The Journal of Environment & Development

http://jed.sagepub.com

The Contribution of Social Capital to Household Welfare in a Paper-Recycling Craft Village in Vietnam

Nguyen Van Ha, Shashi Kant and Virginia MacLaren

The Journal of Environment Development 2004; 13; 371
DOI: 10.1177/1070496504268345

The online version of this article can be found at:
http://jed.sagepub.com/cgi/content/abstract/13/4/371

Published by:
SAGE
http://www.sagepublications.com

The Contribution of Social Capital to Household Welfare in a Paper-Recycling Craft Village in Vietnam

NGUYEN VAN HA
SHASHI KANT
VIRGINIA MACLAREN

This study examined whether the contribution of social capital to household economic outputs was greater than that of other types of capital, whether different dimensions of social capital contribute equally to household income, and whether the role of social capital varies among different categories of households. We developed a reduced-form model of the household production function, in which social capital is treated as a production factor similar to other conventional factors such as physical capital, labor, and human capital, with household income and expenditure as dependent variables. The results show that social capital has a strong and positive contribution to household income, and the positive contribution of social capital to the general (the poor) household's income is greater than that of the paper-recycling (the rich) household's income. In contrast to other studies, the number of memberships in associations does not have an impact on household income.

Keywords: *Asia; recycling; social capital; Vietnam; waste management*

In developing countries, natural resources and the environment have come under increased stress because of simultaneous growth in populations and economies. Reducing the impacts of development on the environment and utilizing natural resources more efficiently are significant challenges. The case of Vietnam is no different from the general trend in developing countries with respect to these stressors. In Vietnam, after the government's formal acceptance of a market economy as a tool for economic development in 1986, rapid industrialization and economic growth have helped raise living standards considerably. The environmental and natural resource impacts of this growth include a substantial increase in solid-waste generation and a significant reduction of the country's forest resources. Recycling is considered to be one of the long-term solutions for addressing these two problems. Among recyclable materials, paper usually constitutes the largest percentage of the urban waste stream (Hoornweg & Thomas, 1999; Leu & Lin, 1998) and is one of the main components of the waste stream going to landfills. Recycling of

Journal of Environment & Development, Vol. 13, No. 4, December 2004 371-399
DOI: 10.1177/1070496504268345

paper not only reduces the amount of solid waste sent to landfills but also alleviates the demand for pulpwood in paper production.

The demand for recyclable materials depends on the health of the recycling industry. In Vietnam, small-scale household-level units dominate the paper-recycling industry, and these units face several constraints such as lack of financial capital, advanced technical knowledge, and market information. On the other hand, these small-scale units may be rich in social capital. There is growing empirical evidence from the rural sector suggesting that social capital can help households or small units to overcome the deficiency of other capitals (Annen, 2001; Fafchamps & Minten, 2002). Scholars from various disciplines, including sociology, political science, and economics, have used the concept of social capital to explain the outcomes of various phenomena including economic development. The concept of social capital as an input in a household's or nation's production function (Grootaert, 1998) and as an asset that can be accumulated and that yields a flow of benefits (Grootaert & Bastelaer, 2001) has contributed to a broader analysis of economic development processes. Many recent empirical studies of economic development at the microlevel, such as Grootaert (1999), Maluccio, Haddad, and May (1999), Narayan and Pritchett (1999), and Ruben and Strien (2001), have used social capital as a factor in household production functions. We contribute to this stream of research by analyzing the contribution of social capital to the production functions of households engaged in waste management practices.

There has been very little research on the connection between social capital and waste management. Two case studies by Beall (1997) on waste collection in Bangalore, India, and waste management in Faisalabad, Pakistan, suggest the presence of a relationship, based on qualitative data, between social capital and the success of community-based waste collection. Pargal, Huq, and Gilligan (2002) used quantitative data from 65 neighborhoods in Dhaka, Bangladesh, and examined the contribution of three components of social capital to a neighborhood's likelihood of organizing a local waste collection system. Although it focuses on waste collection rather than paper recycling, this study is similar to the current study because it develops a waste management model that includes several dimensions of social capital. However, we examined the contribution of social capital to household welfare, whereas they examined the role of social capital in public-good provision and cooperation among neighbors.

In addition, there are at least two other aspects that have not been addressed adequately in previous studies of social capital and economic development. First, studies mentioned earlier have used an aggregate measure of social capital, normally defined as the quantity and quality of membership in social groups. However, similar to other production factors—such as labor, physical capital, and human capital—social capi-

tal is made up of different types of capital, and the contributions of different types to the production process may vary. In such circumstances, an aggregate measure of social capital conceals the effects of different components of social capital, and waste management policies based on an understanding of the outcome of an aggregate measure of social capital may prove to be misleading. Second, social capital may be different for different production processes such as production from household-level recycling units and production from other activities.

In this article, our focus is on the role of social capital in the production process of household-level paper-recycling units in Vietnam; however, we also address the two aspects mentioned above. First, we consider four components of social capital—associational activity, social relations (information sharing), trust, and norms of reciprocity—and examine the contributions of these components separately to the production process of household-level paper-recycling units. Following the lead of previous studies, we also examine the contribution of a social capital index to household welfare. To address the contribution of social capital to different production processes, we examine the household production function of households that own paper-recycling microenterprises and the household production function of households who earn their living from agriculture, raising animals, and provision of support services for recycling and paper production. We also address the issue of income versus expenditure as a measure of the output of a household's production function by estimating separate household production functions for income and expenditures.

Social Capital and the Household Production Function

The concept of social capital has become increasingly popular; however, the early phase of social capital characterization relied largely on abstract definitions and was dominated by sociologists and political scientists.[1] In 1995, Fukuyama incorporated social capital in an economic framework to explain economic development. After that, several studies explored the extent to which social capital contributes to economic success. The recognition of social capital as an input in a production function has contributed to a broader analysis of policy options for economic development.

Narayan and Pritchett (1999) used social capital as a production factor and found that, in rural Tanzania, the degree and characteristics of

1. Bourdieu (1985), Coleman (1988, 1990), Burt (1992), Putnam (1993, 1995), Porters (1998), Lin (1999, 2001), and Flap (2002) are good sources for sociological and political science perspectives of social capital.

associational activity measured by membership in groups, the characteristics of these groups, and individuals' values and attitudes toward these groups have a positive and a strong impact on household expenditure. Grootaert (1999), Grootaert and Narayan (1999), and Grootaert, Oh, and Swamy, (2002) replicated the main characteristics of the methodology used by Narayan and Pritchett (1999) and extended the analysis in several directions for Indonesia, Bolivia, and Burkina Faso. They based their definition of social capital on households' memberships in local associations, which they measured using six variables: the density of association, the internal heterogeneity of association, frequency of meeting attendance, members' effective participation in the decision making of associations, payment of dues, and the community orientation of associations. Combining these variables, they constructed a social capital index, which turned out to be positively and significantly related to household welfare—measured by expenditure per capita. They also studied the impact of different aspects of memberships on household welfare and found that the strongest effect on household welfare comes from the number of memberships and internal heterogeneity of the associations. Other studies by Maluccio et al. (1999) in South Africa and Ruben and Strien (2001) in Nicaragua also revealed that social capital has a positive effect on household income. However, all of these focused on farming activities alone. Other types of household production have yet to be investigated. Most restricted their analysis to associational activity as a measure of social capital, which does not capture the impact of other aspects of social capital on economic outcomes.

