

Analysis of Transaction Costs for REDD+ Trial Payment Scheme in Kilosa District, Tanzania

Research Article

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Abstract

This paper analyzes transaction costs for REDD+ trial payment scheme, based on the survey of 120 households belonging to four villages under REDD+ trial payment in Kilosa District. The analysis revealed that, estimated total transaction costs were TZS 2 704 ha⁻¹ yr⁻¹ equivalent to USD 1.7 ha⁻¹ yr⁻¹. The CBA results show that, the magnitude of NPV decreases by 90% with increase in discount rate from 15% to 31%. The IRR is 33.7% higher than the World Bank rate of 15% and the BOT rate of 20.6% implying that the project is efficient. Local communities perceived REDD+ trial payments as important approach towards improving their forests and were satisfied with payments method used. The study concludes that most of transaction costs (99.7%) were carried by TFCG-MJUMITA project for implementing REDD+ project while villagers or communities implementing the project carried a tiny fraction of it. The REDD+ project worth to undertake since it is economically efficient and well perceived by the communities in terms of promoting villages' forest conservation and income gain. It is recommended that Government intervention to pay for transaction costs could ensure sustainability of village forests under REDD+ particularly after donor support for such projects is ended. Villagers' capacity to cover for transaction costs to implement REDD+ in their villages' forests is lacking.

Keywords: Transaction costs; REDD+ trial payments; CBA

Introduction

Climate change is one of the biggest global problems posing challenges to sustainable livelihoods and economic development, mainly for Least Developed Countries (LDCs) [1]. The adverse impacts of climate change on environment, human health, food security, human settlements, economic activities, natural resources and physical infrastructure are already noticeable in many countries. To address this problem, a system of payments for Reduced Emissions from Deforestation and Forest Degradation (REDD) has been established in Developing Countries. In 2008, COP 14, REDD+ was the official language defined in Bali Action Plan. The '+' in

REDD+ widens the scope of the mechanism to include conservation and enhancement of forest carbon stocks, as well as the Sustainable Management of Forests (SMF). To this effect, a set of policies known as REDD+ has gained momentum in international climate change negotiations as a cost effective way to reduce greenhouse gas (GHG) emissions after expiration of the post Kyoto Protocol in 2012 [2].

Both REDD and REDD+ are intended to reduce carbon emission into the earth's atmosphere through large scale purchases and sales of forest carbon. While REDD+ seeks to address the main problem of tropical forest loss but, the social costs of tropical deforestation and the architects of REDD+ face a range of transaction costs in

structuring the programme [3]. Transaction costs refer to the costs of the various activities needed to make an economic exchange [2]. REDD+ transaction costs arise at three levels: Negotiation of agreement with land owners, monitoring, reporting and verification of carbon and enforcement of agreement if the parties do not fulfil their obligations [4]. In this study, transaction costs are considered as the costs of different activities required to run a REDD+ trial payments project.

Tanzania is one of the countries exploring different modalities of implementing REDD+ and various activities to that effect are going on. Kilosa District is piloting REDD+ payment through Tanzania Forest Conservation Group (TFCG) in partnership with the Community Forest Conservation Network of Tanzania (MJUMITA) under the project known as "Making REDD work for Communities and Forest Conservation in Tanzania". It is a five years project that started in 2009 up to 2014. The project aims at reducing Green House Gases (GHGs) emissions from deforestation and forest degradation in Tanzania in ways that provide direct and equitable incentives to communities to conserve and manage forests sustainably. The project supports the development of a Community Carbon Enterprise under Community Based Forest Management (CBFM) [5].

In order for carbon trading through REDD+ payment scheme to be profitable to target communities, the costs associated with its 'harvesting', including transaction costs, have to be much lower than the market price of the carbon [4]. The process of carbon monitoring involves a lot of bureaucratic, complicated and expensive steps of which at the end, have to be paid for by the producer [6]. This implies that, financial gains to the local communities are likely to be reduced and distributed out thinly if transaction costs are high. This may discourage the communities towards REDD+ payments. However, the magnitude of transaction costs associated with the trial payments is currently not known.

