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Reforestation Program in Pantabangan-Carranglan Watershed Forest Reserve: An Assessment

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ABSTRACT

This descriptive research aimed to assess the Pantabangan-Carranglan Watershed Forest Reserve (PCWFR) particularly under Pantabangan, Nueva Ecija, Philippines. Purposive sampling was used in choosing the respondents. A total of 75 out of 86 respondents served as a source of data. Data were analyzed using frequency count, percentage, mean and standard deviation. Pearson Product Moment Correlation and Chi-square were also used. The majority of the respondents conducted site development practices such activities were based on DENR standards and specifications. Activities under the implementation scheme were found moderately implemented on by-administration and somewhat implemented on by-contract. The outcome of the reforestation program in terms of 100% completed, with a survival rate of 50-89%, 1.0meter height for fast-growing trees, and 0.5 meters for slow growth trees. Site development practices were significantly related to the outcome of the reforestation program. The relationship was established between the implementation scheme and the outcome of the reforestation program: the by-administration scheme was significantly related to the actual area planted and growth height of seedlings while the by-contract scheme had a highly significant relationship to the actual area planted. Lack of financial and other logistic support was the leading problem encountered in the implementation of the reforestation program.

1. Introduction

Reforestation is the re-establishment or expansion of a forest severely destroyed or degraded. Its primary goal is to restore the environmental and economic benefits it provides, and also to ensure the conservation of habitats for animals and plants (World Bank, 2002). The program is being implemented in different schemes. The previous approach is by-administration, but the current approach is by-contract. In the former approach, the DENR itself has performed all related activities. This, besides the reforestation effort made by other national government agencies that have direct stakes with the forest resources. On the other hand, the by-contract approach has engaged the services of peoples' organizations, private corporations, local government units, and others (Korten, 1992).

Target sites of the reforestation program covered all denuded areas that require immediate rehabilitation, but prioritization and more attention are given to certain areas that have important roles in biodiversity conservation, and human development, and other areas that contribute to environmental related risks such as soil erosion, landslide, and flooding. In the province of Nueva Ecija, one critical area that has the above characteristics is the Pantabangan-Carranglan Watershed Forest Reserve (PCWFR), the home of the Pantabangan Dam, one time dubbed as the largest water reservoir in Asia, is a protected area included in the initial component of the National Integrated Protected Area System (NIPAS) (DENR-Administrative Order No. 2008-26).

The Pantabangan-Carranglan Watershed Forest Reserve (PCWFR) was established by virtue of Presidential Proclamation No. 561 issued dated May 19, 1969, reserving certain parcels of land mainly for watershed development purposes. It is situated in the

municipalities of Pantabangan and Carranglan in Nueva Ecija, and in the municipality of Maria Aurora in the province of Aurora. Its total land area is 84,500 hectares wherein 9.94% or equivalent to 8,400 hectares comprise the water reservoir.

Despite the many benefits and opportunities that the watershed has provided, it is also threatened by human activities. Among these are illegal treasure hunting/mining, illegal cutting of trees, dumping of garbage, squatting, illegal hunting of wildlife, burning, and destruction of natural features. Other threats also include unregulated use of water, and illegal cattle grazing (DENR-CENRO, Northern Nueva Ecija, 2018). These prohibited acts that happened in the watershed have contributed enormously to the degradation of the watershed. And this is why that reforestation program has been launched to rehabilitate the area. Notable project interventions involving reforestation that have been implemented in the watershed were agroforestry, socialized upland development program, Pampanga River Basin Project, the RP-Japan Reforestation Project, National Greening Program, and the present project which is the Forestland Management Project. Implementers and participants to these many projects are the Department of Environment and Natural Resources (DENR), National Irrigation Administration (NIA), National Power Corporation (NAPOCOR), Local Government Units (LGUs), Peoples Organizations (POs), and Non-Government Organizations (NGOs).

Correspondingly, a huge amount has been spent for these purposes, yet, until now, massive reforestation is still carried-out. It is from this point that the researcher wanted to assess the outcome of the reforestation program based on the variables presented in the conceptual paradigm of the study. From this, the problems and constraints to successful reforestation were identified. It could also be assimilated whether reforestation program would really be the appropriate program strategy to provide immediate cover of bare soil in the watershed, or just efficiently poured in available financial resources on protection and maintenance aspect of forest land cover enhancement.