According to social capital theory, other influences on household income can include information sharing through social relations, trust, and reciprocity. Information sharing facilitates the flow of information, thereby reducing transaction costs and avoiding the problems of opportunism and market failure because of imperfect information (Fafchamps & Minten, 2002). High levels of trust, achieved through repeated interaction among economic actors, encourages cooperation and reduces transaction costs (Pargal et al., 2002), thereby saving resources and increasing the enforceability of contracts (Pretty & Ward, 2001). Reciprocity fosters exchanges for mutual benefits (Maluccio et al., 1999). Thus, it contributes to the development of long-term obligations among actors, which are an important aspect of achieving positive outcomes (Pretty & Ward, 2001).

For the purpose of the current research, we defined *social capital* as "resources embedded in relationships among households that facilitate productive capacity of households." We operationalized this definition by focusing on four different aspects of relationships: associational activity, information sharing (social relations), trust, and reciprocity at the individual and household levels. The emphasis in this case is on the actual or potential benefits that households accrue from their network of

formal and informal ties with others (Burt, 1992). For example, individuals or households use their personal contacts for getting credits, advice, information, problem solving, borrowing materials, and obtaining complementary resources for their production processes. Hence, similar to Glaeser, Laibson, and Sacerdote (2002) and Loury (1977), we conceptualized and measured social capital as a household good that is different from the conceptualization of social capital as a public good by Coleman (1990), Dasgupta (2000), and Putnam (1993). As a result, in the current study, social capital is treated on a par with conventional production inputs—physical capital, human capital, and labor.

Research Site

Vietnam is a low-income country with more than 80% of its population living in rural areas (Haughton, 2000). As a result, the history of Vietnamese national development is closely connected with the development of villages and craft villages that are typical of the social, economic, and cultural tradition of Vietnamese rural areas (Phuong, 2001).[2] The industrialization of rural areas in Vietnam combined with the development of craft villages has made significant contributions to economic development and to changes in the national economic structure. The most important contribution is their role in increasing local income while providing employment to residents of neighboring villages (Digregorio, 1999). The Vietnamese government sees craft villages as an important rural development option and officially recognizes this in its socioeconomic development plan until 2010 (Phuong, 2001). The new conditions of the market economy have allowed many craft villages to develop and form clusters of industrial craft villages with a certain level of specialization and mechanization. Most important, over the past decade many craft villages have started to exploit the availability of free or low-cost waste materials from rapidly growing urbanized areas and have switched to the production of goods from recycled materials. There are three main types of recycling craft villages in Vietnam: plastic recycling, metal recycling (foundry villages), and paper recycling.

Our focus being on paper recycling, we selected for the current study site Duong O village, Bac Ninh province, situated about 32 kilometers northeast of the Vietnamese capital, Hanoi. According to statistics supplied by the People's Committee of Phong Khe commune (personal

2. Cook (1993) defined crafts as "artifacts produced through labor processes of low organic composition of capital (i.e., low proportion of capital to labor)" (p. 78). "Artisan labor is specialized and special, and depends upon non-mechanized technology. The relations of craft production are not restricted exclusively to family/household units or domestic groups; they may also be wage-based relations" (Cook, 1993, p. 78).

communication, June 2002), Duong O village currently has a population of 3,950 with 700 households. Of many traditional paper-making craft villages that have existed in the north of Vietnam for centuries, Duong O has become the most industrialized village, while other villages have developed poorly. In the past, Duong O was known for its production of Do paper. Do paper is an off-white paper produced from the bark of the Do tree. It is silky smooth and flexible, acid free, mold resistant, and water resistant.

The production of traditional Do paper in the village, because of the shrinkage of the Do paper market, has almost stopped. During the past decade, the village has been transformed from a community of Do paper producers to a community of small industrial producers. From six paper mills with six paper production lines in 1992, Duong O village now possesses 75 paper mills with more than 100 paper production lines. By using mostly wastepaper as material input, Duong O village produces about 200 tons of finished paper per day and employs about 1,900 workers working directly in the paper factories. Different categories of paper produced by the village, such as toilet paper, tissues, votive paper, Kraft paper, and printing paper, are distributed throughout Vietnam. Duong O recycling village has created jobs for thousands of people in other localities as they participate in the process of trading wastepaper; collecting, sorting and cleaning wastepaper; and transporting wastepaper, materials, or finished products.

Data Collection

We collected production data, including social capital, in Duong O using a questionnaire survey administered to two types of households—general (non–paper manufacturer) and paper-recycling households. The first category consisted of a random sample of 15% (105 households) of the total households in the village. One of every six households on an alphabetical list was selected. In the case of refusals or a selected household being also a paper-recycling household, either the immediately preceding or succeeding household on the list replaced that household. Only 13 households were replaced (2 general households refused to cooperate, and 11 households were moved to the second sample because they owned paper-recycling factories). The second set of households constituted 67 household-owned paper-recycling factories (hereafter referred to as paper-recycling households), representing 90% of the total paper-recycling factories in the village. Eight households of 75 households having paper factories could not be reached for various reasons such as holidays, mourning, and refusals.

We administered the survey using face-to-face interviews with the head of a household in the presence of other members of the family from the beginning of June 2002 to the end of July 2002. The questionnaire had three sections. The first section recorded general socioeconomic information (excluding income) about the household. The second section dealt with social capital, and it included questions regarding the four dimensions of social capital: associational activity, social relations, trust, and reciprocity. The final section included questions about the household's assets, number of workers employed in the paper factories, income, and expenditure (details about measuring income, expenditure, and household's assets are given in the Descriptive Statistics section).

We measured associational activity by the number of group and association memberships per capita in the household. To measure the remaining dimensions of social capital, we adapted some questions from the Social Capital Questionnaire (Krishna & Shrader, 1999) recommended by the World Bank and developed some of our own that were more appropriate for the context of this particular case study. The complete set of social capital questions is given in Appendix B. In the case of paper-recycling households, the social capital questions focus mostly on relationships that are specific to the process of paper recycling, whereas the general households' social capital questions focus on a more general form of household-level social capital, covering relationships embedded among households who earn their living by different activities (e.g., agriculture, animal husbandry, trade, and wastepaper services). For all social capital variables, the higher value of the variable indicates the greater level of social capital. Other features of social capital variables and the construction of a social capital index are discussed in the next section.