A study by Antinori and Sathaye [7] on transaction costs of project-based GHG's emissions trading in developed and developing countries estimated a mean transaction costs of USD 0.38/tCO₂e in a sample of project-based Clean Development Mechanism (CDM) forestry projects and found strong economies of scale. Likewise, estimated cost elements of REDD+ in Tanzania revealed an annual transaction cost of about USD 25 000 (USD 0.075 million over 3 years) [8]. However the costs considered by the study, included only part of monitoring reporting and verification costs and REDD+ project development costs. Other costs like enforcement costs, negotiation with land owners, costs of acquiring monitoring equipment's, cost of conducting monitoring and certification cost of GHG's reductions were not included hence underestimation of the real costs. This study was conducted to provide a more exhaustive cause of the cost elements.

Methodology

Description of the study area

The study was conducted in four villages: Chabima, Dodoma Isanga, Nyali and Kisongwe in Kilosa District (Figure 1). The District lies between latitude 5°55' and 7°53' south and longitudes 36°30' and 37°30' east (Figure 1). The District was purposively selected based on

the location of REDD+ pilot project and trial payments which have been conducted in six out of thirteen villages. The four villages were randomly selected out of the six villages covered by the trial payment. The sample of respondents for the survey was drawn randomly using random numbers by picking names of household heads from the list of REDD+ trial payments register book.

Data collection

Primary data were collected by the use of structured questionnaire with both closed and open-ended questions. The questionnaire was designed to collect data on transaction cost where by respondents were asked to state the amount of time they invested on transaction related activities. Moreover, it covered information on transaction costs and benefits of the project and their perception towards trial payments. One hundred and twenty (120) respondents were interviewed in all four villages. Key informants and participant's observation were also employed. Secondary data were collected to support primary data.

Data analysis

Statistical Package for Social Sciences (SPSS version 17) was used to analyse quantitative data whereby analysis was based on descriptive statistics and then, presented in the form of tables and figures. Cost Benefit Analysis (CBA) was done to assess the economic efficiency of the project to offset transaction cost. Content analysis technique was employed to analyze qualitative information captured through participant observation and semi structured interviews. In this analysis, the components of verbal discussion held with key informants was analyzed in detail, whereby recorded dialogue with respondents was broken down into smallest meaningful units of information [9].

Identification of transaction cost and benefits

Two types of costs incurred during implementation of a REDD+ trial payment scheme were identified for analysis. The first category was transaction cost incurred by TFCG/MJUMITA project in monetary terms during implementing a REDD+ trial payment scheme. They include; monitoring and verification, REDD readiness, start up and baseline setting costs which were obtained as secondary data. The second category was transaction cost incurred by villagers in terms of time and resources spent by households during implementing REDD+ trial payments activities. They include; transaction costs of operation, preparation and cost of individual households in attending meetings. This was obtained by converting number of days devoted for REDD+ activities in monetary terms using the current government wage rate (TZS 6 818/=) per manday then, multiplied by the total time (days) invested in REDD+ activities multiplied by number of households (Days X wage X number of households). All costs to the project were obtained as secondary data and were computed by using excel software and presented in the form of tables.

