Determined to Rural Diversification in Java, Indonesia: 
the Case of Yogyakarta Special Province (DIY)

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Abstract

The paper aims at explaining the determinant factors to rural diversification and assessing its consequences on the welfare of rural households. The research utilizes secondary data from Central Bureau of Statistics of Indonesia on village potential (potensi desa). The research is aimed at unravelling the determinants to rural diversification and its consequences on rural household welfare from a regional perspective. The study reveals that rural diversification in DIY has developed into two distinct patterns, namely rural diversification oriented towards service sectors (RDS) and rural diversification oriented towards small-scale industry sectors (RDI). The RDS is determined by the household ownership of motorized vehicles, percentage of farming households, presence of economic services and percentage of households with electricity connections, whereas RDI is associated with the presence of natural resources, which are most commonly following the natural-physical features as given by geological and geomorphological structures. Rural diversification in the province has positive effects on rural household welfare as indicated by the positive and significant relation between RDS and RDI with most measures of rural household welfare.

1. Introduction

Indonesia had experienced an impressive economic growth of above 6 percent per annum prior to the crisis. This relatively high growth could be realized for about two decades. It was mainly achieved via the buoyant oil boom revenue during the 1970s and a relatively successful economic transformation since the 1980s (Manning, 1988). Rural economic structure has experienced a considerable change in terms of employment and income composition. There has been an increasing recognition that the rural economy is not confined to the agricultural sector, but embraces the broad spectrum of needs of all rural people including social service provision, non-farm economic activities, rural infrastructure and natural resource management (Davis and Bezemer, 2003).

The rural economy of the country has diversified, resulting in the growing importance of non-agricultural employment and incomes. Investment in rural infrastructure during the oil boom has facilitated population mobility toward employment opportunities either in the nearby rural areas, or in towns within commuting distance. According to a number of studies, incomes generated per unit of time by these non-farm activities are generally higher than those in agriculture (Effendi, 1993 and Rotge, et al., 2000). This is also in line with some studies in Asia showing that the poorest groups (the landless and small farmers) diversify into activities where wages are lower than those in the agricultural sector, whilst higher income groups (larger farmers) also diversify, but into better paid sectors (Davis and Bezemer, 2003).

DIY has been integrated into the capitalist economy since the colonial period through the establishment of sugar cane plantations and its processing industry, and now it is among the most populous areas in rural Java. During the era of the green revolution and the oil boom decades of the 1970s and 1980s, agricultural commercialization and remarkably generous government investments in rural infrastructure have been the major starting points for the present rural diversification (Rijanta and Suhardjo, 2003). The growing availability of rural infrastructure has increased the opportunities for social and spatial mobility to large sections of rural dwellers. At the same time, the increase of real incomes from agricultural production has provided a basis for the rise of rural-based non-farm activities (Mantra in Rotge et al., 2000).

Among the most notable changes following the

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development of rural infrastructure is the improvement of rural-urban connections. This leads to the diversification of employment and income opportunities in the rural areas of the province (Titus et al., 1994; Rotge et al., 2000; Huisman and Kragten, 2004). The growth of public transportation networks and private transportation means has enabled rural labour to get involved in more lucrative urban jobs. Thus, the improved rural-urban connections have led to more productive utilization of human resources in the rural areas. Higher income gains from urban employment have strengthened the purchasing power of the rural dwellers, and consequently lowered the threshold for various goods and services in rural areas. This in turn allows the growth of more rural and regional based rather than city based non-agricultural activities.

Diversification of the rural economy in areas with an inadequate supply of land and an abundant surplus of labour has led to varied and contradictory interpretations. First, rural diversification has been viewed as a symptom of economic marginalization (Palmer, 1976; Hartman, 1985; Hariss, 1991). This interpretation is based on an assumption that involuntary involvement in non-farm activities is the rule rather than an exception. Thus, according to this view, the growth of rural non-farm activities is triggered by supply-push rather than demand-pull factors. Rural non-farm activities are undertaken as a part of occupational multiplicity for a bare subsistence (Jones, 1984 and Hart, 1986). Second, rural diversification has been viewed in a more optimistic way, viz. because of capital accumulation in the rural areas. This process is seen as a cornerstone for further growth and development of the rural economy (Svensson, 1991) as well as further social differentiation (Breman and Wiradi, 2004). This view asserts that rural diversification cannot be understood as an involutionary process in the Geertz (1974) connotation or as a socio-economic marginalization (Titus et al., 1994). Rotge et al. (1995) in their studies in DIY have shown that the higher level of rural diversification in terms of employment sources reflects a dynamic economic development. Maurer (1991) argues that rural economic diversification in DIY and Java in general is not only a result of successful agricultural development supported by the oil-boom gain but is also related to higher educational attainment and skill improvement of the population. This leads to job specialization away from agriculture rather than occupational multiplicity (cf. White, 1976). It is notable that educational attainment and human development index in the province is the highest in Indonesia (UNDP, 2004). Thus, it is very likely that rural diversification in the province is strongly stimulated by the higher educational attainment.

Studies on the relationship between rural diversification and rural development in Indonesia have continued to increase in the last two decades. The growing literature on this subject commonly deals with micro level studies carried out at village and household levels. The existing studies also tend to have a strong bias toward the relatively well-established non-farm undertakings as they are purposively selected. However, none of the existing studies has unravelled the role of macro level settings of the environment sufficiently, if not completely neglecting them. Such macro and level situations can be significant in determining, conditioning, or providing contextual niches for growth and development of rural non-farm activities at both regional and household levels. Thus, in the absence of such knowledge, interpretations of the possible contribution of rural non-farm activities in rural development are often misleading or contradictory. This is not only the case in Indonesia, but also the present day state of affairs of the international literature on the subject (Davis and Bezemer, 2004, Davis 2004 and Start and Johnson, 2004 and Kundu et al., 2003).

