

ORGANIZATIONAL AND FINANCIAL PERFORMANCE OF COOPERATIVES IN MISAMIS OCCIDENTAL

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ABSTRACT

This paper assessed the performance of the cooperatives using a surrogate measure of data roughness through fractal dimensions. Fractal dimensions as statistical quantities are robust measures which are not easily influenced by extreme observations unlike other variance-based performance measures. This study used the data of the 35 farmers' cooperatives in Misamis Occidental provided by the Department of Agrarian Reform. The fractal dimensions on membership, farm and off-farm income of members, capital build up, savings mobilization, assets and liabilities were measured through the fractal software. The results revealed that all the variables mentioned had high fractal dimensions which implies volatility and unpredictability. In particular, the farm and non-farm incomes are unreliable as indicators of financial stability of the economic conditions of the member farmers.

Keywords: *organizational and financial performance, cooperatives, fractal statistics*

1.0 Introduction

Cooperativism has always been a social reform agendum for rural development in the Philippines. It is a notion that cooperatives are instruments of poverty alleviation. The provision of credits and other government support to the poor are believed to be effective if they are administered by the cooperatives. This policy was originated during the Cory Aquino's era through the Republic Act 6939 where the viable farmers' cooperatives could avail of credits through the Land Bank of the Philippines. Individuals are not qualified to avail of financial assistance unless they are members of cooperatives. This made the number of cooperatives in the early to mid 90's increased substantially.

However, in 2012, the Cooperative Development Authority reported to have

a total of more than 21,000 registered cooperatives, a four times lower than in 1990's. The government spent millions for the cooperative movements of the rural poor. However, the number of registered cooperatives was decreasing and mostly the farmers or agricultural cooperatives lived in a short period of time due to some reasons including lack of adequate funds, illiteracy among its members, lack of training and educational opportunities which make it difficult for cooperatives to contribute maximally in business promotion activities (Nwankwo, Ewuim and Asoya, 2012), poor infrastructure, lack of quality management, over-dependence on government, dormant membership, non conduct of elections, lack of strong human resources policy and absence of

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professionalism (Das, Palai & Das, 2006).

Despite of these, some farmers' cooperatives are still surviving through the taut monitoring of the Department of Agrarian Reform whose members are majority beneficiaries of the agrarian reform programs. In Misamis Occidental, there are 35 active farmers' cooperatives which economic activities have played a crucial role in the improvement of the quality of life of the farmers. These are manifested by the growth in membership and assets of the organizations. The performance of these organizations is commonly measured by an increment in the financial resources and the identification of well-performing organizations in the municipality, city, or province.

Considering the strength of the measurements which are commonly used in the assessment of the cooperatives, it is expedient to analyze the situation using a more powerful approach. The approach that will be used in this study is the fractal analysis approach. This study will analyze the ruggedness or smoothness of the organizational and financial transactions of the cooperatives in the province.

2.0 Basic Concepts in Fractal Statistics

Fractal statistical analysis applies to conditions where the mean or first moment does not occur. It is also applicable to situations where smaller fluctuations over rule the larger ones. Padua (2012) recommended the use of a power law distribution which is similar to Pareto's distribution as given:

$$1....f(x) = \frac{\lambda-1}{\theta} \left(\frac{x}{\theta}\right)^{-\lambda}, \lambda > 0, \theta > 0, x \geq \theta$$

where λ defined as the fractal dimension of X and θ was the smallest

(positive) value of the random variable. The maximum likelihood estimator of λ is:

$$2.... \hat{\lambda} = 1 + \frac{1}{\log\left(\frac{x}{\theta}\right)}$$

so that each observation contributes to the fragmentation of the support X . Padua (2013) demonstrated that the distribution of the maximum likelihood estimators obey an exponential type of distribution so that both the mean and variance of the fractal dimensions exist.

A device called fractal spectrum or $\lambda(s)$ spectrum was suggested by Padua et al., (2013) to identify locations on the support X where high data roughness or fragmentation occur and where smoothness appear to dominate. The spectrum is defined as:

$$3.... \lambda(s) = 1 - \frac{\log(1-\alpha)}{s} = 1 - \frac{\log\left(\frac{x}{\theta}\right)}{\log\left(\frac{x}{\theta}\right)}$$

where X_{α} is the α th percentile of X and $s = \log\left(\frac{x}{\theta}\right)$

Deviations from smoothness indicate the big variations of the 35 farmers' cooperatives in Misamis Occidental on the membership and some financial indicators. A test for deviation from smoothness i.e. $H_0: \lambda = 1$, is suggested in the paper of Padua (2012) and the reader is referred to the paper as provided in the list of references.