2. Literature Review

2.1 Site Development Practices

Most of the activities involved in the implementation of the reforestation program were those conducted in the field particularly technical and silvicultural in nature. The manner in how these were carried out may contribute to the outcome of the reforestation program. However, the success or failure of reforestation projects cannot be explained by either a single technical or a socio-economic factor (Le, Smith, Herbohn, and Harrison, 2012). But in some cases, links were relatively clear, such as weed control and greening management were logical factors that would affect the seedling survival rate.

2.2 Choice of Species

The success of reforestation efforts strongly depends on species that can fulfill the demands of local people and the ability of the forest to support local livelihood (Gunter, Gonzalez, Alvarez, & Aguirre (2009); Weyerhaeuser, Horst, Wilkes, & Kahrl (2005) and as well as the ability of the forest to provide environmental benefits. Though the ability of certain trees to thrive and grow well in a certain place was an important consideration, the sentiments of the local people could not be discounted especially if they were the recipient of the reforestation project implementation.

Even when planted trees have survived to maturity, they have not necessarily been welcomed by local communities. This is a particular problem in the rural areas among developing countries because if reforestation projects do not meet community livelihood needs, then the planted trees will not be respected and will most likely be removed and replaced with agricultural land uses. Higgs (1997), compellingly argued, good reforestation requires a view beyond the technical to include social, aesthetic, and moral aspects. Hence, the selection of appropriate species to be planted in an area needs special attention considering the prevailing condition in the area.

In the Philippines, specifically within watershed areas, laws, policies, and guidelines have been promulgated to serve as a guide in the establishment of reforestation areas and other forest management units. These include the National Integrated Protected Area System Act, and DENR Administrative Order No. 2017-03 (Revised Implementing Rules and Regulations of EO 193, Series of 2015: Enhanced NGP).

2.3 Types of Seedlings

Seeds remained as the basic unit of production in the rehabilitation efforts. But sometimes, seeds were scarce. This is why planting stock for planting is a choice between those plants propagated from seeds or sexual propagation or the use of vegetative parts of the plants. In both manners, the use of nursery-grown seedlings stocks has proven to be more superior to direct seedling in ensuring vegetation of areas that are marginal (Carandang, & Lasco, 2002).

2.4 Quality of Seedlings

Seedling quality describes the genetic and physical aspects of the seedlings. Failures in tree planting can be traced to problems with seed quality. The planting value of seeds has been severely compromised by the haphazard collection of the same without

considering the quality of mother or seed trees. Seed collection processing and handling in most cases are being undertaken without adequate technical supervision (Carandang et al., 2002).

Little emphasis was given to defining and recognizing high-quality seedlings for reforestation in the Philippines. The previous reforestation projects provided a standard for seedlings to be planted. These were being checked in the evaluation of seedlings produced for the basis of payment under the contract of reforestation and as part of the protocols in the sorting and grading of seedlings stocks prior to their dispatch for field planting (DENR Memorandum Circular No.1988-11).

The issuance of DENR Administrative Order No. 09-1995 rationalizing the production and distribution of forest tree seeds for the reforestation process in the country has signaled the placing of emphasis on the use of quality seeds. It stipulated the use of seeds for all reforestation endeavors from seed production areas and accredited seed sources only. Reforestation projects using seedlings produced according to a quality standard had a significantly higher density of trees compared to projects using seedlings with no quality standard (Le, Smith, Herbohn & Harrison, 2012). It was observed that weeds compete directly with seedlings for light, soil nutrients, and water and can smother and eventually kill young planted seedlings. Hence, using higher quality seedlings may have resulted in either better seedling survival with more trees reaching maturity. But it was likely that the poorest quality seedlings were planted by smallholders who had little knowledge of tree nursery systems (Baynes, Herbohn, Russell, & Smith, 2011).

