

# Measuring Trust and Trustworthiness of Farmers in a Conflict-Vulnerable Area in Mindanao, Philippines

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**The study measured trust and trustworthiness in a conflict-vulnerable area of the Philippines, using a trust game approach, and compared the results with a direct questionnaire approach. The participants were potential farmer cooperators in a project seeking innovative extension methods, emphasizing social capital enhancement. Trust is a key component of social capital. The trust game can be considered as a behavioral experiment and it produced a credible baseline quantitative (peso) measure of trust. That baseline measure can subsequently be compared with trust levels following interventions that focus on social capital enhancement. Various socioeconomic factors were positively related to trust. In particular, the positive relationships between trust/youth and trust/education provide encouragement for the future, as the education variable is obviously amenable to change. Another positive relationship between trust and wealth indicates that social capital enhancement may lead to positive wealth outcomes. The question arises as to whether or not an alternative method for measuring trust could give comparable results at lower research cost. Thus, a second approach to measuring trust was tried based on a direct questionnaire approach. However, the latter approach was not able to replicate the trust game result. This finding emphasizes the importance of the trust game, whereby actual trusting behavior can be observed and quantified.**

Key Words: conflict-vulnerable area, social capital, trust game

## INTRODUCTION

The Mindanao Development Authority (2011) indicated that agriculture and agriculture-based industries will continue to be the most prominent drivers of the Mindanao economy well into the future. Therefore livelihood improvements based around agriculture innovation and extension will be vital. Robertson (2012) argues that decentralized, participatory, market-driven extension systems have been successful in augmenting farmer capabilities, and that a focus on this particular form of extension is appropriate in conflict-vulnerable situations, as prevalent in parts of Mindanao.

Agricultural extension can be more cost effective if an emphasis is placed on providing services to groups of farmers. Social capital facilitates cooperation within or between *groups* (Productivity Commission 2003). Thus, social capital is an important component of agricultural extension programs within Mindanao conflict areas, where isolation is a consequence of conflict.

Views differ about what constitutes social capital, but it is broadly agreed that trust is a key part of it, or a close proxy for it. In conflict-vulnerable areas, measures of trust take on added importance. This paper explores a method for measuring trust and trustworthiness in such a location, namely Ampatuan, Maguindanao, on the island of Mindanao, Philippines. The primary purpose of this study was to assess levels of trust and trustworthiness as components of social capital among farmers who have volunteered to participate in a development project involving innovative extension methods within a conflict-vulnerable area of the Philippines. Specifically, the work reported here aims to: (1) measure the trust and trustworthiness of farmers in a conflict-vulnerable area, using a trust game experiment; (2) determine factors that influence the level of trust and trustworthiness of those farmers; and (3) determine whether or not a simple questionnaire approach to assessing trust could substitute for the more sophisticated trust game.

The paper is structured as follows. In the section that follows, a short review is provided on the role of trust and trustworthiness, and the impacts regarding resource management and community development. It is followed by a detailed description of the research methodology including the study site, trust game implementation, participants, data analysis and a presentation of results and discussion. The final section summarizes the findings and offers some conclusions.

## **Overview of Trust and Trustworthiness**

### ***Definition of Trust and Trustworthiness***

Trust as defined is the belief in the reliability, truth, ability, or strength of someone or something. A good relationship is considered to be established with the presence of trust. It is also considered to be a critical aspect of relationships where direct or ready influence is needed. If someone is trustworthy then it implies that he or she will reciprocate trust that has been given to him or her. It is not the intent to review the voluminous literature on the interrelationship between these two concepts (e.g., Hardin 2002). For the purposes of this paper, trustworthiness can be viewed as 'reciprocation' (i. e., a person is trustworthy if he or she does not abuse the trust placed in him or her).

Trust in others is a foundational feature of a prosperous and flourishing society and serves as the basis for collective action and cooperation. Trust can be viewed as a learned capacity. Drawing from a study in Honduras and Uganda by Murphy-Graham and Lample (2014), there were four potential ways that education builds trust: (1) teacher/student relations that emphasize shared learning; (2) peer relations that emphasize collaboration rather than competition; (3) direct engagement with the community through service projects; and (4) the incorporation of lessons about trust and community in a curriculum.

### ***Impacts of Trust***

The presence of trust in a community is said to positively affect the relationship of citizens in a region and that region's economic performance and prosperity. Citizens who trust one another, exchange ideas, goods, and services within local community boundaries – all of these are considered to be helpful in economic development. According to Barnes and Haynes (2006), trust is the glue that binds organizations and communities together. Therefore, building trust in local community organizations represents a viable strategy for agricultural extension.