II. Research Objectives

In response to the lack of knowledge on the relation between the dynamics of rural diversification and rural development at the regional level, this study aims at explaining the determining factors and consequences of rural diversification on rural development at the regional level of observation. The research outcomes are expected to contribute to the building block of the formulation of rural and regional development, production and employment generation in a predominantly small farming economy such as those in DIY or elsewhere. The study focuses on the rural part of the province to unravel the dynamics of the rural side of the regional economy in the most densely populated region of Java.

III. Research Area

The province occupies some 3,185 square kilometers of varied types of topography in the middle southern part of Java Island. The province is among the most densely populated region in Java and is the most urbanized province after Jakarta Special Capital. It is well endowed with a great variation in physical conditions as reflected in the complexity
of the geological and geo-morphological structure. This in turn gives a highly diversified cultural and economic landscape over the province. The richness of the cultural landscape of the province is deeply rooted in the historical background dating back to the history of Mataram Kingdom. This is also partly obtained through contacts with the rest of Indonesia, via socio-economic interaction between the people of DIY as the host to 270,000 students from all over the country, and many foreign tourists from all over the world (Rijanta, 2003).

DIY is well endowed with volcanic soil in the middle parts, stretching from the north to the south from the top of the Merapi Volcano to the coast on Indian Ocean, occupying the Regency of Sleman and Bantul. It is succinctly put by Selosoemardjan (1962) that it is this mountain, which has given the region its unusual fertile land. Volcanic materials erupted and spread out from the mountain, either through the action of rivers that carry a very important volume of sediments of volcanic origins down to the lowlands, or by spilling over of ash following an eruption. Ash loaded winds blowing southward following eruptions would have fertilized the southern part of Merapi Volcano (Maurer as quoted in Rotge et al., 2000).

According to the outcome of Population Census 2000, the population of DIY is about 3.1 millions. At present, the population in DIY is predicted to be about 3.3 millions. Two thirds live in the middle zone of the province, taking various advantages of the environmental services, easy access to the city, and highly accessible public services. Easy terrain and abundant water resources in the middle zone have enabled the growth of larger size urban settlements. This is well reflected from the fact that towns and cities in DIY lay on this zone. Yogyakarta Municipality is the greatest human settlement established in the middle zone, followed by Bantul as the regency capital of Bantul Regency and Sleman as the Regency of Sleman Regency (Fig. 1). It can be predicted that the middle zone of DIY would develop to form a substantial agglomeration.

Population density in the urban core of Yogyakarta Municipality is not less than 12,000 inhabitants/km² or roughly 120 inhabitants/hectare. This is about 7 to 8 times more densely populated in comparison to the most densely populated of the rural Regencies of Sleman or Bantul. From the point of view of environmental quality, high population density in Yogyakarta Municipality and its vicinity can be harmful as it may cause over exploitation of groundwater and declining air quality due to the densification process.

Population growth in DIY has been traditionally very low, resulting from very low natural growth accompanied by a strong out-migration. Nevertheless, there is a notable variation among the district and municipality. Kulon Progo and Gunung Kidul Regencies have stronger tendency to attain low or negative population growth, whereas Sleman and Bantul Regencies show positive growth rates as an indication of their in-migration gain. These regencies have been able to attract migrant population through higher educational facilities established there. Through various linkage mechanisms, such facilities further generate various economic activities related to the provision of services and goods for the students from all over the country.

IV. Research Methods

Rural diversification in this research is defined as a process of growing significance of non-agricultural employment and incomes for rural households as a consequence of the relative increase of commercial and/or industrial activities whether related or not to the agricultural sector, and both located in the rural as well as in the nearby urban areas. The process of rural diversification in the context of DIY is mainly induced by an aspiration for better living conditions. Thus, the improvement in educational attainment on one hand and the improvement in the rural infrastructure on the other are postulated to have stimulated the process of rural diversification. This is the case of DIY where educational attainment of the population is among the highest in the country (UNDP, 2004) and the road density figure is far above the national average (Rijanta, 1993 and 2003).

Based on these assumptions, five variables have been selected for further analysis. The selected variables are perceived to represent the changes in aspiration of the rural dwellers towards non-farm-economy, the process of rural diversification (e.g. transportation development) and the role and contribution of non-farm economy as an outcome of the process. The selected variables include: (1) Percentage of households sending members to universities, (2) Percentage of households depending on service sectors as main occupation, (3) Percentage of households depending on handicraft and processing sectors as main occupation, (4) Number of small-scale industry establishments per 100 households, and (5) The number of motorized seats available per 100 population, a composite variable derived from weighted scoring to the number of motor cycles (score: 2) and the number of four
Fig. 1. Administrative Subdivision Map of Yogyakarta Special Province
wheel vehicles (score: 6).