2.5 Location of Nursery and Hauling of Seedlings

These two variables were related to each other with regard to time in transferring seedlings from their propagation site to the planting site. Basically, the nearer to each other tend to be less time consuming of travel which resulted in the minimization of damages. This is likened to the result of a study that reforestation is closer to the town being more accessible and therefore better maintained (Schuren and Snelder, 2008). Damages to seedlings during transport may result from long-distance nurseries to the planting site because seedlings are more exposed to stress leading to reduce seedling survival.

2.6 Planting Preparation Technique

The activities involved in the actual planting of seedlings greatly influenced the survival of seedlings planted and growth performance. Many kinds of literature have presented different ways of planting but there are also similar to each other. The indigenous people have their unique planting practices originated from their elderly and adopted by their next generation and to the present generation. These practices are incorporated into their Indigenous Knowledge Skills and Practices (IKSP).

Guidebook to reforestation projects prescribed the version recommended to upland farmers for adoption. Some of the practices included are the following :

- **Brushing** – it is conducted either in the strip or spot method. Under the first method, the strip with one (1) meter width is constructed of which the weeds are cut close to the ground. It is here in the cleared line where the seedlings have to be planted. It is time-consuming but provides clean space between two plants. According to (Boyer, (1988), the survival rate was better with a high level of site preparation than with a low. The second method is constructed in a circular shape with a one-meter size diameter.
- **Hole- digging** – it is done after brushing or before the planting of seedlings in the hole. The hole is big enough to accommodate well the root ball of the seedlings.
- **Planting** – seedling is placed in the hole. The plastic is removed before doing so and the root ball is not broken, thus wilting is minimized. Subsequently, the hole is poured with topsoil and pressed gently making the seedlings stand straight.
- **Staking** – stakes made – up of indigenous materials at least one (1) meter is long is placed beside the planted seedlings. It's mainly used is for anchorage by the plants and as signage to easily locate the plants.
- **Mulching** – mulch composed of biodegradable materials is placed on the ground around the planted seedlings. The mulch controls the growth of seeds, control evapotranspiration, and ultimately become organic fertilizer for the plants.

2.7 Forest Protection and Maintenance

The main agents of forest loss and degradation in the tropics are fire, weeds, and grazing (Lamb, Erskine, & Parrotta, 2005). Successful reforestation would be impossible if these agents and their underlying causes are not dealt with effectively. Therefore, before any reforestation project starts, it is important to have a process in place to identify potential forest disturbances and have mechanisms in place to mitigate them, which may require coordination with local authorities and good low enforcement (Nawir, & Rumboko, 2007).

The implementation of forest protection mechanisms (such as fencing, patrolling, firebreaks, and watchtowers) was significantly reduced reported soil erosion and landslide frequency. These protection mechanisms reduce threats to the survival and growth of trees such as grazing, illegal tree harvesting, fire, diseases, and pest (Zhang, Tian, Li, and Lindstrom, 2002) and therefore erosion

and landslide risk. Fire is one of the biggest causes of forest degradation in the Philippines and caused 72.86 % of forest loss between 1980 and 2001 (Rebugio, Pulhin, Carandang, Peralta, Camacho & Bantayan, 2007), hence fire protection mechanisms are particularly important.

2.8 Implementation Scheme

The implementation of reforestation in the Philippines is being carried out through the Forest Management Bureau. In the early implementation of the project, it was the government itself that directly did the field activities. Various forms have been attempted in the project implementation over the last seventy years. In the 1960s and 1970s, billions of pesos were committed to reforestation (Remigio, A., 1993). According to some field implementers of the project, the by-administration approach yielded positive results because the planted area was continuously protected and maintained for a longer period. But overall, the results of the projects were discouraging (Revilla and Gregorio, 1983). This was supported by a case study of local forestry who said that the plus factor on the projects was offset by problems that were purely institutional in nature; cases of delay in the disbursements of the fund, red tape, and graft and corruption. (Hinojosa, 1994).

