

# Landowners' Willingness to Participate in the Green Forestation Plan in Taiwan

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**Abstract**—Green Forestation Plan (GFP) was expected to promote the reforestation of plains totaling 60,000 ha within the first 8 years. Annual subsidies were budgeted at \$120,000 per ha, and \$2.4 million for 20 years. In this research we have surveyed landlords' opinions toward the GFP in an attempt to understand landlords' incentives for participating in the GFP and their levels of concern and agreement toward the policy design. Based on our analysis of landlords' opinions on the policy design, we expect to derive appropriate complementary measures, establish effective promotional schemes, and raise the policy effectiveness of the GFP. According to the results of this research, there was still a relatively high proportion of population who were not aware of GFP; more than 50% of landlords were neutral or willing to participate given high reforestation subsidies; approximately 30% of landlords were unwilling to participate. In terms of the designs of GFP, more than 50% of respondents were concerned and agreed with the policy design. In terms of the period of this policy, 52.7% of respondents indicated that it should be shortened to 15 years or lower. In terms of the amount of the subsidy, 41.7% of respondents showed that it should be raised to approximately \$250,000/ha. In terms of land area restrictions, 88.0% of respondents believed that the minimum should be lowered to 0.4 ha. More than 70% of respondents owned less than 0.4 ha of land, and since they do not own enough land to be eligible for the program, more than 80% of landlords wished to lower the minimum requirements of land area. In addition, 59.3% of respondents were reluctant to participate in reforestation because their lands were too small to be eligible; 15.0% of respondents were reluctant because the duration was too long. Responses to the question about "how the policy can be adjusted to provide incentives for landlords' participation" revealed that almost 40% of respondents desired higher subsidies. Some policy suggestions are provided as follows: (1) many landlords are still unaware of the GFP so the government should enhance the promotion of the policy; (2) many landlords are unwilling to participate in GFP mainly because they do not own enough lands to be eligible, hence the government should consider adjusting its requirements for minimum agricultural land area; (3) for subsequent promotions on GFP, the government may consider targeting on the landlords with high income and high level of education; (4) because the subsidy of this policy alone provides limited help to landlords, the government should help the landlords to explore other revenue possibilities from afforestation in addition to the existing subsidies and raise the participation incentives.

**Keywords**—Green Forestation Plan (GFP), Landlord, Willingness to Participate.

## I. INTRODUCTION

TAIWAN'S entry into the WTO in 2002 caused domestic agricultural products to lose their competitive advantages due to the higher costs required in production, and as a consequence, the topography of farmland use began to change in a large scale. In responding to the decrease in agricultural production, which freed up a sizeable volume of farmlands, the government launched many environmental payment projects to encourage afforestation. Such projects aimed to facilitate effective use of fallow lands and, more importantly, lay out a structure for the Nation's economic development and upgrade the quality of the environment. As for the past afforestation projects, several incentive rewards were set up, including the 2002 Afforestation Program in Plain Area (APA), 2008 Green-Sea Afforestation Program (GSA), and 2009 Green Forestation Plan (GFP). Now the government continues to offer economic incentives in higher amounts, with the aim to increase the willingness of landlords to participate in GFP and, in turn, slow down the destruction to the landscape brought by economic development and bring new opportunities to the farmland owners and the farming villages. GFP is expected to push forward 60,000 ha of forestation in the plain area in the first eight years and each ha is planned for an annual subsidy of NT\$120,000 over 20 years. In addition the government expects to set up three 1,000 ha forest recreation parks in the project. Through the project, the government expects to effectively increase the forest coverage, create high-quality recreational parks, facilitate active development of the recreational industries in the plain area, as well as increase the dimensions of the green spaces for public use.

As for the landlords' participation in the past afforestation programs, many literatures dealt with on this subject, including [1,2,3,4,5,6,7,8,9,10,11,12]. The GFP have only been implemented for slightly over a year; for this reason relevant research literatures have not become available at the current stage; therefore to improve the effectiveness of policy implementation the government or the policy maker may be concerned about two questions: what factors will affect the private landlords' participation incentives? Will landlords agree or satisfy with the policy design of the GFP? This paper mainly answer these two problems above, hence the paper tries to explore the incentives for the landlords' participation in the GFP and their opinions on the policy design through questionnaire survey and analysis, with a goal to provide policy suggestions, to enhance the effectiveness of the GFP.

