. Together, these aspects of Kaizen costing are expected to drive improvements in three key performance outcomes: Quality enhancement, productivity growth, and cost efficiency, leading to greater competitiveness. This framework is grounded in the continuous improvement philosophy of Kaizen and aligns with Total Quality Management (TQM) and lean production theories, which emphasize the interconnection between cost reduction, employee participation, and long-term performance. By testing this framework in the Indian manufacturing context, the study seeks to fill a research gap by examining how Kaizen costing translates into measurable outcomes across different categories of goods manufacturing.

Objectives of the Study

1. To examine organizational performance characteristics prior to the adoption of Kaizen costing practices across manufacturing firms.
2. To evaluate changes in organizational performance following Kaizen implementation.
3. To compare performance outcomes between consumer goods and capital goods manufacturing sectors.
4. To assess whether Kaizen implementation reduces sectoral differences in performance indicators.

Research Hypotheses

H1a: Organizational performance differs significantly between consumer goods and capital goods manufacturing firms before Kaizen implementation.

H1b: Organizational performance differs significantly between consumer goods and capital goods manufacturing firms after Kaizen implementation.

Research Methodology

The present investigation employed a convergent mixed-method research framework combining quantitative evidence with qualitative insights to

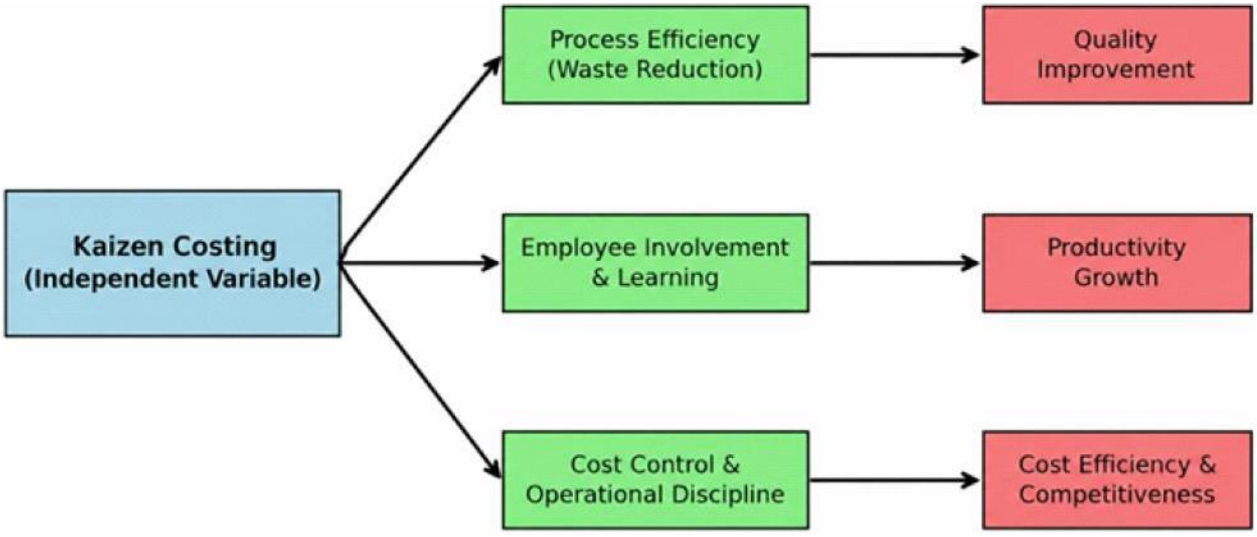

Figure 1: Conceptual Framework: Impact of Kaizen Costing on Performance

examine the adoption and outcomes of Kaizen costing practices in selected Indian manufacturing organizations. Three firms from distinct industrial segments were considered: Raymond Ltd., representing consumer goods and textile manufacturing; Windar Renewable Energy, representing the capital goods sector through wind turbine component production; and KiTEC Industries, operating within the process manufacturing industry through plastic piping systems. These organizations were selected purposively because of their documented Kaizen initiatives and their relevance in facilitating cross-sectoral comparison of implementation outcomes. The quantitative phase relied on survey-based data collected from employees across managerial and operational levels within the selected organizations. A structured questionnaire utilizing a five-point Likert scale was designed to capture perceptions regarding Kaizen costing practices, organizational cost efficiency, and implementation challenges. In total, 800 questionnaires were distributed, generating 616 usable responses, corresponding to a response rate of 77 per cent. The final sample included 200 managerial employees and 416 non-managerial respondents. Data collection procedures varied according to respondent categories: managerial participants completed online surveys, while operational staff participated through face-to-face administration to improve response coverage.