Realizing its time to bring together various efforts, there has been a paradigm shift in conservation and natural resource management away from state-centered control towards approaches in which local people play a much more active role. Thus, the National Forestation Program was launched. Contract Reforestation Program is one of the major components of the forestation where local government units, non-government organizations, local communities, and families were the contractors. They have been paid to engage in seedling production, site preparation, plantation establishments, and maintenance and protection estimated at 20,000 per hectare is the cost and it is a performance-based which means that a contractor receives full payment after three years based on an 80 % survival rate for the trees (Korten, 1992).

The contract reforestation is laudable in recognizing the participation of several groups, nevertheless faces a number of policy constraints that include: (a) lack of tenure rights; (b) lack of community participation in reforestation planning; (c) intrusion of patronage criteria in the selection of contractors; and (d) weak administrative capacity of the DENR.

It was found that the involvement of the local populace from the reforested areas either as contractors or as participants in the preparation of development plans, selection of species, and seedling production was quite limited. Hence, the planning and maintenance of the trees became dependent on short term financial remunerative incentives, which the study argued was a poor substitute for people's involvement in all aspects of forest management (Upland NGO Assistance Committee, 1992)

2.9 The outcome of the Reforestation Program

The outcome of the reforestation program is measured by success indicators to include actual area planted against the target area, survival rate, and growth performance.

The actual area planted refers to the area planted after the implementation of the project plan. It is determined by the actual number of seedlings planted based on a given distance of planting. Usually, the result of validation conducted by a third party using the most recent technology on area location and mapping is being adopted for precise and reliable outcome (DENR Memorandum Circular No.1988-11).

The survival rate of trees is the total number of trees survived after planting for a given period of time. The short-term tree survival rate of 80 percent specified under the Implementing Rules and Regulations (IRR) of the contract reforestation program of the DENR was adopted as the basis in all reforestation project assessments for purposes of turning over the planted area to the DENR and for adoption by interested parties to continue the protection and maintenance component of the project.

Finally, the growth performance is the meat of the maintenance and protection aspect of the reforestation program. It is measured on the basis of the height of seedlings that survived after the 3 years contract period. Also, under the contract reforestation program has a height of slow-growth three species is 1.0 meters from the basal area and 1.5 meters also from the basal area for fast-growing tree species.

3. Methodology

The study was anchored on the Forest Transition Theory by A.S. Mather (2008). Forest transition refers to a geographic theory describing a reversal or turn-around in land-use trends for a given territory from a period of net forest area loss (deforestation) to a period of net forest area gain (reforestation). Based on the above-cited theory, this study was conceptualized to assess the outcome of the reforestation program implemented in the PCWFR for possible improvement. It is believed that assessment of the program is a mechanism to determine the efficiency of schemes that would determine the reforestation success as measured by key indicators that contributed to the improvement of the aforementioned program. The study used a descriptive research design

in the presentation of data. Survey questionnaire patterned from the sample used in the Midterm Report-Third Party Validation of Forestland Management Projects Accomplishment and the Information Impact Survey and Trainee Follow-up Survey under the Enhancement of Community-Based Forest Management Program of DENR-JICA. Purposive sampling was used in choosing the 75 respondents Data were tallied, analyzed, and distributed using frequency count, percentage, mean and standard deviation. Pearson Product Moment Correlation and Chi-square were also used in the study.

4. Results and Discussion

4.1 Site Development Practices

Table 1 presents the summary of the preferences of the respondents on the different site development practices.

Table 1. Site Development Practices

SITE DEVELOPMENT PRACTICES	FREQUENCY (n=75)	PERCENTAGE
Tree Species Planted		
Fast-growing/ Exotic	40	53.33
Slow growth / Endemic	35	46.67
Quality of Seedlings Planted		
Height: 1 foot and above	42	56.00
Below one foot	33	44.00
Base Diameter		
Pencil size and Below	21	28.00
Pencil size and Above	54	72.00
Hardened	36	48.00
Not hardened	39	52.00
Types of Seedling Planted		
Potted	39	52.00
Bare root	36	48.00
Type of transport of Seedlings from the main nursery to the drop-off point		
Motor vehicle	38	50.67
Draft Animal	13	17.33
Human	24	32.00
Type of hauling of seedlings		
Overhead carrying	30	40.00
Back carrying	25	33.33
Hand hanging carrying	20	26.67
Location of the main Nursery		
Within/near the planting site	32	42.67
Outside the planting site	43	57.33
Site Preparation		
Brushing:		
Strip	32	42.67
Spot or ring	28	37.33
No brushing	15	20.00
Hole Size		
Equal the size of the plastic of the seedlings	23	30.67
Above the size of the plastic of the seedlings	52	69.33
Fertilizer Application (Pabaon)		
Yes	32	42.67
No	43	57.33
Mulching		
With Mulch	45	60.00

