

Dynamics of Development in Rural Communities

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Abstract

From complementation among the essential elements of rural development (social infrastructure, physical infrastructure, and financial services), linkages are traced towards the attainment of goals. Roads initiate the delivery of other physical infrastructure to the usually isolated rural community. A comprehensive package of development projects may be identified and formulated through a participatory approach. Substantial funding that will enable both intensity of intervention and wider coverage will be more efficient than a project implemented in phases spread over time covering different communities. The effort to achieve rural development will require efficient coordination and synchronized implementation of various development assistance intended for the rural sector. To establish these links, the community level data is postulated in a time series cross-section framework. Temporal aggregation will be annual and spatial units will be agrarian reform communities.

Keywords: *rural development, rural infrastructure, development intervention, spatial autoregression*

1. Introduction

The intervention strategy used by the Philippine Department of Agrarian Reform (DAR) has evolved over the years. The real benefit from agrarian reform depends on assistance/interventions beyond land distribution to enhance tenure. The agrarian reform beneficiaries (ARBs) are faced with isolation within the community, hence, the strategy of DAR was to launch community-building interventions where the beneficiaries come from agrarian reform communities (ARC), including but not limited to ARBs. Interventions like support services are planned to transform these communities and their corresponding organizations into viable entrepreneurs integrating production activities (farm and non-farm) of the households. This is a necessary sustainability infrastructure since land is often distributed through the agrarian reform program only to be given up by beneficiaries for fast cash, restarting the cycle of poverty. Thus, to ensure more sustainable development, the whole community is provided with development-inducing tools including rural infrastructure and capability building activities.

In rural development intervention, direct provision of amenities has been used for improvement of living conditions or to enhance production. The strategy can provide an easy remedy within the highly vulnerable segment but the effect is non-sustainable and short-lived. The emerging paradigm shift from direct provision to facilitating access of such, and from universal intervention to targeting, requires a clear understanding of the spatial and possibly temporal dynamics of rural development and infrastructure provision. The role of roads, other rural infrastructure, support services, and other interventions in rural development is not a new field. However, an empirical community model that integrates spatial dependencies will potentially contribute toward better understanding the policy directions needed in targeting rural development.

This study hopes to explain the dynamics between development-facilitating assistance provided to the rural communities and the community-wide rural development manifestations.

2. Rural Community Development

Rural development has become one of the major outcomes identified among various assistance/intervention programs of either the individual developing countries, or of multilateral institutions/donors. A clear understanding of rural development dynamics is necessary for it to prosper. In addition, the inadequate indicators of rural development became a constraint in development planning, for an information gap in one of its facets will cripple a program that should rather be integrated. Any contribution in the understanding of rural development is valuable.

During the first few years of the implementation of the Comprehensive Agrarian Reform Program (CARP), the Philippines experienced resistance among the landowners so no tangible results were observed. Real progress among ARCs is starting to show now, but the features of the enabling policies of the agrarian reform law can possibly dampen agricultural development. The CARP allows retention of 7 hectares of land only among the landowners, while the tenants can own an indeterminately small parcel of land - the average farm size cultivated by households is just a little more than half a hectare. It is impossible for tenants to benefit from technology advancement and other farm implements because it is not cost-effective given such a small parcel. This is consistent with the observation of (Mundlak et al., 2002) that new technology changed the returns to fertilizer, irrigated land and capital, all of which proved scarce to varying degrees, partially explained by farm size.

(Fedderke et al., 2006) used a vector error correction model (VECM) in analyzing the effect of expenditures on infrastructures on long-run economic growth in South Africa, and concluded that the role of infrastructure is in terms of raising the marginal productivity of capital and in encouraging private investments. The dynamics between the local governance system, the local administrators, the community, and higher level of administration can facilitate or be a hindrance to development (DasGupta et. al., 2003). The role of community participation is important because of their knowledge/understanding of the environment and the asymmetries of information among the households.