3.0 Research Design and Methods

In this paper, the financial performance including the membership of the 35 farmers cooperatives in Misamis Occidental were considered. The data were taken from the Department of Agrarian Reform Provincial Office.

One dimensional plot of every performance indicator of the cooperatives was constructed. The plot was then used

as an input to a fractal software FRAK.OUT available as a freeware from the NET. The output is a fractal dimension for the data set. Thus, the fractal dimensions of the following were obtained; membership, assets, liabilities.

The deviation from smoothness:

$$4.... d = (\lambda - 1) \times 100\%$$

is computed for each fractal dimension. The higher the percentage deviation is, the more varied the cooperatives' performance.

Finally, we attempt to locate the areas of high fractal dimensions (more varied performance) and relatively smoother areas by computing for the fractal spectra of each data set.

4.0 Results and Discussions

Membership, Farm Income and Off-farm Income

Table 1 displays the fractal dimensions of the one-dimensional plots (induced roughness) as well as the deviation statistics (percentage departure from a smooth straight line).

Figure 1, on the other hand, shows the one-dimensional plots of the Farmers' Cooperatives Total Membership, Members Farm Income, Off-farm Income and Non-Farm Income. This explains how the performance of the cooperatives in membership recruitment and the members' sources of income induced ruggedness or fragmentation on the straight line interval.

Table 1. Fractal dimension and deviation statistics for the cooperatives' total members and members' income

Indicators	Fractal Dimensions	Deviation Stat (%)
Total Members	1.7951	79.51
Members' Farm Income	1.4838	48.38
Members' Off-Farm Income	1.5132	51.32
Members' Non-Farm Income	1.4088	40.88

The one-dimensional plot of the cooperatives total membership in the Province of Misamis Occidental manifests the visual representation of the magnitude of fragmentation/variability of the indicators on these farmers groups. On the other hand, the one-dimensional plots of the members' farm, off-farm and non-farm incomes reflect the varied economic conditions of the cooperative members.

A quantitative index for comparing the degree of fragmentation (and hence, of the magnitude of the total membership

and the diverse economic condition of the members) is the fractal dimension. Table 1 shows that the fractal dimensions of the cooperative's total membership. The ruggedness (1.7951) of the membership of 35 cooperatives is a manifestation of irregular growth. This means that there are still cooperatives whose membership remained low in number while others have already expanded. Considering the closed membership status of agricultural cooperatives (farmers only in a specific area), it is very difficult to increase its number significantly.