Without Mulch	30	40.00
Maintenance and protection		
Brushing	12	16.00
Replanting	22	29.33
Cultivation	14	18.67
Fertilizer application	8	10.67
Mulching	9	12.00
Patrolling	7	9.33
Presence of firefighting tools and equipment	3	4.00

As the result of the choice of seedlings, the majority (53.33%) of the respondents planted fast-growing/exotic tree species, because fast-growing tree species were found to have a good survival rate even under harsh environmental conditions or the planting site was needed to be restored to its original cover immediately. This contradicted the policy on DENR Administrative Order No.2017-03 or Revised Implementing Rules and Regulation of EO 193, series of 2015 which stated that only endemic tree seedlings have to be planted in a protected area. For the quality of seedlings in terms of height, the majority (56.00%) of the respondents had chosen seedlings with at least one foot high and above. In terms of base diameter, 72.00% of the respondents had chosen pencil-size and above the stem, and 52.00% of the respondents had planted unhardened seedlings.

As to the type of seedlings planted, potted seedlings (52.00%) had a slight edge which may be due to the fact that they had encountered a shortage of potted seedlings and they resorted to the planting of bare-root seedlings with quite a high survival rate like the Gmelina tree species.

Location of Forest Nursery, the result shows that the majority (57.33%) of the respondents said that a total number of seedlings planted were procured from outside the planting site and 42.67 percent were procured within/near the planting site. For the transport of seedlings, more than half (50.67%) of the respondents have transported the seedlings from the main nursery to the drop-off point by means of a motor vehicle. Schuren and Snelder (2008), stressed that reforestation closer to town was more accessible and better maintained. Damages to seedlings during transport had resulted from long distance of nursery to planting site because seedlings were more exposed to stress

In the hauling of seedlings, from the drop-off point, 40.00 percent of the respondents hauled the seedlings to the planting site hole mainly through overhead carrying. Some drop-off points were far from the planting holes and the motor vehicle or draft animal used was not applicable because of the terrain of the area and the presence of tree barriers.

Under the planting preparation technique**,** site preparation was conducted properly before planting trees by providing the best possible conditions for survival and growth in the crucial first year. Less than half (42.67%) of the respondents preferred strip brushing, this implies that stripped line provided visibility of rows for planted seedlings.

For hole size, 69.33% was above the size of the plastic used for the seedlings. They believed that plants were easier to recover from stress with the said size of the hole because it would provide more space for the development of the roots and to maintain humidity favorable to the plants.

For mulching, the majority (60.00%) of the respondents preferred newly planted seedlings covered with mulch. Mulching according to Lalijee (2013) also contributed to increasing filtration rate, lowering the temperature and therefore lowering evaporation for sustainable soil and land management, and reducing soil erosion.

After plantation, seedlings planted were maintained and protected through brushing, replanting, cultivation, fertilizer application, mulching, and patrolling with the presence of fire-fighting tools and equipment. Results showed that more than one-fourth (29.33%) of the respondents conducted the replanting of dead plants. Before any reforestation project starts, it is important to have a process in place to identify potential forest disturbances and to have mechanisms in place to mitigate them; which may require coordination with local authorities and good law enforcement (Nawir, & Rumboko, 2007).

4.2 Implementation Scheme of Reforestation Program through By-Administration

The implementation of the different reforestation activities was moderately implemented as shown in Table 2. The overall mean of the indicators relative to the implementation of the reforestation program was 3.90, and it was described as "moderately implemented ". This means that the by-administration scheme was relatively implemented.