The main source of data for the analysis is Potensi Desa of 1996, 2003 and 2006 as available from Central Bureau of Statistics. These sets of secondary data are mainly used to draw the spatial patterns of rural diversification and its determining factors at regional level. These data sets are readily available for statistical manipulation. The data set consists of hundreds of variables but not all of those can be utilized for the research for several reasons. First, in most of the cases the data are less reliable especially due to their lower accuracy and consistency due to some deficiencies in data collection process. Second, the concepts and definition of various terms used in the questionnaire are not fully followed by the officers during the data collection phase. This leads to some inconsistencies in the data set as appears in some related variables. As another party gives the secondary data set, no corrective effort has been possible. The only possible step is to utilize the most reliable and consistent variables forming rural diversification. Third, the most difficult obstacle to overcome is the great variation in the questions posed in data collection by the Potensi Desa questionnaires from year to year.

In order to establish a typology of rural areas according to their level of rural diversification, a factor analysis is conducted (Rummel, 1970 and Gorsuch, 1974). The set of selected variables is entered into the analysis in order to find the grouping of variables showing various types and degree of rural diversification. This technique allows one to detect factors as a grouping of variables forming a certain concept as well as total composite scores for every individual concept by a set of loaded variables termed a factor. The factor score is a composite summary showing the degree of rural diversification as deductively defined by the relevant variables. Among the important advantages of this technique is its capability to exclude irrelevant variables. Thus, a factor consists of a set of variables that are significant to define a certain abstraction that demands a name to describe it.

The determinants to and consequences of rural diversification at regional level are identified by using statistical analysis, especially a regression technique. In identifying the determinants of rural diversification, the obtained factor scores are treated as dependent variables. In the next step, the factor scores of rural diversification are further treated as independent variables affecting the welfare of rural households.

V. Theoretical Frameworks

The spatial patterns of rural diversification are dependent on the relative location of villages to the nearby town with some spots of in-situ diversification owing to the degree of population density in the rural areas. This means that proximity to urban centers and the easy-to-access urban areas are among important determinants of rural diversification at regional level. In the case of Kerala in India, Eapen (1999) demonstrated a similar process as experienced by South East Asian countries as revealed in the work of McGee who proposes the idea of desakotasi, or Ginsburg et al. (1991) who uses the term kotadesasi to denote region base structural changes in the surrounding cities of South East Asia, more especially in Indonesia and Thailand (cf. Rigg, 1994 and 2001).

A recent study by Davis and Bezemer (2004) identifies five factors that may stimulate the growth of rural non-farm activities, namely: (1) local natural/physical factors, (2) quality of local government, (3) local physical infrastructure, (4) proximity to towns, linkages with urban area, and (5) trade and regional growth. The performance of the local natural physical factors in affecting rural diversification may vary according to the differences of resource use. A region endowed by mineral resources tends to specialize rather than diversify their economy.

Local natural and physical conditions are among important factors determining the growth and development of non-farm activities in rural diversification. Although non-farm production is partly dependent on the availability of such natural resources, resource endowment is not the only factor in understanding growth patterns of non-farm activities at least for two reasons. First, given a set of factor endowments there are many possible uses, each of which may or may not generate the growth of non-farm activities. How resources are used is crucial to stimulate the growth of non-farm activities, but it is not simply determined by the presence of resources. Second, the process of resource use is more important than simply its presence. Land resource use in various types of land utilization types may serve as an example of this case. Bray (1994) asserts that in Japan, China and Taiwan the patterns of land use in forms of rice cultivation and economic diversification have brought about a modernization characterized by an unusual degree of balance between rural and urban development. Thus, land resource endowments give a range of possibilities of uses. Land resource endowment determines the possibilities.
and prospects of agriculture sector development and thus determines the non-farm activities (Gordon, 1999). The role of local natural resource endowment to promote in situ rural diversification is not clearly mentioned in the existing literatures. Most of the literature related to this issue is highlighting the role of the agricultural basis in promoting rural diversification through various types of linkages.

Levels of corruption, government stability, policy volatility, the annual occurrence of coups and revolutions, or sometimes, the level of democracy mainly expresses the quality of local governments. An empirical evidence from the transition economy of Eastern Europe shows that there is a significant rural-urban difference in corruption levels, bureaucratic quality, or the nature of civic society that can help explain differences in the diversification of economic activities (Davis and Bezemer, 2003). Governments are typically insensitive to RNFE development and the agricultural paradigm usually dominates. In case of intervention, actions by local administrative bodies seem most appropriate (Haggblade et al., 1989). They have probably less urban bias, are more knowledgeable about rural needs, and operate more efficiently at the local level.

Rural growth of non-farm activities often depends on links with urban areas, either through the acquisition of manufactures or of consumption goods, or through commuting incomes, or through the marketing of rural produce in towns. Rural towns are also important for the following reasons: public service provision, information, credit services, economies of scale and agglomeration. Rural towns can also function as ports towards the national or global market for rural producers (World Bank, 2000). Lanjouw and Lanjouw (1995) used state and district level Indian data to look at the relationship between rural non-farm income and total agricultural income interacting with factors thought to influence the magnitude of the multiplier: infrastructure, rural population density, per capita income in agriculture and irrigation. The estimations were done for rural areas, rural towns with less than 100,000 inhabitants, and the combined area. They calculate that on average a 100 Rupees increase in agricultural income is associated with a 64 Rupees increase in rural non-farm income, with 25 Rupees in rural areas and 39 in rural towns. All of the interaction terms, except irrigation, increase the multiplier as expected. In another study in India, the North Arcot district in Tamil Nadu, a 1 percent increase in agricultural output was associated with a 0.9 percent growth in non-farm employment.