Trust can be a major factor in creating a strong bond within nations and societies that can further help in improving their economy. A study conducted by Abdullah and Musa (2013) examined the impact of trust and information sharing on relationship commitment. Results demonstrated that trust and information sharing significantly influenced the level of relationship commitment of wholesalers, distributors and retailers with their key trading partners. Findings of the study conducted by Caliendo et al. (2012) revealed that trust impacts positively on entrepreneurship.

Studies also showed that trust is an important factor in resource management and is becoming a major issue for natural resource managers and planners desiring to maintain or enhance community–agency relationships. Public distrust, especially local community distrust, can have severe implications for the quality and durability of natural resource policy and management decisions. A study by Leahya and Anderson (2008) sought to understand factors affecting community trust towards an agency responsible for managing water resources. The findings suggested that local community trust factors were complex and critical to understanding the social context of natural resources management in the watershed. The practical significance of this research was a series of suggestions for improving trust relationships between communities, agencies, and agency managers. Research by Walker et al. (2010) concluded that trust does have a key role to play in the contingencies and dynamics of community research and extension projects and in the outcomes they can achieve.

### ***Trust Game***

One potential method to measure trust at the individual level has been undertaken via the so-called trust game. The primary idea of the trust game is to move beyond questionnaires that try to get proxy measures of trust by actually observing how people respond to behavioral experimental situations involving trust relationships. There has been some criticism of the trust game concept, revolving around the possible confounding of risk attitudes and trust. However, Houser et al. (2010) presented evidence supporting the validity of the trust games concept. Their research data showed that risk attitudes predicted individual investment decisions in risk games but not in the corresponding trust games. The results are convergent evidence that trust decisions are not tightly connected to a person's risk attitudes, and they lend support to the "trust" interpretation of decisions in investment games (similar to the trust games reported here).

## MATERIALS AND METHODS

### *The Study Site*

The study was conducted in barangay Kauran in the municipality of Ampatuan and in the province of Maguindanao within the Autonomous Region in Muslim Mindanao (ARMM). Ampatuan has an area of 255.40 km<sup>2</sup> (Fig. 1) and this municipality is composed of 11 barangays, including Kauran. Barangay Kauran has a population of 3,507 (2010 census) and is the second largest barangay, out of the 11, in the municipality of Ampatuan.

Majority of the household heads (80%) are farmers. Therefore, farming is the main source of income of the people in the barangay, followed by business and employment in both private and public offices. Some former residents are working abroad for employment while there are residents whose livelihoods include charcoal making, duck raising, and skilled labor such as carpenters, fish and vegetable vendors, drivers, machinery operators, dressmakers and construction workers.

### *Trust Game Experiment Design and Implementation*

The trust game was based on the standard Berg-Dickhaut-McCabe game (Berg et al. 1995) with modification following the approach in Glaeser et al. (2000). A copy of the modified trust game instructions can be obtained from the authors upon request.

This game is played by pairs of individual farmers. Each pair is made up of a Player 1 and a Player 2. Each farmer played the game with someone from his/her own barangay. However, none of them knew the identity of the person with whom they are playing. Only the experimenter knew the identity of the respective pairings. The trust game was played by 28 farmers. Fourteen of them played the role of senders (Player 1) while the remaining 14 farmers played the role of receivers (Player 2).

The experimenter explained the mechanics of the game. At the start, the experimenter informed the subjects that PhP150 (PhP, Philippine pesos) will be given to each Player 1 and another PhP150 to each Player 2. Player 1 then has the opportunity to give a portion of their PhP150 to Player 2. They could give any amount up to PhP150 or nothing. Whatever amount Player 1 decides to give to Player 2 is doubled by the experimenter before it is passed on to Player 2. This is explained to all the

participants. Player 2 then has the option of returning any portion (or none) of this doubled amount to Player 1).