To complement survey findings, qualitative evidence was gathered through company documentation, organizational reports, and semi-structured interactions with Kaizen practitioners and employees from the selected firms. These inputs enabled richer contextual interpretation and strengthened understanding of organization-specific implementation practices and barriers. The analytical process combined descriptive and inferential techniques. Descriptive measures, including frequencies, percentages, and mean values, were employed to summarize respondent characteristics and survey outcomes. Inferential analysis incorporated paired sample t-tests to examine differences in organizational performance before and after Kaizen implementation, ANOVA to assess variations across employee experience categories, and exploratory factor analysis using Varimax rotation to identify key dimensions associated with Kaizen implementation practices. Qualitative data obtained through interviews and case materials were analyzed thematically to triangulate quantitative findings and capture organizational and behavioral perspectives.

To strengthen methodological rigor, the survey instrument was developed with reference to prior literature and subsequently refined through expert evaluation. Construct validity was examined through factor analysis, whereas internal consistency was assessed using Cronbach's alpha, with all reliability estimates exceeding the accepted threshold value of 0.70. Ethical considerations were maintained throughout the study by obtaining informed consent, ensuring respondent anonymity, and restricting data usage exclusively to academic purposes. Overall, the inclusion of Raymond Ltd., Windar Renewable Energy, and KiTEC Industries provides a multi-sectoral perspective on Kaizen costing practices within the Indian manufacturing context and enables a balanced integration of quantitative rigor with qualitative depth.

Testing of Hypothesis

$H1a_0$: There is no statistically significant difference in organizational performance across manufacturing sectors before the implementation of the Kaizen Cost Technique.

$H1a_1$: There is a statistically significant difference in organizational performance across manufacturing sectors before the implementation of the Kaizen Cost Technique.

The table presents the results of an independent samples test that compares the performance of two groups before applying Kaizen cost: Consumer Goods and Capital Goods manufacturing.

First, Levene's test for equality of variances was conducted to determine whether the variances of the two groups are equal or not. The test yielded a significant result ($F = 21.064$, $p < 0.001$), indicating that the variances of the two groups are significantly different. Therefore, the t-test for equality of means was conducted assuming unequal variances.

The t-test result shows that the mean difference between the two groups is statistically significant ($t = 1.718$, $df = 614$, $p = 0.086$). The mean performance score for Consumer Goods manufacturing is 3.9939, while that for Capital

Table 1: Independent Sample t-test Results for Organizational Performance before Kaizen Cost Technique Implementation across Manufacturing Sectors

Group Statistics				
	Type of goods manufacturing	N	Mean	Std. Deviation
Performance before applying Kaizen cost	Consumer Goods	420	3.9939	0.12586
	Capital Goods	196	3.9628	0.32152

Group Statistics		
	Type of goods manufacturing	Std. Error Mean
Performance before applying Kaizen cost	Consumer Goods	0.00614
	Capital Goods	0.02297

Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Performance before applying Kaizen cost	Equal variances assumed	21.064	0.000	1.718
	Equal variances not assumed			1.306

Independent Samples Test				
		t-test for Equality of Means		
		Df	Sig. (2-tailed)	Mean Difference
Performance before applying Kaizen cost	Equal variances assumed	614	0.086	0.03105
Equal variances not assumed		223.355	0.193	0.03105

