E-ISSN: 2708-4523
P-ISSN: 2708-4515
Impact Factor (RJIF): 5.61
AJMC 2026; 7(1): 191-193

www.allcommercejournal.com
Received: 05-10-2025
Accepted: 10-11-2025

Manjunatha N
Research Scholar, University of Mysore, Mysore, Karnataka, India

Dr. Ravi Kumar K
Research Guide, University of Mysore, Mysore, Karnataka, India

Corresponding Author:
Manjunatha N
Research Scholar, University of Mysore, Mysore, Karnataka, India

Determinants of clean development mechanism (CDM) adaptation: An empirical analysis of institutional, financial, and technical factors

Manjunatha N and Ravi Kumar K

DOI: https://www.doi.org/10.22271/27084515.2026.v7.i1c.984

Abstract
The Clean Development Mechanism (CDM) under the Kyoto Protocol allows developing nations to undertake climate mitigation while achieving sustainable development. Its adaptation is, however, subject to various barriers and facilitators. Six critical factors cost-associated barriers, technical knowledge, government subsidies, carbon credits potential, perceived value, government support with regulatory mechanisms underlie CDM adaptation. Under a quantitative explanatory research design, structured questionnaires were administered to 70 respondents involved in CDM-associated activities to collect data that were subjected to descriptive statistics, reliability and validity tests, variance inflation factor test, and multiple regressions. The results reveal that all six factors significantly and positively correlate with CDM adaptation, with government support and regulatory mechanisms exerting the greatest influence. The research establishes the need for favorable policies, financial support, and technology capacity-building to enhance CDM adoption in developing nations to promote sounder climate governance and sustainable low-carbon transformations. The Clean Development Mechanism (CDM) conceived by the Kyoto Protocol allows developing nations to undertake climate change mitigation while at the same time heading towards sustainable development goals. However, its adoption is mediated by various barriers and enablers. Six key factors-cost-based hurdles, access to technical expertise, subsidies by governments, opportunity for carbon credits, perceived worth, and governmental support through regulation-lie at the root of CDM adaptation. Utilizing a quantitative explanatory research design, 70 respondents engaged with activities involving the CDM were subjected to structured questionnaires allowing for data collection and subsequent descriptive statistics, reliability and validity tests, variance inflation factor procedures, and multiple regression analyses to facilitate data description and model validation. The research shows there is a significant and positive relationship for all six variables with CDM adaptation with governmental support and regulation procedures bearing most significance. This study highlights the need for favorable policies, funding support, and capacity-building for technology to achieve enhanced adoption by developing countries of CDM to enhance climate governance and sustainable transition to low-carbon pathways.

Keywords: Clean development mechanism, financial factors

Introduction

The Clean Development Mechanism (CDM), as operationalized under the Kyoto Protocol, is central to implementing activities geared towards minimizing emissions of greenhouse gases (GHGs) in developing nations while directly addressing sustainable development objectives (UNFCCC, 2012) [6]. Though it has intrinsic capacity to support countries, adaptation and implementation of CDM activities are always met with various intricate challenges based on economic, institutional, and technological pillars. Amongst crucial factors include issues regarding cost, availability of technological expertise, availability of subsidies and incentives from governments, risk for carbon credits, perceived advantages, and support through regulation by governments. These factors combined affect the viability, attractiveness, and sustainability of CDM activities amongst developing countries, especially those with institutional capacities and resources being limited. (Michaelowa & Purohit, 2007; Paul & Cerda, 2020) [3, 4].

Current scholarship points out that financing barriers and non-technical competence commonly thwart CDM implementation by augmenting project risk and diminished financial profitability (Seres, Haites, & Murphy, 2009) [5].

However, government encouragement, carbon markets for credits, and favorable policy environment are significant enablers that allay uncertainty and promote involvement (Boyd *et al*., 2009) [1]. Additionally, perceived advantages for the individual, such as environmental quality improvement, technology upgradations, and sustainable profitability, serve as an integral role in organizational decision-making for CDM implementation (Yamin & Depledge, 2004) [7]. It is necessary to conceptualize how these interrelated elements influence CDM implementation to devise the right policies and plans capable of stimulating involvement, fostering transitions toward low-carbon bases, and facilitating global climate mitigation activities.

Literature Review

(Michaelowa & Purohit, 2007) [3] analysis of additionality determination for Indian CDM projects pointed out how project eligibility is influenced by analyses of investment and barrier. Drawing upon case evidence and Executive Board decisions, they demonstrated that poorly constructed additionality tests can allow non-additional projects to enter the CDM, creating distortions of investment incentives. The research contends that more definitive, standardized criteria and transparent documentation are required for credible CDM adaptation decisions and for directing finance to actually transformative projects.