Local physical infrastructure is a decisive factor facilitating intra and inter-regional interaction through the flow of people, commodities and information. Long-term trends in infrastructure improvement, town growth, and increasing population density lead to development of the rural non-farm sector (Anderson and Leiserson, 1980). Local physical infrastructure including density of the road and telephone networks and household services is an important aspect of the RNFE and growth (cf. Lanjouw and Lanjouw, 2001). In addition to lowering costs, good infrastructure in the form of transport links is indispensable if non-farm enterprises are to break away from dependence on local market demands and sell to the outside world.

Well-developed rural infrastructure is essential to rural non-agricultural development. According to Ho (1986) among the main beneficiaries of rural electrification are small manufacturing and processing enterprises, shops, and service establishments. Rural roads facilitate the movement of raw materials to factories in rural towns and of final products to central markets, enlarge the size of the rural markets and the area from which rural enterprises can attract labour, and improve rural households’ access to education, training, health, and social services. Improved infrastructure also encourages non-farm activities to concentrate in small towns, leading to economies of scale and external economies. The return on investment in rural infrastructure can be quite high, since it not only facilitates the development of small towns and rural non-agricultural activities, but also serves the production and marketing needs of agriculture.

Although the returns to market infrastructure via improved access to non-farm opportunities are therefore difficult to establish with any precision, the qualitative point seems to stand: public services such as education, communication, and transport infrastructure matter significantly to participation in non-farm activities. Most importantly, the benefits of such investments thus come not just from reducing transactions costs on existing activities but, perhaps more importantly, from opening up whole new opportunities previously inaccessible to rural populations (Barrett et al., 2001).

According to Satterthwaite and Tacoli (2003), overall trade and services are an important component of non-farm activities in small and intermediate urban centres, and especially in smaller settlements they are often closely related to agricultural production. This may consist of buying farm produce and selling it in local urban and rural markets, or shipping it to other markets outside the region; it may
also consist of selling goods, both agricultural and non-agricultural, to farmers and households whose main source of income is derived from farming. Both small and intermediate urban centres also provide recreational services to the population of their surrounding region, including bars, restaurants, hotels and guesthouses, cinemas, etc. The link with agricultural production is clear, as in many cases; customers are farmers who come to town to sell their produce or to buy inputs (or, in many cases, do both), and traders travelling between market towns.

Complementing the above works, Davis (2004) asserts that wider determinants to rural diversification are the type of agricultural development. Agricultural development determines the growth and development of rural non-farm economy including rural industries through various mechanisms. According to Ho, (1986) the relationship between agriculture and rural non-agricultural activities is an intimate one. Agriculture is related to rural non-agricultural activities directly through its forward and backward production linkages, and indirectly through the consumption demands of farm households. He further asserts that in the case of rural developing countries through consumption linkages. Thus, agricultural growth and rising farm household income are likely to generate considerable demand for non-agricultural goods and services in rural areas.

Reardon (1997) has identified a number of conditions for the development of the RNFE to be more equality enhancing, which include proximity to urban markets, physical and market infrastructure, and resource endowments directed to the distribution of productive resources within rural areas. Turning to community level variables they find that population density does not exercise an independent statistical influence on occupation categories. This might arise from the fact that in more densely populated localities there is greater demand for non-farm jobs, and possibly even a greater supply of non-farm activities, but also that greater population density pushes people into more intensive cultivation (if they have some land to cultivate) or into agricultural wage labour, where no alternatives exist. The lack of a statistical relationship suggests that one effect does not outweigh the other. Village yield also does not explain much of the variation in occupational categories, although the point estimates (which are not significant) do suggest that greater agricultural intensity is associated with relatively more cultivation and non-farm employment than agricultural labour.

Local governments are typically insensitive to rural non-farm development and the agricultural paradigm usually dominates. They have less urban bias and are more knowledgeable about the rural needs and operate more efficiently at local level. Thus in case of intervention, actions by local administrative bodies may seem most appropriate (Haggblade et al., 2002). The availability of local physical infrastructure including roads, telephone networks and household services is an important aspect of the rural non-farm activities and its development. Proximity to towns and linkages with urban areas are in many cases the key to the growth of rural non-farm activities through the acquisition of manufactured or consumption goods, or commuting incomes, or the marketing of rural non-farm products in towns. Small towns can function as ports through which rural producers can transport their goods to national or global markets. The linkages between town growth and the development of rural non-farm activity are complex and not always positive. By linking the rural hinterland with the wider economy, they may expose the former to competition from the outside, thereby rendering some traditional manufacturing activities non-viable. This process, which has been observed in India is also associated with changing consumer preferences towards modern substitutes (Wandschner, 2003).

VI. Determinants to Rural Diversification

The study confirms that the service sector is very important in rural diversification of the province. This further accentuates the differences between DIY and other provinces in Indonesia where rural economic transformation runs from agricultural to service rather than to manufacturing sectors. On the basis of a factor analysis, it is clear that the variables are clustering into two different factors. The two factors explain some 70 percent of the variance. The rest are explained by variables that are not covered in the analysis. The first factor comprises three variables associated with rural diversification oriented toward service sectors and the second factor comprises two variables related to handicraft processing and small-scale industries. The first factor is named as rural diversification associated with the service sector (RDS) that explains about 40 percent of the variance, whereas the second is termed rural diversification associated with rural small-scale industries (RDI), which explains some 30 percent of the variance. The factor scores of RDS and RDI of all villages in the province are further treated as dependent variables of rural diversification in the province.
(1) Determinants to RDS