The REDD+ benefits were considered as all benefits obtained by the local communities as a result of REDD+ trial payment scheme. They included; selling of forest carbon, construction of village office, Chabima primary school latrine and village dispensary, establishment

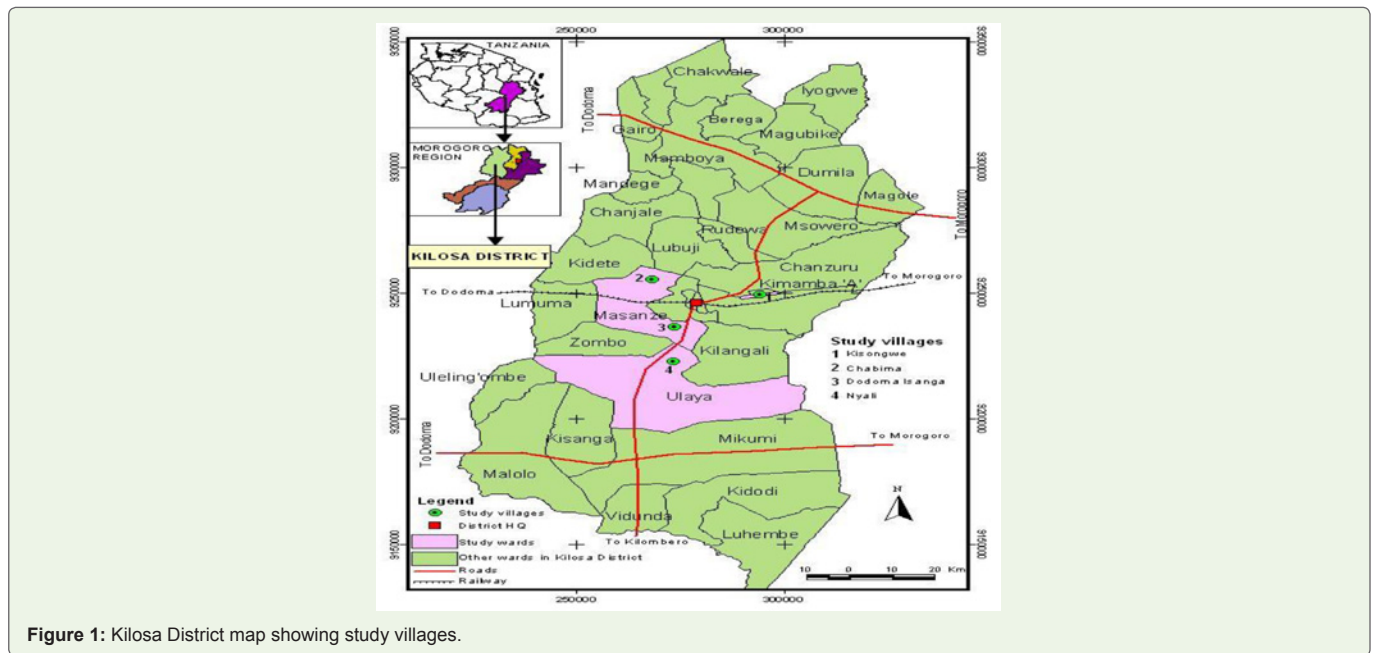


Figure 1: Kilosa District map showing study villages.

of village land use plan sales of forest products and environmental benefits. The value of the forest products were obtained through asking people the value of each forest product per unit and multiplied by the total number harvested per month. CBA was then done using the costs and benefits obtained. IRR was obtained through trial and error. The guiding discount rate used to calculate NPV over time in this analysis was 15%, 23%, 31% and 33.7%.

Results and Discussion

Identified transaction costs of REDD+ trial payment scheme

Based on the clarifications made on section 2.4, the identified transaction costs found on the REDD+ trial payment scheme in the study area are presented in Table 1.

The costs of participating in project activities

The cost of participating in various REDD+ activities by households in each village are given in Table 2.

The study revealed that about (73) days were spent by individual households in activities related to forest management for REDD+ (Table 2). The higher number of days spent in forest management for REDD+ might be influenced by the length of time spent in carbon measurement and forest patrol. This imply that, forest management activities take up the greater part of time because they are continuous activities and essential for maintenance of the forest resource. The results support argument made by Zahabu that carbon measurement could be difficult and dangerous work as may involve walking for a long time in forest where risks of attack by wild animals such as snakes are possible [10].