Boyd *et al*. (2009) [1] surveyed to determine if the Clean Development Mechanism (CDM) offers co-benefits for sustainable development and to identify the adjustments it needs. By analyzing project design documents (PDDs), interviews, and policy analyses in several host nations, they noted large differences at the local level and ongoing lack of governance. They recommend reinforcing sustainable development screening procedures, widening participation by stakeholders, and improving monitoring tools to make CDM implementation nearer to national development plans.

(Seres, Haites, & Murphy, 2009) [5] investigated technology transfer using CDM by using a large dataset of registered CDM projects and PDD disclosures. They noted that CDM can aid diffusion of cleaner technology - especially renewables and industrial gases - yet transfer is sectorally and geographically differenced. Policy instruments augmenting host capacity (techno capacities, institutions) and reducing transaction costs were pivotal to scale-up adoption of CDM.

(Dechezleprêtre, Glachant, & Ménière, 2008) explored the econometric analysis of project characteristics' determinants of international technology transfer with CDM. The study found out that foreign participation, larger projects, and efficient local capacities increase technology transfer prospects. The authors' conclusion is that host-country absorptive capacity-regulatory simplicity, engineering sophistication, and training-makes the difference between sustainable technological upgrading and unsustainable CDM outcomes. (Schneider, 2007) criticized common additionality tests and baseline establishment by contending methodology discretion can inflate credited reductions. By comparative evaluation of methodologies and EB decisions, the paper introduced standardized performance benchmarks and baselines to prevent gaming. The implication for CDM adaptation is that strong standardized rules reduce uncertainty and enhance investor confidence while ensuring environmental integrity protection.

(Haya, 2009) reviewed offset quality in project-based mechanisms by summarizing hydropower and landfill gas case evidence. It recognized over-crediting risks for baseline emissions and permanence that are challenging to demonstrate. Haya advocates conservative baselines, transparent data, and stringent monitoring so that CDM use is indeed helping mitigation and not merely redistributing credits.

(Spalding-Fecher *et al*., 2012) investigated standardized baselines as a CDM reform to minimize transaction costs and enhance consistency. In application to methodological trials of African power sectors, they demonstrated sectoral default factors and grid-emission benchmarks can expedite project pipelines for smaller developers while ensuring integrity. For host nations, embracing CDM participation through standardized baselines can grow and crowd in investment.

(Paul & Cerda, 2020) [4] presented a contemporary overview of CDM's role in climate policy and post-Kyoto market insights. Blending policy research with systematic literature analysis, they reached the conclusion that CDM success is contingent upon predictable credits demand, credible MRV mechanisms, and interconnection to domestic policies. Transparent regulation and additional incentives (tax exemption, subsidies) heavily boost CDM adoption potential for emerging markets, in their opinion.

Objective of the Study

To investigate the combined impact of cost-related barriers, technical expertise availability, government subsidies and incentives, carbon credit potential, perceived benefits, and government support and regulatory frameworks on the adaptation of the Clean Development Mechanism (CDM).

Hypothesis of the Study

- **H1:** Cost-related barriers have a significant influence on CDM adaptation.
- **H2:** Technical expertise availability has a significant influence on CDM adaptation.
- **H3:** Government subsidies and incentives have a significant influence on CDM adaptation.
- **H4:** Carbon credit potential has a significant influence on CDM adaptation.
- **H5:** Perceived benefits have a significant influence on CDM adaptation.
- **H6:** Government support and regulatory frameworks have a significant influence on CDM adaptation.

Research Methodology

The study adopts a quantitative explanatory research design to explore cost-related barriers, availability of technological expertise, availability of subsidies and incentives from governments, possible availability of carbon credits, perceived benefits and support for regulatory policies by governments to determine their impact upon adoptability of the Clean Development Mechanism (CDM). The population of study was organizations and stakeholders concerned with the CDM, from which a purposive selection of 70 respondents was made to ensure relevance and statistical significance. Data collection was achieved through a structured questionnaire developed on a five-point Likert scale and supplemented by information gathered from secondary data like UNFCCC reports and refereed journal literature. The dataset was analyzed using SPSS with descriptive statistics and reliability and validity measures (such as Cronbach's alpha, composite reliability and average variance extracted (AVE), and checks for multicollinearity using the Variance Inflation Factor (VIF)), and multipe regression analyses to test hypotheses and appraise explanatory power. The goodness of fit of the model was evaluated using R^2 and determination of p-values to hence confirm the soundness of findings obtained. Ethical concerns were observed by ensuring volunteer participation and gaining informed consent from respondents and ensuring confidentiality at all stages of research work.