Rural diversification at regional level of DIY is mainly allied with the development of the service rather than manufacturing sectors. Rural diversification associated with service sectors (RDS) is determined by the percentage of households with motorcycles (74.0 percent), the percentage of households with agricultural employment as primary occupation (8.32 percent), number of economic facilities present in the village (8.75 percent), and the percentage of households with electricity connection (2.0 percent). These variables constitute some (87.7 percent) of the total variance explained as it is well reflected from the adjusted $R^2$ value of 0.877. The complete model of regression is shown as follow.

$$\text{RDS}_{\text{DIY}} = 0.140 + 0.464 \text{ households with motorcycles}$$
$$ - 0.330 \text{ farming households}$$
$$ + 0.249 \text{ economic facilities}$$
$$ + 0.064 \text{ households with electricity}$$

From the composition of variables in the equation, one may reckon that RDS is associated with an opportunity to seek for employment outside the village, a strong push from the agricultural sector, and an opportunity to generate local economic activities. This means that the vast growing service sector in the province is shaped by a combination of variables that works simultaneously. Easier access to employment opportunities beyond the village boundaries is expressed in the use of motorcycles as a means of geographical mobility. The unreliability of the existing public transportation services and the need for a more flexible destination have led to the use of motorcycles as the most convenient means of transportation for those who are occupied in service employment away from the village.

Moreover, the model informs that RDS is also negatively related with the percentage of households with farming as the main employment. This means that the higher dependency on agricultural employment as the main occupation tends to yield a lower degree of RDS. Thus, at provincial level the presence of RDS tends to be exclusive from the presence of households with farming as the main occupation. This is in line with the present knowledge on the relationship between farming as secondary occupation and non-farm activities at provincial level of DIY (Huisman, 2003 and Huisman and Kragten, 1994). The proposition of Bray (1994) that rice farming may lead to a more diversified village is only valid in some areas surrounding Yogyakarta Municipality, Bantul Regency and Sleman Regency. This is partly due to the fact that RDS in the province has penetrated into some the non-rice villages as well, leading to the negative relationship between the two variables. The exceptional pattern of economic transformation in the province is that the economic structure has jumped from an agricultural based to a service based economy. This made possible the negative relation between the RDS and the percentage of households with farming as main occupation possible.

The presence of economic facilities and percentage of households with electricity have positively determined the degree of RDS. This reflects the development of more rural based type of services in the province. As it is argued earlier in this chapter, rural diversification in DIY tends to be region-based rather than urban-based. The importance of RDS is related to the presence of local economic services that make such diversification possible. Consequently, the spread of economic services in the province has led to the development of more rural-based diversification. The presence of infrastructure such as electricity connection has enabled the operation of various machineries and equipment required in service provision carried out by rural households. As electrification has been widely spread over the province, the potential for the growth of more rural based services is also increasingly more important even in the most remote villages. This differentiates the process of rural transformation in DIY from those in the other provinces.

(2) Determinants to RDI

Rural diversification associated with rural small-scale industries in the province cannot be explained satisfactorily by the existing set of data. The model can explain only about twenty percent of the variance (total adjusted $R^2$ is 18.8 percent). Rural diversification associated with small-scale industries in the province is strongly governed by the percentage of households with farming as primary occupation (11.2 percent), the number of economic facilities per 100 population (5.0 percent), factor scores for livestock production (2.2 percent) and the percentage of built up areas in the village (1.3 percent). But, unfortunately these variables account for only about 18.8 percent of the total variance. Thus, the model cannot clarify more than 80 percent of the total variance satisfactorily. As the model can clarify only smaller portion of the variance no further discussion can be made on the basis of the prevailing regression model.

$$\text{RDI} = 1.331 - 0.463 \text{ farming households}$$
$$ - 0.257 \text{ economic facilities per 100 population}$$
$$ + 0.148 \text{ livestock scores}$$
$$ + 0.123 \text{ percentage of built up areas}$$
At this point, it suffices to state that RDI in the province is not systematically related to the existing variables measured at village level. RDI seems to be strongly associated with the locations of natural resources for small-scale industries. Accordingly, the distribution of villages with stronger RDI is almost at random, most probably following the distribution of natural resources, which is unevenly spread over the province. The distribution of sand, stones, bamboo, wood, clay and other materials for small-scale industries are most probably following certain natural physical properties such as the conditions of geomorphology, geology and drainage patterns. To prove this preposition another set of data is needed.

Apart from various variables obtained from the statistical analysis, the regional physical conditions also strongly determined the existing patterns of rural diversification, especially those related to rural small-scale industries. Based on an overlay between the rural diversification maps and some regional physical variables there is a systematic relationship between these phenomena (Rijanta, 2006). The most diversified parts of the province occupy the most flat terrain where both irrigation and groundwater are abundantly available and access to various directions is very easy. It is also the reason that the area is among the most populous parts of the province. The role of the agricultural sector here has been decreasing in the provision of incomes and employment, as it was increasingly replaced by the role of services, trade, and small processing activities.

The most diversified parts of the province are mostly located on the lower and middle slope of Merapi Volcano, Progo plain and a small part of Baturagung Range. All these parts of the most diversified regions are very flat in nature where the average slope is less than 2 percent and elevation ranges from 25 to 200 meters above sea level. Regional physical factors are affecting the present patterns of rural diversification through the greater possibilities for rural small-scale industries to develop. The high population density in this area provides a sufficient threshold for various small-scale industries associated with food processing and leather handicrafts. Raw materials for such kind of industries are not available locally. Thus, they should be imported from other regions beyond the province. But this is only possible when the ground water is also sufficient, as these activities demand a substantial amount of water in their production process (Rijanta, 1990). This coincides with a long history of settlements, an in-situ high population density and closer proximity to urban areas where agglomeration of population provide the necessary market for such commodities.