Although conceived with the best of intentions, stand-alone intervention strategies that spread resources too thin make benefits difficult to realize. Implementing a higher density of interventions in an area, which might seem unfair at first, could allow each properly planned intervention to complement the others, resulting in multiplier effects that spread beyond the initially targeted community.

3. Methodology

The ARC level of development assessment is a panel data with ARCs as spatial units. It was collected annually from 2002 to 2005. An ARC may be composed of one or several *barangays* (villages; the smallest political unit in the Philippines), formed based on the homogeneity of development-inducing endowments the barangays possess. The ARC level of development assessment was initiated in 1997; evolving over the years until it reached a form in 2000 that is very similar to the most recent version in 2005. It is a complete enumeration of all ARCs launched by the DAR where intervention will be targeted.

The community level data (panel) will be postulated in a time series cross-section framework. The objective of the econometric specifications will be to account for the

effect of rural roads and other infrastructure on specific rural development targets. Temporal aggregation will be annual and spatial units will be ARCs. Park's mixed model with autoregressive error of order 1 will be postulated and given by $y_{it} = \alpha_i + \beta_t + \gamma x_{it} + \varepsilon_{it}$, where $\varepsilon_{it} = \rho_i \varepsilon_{it-1} + a_{it}$, $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$ independent of $\alpha_i \sim N(0, \sigma_\alpha^2)$, β_t is a temporal effect and may possibly vary across time points, and α_i is a spatial random factor. x_{it} is a vector of covariates including indicators of presence/quality of roads and other infrastructure. The dependent variable will be the community-level index of rural development and income per household averaged at the community level. Total and breakdown of income from different sources will be analyzed. The covariates will include the magnitude and proportion of accomplished rural infrastructure projects (proportion computed over estimated needs), tenure improvement, and aggregate impact of various official development assistance received by the community.

4. Infrastructure and Rural Development in Agrarian Reform Communities

The data used is from the Agrarian Reform Communities Level of Development Assessment (ALDA) conducted by the DAR. It collects basic indicators at the community level and aggregates them into an index for each of the key result areas and finally into an overall index. The index is a measure of a community's development, so if interventions among key result areas are accomplished, rural development will be feasible. DAR's major goal is land distribution, but land distribution alone will not necessarily result in tenure improvement and eventually in rural development, hence, other support services are also provided either directly or through facilitation of access to such. The key result areas of the department include land tenure improvement (LTI), economic and physical infrastructure support services (ECOPISS), farm productivity and income (FPI), organizational maturity (OM), basic social services (BSS), and gender and development (GAD). An index or a score (range of 0–100) is computed for each of the key result areas before the overall index is completed. The indicators are immediate outputs intended to meet the key result. A community's score depends on the amount of output resulted from the interventions delivered. At present, the ARCs account for approximately 20% of all rural communities in the country.

As of 2005, the households in the ARCs have an average total income of PhP 92,773 per household, of which an average of PhP 53,802 comes from agricultural sources and PhP 39,420 comes from non-agricultural sources. The average overall index for all communities is 71.52, indicating that there is still ample room for the department to provide rural development inducing interventions. Among the key result areas, LTI is the only one approaching completion (100) with the average index of 92; the target is to complete land distribution by 2008. The BSS also yields a higher average score of 87, followed by ECOPISS with 68, OM with 67, FPI with 66, and GAD with 51.

The total land area distributed relative to scope averages 92% per ARC, consistent with the actual ARBs relative to the ARB scope of 93%. One negative effect of agrarian reform is that some beneficiaries did not appreciate the purpose and were easily lured by the quick cash value of the land. Only 77% of the ARBs are still cultivating the land as of 2005.