Descriptive Statistics (Key Economic and Demographic Features of Households)

Key summary statistics for the two categories of households are given in Table 1. The average value of physical capital owned by paper-recycling households is nearly 23 times higher than that of the general households. Although most of the heads of households graduated from secondary school, the heads of paper-recycling households have a higher level of education. The main annual source of income of the paper-recycling and the general households is from the paper industry, which for the general households includes services such as buying, transporting, sorting, and selling wastepaper materials and finished paper. Besides producing some traditional paper, general households also provide labor (receiving wages) to the paper production enter-

Table 1
Selected Characteristics of the Paper-Recycling Households and the General Households

	Paper-Recycling Households		*General Households*	
Variables	%	M	%	M
Value of physical capital (1,000 VND)[a]		1,232,761		56,711
Number of people older than 8 years		4.73		4.02
Education (no. of years)		9.9		8.7
None	0.0		1.0	
Primary	1.5		4.8	
Secondary	58.2		73.3	
High school	35.8		18.1	
Above	4.5		2.9	
Composition of gross household income (1,000 VND)		3,383,004		31,548
Income from raising animals	0.2	5,750	6.0	3,905
Income from agriculture	0.1	2,145	2.2	1,345
Income from paper production	98.2	3,320,349		
Income from paper-recycling services			54.1	25,974
Income from wages (paper workers)			10.4	8,033
Allowances (commune and village staffs)	0.1	2,760	1.1	2,798
Other (transportation, small shops, etc.)	1.5	52,000	26.2	20,638
Annual per capita net income (1,000 VND)		83,451		4,752
Composition of household expenditure (1,000 VND)		2,977,546		22,327
For production activities	98.1	2,920,050	43.4	9,690
For daily living	1.9	57,496	56.6	12,637
Annual per capita living expenditure (1,000 VND)		11,891		2,754
Living expenditure as percentage of net income		14.3		58.0
Annual per capita saving (1,000 VND)		71,517		1,995

a. 1 U.S. $ = 15,500 Vietnam dong (VND).

prises. The paper-recycling households receive almost all of their income from paper production, whereas the general households receive about one half of their income from paper-recycling services. The average net income per capita of the paper-recycling households is about 18 times higher than that of the general households. Daily living expenses for paper-recycling households constitute only 1.9% of total household expenditures; however, daily expenses for general households amount to more than one half of all expenditures. The per capita annual living

expenditure of paper-recycling households is 4 times greater than that of the general households.

One finding of interest from these data is that the ratios of average annual-per-capita living expenditure to the average annual-per-capita net income for the paper-recycling and the general households are quite different. Paper-recycling households use only 14.3% of their net income for living expenses while general households use 58.0% of their net income. On average, paper-recycling households save 85.7% of their income, equivalent to 71,517,000 Vietnam dong (VND; U.S. $4,600) per year while general households only save 42.0% of their income, equivalent to 1,995,000 VND (U.S. $130) per year. This means that we should be careful when using expenditures as a proxy for income when comparing the two groups of households because they have different patterns of consumption and savings.

Paper-recycling households tend to have greater amounts of physical capital, heads of household with higher education levels, higher net incomes per capita, and higher expenditures per capita than general households. The vast majority of income sources for both categories of households originate from paper production and activities relating to paper production. Therefore, the welfare of households in the village is highly susceptible to changes in the demand for recycled paper and the supply of used paper.

Specification and Estimation of Econometric Models

OUTPUTS AND INPUTS OF THE HOUSEHOLD PRODUCTION FUNCTION

With the definition of social capital given earlier, we used the same form of the household-production function model used by Grootaert (1999), Grootaert and Narayan (1999), and Grootaert et al. (2002) in which social capital is treated as a private good input to the production process and on a par with other types of capital such as physical capital, human capital, and labor.[3] We also considered the production function as continuous so that it could be approximated as a linear function (Griliches & Intriligator, 1983). Hence, the basic form of the household production function can be expressed as:

$$Y = F(K, L, H, SC) \tag{1a}$$

3. This form of the production function is different from the production functions in which social capital is treated as a public good and a shift factor in the aggregate production function.

and

$$Y = F\,(K, L, H, SC_1, SC_2, SC_3, SC_4). \tag{1b}$$

In these two equations, Y is production output, K is physical capital, L is labor, H is human capital, SC is social capital (expressed as a composite index), SC_1 is associational activity, SC_2 is information sharing, SC_3 is trust, and SC_4 is reciprocity. Each of these outputs and inputs are discussed next.

Production output. Generally, outputs and inputs are measured in physical terms; however, production-specific conditions may demand the measurement of outputs and/or inputs in value terms (Nerlove, 1965). The paper-recycling households produce different types of paper; the general households produce many outputs that cannot be added together in term of physical units (e.g., "apples cannot be added to pears," Nerlove, 1965, p. 11). Moreover, it was impossible to measure the general households' outputs in terms of physical units because their major income was from providing services (Table 1). Hence, we measured household outputs in monetary terms.

Many authors have used expenditures as a proxy for production output, mainly because of difficulties in obtaining data on household income. Narayan and Pritchett (1999) claimed that even if it is possible to obtain income data, the presence of "saving and dissaving" means that using current expenditures to measure permanent income is better than using current income. A counterargument to this claim is that consumption, and hence expenditures, depends not only on income but on many other factors as well, such as habits, traditions, attitudes toward risk, and moral, socioeconomic, and political conditions that can vary by nation or community. Consequently, the substitutability of income and expenditures needs to be carefully tested when applied to different contexts. In recognition of this concern, we have used household income and household expenditure as production outputs in the current study. The total annual household income is the total income from different sources (i.e., agriculture, animal husbandry, paper production, services, pensions, and subsidies), whereas household expenditures include production expenses (e.g., agriculture, animal husbandry, paper production, and other services), living expenses (e.g., food, clothes, transportation, health care, education, electricity, telephone, and entertainment), and any other expenditures.

Physical capital. The measurement of physical capital, in terms of physical units, poses the same problem as measurement of output. The

different types of machines, instruments, and tools cannot be added together in physical terms. Hence, the physical capital was also measured in terms of monetary values, and it is the total value of the means of production for a household. The value of the paper production lines and workshops constitutes a main part of the physical capital of the households having paper-recycling units, whereas the value of transportation and agriculture equipment, farm animals, and so on are the main constituents for the general households.

Labor. In developing economies such as Vietnam, in many situations labor markets are absent, and the existing labor markets are subject to many market imperfections. Therefore, the labor inputs may not be reflected by the workers' wages. For example, workers might not be paid at their marginal product but on the basis of their relationships with the owners of paper-recycling mills (e.g., with the same labor, the mill owner's uncle might get higher payment compared to that of other workers). For the same reason, the opportunity cost of household members, providing labor inputs, cannot be measured. Hence, labor was measured in physical units.

Paper-recycling households employ skilled workers and also rely on family labor. Hence, for these households, the total amount of labor is the number of outside workers plus the number of family members older than 8 years of age. Household members older than 8 years are considered part of the labor force because at this age they contribute to the production process by sorting and cleaning wastepaper or making votive papers. Previous studies have also used the number of people older than 8 years as an indication of the amount of family labor available for farm production (Ruben & Strien, 2001). Moreover, in Vietnam, children only go to school for a half-day; therefore, they can help their parents for the rest of the day. General households do not hire workers, so the total labor in these households consists of all family members older than 8 years.

Human capital. In the rural areas of Vietnam, the family is normally managed by a patriarchal system in which the head of the household decides nearly everything from production to expenditure on expensive items. Therefore, we measured the level of education of the head of the household as a proxy for the human capital of the household.

Social capital. The four components of social capital are associational activity, social relations (information sharing), trust, and norms of reciprocity. All four are measured by their proxies, as discussed previously. We also created an additive index of social capital, similar to that used by Grootaert (1999), Grootaert and Narayan (1999), and Grootaert et al. (2002).

We selected a single measure, except for social relations, for each dimension of social capital. We had only one measure for associational activity—the number of group and association memberships per capita in the household, and it was used as it is. The proxies for social relations consist of three variables, one of which is binary and two of which are on 5-point scales. We kept the binary variable as a dummy variable and selected one of the two remaining social relations variables by choosing the variable having the highest correlation with the dependent variables (i.e., income and expenditure).[4] The four proxies for trust are all measured on 5-point scales, although the proxies for reciprocity[5] for paper-recycling households are measured on a ratio scale and those for general households are on a 5-point scale.[6] We applied factor analysis to select one variable (question) from among the four variables used to measure each of the trust and reciprocity dimensions.[7]

As suggested by Hjollund and Svendsen (in press), we chose the highest loading variable on each factor representing these dimensions. The selected variables for trust and reciprocity are shown in Table 2.