The lack of positive relationship between population density and RDI indicates that many rural small-scale industries are strongly tied to local resources as their raw materials rather than to population density. Thus, there is no strong evidence that rural industrialization in the province in general tends to take place in the densely populated parts only as they are mostly relying on the availability of natural resources rather than the availability of local market. The presence of cassava processing, wood processing, stone carving, brick and roof tile making activities are among examples of such kind of industries. Clustering in some parts of the province where natural resources are present is a typical behaviour of this kind of industries (Krøgten, 2000). To mention some, among important small-scale industrial clusters in the province are Godean Cluster with roof tile making from clay, Bobung Cluster with wooden mask making from wood of the local villages, Krebet Cluster with shadow puppet making from leather, Minggir Cluster with bamboo craft making, Kasongan Cluster with ceramics and earthenware potteries. All of these clusters have been relying on locally available raw materials for many decades of their production. But recently most of these clusters have been growing tremendously and local materials have become insufficient to cater to the expanding industrial clusters. Some of these have been relying on imported materials, but sustaining the same locations due to immobility of capital investments that they have made on spot so far.

Another type of rural industries are those related to food processing that mainly take place in the more densely populated areas of the province, capturing the advantage of better accessibility to an urban centre that allows for easy transportation of inputs and output commodities, proximity to urban agglomeration and abundant ground water. Some of this kind of small-scale industries are also clustering in some spots like Kasihan with emping (chip making from melinjo [Gnetum gnemon sp] seeds), Srandakan and Brosot with tahu (soyabean cake) and tempe (fermented soybean cake) making, Bantul with geplak (coconut cake) making, Tepus and its surroundings with patilo (cassava chip) making and Pathuk in Yogyakarta Municipality with bakpia (green bean cake) making. Most of these industrial clusters depend on imported materials from outside the village, sometimes from abroad. Most of the processing plants of this kind of industries are adjoining to the house or within the house itself.
The clusters are usually located in more densely populated areas with easy access to urban market for raw materials and markets, cheap and flexible labour supply is available and abundant and shallow ground water is ready for exploitation.

VII. Rural Diversification and Rural Household Welfare

The relationship between rural diversification and rural development is examined through a correlation analysis between the group of variables representing rural diversification and rural development respectively. The degree and types of rural diversification affect the level of rural development and household welfare as measured by seven variables related to the household economic conditions as well as the village financial conditions. The RDS is strongly associated with the household economic proxies such as housing conditions, telephone connections and ownership of four-wheeled vehicles. Meanwhile, RDS is also strongly related to the village financial conditions, as reflected by a rather strong and highly significant correlation between the RDS and village revenue (Table 1).

The positive, strong and highly significant relation between the RDS and percentage of households with permanent houses indicates that the presence of high RDS factor scores is associated with the high percentage of permanent houses. Permanent houses are among the proxies of household wealth in a rural setting of DIY and elsewhere. Only households with sufficient and secure incomes can afford permanent houses. Thus, it is plausible to mention that the strong relationship between the RDS factor scores and the percentage of permanent houses may reflect a successful livelihood achievement through rural diversification. Non-farm employment has been well known as a significant contributor to the rural household economy. In many cases, non-farm economy offers a lower wage level in comparison to agricultural sector, but it provides a more continuous income through the year. This means that participation in non-farm activities can help in fulfilling the housing needs. Given the fact that houses are demanding a substantial amount of money to construct or to purchase, the households must have a buffer for their primary needs. In other words, once a household has been able to obtain a house it must have been able to fulfill the more basic needs such as foods, clothes and basic social services (education and health).

This does not mean that all households participating in the service sector can easily obtain houses. Many of them may attain their second or third houses, but for most of the common service workers housing procurement is really challenging and a prolonged struggle. Those who have secure incomes for a long period of time may have an opportunity to obtain a long-term credit from the banks for a modest house constructed by private developers. Under this scheme they have to pay the credit for a maximum of a 20 year period. Or many households prefer to construct their own houses on lands that they secured before. If this option is chosen, a household may begin the construction of only a bedroom and its most basic amenities only. Other rooms may be constructed later, depending on the available budget of the households.

The importance of RDS in advancing rural household welfare is also well reflected from the fulfilment of tertiary goods of four-wheel vehicles and services such as telephone connection. RDS is in a positive, strong and significant correlation with the percentage of households with four-wheel vehicles at r=0.786 and significant at 0.01. Meanwhile, the RDS is rather strongly and positively correlated with percentage of households with telephone connections at r=0.507 and significant at 0.01. The strong correlation between RDS and percentage of households with four-wheel vehicles indicates that there is a strong capability of the households with service employment to fulfil the need for more dependable transportation means. Given the unreliability of the existing public transportation service in the province, the households with service employment tend to be able to afford private two or four-wheel vehicles. Parts of these vehicles are directly functioning to support the work in service