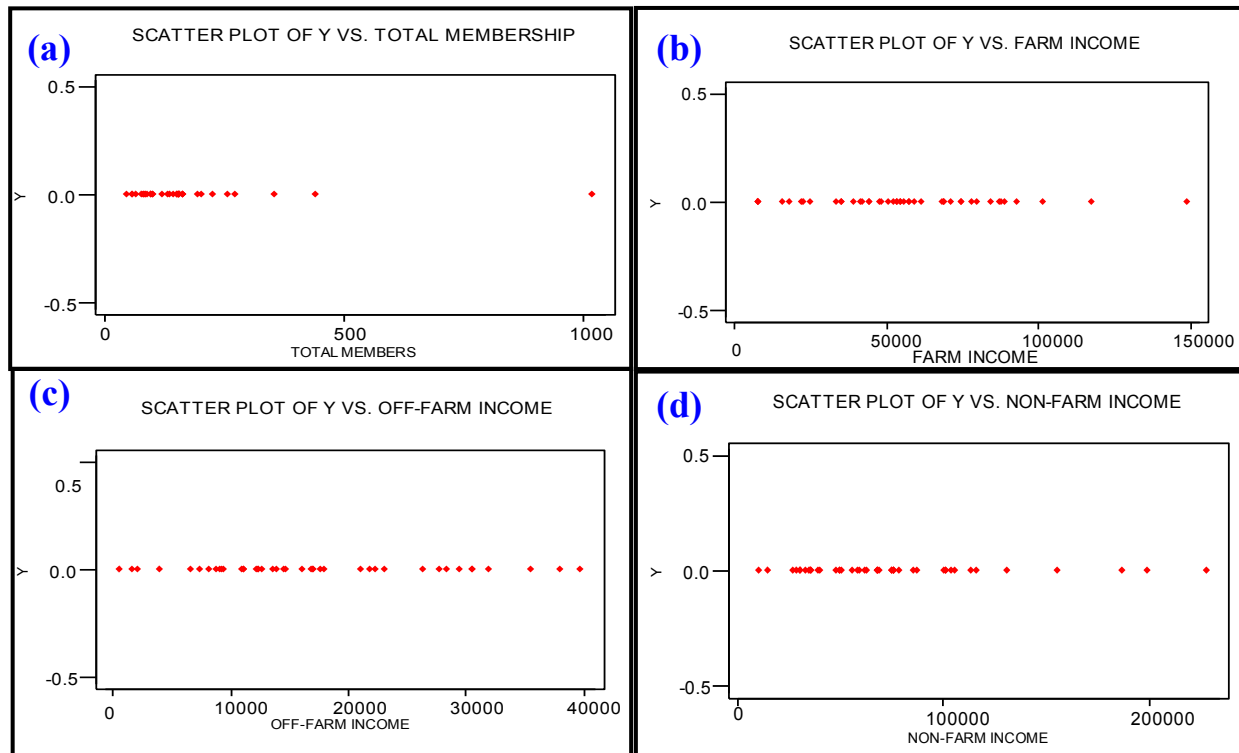


Figure 1. One-dimensional plot of the (a) total members of cooperatives, (b) farm income, (c) off-farm income and (d) non-farm income

In addition, an average of 3 farmers' cooperatives in the municipality or city is also an impediment for the cooperative to expand its membership. An area which has a bigger number of farmers has also a better chance for membership growth.

On the other hand, the farm income of the members is slightly smoother (1.4838) than their off-farm income (1.5132). This indicates that as farmers, their household farm income is not so serrated but its ruggedness is brought about by different farm size, area, crops, topography and climate. However, the roughness of their off-farm income is brought about by diverse alternative livelihoods. Some farm households whose income is low, are very much dependent on farming as a source of livelihood. Other farmers who have the capacity to engage in other sources of income such as driving, carpentry and

other technical works, bring additional income to the family.

Resource Generation and Financial Performance

Table 2 presents the fractal dimensions of the one-dimensional plots (induced roughness) as well as the deviation statistics (percentage departure from a smooth straight line).

Figure 2, on the other hand, shows the one-dimensional plots of the Cooperatives' Capital Build-up, savings mobilization, assets and liabilities. This reflects how the performance of the cooperatives in generating financial resources and their economic performance stimulated roughness or fragmentation on the straight line interval.

Table 2. Fractal dimension and deviation statistics for the cooperatives' Resource Generation and Financial performance

Indicators	Fractal Dimensions	Deviation Stat (%)
Capital Build-up	1.5921	59.21
CBU Contributors	1.4490	49.90
Savings Mobilization	1.5821	58.21
Members with Savings	1.5116	51.16
Assets	1.8044	80.44
Liabilities	1.6199	61.99