Then, the game is over. Player 1 goes home with whatever he or she kept from their original PhP150, plus anything returned to them by Player 2. Player 2 goes



**Fig. 1.** Map showing the study site in Ampatuan, Maguindanao (Source: [http://en.wikipedia.org/wiki/Ampatuan,\\_Maguindanao](http://en.wikipedia.org/wiki/Ampatuan,_Maguindanao)).

home with their original PhP150, plus whatever was given to them by Player 1 and then doubled by the experimenter, minus whatever they returned to Player 1. The experimenters guided the players through some examples by means of tokens to calculate their own, and their partner's, payoffs associated with decisions made in the game:

$$\text{Payoffs to Player 1} = 150 - x + y \quad (1)$$

$$\text{Payoffs to Player 2} = 150 + 2x - y \quad (2)$$

where:  $x$  is the amount sent by Player 1 to Player 2, while  $y$  is the amount sent back by Player 2 to Player 1. Once the players understood the rudiments of the game and have practiced using the examples, the games were formally played.

After the trust games were completed, subject-participants were surveyed one by one with a questionnaire relating to their socioeconomic characteristics and also consisting of questions relating to trust and solidarity.

**Data Analysis**

Descriptive statistics was employed to summarize the trust game data and survey data from subject-participants. The study conducted two sample t-test to test the difference in mean trust and trustworthiness level between subject participants from project beneficiaries and non-project beneficiaries.

A censored regression model (also popularly known as Tobit model) was used to analyze the factors affecting trust and trustworthiness behaviors of subject-participants. The trust index is measured by Player 1’s ratio of amount sent to endowment while trustworthiness index is derived from Player 2’s ratio of amount returned to amount received. The minimum value for trust index is expected to be zero percent if Player 1 decides to send nothing to Player 2 while its maximum value is 100 percent if Player 1 decides to send to Player 2 all his endowment. As such a two limit Tobit model is more appropriate for this dataset. However, there was no zero amount in the actual dataset and hence, an upper limit Tobit model was used instead. The same model was applied to analyze trustworthiness behavior.

The upper limit Tobit model is specified as follows (Tobin 1958):

$$\begin{aligned}
 Y_i &= X_i\beta + \mu_i && \text{if } X_i\beta + \mu_i \leq \tau \\
 Y_i &= \tau && \text{if } X_i\beta + \mu_i \geq \tau \\
 &&& i = 1, 2, \dots, N
 \end{aligned}$$

where  $Y_i$  is the dependent variable;  $X_i$  is the vector of explanatory variables;  $\beta_1$  is a vector of unknown parameters or coefficients to be estimated;  $\mu_i$  is an independent and normally distributed error term assumed to be normal with zero mean and constant variance  $\sigma^2$ ;  $N$  is the number of observations. The specific explanatory variables included in the model are as follows:

- Age – age of the respondents (years);

- Civil status – dummy variable for civil status: 1=married, 0= otherwise;
- Gender – dummy variable for gender: 1=male, 0=otherwise;
- Education level – dummy variable for educational attainment: 1=elementary, 0= otherwise;
- Household income – annual household income (PhP);
- Native – dummy variable: 1=native in the place, 0=otherwise;
- Household size – number of household members in the family residing with the respondents;
- Trust people – dummy for trust variable from the suruvey (i.e., not from the trust game): 1= most people can be trusted, 0=otherwise;
- Trust own ethnic group – respondents’ extent of trust in own ethnic group being asked from the survey: 1=very small extent, 5=very great extent; and
- Trust other ethnic group – respondents’ extent of trust in other ethnic group being asked from the survey: 1=very small extent, 5=very great extent.

Similar to Gong (2010), the above three trust indicators were included as explanatory variables to test whether or not trust as measured by direct questioning are related to, and are able to predict, the actual trusting behavior of the respondents, as exhibited in the trust game. If that relationship is found to be significant, we can say that the experimental method of measuring trust, which is a relatively expensive approach, could be simply proxied by asking people directly via survey.

**RESULTS AND DISCUSSION**

*Trust Game Results – All Participants*

Results from the trust game (Table 1) showed that the amounts sent by Player 1 for all subjects ranged from PhP50 to 150 with an average of PhP78 (Line 1). The trust game outcome for Player 2 also indicates that subjects are returning back greater than zero amount from the money they received from the doubled amount sent by Player 1. For all subjects, the average amount returned by Player 2 is about PhP62 (Line 3).

The above results indicate that subject-participants did not exhibit a sub-game perfect Nash equilibrium<sup>1</sup> predicted in theory based on the individual payoff maximization, i.e., Player 1 would send zero amount to Player 1 and Player 2 would return zero amount to Player 1. The fact that these amounts were not zero indicates the

level of trust involved and these results are in consonance with the findings from previous trust games (Gong 2010; Glaeser et al. 2000) in measuring trust and trustworthiness behavior of the individual towards the rest of the community.