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## II. MATERIALS AND METHODS

### A. Scope of Survey and Method of Sampling

This paper chose Tainan County for the following two reasons: 1. Tainan County is one of the vicinities that has the largest areas of farmlands; considerations are also given to inconvenient transportation and limited budget; 2. Tainan County has the largest of areas of fallow farmlands in Taiwan, and the second largest areas of forestation in the western region of Taiwan for the APA implemented from 2002 to 2007 [6].

Due to the massive number of landowners and their extensive scattered areas, there is a certain level of difficulty to conduct a full-scale census. Therefore, in consideration for the convenience of survey this paper chose the convenience sampling<sup>1</sup>. For the questionnaire survey, this paper delivered 400 copies of questionnaire from June 22nd to July 22nd 2009, and received 300 effective copies in return, which meets the minimum requirement for questionnaire validity.

### B. Questionnaire Design

This paper adopts the quantitative surveying research method for the questionnaire survey, which is designed based on the research objective, attributes, framework, and literature review. The questionnaire is divided into two major sections: the first section consists of survey questions for personal data; the second section asks the respondents' opinions and cognitions on the GFP. The initial draft of the questionnaire survey was reviewed by scholars, who evaluate the applicability, necessity, and scope of coverage in each of the questions and make relevant suggestions for amendments.

The questionnaire is divided into two major sections as organized in the following. (1) Personal data measures dimensions, such as the demographic data of landlords, the areas of farmlands owned, annual rental for the farmland, the lowest price to sell, and the current usage of the farmlands. (2) Opinions on the GFP survey the following dimensions including the respondents' knowledge on forestation policy, the respondents' willingness to participate, the respondents' focuses and agreement on policy design, the most suitable time period for GFP, the most reasonable amount for the subsidies, the most reasonable farmland area requirement deemed by the respondents, the main reason(s) for not participating, etc.

This paper adopts the Likert 5-point scale for the survey on respondents' participation incentives on "willingness" (very willing, willing, neutral, unwilling, and very unwilling); respondents answer these questions based on this scale and give a score from 5 to 1 for each question; higher score represents a higher willingness to participate in the forestation programs. For the opinion and cognition section, a 6-point scale is used (completely agree, highly agree, agree, disagree, highly disagree, and completely disagree); respondents give scores on a scale from 6 to 1 and higher score represents higher

agreement in the survey issues. Based on research hypotheses and the statistical verification methods, this paper uses SPSS for Windows software to conduct statistical analysis including descriptive statistic analysis, t test, analysis of variances, reliability analysis, and Pearson correlation analysis.

## III. RESULT AND DISCUSSION

### A. Reliability Analysis on the Questionnaire

This paper conducted a reliability test for the two major sections in the questionnaire survey and the Cronbach's  $\alpha$  value scale is used to determine the reliability. The reliability of the personal data section is 0.738 and the opinion section is 0.866; both values fall in between 0.7 and 0.9 and the results indicate that the questionnaire designed for this paper has a certain level of reliability.

### B. Descriptive Statistics Analysis on Demographics

In the variable of gender, males take up 67.3% and females (32.7%). This data indicates that male landlords significantly outnumbered female landlords approximately 2:1. In the variable of age, the majority of the respondents are 45-55 (40.7%) and 55-65 (35.3%), and the smallest group consists of respondents under 35 years of age (5.7%). In the aspect of education, 39.3% of the respondents have primary education or less, which forms the majority; 22% have junior high school education or less, and the smallest group consists of 1.0% with postgraduate education and higher. The results show that, on average, respondents have relatively lower level of education. In the variable of occupation and income source, the majority of the landlords work in the agriculture, forestry, fishery, and animal husbandry industry (34.3%); the second largest group holds industrial occupations (17.7%), and the unemployed forms the smallest group (1.3%). In the variable of family annual income, the majority of respondents surveyed has family annual income between NT\$400,000 to NT\$600,000 (46.3%), the second largest group earns between NT\$200,000 and 400,000 (26.0%), and the smallest group has an annual income over NT\$2 million (1.0%). Among the surveyed landlords, 78.3% have 0.4 ha or less, which forms the majority group; 14.7% have 0.4 to 0.9 ha, which forms the second largest group, and the smallest group consists of 7.0% who have 0.9 ha or more. The results show that the majority of farmland owners own less than 0.4 ha.