Second, we created a single additive index of social capital, as suggested by Krishna and Uphoff (2002) and Hjollund and Svendsen (in press), for both categories of households using a similar methodology as used by Grootaert (1999), Grootaert and Narayan (1999), and Grootaert et al. (2002).[8] The index was calculated using the arithmetic average of

4. Using the factor analysis method also gave the same result because, in the case of two variables, the variable that had stronger correlation with the dependent variable would have higher loading.

5. The lowest rating for social capital on the reciprocity vairable occurs when households seek mutual help from friends, while the highest is for households that look to others outside their village. The rational for this rating is that in traditional social groups, with the presence of what Granovetter (1973) calls "weak ties," their members are able to move between groups thereby becoming bearers of new ideas and information. They also have more opportunities to pass on innovation and production experience and to exchange human and financial resources more easily (Fukuyama, 2001).

6. The choice of scales, a 5-point scale and a ratio scale, was based on the responses of people interviewed during the pretesting phase of the data collection and was used to improve the reliability of data. However, all these variables, measured on these two scales, are continuous variables and are treated accordingly in factor analysis and regression analysis.

7. The suitability of factor analysis was checked by examining the strength of the relationship among variables using the Kaiser-Meyer-Olkin (KMO) test. The KMO values of trust variables for paper-recycling household and general household are .63 and .64, respectively, while the KMO values for reciprocity variables are .83 and .79 for paper-recycling household and general household, respectively. All these values are greater than the critical value of 0.6 suggested by Field (2000) for factor analysis.

8. The index of social capital was found not to be a reliable measure because there were weak correlations among variables. For example, the Cronbach's alphas for the index of social capital for general household and paper-recycling household were only .29 and .22, respectively. Similarly, it was not appropriate to use a factor analysis method to aggregate an index of social capital because the strength of the relationship among variables was very

Table 2
Social Capital Variables Selected for Inclusion in the Household Production Models

Social Capital Variables	*Paper-Recycling Households*	*General Households*
ASSOCIATIONS	Number of memberships.	Number of memberships.
SOCIAL RELATIONS	It is helpful to join with other paper factories when making production decisions.	It is helpful to join with others in the village to solve common issues.
TRUST	Level of trust of waste-paper suppliers in the paper-recycling household.	Level of trust in other households in the village to help in difficult times.
RECIPROCITY	Number of times the paper-recycling household had helped a paper buyer in the past 2 years.	The household has helped others with production capital.

the four variables listed in Table 2. All the variables were first rescaled to a range from 0 to 100 and then the arithmetic average was divided by 20 to produce an index with a scale having a maximum value of 5 (see Appendix A).

FUNCTIONAL FORM OF THE HOUSEHOLD PRODUCTION FUNCTION AND ITS ESTIMATION

One of the main challenges in any production analysis is the choice of functional form of the production function. Because of the absence of any previous study on household-level production analysis of paper-recycling units, we do not have a priori information about the appropriate functional form for production analysis in the current case. In the most general terms, the choice for functional form is between the constant elasticity of substitution (CES) and the variable elasticity of substitution (VES) functions. Hence, first we estimated two production

weak. For example, the KMO values for the index of social capital for general household and paper-recycling household are .57 and .40, respectively. The low correlations are perhaps due to the fact that these variables measure different dimensions of social capital (e.g., number of memberships, trust, information sharing, and reciprocity). Hence, it may be more useful to use an aggregate index when only one dimension of social capital is considered. However, we still used the social capital index in the analyses presented in this article because one of the objectives of the current study was to make a comparison of the outcomes using measures of the four components of social capital and the index of social capital, as well as a comparison between the current study and previous studies that have used the social capital index.

functions using the Cobb-Douglas specification and the transcendental logarithmic specification. However, for both cases, neither the coefficients of most of the terms nor the *F* statistics were significant at 5% significance level. Next, following the lead from Griliches and Intriligator (1983), we estimated the simplest form of VES function given below:

$$Y_i = \alpha_0 + \alpha_1 K_i + \alpha_2 L_i + \alpha_3 H_i + \alpha_4 SC_i + u_i \quad (2a)$$

and

$$Y_i = \alpha_0 + \alpha_1 K_i + \alpha_2 L_i + \alpha_3 H_i + \alpha_4 SC_{1i} + \alpha_5 SC_{2i} + \alpha_6 SC_{3i} + \alpha_7 SC_{4i} + u_1. \quad (2b)$$

During the estimation of these two functions (2a and 2b), we found that there is no harmful multicollinearity[9]; however, heteroscedasticity was present. We addressed this problem by transforming the income, expenditure, and physical capital variables into their natural logarithms. As a result, the final functional forms of the two production functions, which were estimated, are as given in Equations 3a and 3b:

$$\text{Ln}(Y_i) = \alpha_0 + \alpha_1 \times \text{Ln}(K_i) + \alpha_2 L_i + \alpha_3 H_i + \alpha_4 SC_i + u_i \quad (3a)$$

and

$$\text{Ln}(Y_i) = \alpha_0 + \alpha_1 \times \text{Ln}(K_i) + \alpha_2 L_i + \alpha_3 H_i + \alpha_4 SC_{1i} + \alpha_5 SC_{2i} + \alpha_6 SC_{3i} + \alpha_7 SC_{4i} + u_i. \quad (3b)$$

The production functions given in Equations 3a and 3b are simple additive nonhomogeneous production functions (details are available in Bairam, 1998). In terms of elasticity of output with respect to factors, they are a hybrid of constant and variable elasticity—elasticities of output with respect to physical capital are constant while the elasticities with respect to labor, human capital, and social capital are variable. The results of the estimated production functions are discussed next.

9. The variance inflation factor (VIF) for the income models of paper-recycling households and general households ranged from 1.11 to 3.21 and 1.05 to 1.10, respectively, which means there was no harmful multicollinearity (Studenmund [1996] suggested that there is no harmful multicollinearity if the VIF is less than 5).

Table 3
Coefficients for the Production Function of the Paper-Recycling Households With a Social Capital Index

Dependent Variables	*Coefficients With Income as an Output*	*Coefficients With Expenditure as an Output*
Intercept	8.870**	8.275**
Ln (physical capital)	.277*	.310*
Employed labor	.026**	.026**
Household size	.002	.024
Human capital (education)	.062*	.055*
Social capital index	.323**	.335**
Households received support or information from influential persons	–.119	–.179
Number of observations	67	67
Adjusted R^2	.757	.767

*$p < .05$. **$p < .01$.

Results of the Econometric Analysis

HOUSEHOLD PRODUCTION FUNCTIONS WITH AGGREGATED SOCIAL CAPITAL

The results for two production functions, with income and expenditure as output, of the paper-recycling and general households, are given in Tables 3 and 4, respectively. The results indicate that income and expenditure models explain roughly 76% of the variation in the production output of paper-recycling households and 40% of the variation for general households. The similar fit found with the income and expenditure models is not surprising in light of the fact that the correlation between the income and expenditure variables is high at 0.99 for paper-recycling households and 0.98 for general households. These results suggest that our previous caution about using expenditure as a proxy for income may be unwarranted.