Independent Samples Test			
		t-test for Equality of Means	
		Std. Error Difference	95% Confidence Interval of the Difference
			Lower
Performance before applying Kaizen cost	Equal variances assumed	0.01807	-0.00444
	Equal variances not assumed	0.02377	-0.01580

Independent Samples Test		
		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Performance before applying Kaizen cost	Equal variances assumed	0.06654
	Equal variances not assumed	0.07790

Source: *Author's own calculation*

Table 2: Testing of Hypothesis: Performance after applying the Kaizen Cost Technique according to types of goods manufacturing

Group Statistics				
	Type of goods manufacturing	N	Mean	Std. Deviation
Performance after applying Kaizen cost	Consumer Goods	420	4.9690	0.19328
	Capital Goods	196	4.9473	0.30485

Group Statistics		
	Type of goods manufacturing	Std. Error Mean
Performance after applying Kaizen cost	Consumer Goods	0.00943
	Capital Goods	0.02177

Independent Samples Test				
		Levene's Test for Equality of Variances		t-test for Equality of Means
		F	Sig.	t
Performance after applying Kaizen cost	Equal variances assumed	4.234	0.040	1.073
	Equal variances not assumed			0.917

Independent Samples Test				
		t-test for Equality of Means		
		Df	Sig. (2-tailed)	Mean Difference
Performance after applying Kaizen cost	Equal variances assumed	614	0.284	0.02177
Equal variances not assumed		270.594	0.360	0.02177

Independent Samples Test			
		t-test for Equality of Means	
		Std. Error Difference	95% Confidence Interval of the Difference
			Lower
Performance after applying Kaizen cost	Equal variances assumed	0.02029	-0.01807
	Equal variances not assumed	0.02373	-0.02495

Independent Samples Test		
		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Performance after applying Kaizen cost	Equal variances assumed	0.06161
	Equal variances not assumed	0.06849

Source: *Author's own calculation*

Goods manufacturing is 3.9628. The confidence interval of the difference (CI) between the two means ranges from -0.00444 to 0.06654. The results suggest that there is a small but statistically significant difference in performance between the two groups before applying Kaizen cost, with Consumer Goods manufacturing performing slightly better than Capital Goods manufacturing.

Hypothesis 1b

$H1b_0$: There is no statistically significant difference in organizational performance between consumer goods and capital goods manufacturing firms following Kaizen Cost Technique implementation.

$H1b_1$: There is a statistically significant difference in organizational performance between consumer goods and capital goods manufacturing firms following Kaizen Cost Technique implementation.

The table presents the results of an independent samples test that compares the performance of two groups after applying Kaizen cost: Consumer Goods and Capital Goods manufacturing.

First, Levene's test for equality of variances was conducted to determine whether the variances of the two groups were equal or not. The test yielded a marginally significant result ($F = 4.234$, $p = 0.0040$), indicating that the variances of the two groups may be different. Therefore, the t-test for equality of means was conducted assuming unequal variances. The t-test result shows that the mean difference between the two groups is not statistically significant ($t = 1.073$, $df = 614$, $p = 0.284$). The mean performance score for Consumer Goods manufacturing is 4.9690, while that for Capital Goods manufacturing is 4.9473. The confidence interval of the difference (CI) between the two means ranges from -0.01807 to 0.06161. The results suggest that after applying Kaizen cost, there is no statistically significant difference in performance between Consumer Goods and Capital Goods manufacturing.