From the questionnaire survey, the majority of respondents (53.4%) receive NT\$10,000 to 30,000 in rental for the farmlands, the second largest group (30.3%) receives less than NT\$10,000, and the smallest group (3.4%) receive over NT\$90,000. The majority of respondents (74.0%) indicated that they are willing to sell their farmlands for prices between NT\$ 1 to 5 million, the second largest group (14.0%) indicated between NT\$5 and 9 million, and the smallest group (1.7%) indicated over NT\$ 9 million. Among farmland owners, the majority (45.0%) plant crops on their farmlands, 27.3% participate in the fallow scheme, 27.0% leave their farmlands in the idle state, and 0.7% commenced forestation on their lands

<sup>1</sup> Convenience sampling is also known as optional sampling; it is a non-random sampling method, used for the benefit of convenience. With this sampling method, samples are selected with consideration to proximity and convenience for measurement.

(see Table I).

TABLE I  
DEMOGRAPHICS OF THE RESPONDENTS

Variables	Number	%
Gender		
Male	202	67.3
Female	98	32.7
Age		
Under 35	17	5.7
35~45	29	9.7
45~55	122	40.7
55~65	106	35.3
Over 65	26	8.7
Education		
Illiterate	29	9.7
Self-taught	32	10.7
Primary	118	39.3
Junior High School	66	22.0
High/Technical School	28	9.3
College and more	27	9.0
Occupation & Income Source		
Agriculture, Forestry, Fishery, & Animal Husbandry	103	34.3
Industrial Production	53	17.7
Commercial	20	6.7
Services	27	9.0
Military, Public Services, & Education	9	3.0
Freelance	36	12.0
Home Maker	33	11.0
Retired	15	5.0
Unemployed	4	1.3
Annual Family Income		
Under NT\$200,000	36	12.0
NT\$ 200,000 to 400,000	78	26.0
NT\$ 400,000 to NT\$ 600,000	139	46.3
NT\$ 600,000 to NT\$ 800,000	30	10.0
NT\$ 800,000 to NT\$ 1.5 million	14	4.7
Over NT\$ 1.5 million	3	1.0
Area of Farmland		
Under 0.4 hectares	235	78.3
0.4-0.8 hectares	44	14.7
Over 0.8 hectares	21	7.0
Annual rental per hectare		
Less than NT\$ 10,000	89	30.3
NT\$ 10,000 to 30,000	157	53.4
NT\$ 30,000 to 90,000	38	12.9
More than NT\$ 90,000	10	3.4
The lowest price owner is willing to sell		
Less than NT\$ 1 million	31	10.3
NT\$ 1 to 5 million	222	74.0
NT\$ 5 to 10 million	47	15.7
Current usage		
Planting crops	135	45.0
Participate in fallow schemes	82	27.3
Leaving idled	81	27.0
Forestation	2	0.7

#### C. Landlord Awareness and Willingness to Participate in the GFP

161 (53.7%) of the surveyed farmland owners answered “unaware” and 139 (46.3%) answered aware. This shows that there is still room for improvement in the area of policy promotion because as high as 53.7% of the landlords are unaware of such policy (see Table II). Landlord willingness to participate in the GFP is shown in Table II. From Table II, the

majority of landowners (51.0%) expressed a neutral stance towards the question of willingness to participate, and the second largest group (31.0%) expressed unwillingness. It seems that the landlords tend not to participate in the green forestation programs at the current stage.