The comparative analysis of household production functions for the two groups of households provides some interesting outcomes. First, the explanatory power of the paper-recycling household model is much better than that of the general household model. This result suggests that specific measures of social capital may provide much better model fits and estimates for income and expenditures than general social capital. Because we collected information on the general social capital variables from the paper-recycling households, we were able to check whether

Table 4
Coefficients for the Production Function of the General Households With a Social Capital Index

Dependent Variables	*Coefficients With Income as an Output*	*Coefficients With Expenditure as an Output*
Intercept	6.484**	6.471**
Ln (physical capital)	.219**	.193**
Household size	.222**	.206**
Human capital (education)	–.003	–.032
Social capital index	.191*	.213*
Households received support or information from influential persons	.595**	.550**
Households working as farmers	–.649**	.460*
Households working as paper workers	–.448**	–.448**
Traditional paper producers		–.330*
Number of observations	105	105
Adjusted R^2	.416	.390

*$p < .05$. **$p < .01$.

substituting general social capital for specific social capital affected the model fit for those households. The fit was found to be weaker, with adjusted R^2 of 0.64 and 0.66 for the income and expenditure models, respectively. Second, the coefficient of household size is not significant for paper-recycling households but is significant for general households. This is not difficult to explain. Because paper-recycling households have higher incomes, they can afford to place priority on ensuring that their children receive a good education rather than working in the family business. For the lower-income general households, where the work is less specialized—sorting wastepaper, some agricultural activities—children and all members of the family are more likely to be working. Furthermore, the coefficient of labor employed by paper-recycling households is significant, confirming that there are differences in the nature of productive labor by type of household. Third, the human capital variable is not significant for general households although it is positive for paper-recycling households. This might be because the more highly skilled and capital-intensive nature of the paper-recycling business requires higher education levels for households to be successful. Fourth, the coefficients of the social capital index are positive and statistically significant for both types of households, as expected. Fifth, if members of a general household have made personal contact with influential persons, their household income improves; this contact is not sig-

Table 5
Coefficients for the Production Function of the Paper-Recycling Households With Disaggregated Social Capital

Dependent Variables	*Coefficients With Income as an Output*	*Coefficients With Expenditure as an Output*
Intercept	8.804**	8.126**
Ln (physical capital)	.263*	.304*
Employed labor	.028**	.027**
Household size	–.015	.016
Human capital (education)	.058*	.051*
ASSOCIATIONS	–.024	.002
TRUST	.245**	.203**
SOCIAL RELATIONS	.050	.055
RECIPROCITY	.030*	.032*
Households received support or information from influential persons	–.196	–.239
Number of observations	67	67
Adjusted R^2	.763	.769

*$p < .05$. **$p < .01$.

nificant for paper-recycling households.[10] Sixth, among general households, the two dummy variables for source of income, namely households receiving income from farming and households receiving income as paper workers, are negative and significant. The magnitudes of these coefficients indicate that the farmer households have the lowest income while paper-worker households are the second lowest in income. Next, we discuss the results with disaggregated social capital.

HOUSEHOLD PRODUCTION FUNCTIONS WITH DISAGGREGATED SOCIAL CAPITAL

The results for the production function for the paper-recycling households are given in Table 5. These results have two noticeable and interesting outcomes. First, the explanatory powers of income and expendi-

10. There can be two potential reasons for the support and/or information from influential people variable having more impact on general households than on paper-recycling households. First, there is a great number of paper-recycling households who got help from influential people (e.g., 15 of 67); therefore, there is less variation of impacts on the income of paper-recycling households compared to that of general households (e.g., only 7 of 105 got help from influential people). Second, the general households have a much lower income compared to that of paper-recycling households; therefore, the same small change in any production factor of the general household will have greater impact on their income than the same amount of change on the income of the paper-recycling household.

ture models are almost identical to the explanatory powers of the two models with the social capital index. Second, contrary to previous studies by Grootaert (1999), Grootaert and Narayan (1999), and Grootaert et al. (2002), the membership variable representing associational activity (ASSOCIATIONS) is not statistically significant. There are two possible explanations for this finding. First, in Vietnam, people are often encouraged to participate in a number of organizations or associations involuntarily. This type of membership yields little or no benefit for its members but costs them membership fees, their time, and energy. For example, during our interviews, some owners of the paper factories complained that every year they had to pay more then 500,000 VND for membership fees but got nothing from them. To check whether this explanation could be valid, we reestimated the equations using two separate membership variables: The first consisted of the number of memberships in 10 voluntary organizations, and the second consisted of memberships in 6 organizations, mostly mass organizations, that household members are expected to join. Neither variable was significant, and we concluded that the voluntary/involuntary nature of membership was not responsible for the lack of significance.

A second possible reason for the lack of significance in the membership variable is that, as mentioned earlier, in the rural areas of Vietnam there is a strong patriarchal system in which the head of the household decides nearly everything. Consequently, what other members of the family gain from participation in associations is hard to apply to household production activities.

The results for the production functions for the general households are given in Table 6. The results are similar to the results for paper-recycling households except that the explanatory powers of the income and expenditure models have improved noticeably in comparison to the models with a social capital index.

COMPARISON OF OUTPUT (HOUSEHOLD INCOME) ELASTICITIES WITH RESPECT TO SOCIAL CAPITAL AND OTHER FACTORS

In addition to the insights given by the above discussion of the coefficients of different variables and their significance, the relative responsiveness of production output with respect to different factors (point elasticities) will provide important information for household decision makers as well as policy makers.[11] The following discussion focuses on point elasticities for household income only. However, we provide a comparative view of point elasticities for the two treatments of social capital—aggregated and disaggregated.

11. Because point elasticities are defined at a specific point, we have calculated point elasticities at mean values, minimum values, and maximum values.

Table 6
Coefficients for the Production Function of the General Households With Disaggregated Social Capital

Dependent Variables	*Coefficients With Income as an Output*	*Coefficients With Expenditure as an Output*
Intercept	5.628**	6.367**
Ln (physical capital)	.215**	.153**
Household size	.189**	.197**
Human capital (education)	–.001	–.035
ASSOCIATIONS	–.030	.018
TRUST	.345**	.228*
SOCIAL RELATIONS	–.029	–.023
RECIPROCITY	.239**	.265**
Households received support or information from influential persons	.586**	.620**
Households working as farmers	–.572**	–.465**
Households working as paper workers	–.403**	–.355**
Number of observations	105	105
Adjusted R^2	.487	.433

*$p < .05$. **$p < .01$.

The mean values and the range of household income point elasticities with respect to different factors for the paper-recycling households are given in Table 7. The elasticity of physical capital is a constant and is equal to .28; however, the elasticities of all other factors vary with their levels.