In terms of physical infrastructure: accomplishment of rural roads (length) averages 60%, 65% for bridges (length), 69% for the number of irrigation systems required, and 62% for area coverage of irrigation (relative to total irrigable area); 67% of ARBs needing irrigation are actually served, and 73% requiring post-harvest facilities (warehouse, dryers, etc.) are served. For the economic infrastructure, accomplishment

in credit provision is at 54%. This can be attributed to the low repayment rate at 44%. Some credit facilities are not sustainable because funds are easily drained due to low repayment rates. The adoption rate of modern agricultural technologies is low at 38%.

Among the foreign-assisted projects, the best profile of supported communities can be observed from Agrarian Reform Communities Development Program by World Bank (ARCDPWB), with an average index of 75.96, the highest among the projects as of 2005. This is supported with the highest income of PhP 102,300 per annum per household. An important feature of the project is that aside from the bundles of intervention provided, it implements a cost-sharing arrangement among stakeholders (beneficiaries, local government, and national government). The Microfinance project has an average index of 75.29, but the average income is lower at PhP 90,915. This is one highly specialized project without diversity in menu, focusing only in credit, with minimal institutional capacity development. Similar is true for Agrarian Reform Infrastructure Support Project (ARISP) focusing on rural infrastructure with some institutional development, usually related to the infrastructure. Belgian Integrated Agrarian Reform Support Project (BIARSP) has a wide menu of interventions, thus the average index is high at 73.02, but income is only PhP 83,940. Although the menu is diverse, provision to a community is not necessarily bundled, spreading resources to several communities. Western Mindanao Community Initiatives Project (WMCIP) yields the lowest index (64.03) and income (PhP 72,471). Aside from a limited project menu, it was also implemented by government line agencies, local government units, and non-government organizations. The usual implementers of such projects are development consulting groups with established track records. The package of implementers could be detrimental to the project because of the complex political dynamics they engaged in.

The panel models with and without autocorrelation are fitted to investigate the dynamics of community level rural development across the ARCs and over time, both using a random effects model (detailed results may be provided upon request). The scores of each community for overall index, for each of the key results areas, farm, off-farm, non-farm, and total income were regressed on some infrastructure indicators. Models for income data have poor performance while those for indices yield adequate fit. Some statistics on model fit performance are shown in Table 4.1.

Table 4.1. Random Panel Data Models for Community-Level Data

Dependent Variable	Random Effect Panel Data			Random Effect Panel Data with AR(1)			
	MAPE(%)	σ_{ARC}	σ_{error}	MAPE(%)	σ_{ARC}	σ_{error}	ρ
Overall Index	6.57	3.355	4.573	6.56	1.029	5.189	-0.3367
Farm Income	143.77	21130	23863	141.15	10313	25684	-0.3304
Off-Farm Income	119.18	9526	9808	114.55	5809	10228	-0.2632
Non-Farm Income	179.20	15861	14635	170.94	9752	15342	-0.2627
Total Income	40.52	34478	38571	38.96	16955	41311	-0.3278
OM	16.79	10.067	8.470	16.75	6.150	9.169	-0.2349
LTI	6.46	3.053	5.230	6.45	0	5.956	-0.3177
FPI	21.88	6.986	13.665	21.90	0	15.002	-0.3298
BSS	11.23	7.035	8.304	11.24	3.817	8.979	-0.2490
GAD	28.26	9.978	10.210	27.98	5.233	11.234	-0.2894
ECOPISS	12.03	4.32	7.79	12.10	0	9.339	-0.4130

The random variation of the indices and income data across the ARCs could mean that even if similar interventions are implemented, there is still an ARC-specific source of variation that will make the actual outcome different from the one expected

from that intervention. The significance of the autoregressive parameter is evidence of the accumulation of outcomes in the key result areas as exhibited by the ARCs over the years, which could mean that the kinds of interventions currently implemented in these ARCs are leading towards sustainability.