However, the number of days spent by Chabima and Nyali villages were high (83 and 82) days respectively (Table 2) in forest management for REDD+. Discussion with village leaders revealed that variation in

number of days spent in REDD+ activities amongst villages might be influenced by the quality of their forest since the communities spent more time (i.e. more number of days) on maintenance of their degraded. This imply that communities in Chabima and Nyali villages devoted more time in forest management activities because their village forests were highly destroyed as opposed to Kisongwe and Dodoma Isanga villages. The findings support observations made by Adhikari and Lovett that variation in transaction costs could be contributed by variation in forest conditions or in particular quality of the forest resource itself [11].

Quantified annual transaction costs of REDD+ trial payment scheme

costs incurred by villagers: The quantification of the cost of participating in various REDD+ activities in monetary terms are shown in Table 3. From the results, transaction costs of forest management for REDD+ is relatively high (TZS 497 714) due to high number of days spent on forest management for REDD+ (Table 2), compared to TZS 211 358 and 61 362 as transaction costs of VLUP and CBFM processes and REDD+ meetings respectively (Table 3). Moreover, there were differences between the transaction costs incurred between villages. For example, Chabima and Nyali villages had incurred a more or less higher transaction cost of TZS 565

Table 1: Identified transaction cost in the study area

Main categories	Sub categories
To project	Monitoring and verification
	REDD readiness
	Baseline settings
	Start-up
To villagers	Operation
	Preparation
	Attending meetings

Source: Field survey, (2012/2013)

Table 2: Households costs of participating in REDD+ project activities in the study area

REDD+ activities	Number of days per village/year				Total average days/year
	Dodoma Isanga	Chabima	Nyali	Kisongwe	
Forest management for REDD+	74	83	82	51	73
Village Land Use Plan VLUP and Community-Based Forest Management (CBFM) process	49	39	18	16	31
REDD+ meetings	10		8	9	9

Source: Field survey (2012/13)

Table 3: Quantified costs of participating in REDD+ project activities in the study area.

REDD+ activities	Transaction costs per village per year				Average Total (TZS)
	D o d o m a Isanga	Chabima	Nyali	Kisongwe	
F o r e s t management for REDD+	504 532	565 894	559 076	347 718	497 714
VLUP & CBFM process	334 082	265 902	122 724	109 088	211 358
REDD+ meetings	68 180	61 362	54 544	61 362	61 362

Source: Field survey (2012/13)

894 and 559 076 respectively in forest management for REDD+ as opposed to Dodoma Isanga and Kisongwe who had incurred (TZS 504 532 and 347 718) respectively (Table 3). The reason for higher transaction costs, their variations and implications are the same as those mentioned in section 3.2.

Total transaction costs incurred by the REDD+ trial payment project

The total transaction costs for a REDD+ project includes transaction costs incurred by project and transaction cost incurred by villagers (Table 4).

The result implies that, higher transaction cost might be influenced by carbon pools covered, activities adopted for reducing deforestation and/or forest degradation and monitoring methods employed. Average transaction cost of six Peruvian REDD+ projects (6 672 440ha) was estimated to be USD 0.73 ha⁻¹ yr⁻¹ [12], which is equivalent to TZS 1 146 ha⁻¹ yr⁻¹. Based on the study findings it has been argued with focus on economies of scale that REDD+ transaction costs tend to increase with reduction of the project area and carbon benefits [12].

Transaction costs incurred by the project are relatively high, rising to the equivalent of 99.71% of the total transaction cost as opposed to 0.29% incurred by the villagers (Table 4). Again, it is apparent that costs for measurement, monitoring and verification are high constituting about 52.2% of the total estimated transaction cost (Table 4). The results are relatively similar to observations made by Antinori and Sathaye Antinori, C and Sathaye J [8] who found that monitoring and verification costs component have the largest rank

(34%) of weighted transaction costs.