#### *Trust and Trustworthiness Outcomes*

In this study, we measured trust as Player 1's ratio of amount sent to Player 2 expressed as a percent of initial endowment. An initial endowment of PhP150 was given to all subject-participants initially for showing up in the game representing their daily wage rate. On the other hand, trustworthiness (or reciprocity) is measured by Player 2's ratio of amount returned to amount received, expressed in percent.

On average, Player 1 subject-participants sent 52% (PhP78/150) of the maximum amount (PhP150) that could be sent (Line 2 of Table 1). A figure of zero percent implies no trust and a figure of 100% implies complete trust. Likewise, Player 2 participants returned an average 46% of the money received. As a result of trusting behavior, the average payoffs are PhP134 for Player 1 and PhP244 for Player 2, compared with PhP150 for each player in the non-trusting case. Therefore, trust leads to an improvement in the welfare of the participants.

#### *Characteristics of Player-Respondents Used in the Model*

The selected characteristics (from questionnaires) of the player-respondents are summarized in Table 2. The Player 1 respondents have the following characteristics: average age of about 44 years, 93% married, 79% male, 57% with elementary education, average household annual income of PhP42,219, 86% are native in the area, and have an average of five household members in the family. Three attitude variables on trust are included in the descriptive statistics because these variables might

directly explain trusting behavior of the respondents, obviating the need for the more complex trust game approach. The characteristics of Player 2 respondents are as follows: average age of 41 years, 93% married, 86% male, 57% have elementary level education, average household annual income of PhP35,486, 93% are native in the area, and have an average of six household members (Table 2).

#### *Factors Influencing Trust and Trustworthiness*

The Tobit regression model for trust measure based upon the trust game was highly significant at the 1% level (Table 3, 3rd to the last row—Prob>chi2). Among the variables included in the model, age, ethnic group and household size were found to be significant and to negatively influence trusting behavior of respondents. This means that older people have a higher propensity to distrust other people in this community. This is somewhat contradictory to the general tenor of previous research findings (Li and Fung 2013), although those same authors found no clear evidence of any relationship between age and trust in less developed countries. The age/trust relationship is surely highly sensitive to the prevailing social context and here that context is quite abnormal in comparison with previous studies. Farmers with bigger household size tend to trust others less, perhaps being more inward looking towards their own family.

Trusting behavior of the participants was significantly and positively influenced by education level and household income. Those with higher income tend to exhibit a higher level of trust among their peers. This finding has important implications, favoring policies such as agricultural extension programs containing a strong social capital component.

**Table 1.** Trust game outcomes in Ampatuan, Maguindanao, all participants.

Variable	Observation	Mean	Std. Dev.	Min	Max
1. Amount sent by Player 1 (PhP)	14	78	31	50	150
2. Trust index: Player 1 ratio of amount sent to Player 2 and endowment (%)	14	52	21	33.3	100
3. Amount returned by Player 2 (PhP)	14	63	34	25	150
4. Trustworthiness index: Player 2 ratio of amount returned to amount received (%)	14	46	29	12.5	100
5. Payoffs for Player 1 (PhP)	14	134	45	75	200
6. Payoffs for Player 2 (PhP)	14	244	70	150	375

The Tobit regression model relating to the trustworthiness index was found to be not significant. People appear to have more difficulty gauging trustworthiness as opposed to trust (Hardin 2002). As a practical matter, the relatively small sample size of the subject respondents is also likely to be a factor in giving this result, and more generally means that the results of the research should be interpreted with caution.

As part of the questionnaire assessing the farmers' characteristics, they were asked to give their own views/assessment of their trust behavior and attitude. This was done in order to see whether or not a simpler (compared to trust game) approach could ascertain similar results. No significant results were obtained from that survey. This means that direct survey questions aimed at eliciting a measure of trusting behavior and attitude of respondents cannot be used to explain/estimate the direct behavioral consequences of trust, as demonstrated via the

behavioral experiment trust game.

## SUMMARY AND CONCLUSION

Measuring social capital in conflict-vulnerable areas is an important empirical inquiry in support of an improved model for agricultural extension in such areas. Trust and trustworthiness are key components of social capital. This paper explored a method for measuring trust and trustworthiness among farmers in Ampatuan, Maguindanao (island of Mindanao) by conducting behavioral experiments involving monetary rewards.