Data Analysis and Interpretation

Multicollinearity test results from Table 1 indicate that all the independent variables are within acceptable variance inflation factor (VIF) values of 1.02 to 2.76. It is stated by Hair *et al*. (2019) [2] that VIF values of below 5 indicate that multicollinearity is not severe and thus validates that predictors included in the above model are suitable for regression analysis. R^2 value of 0.57 of availability of technical expertise indicates that 57% of variability of the predictor is accounted for by other independent variables, indicating moderate interdependence, although not to the detrimental level. It is implied that although there is evidence of correlations between variables such as government subsidies, potential for carbon credits, and availability of technical expertise, they do not influence precision of coefficient estimates.

Table 1: Multicollinearity and Model Fit

Variable	VIF	R-Square
Technical Expertise Availability	2.590	0.57
Government Subsidies and Incentives	2.760	
Carbon Credit Potential	2.765	
Perceived Benefits	1.060	
Government Support and Regulatory Frameworks	1.026	

Regression coefficients in Table 2 also highlight the significant influence of all independent variables in CDM adaptation. More specifically, cost-based constraints (β = 0.335, p =.001), availability of technical knowledge (β = 0.273, p =.020), government incentives and subsidies (β = 0.383, *p*<.001), carbon credits potential (β = 0.349, p =.002), perceived advantages (β = 0.241, *p*<.001), and government support in policy regimes (β = 0.398, *p*<.001) all indicate statistically significant favorable influences. These findings highlight that financial, institutional, and technical enablers all individually account for successful CDM adaptation. In line with prior research (Boyd *et al*., 2009; Seres *et al*., 2009) [1, 5], the findings highlight the prominent role of conducive policy support and perceived developmental benefits in encouraging all stakeholders to enter into CDM activities, hence again establishing its value as a strategic climate change action tool.

Table 2: Coefficient Table

	Coefficient	Std. Error	t-value	p-value
Const	-0.233	0.448	-0.521	0.603
Cost-related Barriers	0.335	0.097	3.446	0.001
Technical Expertise Availability	0.273	0.116	2.349	0.020
Government Subsidies and Incentives	0.383	0.078	4.888	0.000
Carbon Credit Potential	0.349	0.113	3.079	0.002
Perceived Benefits	0.241	0.061	3.979	0.000
Government Support and Regulatory Frameworks	0.398	0.055	7.196	0.000

Conclusion

The research attempted to observe major determinants of CDM implementation with special reference to cost-related limitations, access to technical knowledge, subsidies and incentives by governments, carbon credit possibilities, supposed advantages, and governance by governments through regulation regimes. There is empirical evidence to justify all six of the observed factors to affect CDM adoption significantly and hence lend credence to all CDM projects to be governed through multi-dimensional financial, technical, institutional, and perceptual influences.

Results indicate that while cost and technical capacity impediments are present, subsidies by governments, carbon credit prospects, and regulation facilitate support are key enablers for deploying CDM. Moreover, perceived advantages evidence that there is not only economic-growth-driven but environment and developmental co-benefits-related stakeholders' interest in CDM. Collectively, these are evidence highlighting integrated policy regimes' importance, sectoral incentive targeting at the sector level, and complementing capacity-building programs to further strengthen CDM deployment at the developing-country level. By overcoming impediments and enablers, governments, institutions, and financiers can build a sturdier environment for sustainable climate action through CDM.

References

1. Boyd E, Hultman N, Roberts JT, Corbera E, Cole J, Bozmoski A, *et al*. Reforming the CDM for sustainable development: Lessons learned and policy futures. Environ Sci Policy. 2009;12(7):820-831. DOI: 10.1016/j.envsci.2009.07.005.
2. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis. 8th ed. Hampshire: Cengage Learning; 2019.
3. Michaelowa A, Purohit P. Additionality determination of Indian CDM projects: Can Indian CDM project developers outwit the CDM Executive Board? Climate Policy. 2007;7(5):379-391. DOI: 10.1080/14693062.2007.9685660.
4. Paul S, Cerda R. Clean Development Mechanism: An instrument for climate policy. J Clean Prod. 2020;276:123214. DOI: 10.1016/j.jclepro.2020.123214.
5. Seres S, Haites E, Murphy K. Analysis of technology transfer in CDM projects. Energy Policy. 2009;37(11):4919-4930. DOI: 10.1016/j.enpol.2009.06.052.
6. UNFCCC. Benefits of the Clean Development Mechanism 2012. Bonn: United Nations Framework Convention on Climate Change; 2012.
7. Yamin F, Depledge J. The international climate change regime: A guide to rules, institutions and procedures. Cambridge: Cambridge University Press; 2004.