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
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<tbody>
<tr>
<td>Percentage of households with permanent houses</td>
<td>0.747**</td>
</tr>
<tr>
<td>Percentage of households with telephone lines</td>
<td>0.507**</td>
</tr>
<tr>
<td>Percentage of households with four-wheel vehicles</td>
<td>0.786**</td>
</tr>
<tr>
<td>Value of village genuine revenue</td>
<td>0.500**</td>
</tr>
<tr>
<td>Value of self-financed projects/100 households</td>
<td>0.217**</td>
</tr>
<tr>
<td>RDS</td>
<td>0.157**</td>
</tr>
<tr>
<td>RDI</td>
<td>0.124**</td>
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<tr>
<td>RDI</td>
<td>0.154**</td>
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<tr>
<td>RDS</td>
<td>0.097</td>
</tr>
<tr>
<td>RDS</td>
<td>0.147**</td>
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**=Significant at 0.99 or ∂=0.01
sectors for many people, but for the others it may be related to non-productive use. As a consequence of the growing ownership of motorized vehicles, traffic congestions and jams are becoming common phenomena on the roads connecting Yogyakarta to its urbanizing fringe, especially during the peak hours in the morning and late afternoon. The spatial patterns of settlement development in the urban fringe areas of Yogyakarta have worsened the performance of the circulation systems in the province in general.

The same situation is applied to the relation between RDS and the percentage of households with telephone connections. The moderately strong correlation between the two variables indicates the capability of the households participating in service employment to fulfil their tertiary needs, including telephone connections. Parts of the telephone connections are tied with the service sectors that the households deal with. But, in most of the cases telephone connections are used for domestic use only. The importance of telephone line in rural development of DIY is that the villages with telephone network have greater probability to be selected as a location for investments. The shortage of telephone connections and higher land price in the town by 1996 has stimulated the growth of service establishment along the main corridors to Bantul, Sleman, Wates, Gunung Kidul, Magelang and Surakarta (cf. Rotge et al., 2000). The same process also occurred in the smaller corridors to Kaliurang (north), Imogiri (south) and Godean (west). This process of corridor development also coincides with the growth of new settlements initiated by private developers.

The positive effects of RDS on village capability in rural development are reflected in the positive and fairly strong relationship between RDS and the value of village genuine revenue \((r=0.500\) and significant at 0.01) and the value of self-financed projects \((r=0.217\) and significant at 0.01). The capability of villages in optimising revenue is strongly associated with the RDS. This means that villages with greater households participating in service sectors tend to collect more genuine revenue. As the diversified villages are located in the heart of the province where access to urban region of Yogyakarta is at the best, land price in the areas are also among the most expensive in the province. Many villages are depending on village land \((bondho desa)\) rents for their genuine revenue. The more diversified villages would be able to attain greater incomes from this source. Moreover, villages with closer proximity to or within Yogyakarta urban region may have greater opportunity to undertake business of their own. Villages within the urban region of Yogyakarta may enjoy a lot of revenue from a highly commercialised rent of common lands. Moreover, some villages on the borders and within the urban region of Yogyakarta build many office buildings and kiosks for rents. These kinds of villages have been able to collect genuine revenue from many more kinds of business transaction, ranging from land purchase transaction, land certification, land rent transaction, shares from share cropped lands, location permits, building permits and legalizations of various documents for business activities. Thus, there seems to be no direct relationship between RDS and the village revenue. In many instances the relationship between RDS and village’s genuine revenue is through non-farm business transaction that need an administrative support from the village authority.

As a further consequence of this situation, there is a fairly strong, positive, and very significant relationship between RDS and the value of self-financed projects. The higher village revenue of villages in the most diversified areas seems to stimulate stronger capability of the village to finance their own development projects. The revenue obtained from putting village resources in business or collecting fee from various services rendered by the village administration. Many villages with strong RDS factor scores have been able to construct various kinds of infrastructure and other public buildings necessary for the village community. Under the current spirit of regional autonomy, there is a greater awareness of the villagers to directly control the management of village assets. Thus, there is optimism that in the capability of managing the high valued land resources as common properties owned lay the village in the vicinity of Yogyakarta urban region would be a crucial factor to promote rural development of these urbanizing villages.

A contrasting story emerges when a comparison is made between the villages in the vicinity of Yogyakarta and those in the more remote areas of Gunung Kidul Regency or Kulon Progo Regency. In most of the cases villages in these regencies are endowed with plenty land resource as common properties of the villages. But due to their remote locations, the value of lands is very low and no further incentive to the lands is encountered. Lands are perceived as space for agricultural production, but with very low production level. Moreover, the artificially low price of agricultural commodities in the country has hampered the optimal use of resources at local level. Interest in making use of the lands is increasing but only very limited options can be
recognized. Some important options taken by the remote rural communities in utilizing lands resources can be observed along the coastal region of Kulon Progo Regency where local transmigration settlements are built in close proximity with large scale cattle and chicken raising as well as intensification of agriculture on the coastal environment using local appropriate technology. In Gunung Kidul Regency, one can see the more intensive exploitation of limestones for building materials while at the same time creating a space for agricultural production. Recent efforts of the provincial government assisted by a German University to raise ground water from the underground rivers are among important steps taken for an optimum use of rural resources in this karst environment.

The relationship between RDI and household related variables are surprisingly positive, not strong but highly significant. The presence of villages with high RDI factor scores is positively associated with the percentage of households with permanent houses ($r=0.159$ and significant at 0.01), percentage of households with telephone connections ($r=0.124$ and significant at 0.01) and percentage of households with four-wheel vehicles ($r=0.154$ and significant at 0.01). This gives the idea that rural industrialization process in the province has brought about positive effects on household welfare as reflected by the higher presence of the above mentioned goods. As is known from the previous discussion, villages with strong RDI factor scores tend to be exclusively separated from the focal point of economic activities in the province. This does not mean that their peripheral locations are a reflection of backwardness. Rather, their dependency on natural resource availability has been able to raise the welfare of the households. In their given location of production, natural resource is almost freely available or very cheap in case they should be imported from elsewhere. Moreover, the regional market orientation of these industries has enabled them to obtain greater margin of profit from the uniqueness of the commodity and a captive market from the presence of domestic tourists visiting Yogyakarta.