The findings illustrate that subject-participants sent and returned non-zero monetary amounts, indicating a level of trust between them which enabled positive monetary rewards. These results are in consonance with

**Table 2. Player-respondents characteristics used in the model.**

Variable	Observation	Mean	Std. Dev.	Min	Max
<b>Player 1</b>					
Age (years)	14	44	12.64	25	73
Civil status (Married=1)	14	0.93	0.27	0	1
Gender (Male=1)	14	0.79	0.43	0	1
Education level (Elem=1)	14	0.57	0.51	0	1
Annual household income (PhP)	14	49,214	38,835	10,000	129,000
Native	14	0.86	0.36	0	1
Household size	14	4.93	1.82	1	8
Trust people	14	0.36	0.50	0	1
Trust own ethnic group	14	3.57	1.02	2	5
Trust other ethnic group	14	2.29	0.91	1	4
<b>Player 2</b>					
Age (years)	14	41.14	9.94	19	60
Civil status (Married=1)	14	0.93	0.27	0	1
Gender (Male=1)	14	0.86	0.36	0	1
Education level (Elem=1)	14	0.57	0.51	0	1
Household income (PhP)	14	35,485	16,165	18,000	70,000
Native	14	0.93	0.27	0	1
Household size	14	6.00	2.60	3	12
Trust people	14	0.57	0.51	0	1
Trust own ethnic group	14	3.86	1.29	2	5
Trust other ethnic group	14	2.79	1.05	1	5

Source: Authors' calculation using survey data

<sup>1</sup>A concept of game theory where the optimal outcome of a game is one where no player has an incentive to deviate from his or her chosen strategy after considering an opponent's choice. The Nash equilibrium exists if no players change their strategy, despite knowing the actions of their opponents.

**Table 3.** Tobit model regression results concerning trust relationships.

Independent Variable	Trust Index (Player 1)			Trustworthiness Index (Player 2)		
	Coefficient	Std. Error	P>t	Coefficient	Std. Error	P>t
Age (years)	-0.717**	0.169	0.013	1.631 <sup>ns</sup>	1.738	0.401
Civil status (Married=1)	-5.453 <sup>ns</sup>	7.589	0.512	-143.345 <sup>ns</sup>	89.106	0.183
Gender (Male=1)	-0.362 <sup>ns</sup>	5.437	0.950	-36.046 <sup>ns</sup>	28.372	0.273
Education level (Elem=1)	35.262***	4.061	0.001	-24.868 <sup>ns</sup>	20.892	0.300
Household income (PhP)	0.0003*	0.0001	0.063	0.001 <sup>ns</sup>	0.001	0.308
Native	-36.469***	7.270	0.007	61.791 <sup>ns</sup>	49.596	0.281
Household size	-5.705**	1.928	0.042	-14.006 <sup>ns</sup>	9.071	0.197
Trust people	0.209 <sup>ns</sup>	4.596	0.966	40.383 <sup>ns</sup>	29.710	0.246
Trust own ethnic group	0.814 <sup>ns</sup>	1.963	0.700	4.583 <sup>ns</sup>	7.938	0.595
Trust other ethnic group	1.017 <sup>ns</sup>	2.327	0.685	-16.366 <sup>ns</sup>	8.529	0.127
Constant	110.262***	17.602	0.003	166.620*	73.557	0.086
Sigma	5.074	1.013		22.787	4.824	
LR chi <sup>2</sup> (10)	38.560			9.930		
Prob > chi <sup>2</sup>	0.000***			0.447 <sup>ns</sup>		
Pseudo R <sup>2</sup>	0.323			0.091		
No. of observations	14			14		

Note: \*\*\*, \*\*, \* = significant at 1%, 5%, and 10% level, respectively; ns = not significant

the findings from previous trust games (Gong 2010; Glaeser et al., 2000). In game theory, based on individual payoff maximization (reflecting no trust), amounts sent and returned are expected to be zero. A simpler, direct questionnaire concerning trust attitudes was not able to replicate the results of the behavioral experiments.

The analysis elicited various positive and negative relationships between trust (as measured by the trust game) and the socioeconomic characteristics of respondents. These relationships, particularly the positive ones involving youth, wealth and education point to possible avenues for enhancing trust. The positive relationships between trust/youth and trust/education are encouraging. The education variable is obviously amenable to change, as indicated earlier in the paper, and, since education is generally targeted towards the young, those two impacts can work in harmony towards improving trust. The positive relationship between trust and income provides impetus for the idea that social capital enhancement can be an effective policy for poverty alleviation. The background context for this reported research is trust as a component of agricultural extension, but trust can lead to increased well-being in multifarious ways.

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