In the case of the aggregated social capital model, the point elasticity of income with respect to social capital, at mean values, is .72. Although at this point, income is inelastic with respect to social capital, the magnitude of the income elasticity with respect to social capital is greater than that with respect to labor and human capital. This means that household income is relatively more responsive to social capital compared to that of labor and human capital. For example, an increase of 1% in the social capital index increases the income level of paper factories by 0.72%; however, a similar increase of labor or in the years of education for the heads of paper-recycling households only yields an increase of 0.59% and 0.61% in their income level, respectively. The aggregate data in Table 7 also indicate that household income is inelastic with respect to social capital, labor, and human capital at the minimum and mean values; however, it becomes elastic with respect to social capital and labor at the maximum points. For example, income elasticities at the maximum points with respect to social capital and labor are 1.29 and 2.60, respec-

Table 7
Household Income Elasticities for Paper-Recycling Households

	Aggregated Social Capital		*Disaggregated Social Capital*	
Factors	*Factor Coefficient*	*Factor Elasticity*[a]	*Factor Coefficient*	*Factor Elasticity*
Social capital index	.323	.72 (.38, 1.29)	—	—
TRUST	—	—	.245	.94 (.49, 1.22)
RECIPROCITY	—	—	.030	.10 (0.0, .6)
Number of laborers	.026	.59 (.21, 2.60)	.028	.63 (.22, 2.8)
Human capital (education)	.062	.61 (.25, .99)	.058	.57 (.23, .93)

a. The numbers in parentheses are the point elasticities at the minimum and maximum points.

tively. This means that when paper-recycling households reach a certain level of production, their production becomes more responsive to these two factors, especially with households having a large number of workers. Income is not very responsive to human capital even at the maximum point.

For the disaggregated social capital model, the point elasticities of income with respect to different dimensions of social capital, at mean values, are quite varied. For instance, the income elasticity with respect to trust is close to unitary elastic (.94) while the income elasticity with respect to reciprocity is quite inelastic (.10). This can be explained by the differences in the development stages, in which each dimension of social capital plays different roles. In a market economy where there is strong competition among the suppliers in input and output markets, trust facilitates cooperation and supports a long-term relationship among actors, reducing transaction costs for paper factories and increasing their income. However, reciprocity is not as important for paper-recycling households because most of them can meet the demands of physical capital and labor for their production.

Compared to other capitals, the magnitude of the mean point elasticity of income with respect to trust is much greater than that with respect to labor and human capital. This means that trust has more impact on the income of paper-recycling households than labor and human capital. Most important, trust has a large range of elasticities (i.e., from .49 to 1.22) on which policy should be focused to enrich them to maximum levels.

The range of income elasticities with respect to social capital varies greatly. However, household income remains inelastic with respect to reciprocity across the full range of this factor, and thus income responsiveness with respect to this component of social capital is similar to

Table 8
Household Income Elasticities for General Households

	Aggregated Social Capital		*Disaggregated Social Capital*	
Factors	*Factor Coefficient*	*Factor Elasticity*	*Factor Coefficient*	*Factor Elasticity*
Social capital index	.191	.56 (.33, .90)	—	—
Household received help from influential persons	.595	.04 (0.0, .595)	.586	.04 (0.0, .586)
TRUST	—	—	.345	1.52 (1.38, 1.72)
RECIPROCITY	—	—	.239	.275 (.239, 1.195)
Household size	.222	.89 (.44, 2.0)	.189	.76 (.38, 1.70)

human capital and physical capital. On the other hand, household income, at the higher end, becomes elastic with respect to trust, and this means that the responsiveness of household income with respect to this component is similar to labor. The wide range of income elasticities with respect to trust indicates that social capital may or may not contribute much to the increase of household income depending on how it is used and at what level it is being used. In other words, finding appropriate policy options for the enrichment and suitable utilization of social capital has an important role in the economic development of the village because with those policies, social capital can be an important contributor to increasing household income; otherwise, it can be useless or less useful.

The mean values and the range of household income point elasticities with respect to different factors for the general households are given in Table 8, and the main features of these results are discussed next.

First, in the case of the aggregated social capital model, income elasticity with respect to social capital, at mean values, is .56, which is smaller than that of income elasticity with respect to household size (.89). Similar to the case of paper-recycling households, household income with respect to labor (household size) is inelastic at the minimum and mean points; however, at the maximum points it is elastic with a value of 2.0.

Second, in the case of the disaggregated social capital model, trust plays the most important role in the increase of income for general households. Even at mean values, its impact on the income of households is nearly twice that of the labor (household size). This could be because personal trust among general households is very important for them; households rely on trust to obtain credit from others to compensate for any temporary shortage of physical and financial capital.

Third, although the income elasticity with respect to the reciprocity index has a large range, from .24 to 1.95, the magnitude of point elasticity at the mean point is still small, only .28. This means that policy makers should focus on enriching this component of social capital so as to improve household income.[12]

Finally, the point elasticities of paper-recycling and general household models indicate that in the aggregated and disaggregated social capital models, social capital has a positive impact on household income, and the influence of trust on income is far greater than that of labor and human capital.

Policy Implications and Conclusions

This article examined the contribution of social capital to the welfare of paper-recycling households and general households in a typical craft village in Vietnam. In contrast to most previous studies at the microlevel that used group memberships to measure social capital, four dimensions of social capital—associational activity, social relations (information sharing), trust, and norms of reciprocity—were used in this article. This is the first study on these issues in Vietnam, and it is limited to only one craft village. Hence, the results of the current study alone are insufficient as a basis for policy prescriptions. However, they offer some important insights that may be used, but carefully, for enhancing welfare in the craft villages of Vietnam.

First, similar to empirical results from other countries, social capital has a strong impact on the income of households. The effects of social capital on the income of households are far greater than those of human capital and labor. Hence, social capital should receive a high priority in policy interventions directed toward the development of craft villages.

Second, among the four dimensions of social capital, the strongest contributions are from trust and reciprocity. In contrast to previous research, the number of association memberships does not have an impact on the income of either paper-recycling or general households. Hence, policy makers may like to focus their attention on trust, reciprocity, and evaluation of the forced memberships to many associations. Because trust was one of the most important aspects of social capital for paper-recycling households and general households, the Vietnamese government might use regulations and economic incentives to encourage the change in actors' behavior to enhance trust. In the case of paper-

12. The mean value of the reciprocity index is very low, indicating an absence of what M. S. Granovetter (1973) called weak ties. This limits the movement of households between social groups to obtain ideas, information, production experience, human resources, and assistance for their production.

recycling households, the government may increase the monitoring and enforcement of implementing agreements and contracts among producers and between producers and customers. In the case of general households, traditional and communal activities may be regularly organized to create confidence through providing occasions for trust and commitment. Similarly, reciprocity can be enhanced through a policy that maintains and encourages cooperation among households in the village (e.g., a policy to establish cooperative associations in which households can exchange labor and paper and borrow credit to satisfy urgent demand for their production), which would create favorable conditions for capital mobilization and for the exchange of labor and production experiences. At the same time, through this cooperation, people may come to understand one another better, thus enhancing interpersonal trust and promoting even more cooperation. Together with this process, the state should improve the functions and activities of professional associations so that they can help households to strengthen their ties. Professional associations could also provide assistance with better market information and improved knowledge of efficient production processes.

Third, social capital effects differ by type of household. For example, although getting help from influential persons contributes to increases in the income of general households, it has no impact on the income of paper-recycling households. Our findings also suggest that the enrichment of social capital in the village will benefit the poorer general households more than the richer paper-recycling households. Hence, policy makers may like to develop different policy interventions for different categories of households.

Fourth, the study verified that there is a relatively high trust level among general households and that family ties remain at the center of social networks in Vietnam. These findings are consistent with the study by Dalton, Hac, Nghi, and Ong (2002), in which they attributed the high level of social trust in Vietnam to the country's political mobilization efforts in the past and suggested that the presence of strong family ties reflected the traditions of many other East Asian societies. Policy makers should make use of these features of rural communities in Vietnam.