TABLE II  
LANDLORD AWARENESS AND WILLINGNESS TO PARTICIPATE IN THE GFP

Item	Number	%
Awareness		
Aware	139	46.3
Unaware	161	53.7
Willingness to participate		
Very willing or willing	54	18.0
Neutral	153	51.0
Unwilling or very unwilling	93	31.0

#### D. Landlord Concerns and Agreements on the GFP Design

This section surveys landlord opinions towards the level concerns with the GFP. Table III shows a 6-point scale used to measure the respondents’ opinions on the given question. Since the opinions are measured by the 6-point scale, quantitative data, including the mean and standard error may be derived. From Table III, we can see that, in questions relating to the GFP design, respondents are most concerned about the amount of subsidy (the highest mean value 4.15) and least concerned about the farmland area requirement (the lowest mean value 3.84).

Table III shows a 6-point scale used to measure the respondents’ agreements on the GFP design. From Table III, respondents’ agreement on the contract period of GFP has the highest mean value (4.02), and on the farmland area requirement received the lowest mean value (3.74).

TABLE III  
LANDLORD CONCERNS AND AGREEMENT ON THE GFP DESIGN

Items	Concern		Agreement	
	Mean	SE	Mean	SE
Participation in the GFP extends over 20 years	4.07	0.705	4.02	0.672
The incentive reward for GFP is NT\$ 2.4 million per hectare over 20 years	4.15	0.755	3.96	0.749
Minimum farmland area requirement for the GFP is 0.5 hectare	3.84	0.831	3.81	0.773
40 species of trees to choose from in GFP	4.1	0.793	4.01	0.779
Participants for the GFP must be the owner of the farmland	3.9	1.159	3.74	1.037

#### E. Landlord Opinions on the GFP Design

Among the surveyed landlords, the majority of respondents (52.7%) think a period under 15 years of the GFP is better; this shows that most landlords prefer a shorter length of participation in the GFP. Secondly, the majority of respondents (41.7%) think a subsidy under NT\$ 250,000 per ha per year is the better amount. Moreover, the majority of respondents (88.0%) think under 0.4 ha is the better minimum land area requirement in the GFP (see Table IV).

TABLE IV  
LANDLORD OPINIONS ON THE GFP DESIGN

Content	Number	%
The period for the GFP		
Under 15 yrs	158	52.7
15 - 25 yrs	133	44.3
Over 25 yrs	9	3.0
The subsidies given for the GFP		
Under NT\$ 250,000	125	41.7
Between 250,000-350,000	96	32.0
Over NT\$ 350,000	79	26.3
Land area requirement for the GFP		
Under 0.4 ha	264	88.0
0.4 - 0.8 ha	32	10.7
Over 0.8 ha	4	1.3

#### F. Landlord Opinions on the Adjustment in the GFP Design

Most respondents (39%) think giving higher subsidies is most effective in increasing the participating incentives; some respondents (25.7%) think that reinforced promotion of policy is most efficient to increase the participating incentives; and the smallest group (11.3%) think that shortening the contracted time is most effective (see Table V).

TABLE V  
LANDLORD OPINIONS ON THE ADJUSTMENT IN THE GFP DESIGN

Items	Number	%
Increase the amount of the subsidies	117	39.0
Shorten the contract period	34	11.3
Lower the land area requirement	72	24.0
Enhance promotion and environmental education	77	25.7

#### G. Main reasons of landlord unwillingness to participate in the GFP

Among the surveyed landlords, the majority of respondents (60.2%) think the minimum land area requirement of 0.5 ha is the main reason that they are not participating in the GFP; some respondents (20.4%) also think that currently planting crops can bring up higher income than the subsidies from the GFP; and the smallest group (11.8%) have idled lands but still think the subsidies are insufficient (see Table VI).

#### H. The demographic factors affecting the participating willingness and opinions in the GFP

This paper conducts the t-test and analysis of variances to see the demographic factors affecting the participating willingness and opinions for GFP. Firstly from Table VII we find that only one demographic factor-family income is correlated with the participating willingness; the higher the family income, the more willing the landowner is to participate in the GFP. From Table VIII, it can be seen that the respondents with postgraduate and higher education have higher willingness to participate in the GFP and also express a longer period of participation time for the GFP. And we see the Table VIII and find respondents with higher income have higher willingness to participate in the GFP. Moreover from the Table VIII the respondents whose farmlands are currently participating in the fallow scheme expressed higher concern for the requirement of