Table 2. Implementation of Reforestation Program By-Administration

INDICATORS	MEAN	DESCRIPTION
a. Level of implementation about the implementation scheme	3.70	Moderately Implemented
b. Implementation of the reforestation project and its compliance.	3.92	Moderately Implemented
c. Resources/ Support Facilities	4.18	Moderately Implemented
d. Materials on Protection and Maintenance	4.07	Moderately Implemented
Over-all Mean	**3.90**	**Moderately Implemented**

Scale:
4.20 - 5.00	Fully Implemented
3.40 - 4.19	Moderately Implemented
2.60 – 3.39	Somewhat Implemented
1.80 - 2.59	Slightly Implemented
1.00 - 1.79	Not Implemented

4.3 Implementation Scheme of Reforestation Program through By-Contract

The overall mean on the by-contract scheme was 3.14 described as "somewhat implemented" which means that the respondents have low awareness of the different aspects of the implementation scheme.

Table 3. Implementation of Reforestation Program By-Contract

INDICATORS	MEAN	DESCRIPTION
a. Level of implementation about the implementation scheme	3.50	Moderately Implemented
b. Is NGP implemented in your area?	3.30	Somewhat Implemented
c. Different aspects of the project	3.19	Somewhat Implemented
d. Barriers encountered that have prevented from attending field activities	2.91	Somewhat Implemented
e. Level of implementation on the satisfaction of the quality of management of the organization	3.60	Moderately Implemented
f. Improvement in the forest condition on the project area after it was completed	3.31	Somewhat Implemented
g. Have read/implemented the IEC materials on NGP	2.67	Somewhat Implemented
h. After reading the materials, have you implemented the orientation program and engaged in all activities.	2.67	Somewhat Implemented
Overall Mean	**3.14**	**Somewhat Implemented**

Scale:
4.20 – 5.00	Extremely Implemented
3.40 – 4.19	Moderately Implemented
2.60 - 3.39	Somewhat Implemented
1.80 – 2.59	Slightly Implemented
1.00 - 1.79	Not at all Implemented

4.4 The outcome of a reforestation program

The outcome of the reforestation program was described in terms of the actual area planted against the target area, the survival rate of seedlings planted, and the growth height of seedlings planted. The actual area planted was measured as 100% completed and 75 % completed against the target area to be planted. The survival rate of seedlings planted was categorized as 90-100% survived and 50-89% survived. The growth height of seedlings planted was measured into 3 categories. First was 1.5 meters for

fast-growing trees, and 1.0 meters for slow growth trees. Second, 1.0 meters for fast-growing trees, and 0.5 meters for slow growth trees. Third, 0.5 meters for fast-growing trees and 30 cm. for slow growth trees (Table 4).

The majority (57.33%) of the respondents claimed their areas were 75% completed. In terms of the survival rate of seedlings planted, 88.00% of the total respondents said that there was only 50-89 percent of total seedlings planted survived. With regard to the growth height of seedlings planted, 49.33% of the respondents said that the seedlings they planted had a height of 1.0 meters for fast-growing trees and 0.5 meters for slow growth.

Table 4. The outcome of the Reforestation Program by each respondent

OUTCOME OF REFORESTATION PROGRAM	NIA		DENR		PO	
Actual area planted against the target area	**F**	**%**	**F**	**%**	**F**	**%**
100% completed	17	56.67	6	40.00	20	66.70
75% completed	13	43.33	9	60.00	10	33.30
The survival rate of seedlings planted after 3 years						
90 to 100	3	10.00	1	6.70	5	16.7
50 to 89	27	90.00	14	93.30	25	83.3
Growth height of seedlings planted after 3 years						
1.5 meters for fast-growing trees, 1 meter for slow growth trees	11	36.67	5	33.30	17	56.70
1 meter for fast-growing trees, 0.5 meter for slow growth trees	16	53.33	8	53.30	13	43.30
0.5 meters for fast-growing trees, 30 cm for slow growth trees	3	10.00	2	13.30	-	-

4.5 Relationship between Site Development Practices and the Outcome of Reforestation Program

Table 5 shows that certain variables concerning site development practices cannot be rejected in one or two parameters on the outcome of the reforestation program implemented in PCWFR after 3 years.