Finally, the relevance of the outcomes of the current study is not limited to policy makers. Some outcomes may be highly influential and useful for future research on social capital. First, social capital exists at the household level as well as at the community level, and social capital can be general in nature as well as specifically related to a productive activity. Second, associational activity is only one dimension of social capital, and the analysis of the contribution of associational activity to productive activities provides only a very small picture of the contribution of social capital to the production process. Third, an aggregate index may not be an appropriate approach to measure the total social capital that includes all the dimensions of social capital. Fourth, the contributions of

different dimensions of social capital may vary across the categories of households and production processes.

In conclusion, to improve the reliability of the outcomes of the current study, and to suggest specific and definitive policy interventions for craft villages of Vietnam, similar studies should be repeated in other craft villages.

Appendix A
Descriptive Statistics of the Outputs and Factors

	Paper-Recycling Households		*General Households*	
Variables	M	SD	M	SD
Total annual income	3,324,959	3,910,550	31,548	57,716
Ln (total income)	14.54	.94	9.87	.83
Total annual expenditures	2,977,546	3,559,531	22,326	52,496
Ln (expenditures)	14.42	.94	9.48	.77
Total value of physical capital	1,232,761	1,615,032	56,711	70,241
Ln (physical capital)	13.57	.88	9.64	2.10
Number of laborers	22.57	18.52	—	—
Household size	4.73	1.48	4.02	1.47
Head of household years of education	9.90	2.33	8.70	2.43
Average number of memberships per capita	3.76	1.25	3.32	1.02
TRUST	3.84	.83	4.43	.50
SOCIAL RELATIONS	2.67	1.99	4.28	1.55
RECIPROCITY	3.36	4.78	1.15	.77
Households received support or information from influential persons	.22	.42	.07	.25
Social capital index	2.24	.71	3.15	.56

Appendix B
Social Capital Questions

Criteria	*Households Who Have Paper-Recycling Units*	*General Households*
Associational activity	Are you or someone in your household a member of any of the following groups, organizations, or associations? *Checklist of 16 organizations*	Are you or someone in your household a member of any of the following groups, organizations, or associations? *Checklist of 16 organizations*
Social relations (information sharing)	In the past 2 years, have you contacted an influential person to ask for information or help for paper production? *1. No 2. Yes*	In the past 2 years, have you contacted an influential person to ask for information or help? *1. No 2. Yes*
	If you need information to make a decision in paper production, do you know where to find that information? *1. No, never; 2. No, almost never; 3. Sometimes; 4. Yes, most of the time; 5. Yes, always*	If you need information to make a decision in your production, do you know where to find that information? *1. No, never; 2. No, almost never; 3. Sometimes; 4. Yes, most of the time; 5. Yes, always*
	Do you find it helpful to join with owners of other paper factories to make a decision relating to paper production, such as decisions on prices, hiring workers, or investment? *1. No, never; 2. No, almost never; 3.Sometimes; 4. Yes, most of the time; 5. Yes, always*	Do you think that by joining with others in the village to solve common issues you have acquired new skills or learned something valuable? *1. No, never; 2. No; 3. Neutral; 4. Yes; 5. Yes, definitely*
Trust	What level of trust do you feel that wastepaper suppliers have in you? *1. No trust; 2. Low trust; 3. Moderate trust; 4. High trust; 5. Absolute trust*	What level of trust do you have in your neighbors to help you when you face difficult times? *1. No trust; 2. Low trust; 3. Moderate trust; 4. High trust; 5. Absolute trust*
	What is your level of trust in your wastepaper suppliers? *1. No trust; 2. Low trust; 3. Moderate trust; 4. High trust; 5. Absolute trust*	If you lose something such as a pig or a chicken, would someone in the village help look for it or return it to you? *1. No, never; 2. No, almost never; 3. Sometimes; 4. Yes, most of the time; 5. Yes, always*

(continued)

Appendix B ***(continued)***

Criteria	*Households Who Have Paper-Recycling Units*	*General Households*
	What is your level of trust in the people working for you? *1. No trust; 2. Low trust; 3. Moderate trust; 4. High trust; 5. Absolute trust*	Do people in this village generally trust one another in matters of lending and borrowing? *1. No, never; 2. No, almost never; 3. Sometimes; 4. Yes, most of the time; 5. Yes, always*
	What is your level of trust in other paper producers? *1. No trust; 2. Low trust; 3. Moderate trust; 4. High trust; 5. Absolute trust*	Are people in this village basically honest and can be trusted? *1. No, nobody; 2. No, hardly anybody; 3. Some people; 4. Yes, most people; 5. Yes, everyone*
Reciprocity (mutual help)	How many times have you borrowed wastepaper from other paper factories in the past 2 years? *Number of times* ____	Who do you most often ask for or may ask for a loan? *1. Relatives; 2. Friends; 3. Neighbors; 4. Others in your village; 5. Others from outside your village*
	How many times have you given credit to paper buyers in the past 2 years? *Number of times* ____	Who most often provides or may provide you with advice on production activities? *1. Relatives; 2. Friends; 3. Neighbors; 4. Others in your village; 5. Others from outside your village*
	How many times have other paper factories lent you their laborers or given credit to you in the past 2 years? *Number of times* ____	Who most often asks you or may ask you for a loan? *1. Relatives; 2. Friends; 3. Neighbors; 4. Others in your village; 5. Others from outside your villages*
	How many times have paper buyers given you loans in the past 2 years? *Number of times* ____	To whom do you most often provide or may provide with advice on production experiences? *1. Relatives; 2. Friends; 3. Neighbors; 4. Others in your village; 5. Others from outside your village*

Manuscript submitted January 31, 2004; revised manuscript accepted June 21, 2004.

Acknowledgments

We would like to thank three anomymous reviewers for useful comments on an earlier draft of this article. Financial support from the Canadian International Development Agency (CIDA) is greatly appreciated. We are grateful to Hy Luong Van for his comments and helpful advice. Thanks are also due to the participants of a Social Capital and Paper Craft Villages in Vietnam seminar organized as part of the Waste-Econ Seminar Series on January 29, 2003, at the University of Toronto, Ontario, Canada where this article was presented and received valuable comments.

References

Annen, K. (2001). Inclusive and exclusive social capital in the small-firm sector in developing countries. *Journal of Institutional and Theoretical Economics*, *157*(2), 319-330.

Bairam, E. (1998). *Production and cost functions: specification, measurement, and applications*. Aldershot, UK: Gower House.

Beall, J. (1997). Social capital in waste: A solid investment? *Journal of International Development*, *9*(7), 951-961.

Bourdieu, P. (1985). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (3rd ed., pp. 241-258). New York: Greenwood.

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95-S120.

Coleman, J. S. (1990). *Foundation of social theory*. Cambridge, MA: Belknap Press.

Cook, S. (1993). Craft commodity production, market diversity, and differential rewards in Mexican capitalism today. In J. Nash (Ed.), *Crafts in the world market* (pp. 58-83). Albany: State University of New York.

Dalton, J. R., Hac, P. M., Nghi, P. T., & Ong, N. N. (2002). Social relations and social capital in Vietnam: Findings from the 2001 World Values Survey. *Comparative Sociology*, *1*, 369-386.

Dasgupta, P. (2000). Economic progress and the idea of social capital. In P. Dasgupta & I. Serageldin (Eds.), *Social capital: A multifaceted perspective* (pp. 329-334). Washington, DC: World Bank.