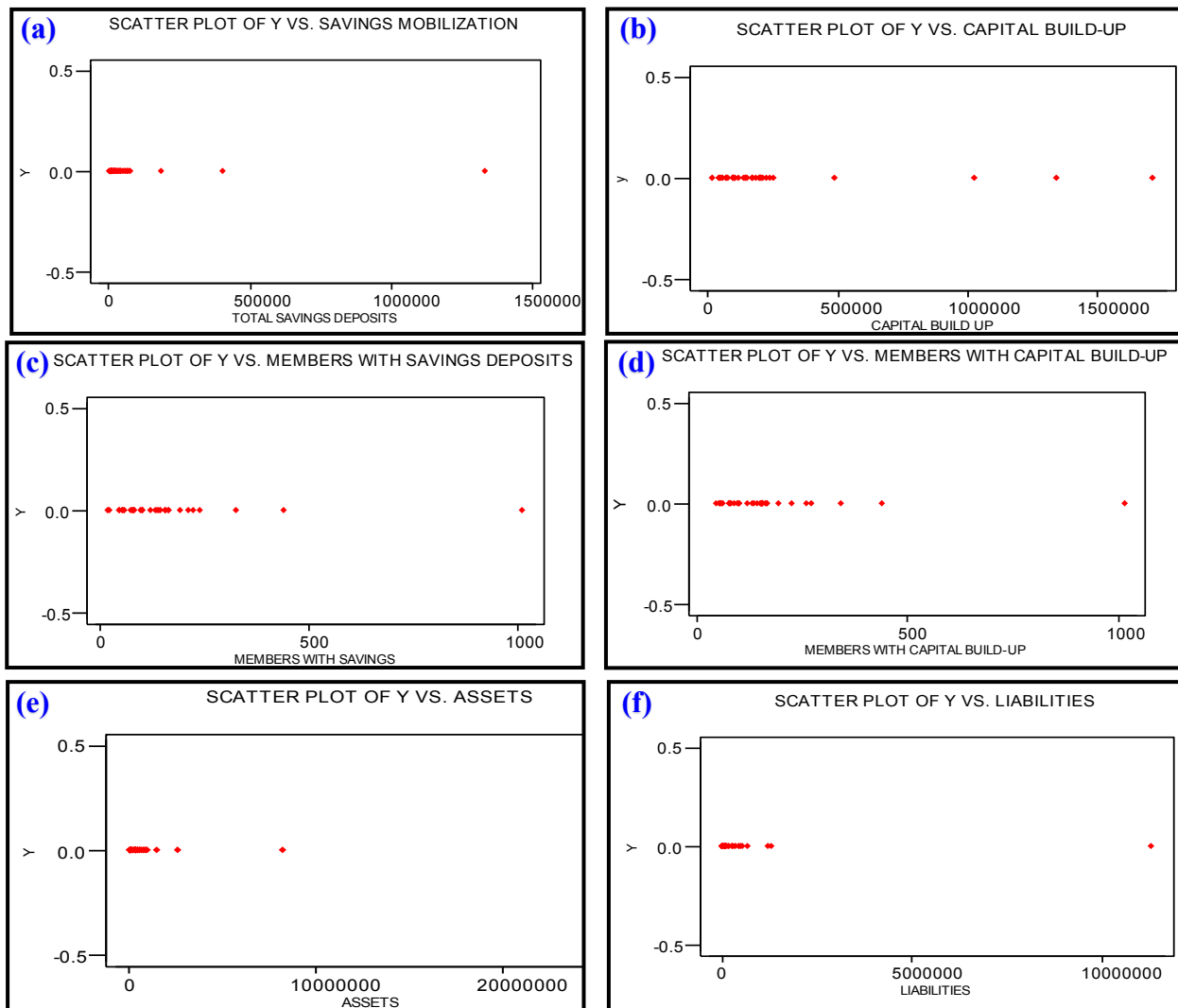


Figure 2. One-dimensional plot of (a) savings mobilization, (b) capital build-up, (c) members with savings deposit, (d) members with capital-build-up, (e) assets and (f) liabilities

The capital build-up (1.5921) as the main source of the cooperatives' capitalization is more fractal than the number of members (1.4990) who contributed it.

The result reveals that the share capital of every member in the cooperatives is jagged. The increase in the number of contributing members is lower than the increase in their contributions. But the roughness of the capital build up means that there are some cooperatives which are good in motivating members to invest in the cooperatives while there are also cooperatives which are low in extracting capitalization.

The same instance occurred in the Cooperatives Savings mobilization (1.5821) and the members with savings deposits (1.5116). Small farmers' cooperatives tend to have minimal savings and capital build up. Mills and Davies (2013) suggest that in order for the cooperatives to be established, grow and flourish, they need access to capital.

The value of assets of the cooperatives is one of the best indicators of the performance. The fractality of the assets (1.8044) of the cooperatives in the province connotes the big disparity between smaller and bigger ones. This also manifests the drive of the organizations to obtain capital and to engage in some economic activities. Cooperatives' successful economic activities tend to acquire more assets leaving behind other low performing organizations. Prakash (n.d.) pointed out that "the smallness of cooperatives has been claimed to contribute to poor performance. The larger one is supposed to be more economically viable and efficient". He then suggested that the cooperatives should have to be amalgamated.

The high performing cooperatives have also high tendencies to have access with credits with the lending institutions.

Its fractality of 1.6199 is also an indication that there are those cooperatives which have availed of credit in higher amounts while others have not. Any credit provision however, is based on the ability of the cooperatives and their members to become sustainable. But the interpretation as to the ruggedness of the liabilities can also be in another way. There are some cooperatives which do not avail of credits because some officers are not risk-takers. Although, they perform well in their economic activities, they prefer to use their own funds rather than to borrow (Nabua et al., 2013). This scenario affects the value of the fractal dimension.

5.0 Conclusion

The financial performance of the cooperatives in the province has high fractal dimensions which suggests volatility and unpredictability. Hence, it is imperative that the low performing cooperatives be given attention by the government to attain inclusive and sustainable development.

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