Table 5. Relationship between Site Development Practices and the Outcome of the Reforestation Program

SITE DEVELOPMENT PRACTICES		OUTCOME OF REFORESTATION PROGRAM		
		Actual Area Planted	Survival Rate	Growth Height
Trees Species Planted	Exotic	0.284*	0.120	0.222
	Endemic	-0.354**	0.083	-0.358**
Types of Seedlings Planted	Potted	0.063	0.100	0.000
	Bare root	-0.122	-0.139	0.179
Quality of Seedlings Planted: Height	Above 1 foot	0.045	0.003	-0.266*
	Below 1 foot	0.014	0.059	0.148
	Below pencil size	0.124	0.336**	0.109
Quality of Seedlings Planted: Base Diameter	Above pencil size	-0.219	0.060	-0.342**
	Hardened	0.045	0.211	0.108
	Not hardened	0.141	0.073	0.249*
Types of Transport of Seedlings	Motor Vehicle	0.093	0.096	0.099
	Draft Animal	-0.237*	0.091	0.097
	Human	0.085	0.109	0.050
	Overhead Carrying	0.051	0.258*	0.210

Types of Hauling of Seedlings	Back Carrying	0.124	0.040	0.070
	Hand Hanging Carrying	0.007	-0.274*	0.150
Location of Main Nursery	Within Planting Site	0.127	0.028	0.050
	Outside Planting Site	0.162	0.041	0.089
Site Preparation/Planting: Brushing	Strip	0.079	0.446**	0.030
	Spot or Ring	0.058	-0.314**	0.074
Site Preparation/Planting Hole size	Equal the size of plastic	0.100	0.274*	0.200
	Above the size of plastic	0.058	0.268*	0.228*
Fertilizer Application		0.028	0.142	0.068
Mulching		0.158	0.062	0.0 89
Maintenance and Protection: Brushing	Strip	0.113	0.158	0.078
	Spot	0.063	0.322**	0.071
Replanting		0.205	0.297*	0.006
Cultivation		0.037	0.149	0.027
Fertilizer Application		0.014	0.075	0.097
Mulching		0.053	0.084	0.029
Fire-line Establishment		0.131	0.039	0.084
Patrolling		0.108	0.116	0.108
Presence of firefighting tools and equipment		0.097	0.045	0.218

** Significant at 0.01 level (2 – tailed)

* Significant at 0.05 level (2 – tailed)

In terms of tree species planted, fast-growing/exotic trees have a significant relationship with the actual area planted against the target area (r=0.284) but slow growth/endemic has a negative high significant relationship with the same parameter of the outcome of the reforestation program (r= -0.354). This means that the higher number of exotic tree species used, the wider actual area planted while the lesser number of endemic tree species used has resulted in a wider area planted. This conforms to the findings of Herbert, (2016) which states that rapid canopy closure in exotic tree plantations could accelerate succession processes, while Brokerhoff, et. al., (2008), stated that it favors the establishment of tree regeneration. Also, this outcome was justified by the observations in some other reforestation sites wherein the lesser number of endemic trees than exotic trees were planted, but they had an equal size of area planted. The reason perhaps was that endemic trees had a broader crown, thus, wider space of planting was required. In the same manner, endemic tree species had a negative highly significant correlation with the growth` height of seedlings (r= -0.358). This means that the lesser number of trees planted in a given area, the higher growth of seedlings.

The quality of seedlings planted specifically the height of 1 foot and above had a negative significant relationship with the growth height of seedlings planted (r= -0.266). This means that seedlings planted with above 1 foot; slower the growth height of the seedlings. This contradicted the views of Haase, (2008) who said that taller seedlings could have an advantage against severe weed competition as may indicate superior genetics. However, she stressed that the greater transpiration area of taller seedlings could result in moisture stress on drier sites, especially before root establishment. Likewise, seedlings with a base diameter of pencil size and below showed a highly significant relationship with the survival rate of seedlings planted after 3 years (r=0.336). This means that seedlings planted with the said base diameter have a lower survival rate. Stem diameter was considered the best predictor of field survival and growth. A larger diameter, also indicate a larger root system and a larger stem volume. Consequently, seedlings with the above pencil size base diameter had a negative high significant relationship with the growth height of seedlings (r= -0.342). This means that seedlings planted with the above pencil size diameter have the lower growth height. Not hardened seedlings planted has a significant relationship to the growth height of seedlings planted (r = 0.249). This means that not hardened seedlings planted had slower growth height.