Economic efficiency of the project to offset transaction cost

CBA and sensitivity analysis were done, and results (Table 5) show that even at a discount rate of 31% the project was able to offset transaction cost incurred during implementing REDD+ activities. However, the magnitude of the NPV decreases by 90% with increase in discount rate from 15% to 31%. The IRR was found to be 33.7%. This is the maximum interest that the project can pay to offset project costs and remain viable. The amount is higher compared to the World Bank’s rate of 15% and the rate used by Tanzania’s Bank of 20.6%. This implies that the project is economically efficient. Moreover, the switching value approach shows that even when the benefits were reduced by 90%, it was still viable. The REDD+ project would be inefficient when project benefits are reduced by more than 90% (>90%).

People’s perceptions towards REDD+ Trial Payments scheme

Perception on condition of the forest reserve after REDD+ activities: Respondents in the study area were asked of their perceptions on the changing trends of a series of indicators in the last 3 years. The results of respondents’ judgments are given in Figure 2.

Table 4: Total transaction costs for implementing a REDD+ project.

Main category	Sub-category	Total value (TZS)	Total transaction cost (TZS ha ⁻¹ yr ⁻¹ [%])
To project	Monitoring and Verification	166 421 389	1 411.0 (52.20)
	Start up cost	123 672 000	1 049.0 (38.80)
	REDD readiness cost	28 000 000	237.0 (8.70)
	Baseline setting	50 000	0.4 (0.01)
Sub-total		318 143 389	2 697.4 (99.71)
To villagers	Operation cost	497 714	4.2 (0.20)
	Preparation cost	211 358	1.8 (0.07)
	REDD+ meetings	61 362	0.5 (0.02)
Sub-total		770 434	6.5 (0.29)
Grand total		318 913 823	2 704.0 (100)

Source: Field survey (2012/13)

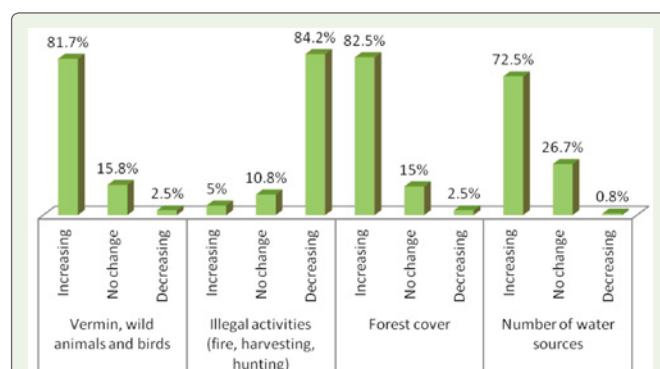


Figure 2: Responses on perception regarding condition of the village forest reserve.

Table 5: NPV to different discount rates.

YYear	CCost	BBenefit	NNet benefit	NPV at r =:			
				115%	223%	331%	333.7%
11	1133 350 434.00	229 357 768.00	--103 992 666.00	--90 428 405.22	--84 546 882.93	--79 383 714.50	--77 801 493.45
12	777 187 118.00	1112 630 568.00	--10 795 650.00	--8 163 062.38	--7 135 732.69	--6290804.73	--6 042 535.89
13	774 456 271.00	1128 630 568.00	554 174 297.00	335 620 479.66	229 112 396.00	224 097 911.07	222 685 530.98
14	116 960 000.00	1128 630 568.00	1111 670 560.00	663 848 005.12	448 788 587.88	337 918 706.27	334 984 814.86
15	116 960 000.00	1128 630 568.00	1111 670 568.00	555 520 008.43	339 665 521.45	228 945 579.38	226 173 682.66
TTotal	3318 913 823.00	5527 880 040.00	1162 727 109.00	556 397 025.60	225 883 889.70	5 5 287 677.48	--0.80

Source: Field survey (2012/13)

Table 6: Communities' perception towards REDD+ trial payments.