The age of the ARC is the number of years since the community was launched. Since intervention is provided for the whole community, it is expected that gains or status of the ARCs will be proportional to the age. Farm income, off-farm income, total income, organizational maturity, and ECOPISS are all increasing over the years. For every year added to the age of the ARC, these indicators are expected to grow as well. However, LTI is declining over the years. This is consistent with the discussion above, explained by the difficulty in ensuring that the beneficiaries will continue cultivating the land and do not forego their tenurial right over it.

Meanwhile, the percentage of ARBs to potential beneficiaries will indicate accomplishment level of the scope of the program, the percentage of distributed area to total area covered by the program will complement the counts of the number of beneficiaries, and the percentage of beneficiaries who are still cultivating the land is a measure of maintenance of tenure after land distribution. All three indicators contributed significantly to the LTI index. Non-farm income is affected by percentage of area distributed, while off-farm income is affected by percentage of beneficiaries to the potential number. Through land distribution alone, it is not really expected that income will increase instantaneously, until other dimensions of agrarian life also improve. In addition to LTI, indices for other key result areas will also improve, including the overall index. The proportion of accomplishment in area or beneficiary coverage will affect OM and GAD indices because the institutional strengthening efforts are intensified in areas where there are more beneficiaries. ECOPISS and correspondingly FPI indices are also affected by indicators of accomplishment in land tenure improvement.

Among the types of rural infrastructure, rural roads exhibited effects on the largest number of indicators. Income from all sources, as well as the total income, increases for every accomplishment in roads constructed or rehabilitated relative to the demand identified by the communities. Rural roads facilitate accessibility by bringing the community out of isolation and exposing them to development in other areas. Only LTI and FPI did not exhibit direct benefits from meeting the needs for rural roads. These factors, however, can be enhanced with improved accessibility, thus resulting in indirect benefits from rural roads. Similar benefits from bridges also manifest.

The irrigation indicators used include proportion of the number of irrigations to the identified needs, proportion of the serviced area to the total irrigable area, and proportion of agrarian reform beneficiaries with access to total beneficiaries within the service area. The indicators contribute to the index on ECOPISS. This support also appeared to be an important determinant of the overall index. However, the indicators do not contribute significantly to any of the income indicators or to indices of attainment of other key result areas. Irrigation will definitely have an indirect effect but the absence of a direct effect on other indicators may be explained by some details of the irrigation system. Similar results for post-harvest facilities hold.

All the income indicators and indices are affected positively by the proportion of credit needs met in the ARC except farm productivity. This may be because the loan proceeds must be spent on input procurement or planting before they result in increased productivity. Adoption of farming technologies also affected almost all indicators, except off-farm income. Trainings on different farming technologies,

although they may not individually benefit some households, can generally produce a positive effect for the whole community.

The effect of the different projects funded through official development assistance (ODA) could have been accounted for since most of the projects included rural infrastructure in their menus. Those presented above can be considered as the pooled effect of various efforts (including ODA) at the ARC level intended to push rural development. Organizational maturity can simplify the facilitation of access to development interventions. With rural infrastructure alone, income will not change, but with substantial support services, infrastructure will be used optimally. Given a good project menu, potential benefits will not be optimized if interventions are spread among too many areas. Although project diversity is good, making project menus exceedingly diverse is too much of a good thing.

5. Concluding Notes

Rural roads generate the largest impact on rural development indexes and income growth. Furthermore, the rural households' production (income-generation) potential is also optimized with the availability of an accessibility network that alleviates their isolation. Provision of an irrigation system in a properly identified community necessarily fuels growth in farm income and optimizes the household's technical efficiency in perceiving rural development.

Community organizing and the active participation of stakeholders in various activities during project planning and implementation are some of the crucial elements that can encourage sustainability in development projects. The proportions of households who are members of any community of user's organization are very low. Membership in a user's group or any organization entitles one to avail of the services provided by the organization leading to larger farm income growth. Community organizing and development should be an integral part of a social preparation scheme of any project, and not just be added in post-project evaluation recommendations.

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