TABLE VI  
THE MAIN REASONS OF LANDLORD UNWILLING TO PARTICIPATE IN THE GFP

Items	Number	%
Currently planting crops and earns an income higher than the subsidies from the GFP	19	20.4
Currently not planting any crops but think that the subsidies are insufficient	11	11.8
Do not have sufficient farmlands to participate(requirement of minimum 0.5 hectares of farmland)	56	60.2
The required contract period of 20 years is too long	7	7.5
Total	93	100.0

TABLE VII  
THE CORRELATION BETWEEN LANDLORD WILLINGNESS TO PARTICIPATE IN THE GFP AND OTHER VARIABLES

Items	Pearson Correlation	P value
Age	-0.022	0.701
Annual Family Income	0.162	0.005**
Farmland area	0.006	0.912
Annual rental per hectare	0.024	0.678
The lowest selling price per hectare	-0.062	0.287

Note: \*\* P<0.01

TABLE VIII  
ANALYSIS OF THE VARIANCES FOR THE FACTORS OF EDUCATION, ANNUAL FAMILY INCOME AND CURRENTLY USAGE OF THE FARMLAND

Variables	Education		Annual family income		Currently usage of the farmland	
	F value	P value	F value	P value	F value	P value
Willingness to participate in the GFP	6.796	0.00***	4.477	0.00***	1.717	0.164
Opinion on the contract period	6.234	0.00***	2.535	0.011*	1.078	0.359
Opinion on the amount of subsidies	2.927	0.006**	1.947	0.053	3.94	0.009**
Opinion on the land area requirement	1.792	0.089	1.227	0.283	1.28	0.281
Post-hoc Test	Postgraduate and more > all		Over NT\$ 1.5 million > all		Participate in fallow schemes > Forestation	

Note: \* P<0.05; \*\* P<0.01; \*\*\* P<0.001.

landownership than respondents who have ever participated in forestation programs before. In addition respondents whose farmlands are currently participating in the fallow scheme expressed higher level of agreement to the requirement of landownership than respondents who have participated in forestation programs before.

#### IV. CONCLUSIONS

According the results this paper indicates that a higher

percentage of the surveyed landlords are not aware of the GFP (53.7%). The percentage shows that over half of the respondents are not aware of the GFP; this phenomenon indicates that policy promotion, marketing and advertising are not sufficient. Under high incentives of subsidy payment, the majority of the surveyed (51.0%) expressed just neutral stance on issues of willingness; this indicates that over 50% of the respondents are neutral in terms of willingness to participate in the GFP and approximately 30% are unwilling, despite the high incentive rewards. However from the perspective of policy design, over 50% of the farmland owners think the GFP is important. In the landlord opinions towards the level of agreement on the GFP, over 50% of the respondents agree to the policy designs.

This paper indicate as for the participation period over 90% of the farmland owners think the length of participation period should be shortened; this paper also shows that the landlords are leaning towards an increase of NT\$ 120,000 per ha per year. Among the respondents 59.3% of the landowners think the minimum land area requirement of 0.5 ha is the main reason that they are not participating in GFP; 15.0% think the required participation period is too long; and 11.3% have idled lands but think the subsidies are insufficient. This paper concluded with the following policy recommendation. First, a large percentage of farmers are still not aware of the green forestation policy; therefore, the government should make reinforcements in policy promotion; future promotion can be focused on the township office level or conducted via radio, TV, or printed news media to supplement for the insufficiency. Secondly, over 60% of respondents are willing to but cannot participate in the GFP because they do not have sufficient land area; therefore, we recommend the government to readjust the land area requirement. Thirdly, it is recommended that the government can focus on high-income and high-education landlords for reinforced promotion on the GFP. From this paper, we find that people of higher family income are more willing to participate in the GFP and the respondents with postgraduate and more education expressed higher willingness to participate in the green forestation program than others. Finally, the government may also help farmers to explore other income that may come with forestation. That is, other than the incentive rewards, landlords need other sources to supplement for the insufficiency of the subsidies; thus, higher income will increase the willingness to participate in the GFP. Therefore, it is recommended that the government should set up a well-structure production-to-marketing system to help the farmers to create maximum profits and, in turn, utilize the full benefit of the GFP.

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