The transport of seedlings from the main nursery to the drop-off point, the use of draft animals was negatively correlated with the actual area planted (r= -0.237). This means that with the use of a lesser number of draft animals, the wider area would be planted. Overhead carrying was significantly related to the survival rate of seedlings (r = 0.258). This means that seedlings carried through overhead have a higher survival rate of seedlings. Hand-hanging carrying was also negatively correlated with survival rate (r = -0.274) which means that the frequent use of hand-hanging carrying of seedlings would result in the lower survival rate of seedlings because they were possibly uprooted.

Strip brushing was highly related to survival rate (r = 0.446). This means that a wider strip could result in a higher rate of survival among planted seedlings because more amount of weeds near the plants would be eliminated. This result corroborated the report of Boyer, (1988) that the survival rate was better with a high level of site preparation than with low preparation. While spot or ring-weeding had a negative high correlation with survival rate (r = -0.314). This means that more spot weeding could result in a lower survival rate because more plants had little space cleared from weeds that could hinder survival and growth. This means that the conduct of these activities favorably increased the survival rate of seedlings planted.

4.6 Relationship between Implementation Scheme and the Outcome of Reforestation Program

Results showed that the by-administration scheme was significantly related to the actual area planted (r=0.273) and the growth height of seedlings (r=0.301). This means that through the said scheme of program implementation, the area actually planted with seedlings was high. The growth height of seedlings planted had increased. The same data revealed that the by-contract scheme had a highly significant relationship with the actual area planted (r=0.343). This means that the actual area planted in areas contracted for reforestation was significantly higher. This result could be attributed to the fact that the completion of the area to be planted was bound with the contract.

Table 5. Relationship between Implementation Scheme and the Outcome of Reforestation Program

	OUTCOME OF REFORESTATION PROGRAM		
IMPLEMENTATION SCHEME	**Actual Area planted**	**Survival Rate**	**Growth Height**
By-Administration	0.273 *	0.125	0.301 *
By- Contract	0.343 **	0.098	0.087

** significant at 0.01 level (2-tailed)
*significant at 0.05 level (2-tailed)

4.7 Problems Encountered by the Respondents in the Implementation of the Reforestation Program

The respondents claimed that out of the seven pre-determined problems encountered, the lack of financial and other logistic support was the number one problem encountered during the reforestation program implementation with the highest mean of 2.45 and described as "very severe". The results imply that the lack of financial support and other logistic support could have hampered the implementation of the different reforestation activities. Consequently, this resulted in the low performance on the outcome of the reforestation program.

5. Conclusions

Results showed that the indicators on the implementation of reforestation program through by-administration, were almost moderately implemented, while respondents indicated somewhat implemented through the by-contract scheme. The outcomes of the reforestation program in terms of actual area planted was 75 percent completed, the survival rate of seedlings planted was 50-89 percent and the height of the seedlings planted after 3 years was 1.0 meters for fast-growing trees and 0.5 meters for slow-growing trees. Site development practices and the outcome of the reforestation program were significantly correlated. The implementation scheme and outcome of the reforestation program particularly on actual area planted and growth height of seedlings planted was significantly correlated. And the lack of financial and other logistic support was the leading problem encountered by the respondents in the implementation of the reforestation program.

To achieve the success of the reforestation program, consider the workforce involved. Program implementers and participants shall be given equal attention and concern in all the parameters of the outcome of the reforestation program. Corrective measures in the implementation of inappropriate site development practices shall be done. Site development practices with a significant relationship with the outcome of the reforestation program should be evaluated further considering the survival rate of the planted seedlings. The outcome of the reforestation program should be improved to equalize or surpass the outcome passing rate of the reforestation project as per implementing rules and regulations of the reforestation program under the by-contract scheme.

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