Results

The results of the independent samples t-tests provided insights into how Kaizen costing influenced performance across consumer and capital goods manufacturing firms. Before the introduction of Kaizen costing, there was a small but notable difference in performance levels, with consumer goods firms reporting slightly higher mean scores than capital goods firms. While consumer goods firms such as Raymond Ltd. reported significant improvements in cost efficiency, capital goods producers like Windar Renewable Energy showed even higher relative gains, reinforcing the context-specific nature of Kaizen benefits. This suggests that, prior to the adoption of Kaizen, consumer goods manufacturers may have had relatively stronger operational practices or efficiency systems in place. However, the difference was marginal, and the confidence intervals indicated that the true effect was likely to be limited. After the implementation of Kaizen costing, the results showed no statistically significant difference in performance outcomes between the two groups. Both consumer goods and capital goods manufacturers reported substantial improvements, with mean performance scores rising above 4.9 on a five-point scale. This finding suggests that Kaizen costing, as a continuous improvement tool, has a unifying effect: It enhances performance across manufacturing categories, irrespective of whether firms produce consumer or capital goods. These results align directly with the conceptual framework presented in Figure 1. First, the mediating role of **process efficiency and waste reduction** is supported, as Kaizen practices standardize processes and reduce inefficiencies that previously created disparities between manufacturing sectors. Second, the emphasis on **employee involvement and learning** appears to be a critical equalizer; training andparticipatory practices ensure that performance gains are broadly distributed across organizational levels, thereby diminishing pre-existing performance gaps. Third, improvements in **cost control and operational discipline** are evident in the post-Kaizen results, where both sectors achieved comparable levels of efficiency.

Conclusion and Future Scope

This study examined the impact of kaizen cost techniques on organizational performance across consumer goods and capital goods manufacturing firms in India. By comparing performance indicators before and after Kaizen implementation, the study provides empirical evidence that Kaizen costing leads to substantial improvements in

efficiency, quality, and productivity. Although consumer goods firms initially displayed marginally higher performance levels, these differences disappeared after Kaizen adoption, suggesting that the technique has a leveling effect across diverse manufacturing sectors. The results demonstrate that Kaizen costing is not only effective in reducing costs but also serves as a strategic tool for fostering competitiveness and sustainability.

From a theoretical perspective, the findings reinforce Kaizen's role within the broader frameworks of Total Quality Management and lean production, while extending the literature by highlighting its adaptability across different categories of goods manufacturing. The study adds to prior research from Vietnam, Nigeria, and other contexts by providing robust empirical evidence from India, thereby addressing a critical research gap in the literature on continuous improvement practices in emerging economies. By integrating the dimensions of process efficiency, employee involvement, and cost discipline into a unified conceptual framework, this paper contributes to a deeper understanding of how Kaizen costing operates as a dynamic capability that enhances firm performance.

From a managerial perspective, the results suggest that Kaizen costing should be viewed not as a narrow accounting tool but as an organization-wide philosophy that drives continuous improvement. Managers in both consumer and capital goods sectors are encouraged to adopt Kaizen practices to standardize operations, reduce waste, and foster a culture of employee engagement. Policymakers and industry bodies can also leverage these insights to promote Kaizen adoption as part of broader industrial competitiveness and quality improvement initiatives.

Future research can extend this study in several ways. First, longitudinal designs can assess the long-term sustainability of performance improvements resulting from Kaizen adoption. Second, comparative studies across countries and sectors can test the generalizability of these findings beyond the Indian context. Third, integration of Kaizen costing with digital technologies such as Industry 4.0 tools, Artificial Intelligence, and the Internet of Things could be explored to examine how traditional continuous improvement practices evolve in a technology-driven environment. Such extensions would not only enrich theory but also provide practical roadmaps for firms seeking to remain competitive in an increasingly dynamic global marketplace.

Managerial Implications

The findings of the study provide several practical implications for managers and manufacturing organizations. The results indicate that Kaizen costing should be viewed not solely as a cost reduction mechanism but as a continuous improvement philosophy capable of enhancing operational performance. Manufacturing firms may strengthen productivity and process efficiency by encouraging employee participation and integrating Kaizen practices into routine operational activities. Furthermore, organizations should adapt implementation strategies according to sector-specific characteristics rather than adopting standardized approaches across industries.

Limitations of the Study

The present investigation is subject to certain limitations. First, the analysis was confined to selected manufacturing organizations, which may restrict broader generalization of findings. Second, the cross-sectional nature of the study limits the examination of long-term outcomes associated with Kaizen implementation. In addition, perceptual responses collected through questionnaires may involve respondent bias despite efforts to ensure reliability and validity.

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