Statement	Agree	Disagree	χ ² -value	Significance
REDD+ payments are satisfactory	115 (95.8)	5 (4.2)	100.833	0.000*
It is a source of supplementary income	109 (90.8)	11 (9.2)	80.033	0.000*
All village member should receive REDD+ revenue	102 (85.0)	18 (15.0)	58.800	0.000*
REDD+ payments should not be given during agricultural crops harvesting	89 (74.2)	31 (25.8)	28.033	0.000*
A significant amount of money should be directed to social services	71 (59.2)	49 (40.8)	4.033	0.045*
REDD+ revenue is necessary to sustain forest in your area	81 (67.5)	39 (32.5)	14.700	0.000*

Source: Field survey (2012/2013), figures in parenthesis is percentages

Note: * = Statistically significant at P < 0.05

Majority of respondents (81.7%) had declared that there was an increase on the number of vermin, wild animals and birds in the forest which destroy their crops in their farms; 15.8% reported no change and 2.5% said it was decreasing (Figure 2). One respondent in Kisongwe village said,

“Forest conservation is good but when it comes to the issue of vermin I hate it because I spend more time in a year chasing them to protect my crops from being destructed”.

The result implies that, as the forest cover improves and biodiversity values increase, so does the population of vermin, wild animals and birds. This then might create costs to households such as crop damage to the farms found nearby the forests. However, transaction costs of scaring vermin from the farms were not included because such costs are incurred even without REDD+ activities. Experience shows that, crop damage is confined to villagers who cultivate adjacent to forest reserve [13]. It has been reported that improved conservation creates indirect costs to the household with farms adjacent to protected forest [14].

On the other hand, 82.5% of respondents mentioned that there was an increase in the forest cover, 15% mentioned that there were no change and 2.5% said it was decreasing (Figure 2). The result shows that, an increase in forest condition might be influenced by proper management of the forest as a result of REDD+ activities. The results imply that REDD+ initiatives had already shown its positive impacts to forest conservation in the study area. This might influence the increase in amount of carbon harvested hence increased the earnings from REDD+ revenue. These results could provide information to support efforts of forest managers in the country on conservation.

The approach could be extended and easily adopted particularly in areas where Participatory Forest Management (PFM) programme already exists in the country [15].

Perception on amount of money received: A chi-square test on people’s perception on amount of money received was obtained using six statements (Table 6).

Results show that 95.8% of the respondents agreed to the perception that REDD+ payments were satisfactory, implying that it is worth to continue with similar payments. There is significant relationship between communities’ perceptions on REDD+ trial payments with their responses to agree or disagree at P < 0.05 level. However, observations on Makira REDD project in Madagascar revealed that people who directly benefited from the forest conservation did support it. Also it was suggested that ensuring fair distribution of benefits from forest carbon project similar to REDD would bring success in forest conservation [16].

Conclusions and Recommendations

The study concludes that most of the transaction costs (99.7%) were carried by TFCG-MJUMITA project for REDD+ implementation. Although a tiny fraction of it is carried by villagers or communities implementing REDD+. The financial support to cover transaction costs of the pilot REDD+ project through TFCG-MJUMITA was essential in making it possible for REDD+ initiatives in Kilosa to be realized.

It is also worthwhile to undertake REDD+ project. The project was observed to be economically efficient and approaches used in undertaking it were perceived positively by communities under the

project, particularly in terms income gain and also in sustaining their village forests.

It is therefore recommended that in order to facilitate implementation of REDD+ initiatives in the country, the government should take responsibility to pay for transaction costs of REDD+ projects. Villagers could only cover a tiny fraction of transaction costs as observed in this study. Government intervention to pay for transaction costs could ensure sustainability of forest conservation under REDD+ particularly after donor support for such projects is ended. This study revealed transaction costs ($TZS\ 2\ 704\ ha^{-1}\ yr^{-1} \approx USD\ 1.7\ ha^{-1}\ yr^{-1}$) that should be covered.

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