There is also a weak but positive and highly significant relation between RDI and the value of self-financed projects ($r=0.147$ and significant at 0.01). The RDI is not related with the value of village revenue. The lack of systematic relationship between the value of village revenue and RDI reflects a situation in which the direct and indirect contribution of rural industrialization to the village revenue is absent. This means that the presence of rural processing establishments does not directly perform a contribution to the village revenue. Moreover, the spread of rural small-scale industry establishments in a given village does not give further effects on higher land price, business opportunities or wider range base of activities for taxation. Thus, only very limited opportunities are offered by the rural small-scale industries in stimulating rural development in villages with high RDI factor scores.

The important contribution of rural-small scale industries in rural development of the areas with high RDI factor scores is mainly through the improvement of rural infrastructure. This is evident from the positive and very significant correlation between RDI and the value of self-financed projects. Thus, the presence of rural small-scale industries in the provision of rural roads is most probably very important. The village and rural small-scale industries share the same interest in providing and maintaining the rural roads. In many villages, rural small-scale industry establishments are considered as a main source of financial assistance for many types of self-financed projects initiated by the village management. As a consequence, the value of self-financed projects is much greater in villages with higher RDI factor scores than elsewhere.

The presence of rural small-scale industries in the province is not related systematically and significantly to the agricultural sector. The lack of relationship between the agricultural sector and RDI is a reflection of the fact that rural small-scale industries in the province is mostly associated with natural resources other than agricultural lands, rather than with abundant rural labour force. The presence of natural resources for rural small-scale industries tends to be exclusively separated from natural resources for agricultural activities (PSPPR-UGM, 2000). Thus, there is a distinct pattern of distribution between the agricultural and small-scale industries. Rural small-scale industries tend to be more widely distributed over the region of DIY, utilizing available natural resources as present locally. The agglomeration of small-scale food processing industries in the core region of DIY has not been able to counter balance the spread of other industries in the rest of the province. Thus, the factors determining rural industrialization cannot be explained satisfactorily using the existing data set.

VIII. Concluding Remarks

Rural diversification in DIY is spatially following the most favourable parts of the province where the physical environment gives the most easy access for a geographical mobility and economic agglomerations.
tion. These form the basic ingredients of the spatial patterns of rural diversification as present in DIY. The middle parts of DIY region stretching from Sleman Regency in the north to Bantul Regency in the south is the most diversified parts that put Yogyakarta municipality as the core of this economic hub. The area is a part of the lower slope of Merapi Volcano where abundant water resource is available and comfortable terrain is present. This has enabled human settlements to grow for centuries leading to a substantial agglomeration of population in the province that leads to the present day rural diversification.

Two distinct types of rural diversification can be recognized in the province, namely: rural diversification associated with service sectors (RDS) and rural diversification associated with small-scale industries (RDI). The degree of RDS in the province is governed by the availability of rural infrastructure and transportation means at village level (percentage of households with electricity connections, number of economic facilities and number of motorcycles), as well as the agro-ecological conditions (number of inhabitants per hectare of lands, percentage of irrigated lands to village area, percentage of households depending on agriculture as primary occupation). The role of population density (number of inhabitants per hectare of village area) and proximity to urban economy (network distance to Yogyakarta Town) are also very important factors shaping the present day RDS. In addition, from the previous study (Rijanta, 2006) rural diversification in DIY is also associated with the historical factors (past existence of sugar factories) as well as physical factors at meso-regional level ranging from basic physical conditions (less risk of natural disasters and geomorphological conditions).

The intensity of RDI is more complex in nature and thus more difficult to explain. Part of the villages with higher RDI scores lay in the middle part of the province, overlapping with the RDS. But there are many other clusters of villages with higher intensity of RDI located beyond the crux of the urban region of Yogyakarta. The patterns of RDI cannot satisfactorily be explained by the available data. This is partly due to the fact that RDI in the province is not only market oriented as demonstrated by the higher scores of RDI in the middle region, but also resource based as demonstrated by the importance of village clusters with higher RDI score located beyond the heart of the urban area of Yogyakarta.

The effects of rural diversification on rural development in the province seem to be beneficial to the village and the people as whole. This is evident from the positive and significant correlation between the RDS and many variables representing rural development and welfare at village level. RDS is found positively correlated with percentage of permanent houses, percentage of households with telephone connections, percentage of households with four wheel vehicles as well as value of genuine village revenue. This means that villages with higher RDS scores tend to be better able to develop independently on their own resources and initiatives as well as to facilitate the welfare of their population. The same patterns of relation are also applied between RDI scores and these variables. Nevertheless, the correlation indices are commonly weak but highly significant. Thus, one can observe that rural diversification at regional level of DIY shows a common picture that either RDS or RDI is enhancing rural development and welfare.

Note

1 The Podes data on telephone networks were collected in 1996 when the mobile phone cellular was still a luxury good and their service did not cover the rural areas of DIY.

References


Determinants to Rural Diversification in Java, Indonesia (Rijanta)