Digregorio, M. (1999, December). *Report on the environment of development in industrializing craft villages*. Hanoi, Vietnam: Center for Natural Resources and Environmental Studies.

Fafchamps, M., & Minten, B. (2002). Social capital and the firm: Evidence from agricultural trades in Madagascar. In C. Grootaert & T. Bastelaer (Eds.), *The role of social capital in development* (pp. 125-154). Cambridge, UK: Cambridge University Press.

Field, A. P. (2000). *Discovering statistics using SPSS for Windows: Advanced techniques for the beginner*. London: Sage.

Flap, H. D. (2002). No man is an island: The research program of a social capital theory. In O. Favereau & E. Lazega (Eds.), *Conventions and structures in economic organization* (pp. 29-59). Cheltenham, UK: Edward Elgar.

Fukuyama, F. (1995). Social capital and the global economy. *Foreign Affaires*, *74*(5), 89-103.
Fukuyama, F. (2001). Social capital, civil society and development. *Third World Quarter*, *22*, 7-20.
Glaeser, E., Laibson, D., & Sacerdote, B. (2002). An economic approach to social capital. *Economic Journal*, *112*, F437-F458.
Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*, 1360-1380.
Griliches, Z., & Intriligator, M. D. (1983). *Handbook of econometrics*. Amsterdam, New York, Oxford, UK: North-Holland.
Grootaert, C. (1998). *Local institutions and service delivery in Indonesia* (Local Level Institutions Study Working Paper No. 5). Washington, DC: World Bank.
Grootaert, C. (1999). *Social capitals, household welfare, and poverty in Indonesia* (Local Level Institutions Study Working Paper No. 6). Washington, DC: World Bank.
Grootaert, C., & Bastelaer, T. (2001). *Understanding and measuring social capital: A synthesis of findings and recommendations from the social capital initiative* (Social Capital Initiative Working Paper No. 24). Washington, DC: World Bank.
Grootaert, C., & Narayan, D. (1999). *Local institutions, poverty and household welfare in Bolivia* (Local Level Institutions Study Working Paper No. 9). Washington, DC: World Bank.
Grootaert, C., Oh, G., & Swamy, A. (2002). Social capital, household welfare and poverty in Burkina Faso. *Journal of African Economics*, *11*, 4-38.
Haughton, J. (2000). Ten puzzles and surprises: Economic and social change in Vietnam, 1993-1998. *Comparative Economic Studies*, *42*(Winter), 67-92.
Hjollund, L., & Svendsen, G. T. (in press). Social capital: A standard method of measurement. In M. Paldam & G. T. Svendsen (Eds.), *Trust, social capital and economic growth: An international comparison*. Cheltenham, UK: Edward Elgar.
Hoornweg, D., & Thomas, L. (1999). *What a waste: Solid waste management in Asia* (Urban and Local Government Working Paper Series No. 1). Washington, DC: World Bank.
Krishna, A., & Shrader, E. (1999). *Social capital assessment tool prepared for the Conference on Social Capital and Poverty Reduction*. Washington, DC: World Bank.
Krishna, A., & Uphoff, N. (2002). Mapping and measuring social capital through assessment of collective action to conserve and develop watersheds in Rajasthan, India. In C. Grootaert & T. Bastelaer (Eds.), *The role of social capital in development* (pp. 85-124). Cambridge, UK: Cambridge University Press.
Leu, H. G., & Lin, S. H. (1998). Cost-benefit analysis of resource material recycling. *Resources, Conservation, and Recycling*, *23*, 183-192.
Lin, N. (1999). Building a network theory of social capital. *Connections*, *22*, 28-51.
Lin, N. (2001). *Social capital: A theory of social structure and action*. Cambridge, UK: Cambridge University Press.
Loury, G. (1977). A dynamic theory of racial income differences. In P. Wallace & A. LeMund (Eds.), *Women, minorities, and employment discrimination*. Lexington, MA: Lexington Books.
Maluccio, J., Haddad, L., & May, J. (1999). *Social capital and income generation in South Africa, 1993-1998* (Food Consumption and Nutrition Division Discussion Paper No. 71). Washington, DC: International Food Policy Research Institute.
Narayan, D., & Pritchett, L. (1999). Cents and sociability: Household income and social capital in rural Tanzania. *Economic Development and Cultural Change*, *47*(4), 871-897.
Nerlove, M. (1965). *Estimation and identification of Cobb-Douglas production functions*. Chicago: Rand McNally.
Pargal, S., Huq, M., & Gilligan, D. (2002). Does social capital increase participation in voluntary solid waste management? Evidence from Dhaka, Bangladesh. In C. Grootaert & T. Bastelaer (Eds.), *The role of social capital in development* (pp. 188-212). Cambridge, UK: Cambridge University Press.

Phuong, D. B. (2001). *Bao Ton Va Phat Trien Cac Lang Nghe Trong Qua Trinh Cong Nghiep Hoa* [Restoring and developing handicraft village in the process of industrialization]. Hanoi, Vietnam: Social Science Press.

Porters, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, *24*, 1-24.

Pretty, J., & Ward, H. (2001). Social capital and the environment. *World Development*, *29*(2), 209-227.

Putnam, R. D. (1993). The prosperous community: Social capital and public life. *American Prospect*, *13*, 35-42.

Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*, *6*(1), 65-78.

Ruben, R., & Strien, D. (2001, September 12-15). *Social capital and household income in Nicaragua: The economic role of rural organization and farmers' networks*. Paper presented at the 74th European Association of Agricultural Economists (EAAE) Seminar, Wye College, UK.

Studenmund, A. H. (1996). *Using econometrics: A practice guide with the assistance of Henry J. Cassidy* (3rd ed.). Reading, MA: Addison-Wesley.

Nguyen Van Ha is currently a Ph.D. candidate in the Faculty of Forestry at the University of Toronto. He has been a lecturer in the Department of Forestry Business Management at the Forestry University of Vietnam since 1988. He received B.Sc. from the Forestry University of Vietnam and B.Sc. from Ha Noi Law University. His M.Sc. was obtained from the Department of Agricultural and Natural Resources Economics, Colorado State University. In addition to working as a lecturer in macroeconomics and forestry finance, university planner and coordinator of high education project at the Forestry University of Vietnam, he worked as an expert and consultant for the reform of forestry administration project, the Forestry Administration and Development Vietnam-German Technical Cooperation, and as a consultant for FAO Government Cooperative Program in Vietnam.

Shashi Kant is an associate professor in the Faculty of Forestry, University of Toronto, Canada. He is a recipient of Ontario Premier's Research Excellence Award. He has published more than 50 articles in a wide range of journals and books. He specializes in forest resource economics and forest management systems with emphasis on economics of sustainable forest management (SFM). The main goal of his research is to establish a new paradigm, different from the market-driven paradigm, of forest resource and environmental economics. His main research interests are consumer choice theory including theory of preferences revealed in nonmarket situations; institutional and evolutionary aspects of forest management; and production analysis of comanagement production processes His research interests also include quantum nature of economics, game theoretic and agent-based models, and mathematical modeling and economics of uneven-aged forests.

Virginia Maclaren is an associate professor in the Department of Geography and Program in Planning at the University of Toronto. She has participated in a number of different indicator projects in Canada over the past 5 years. She is currently leading a University of Toronto team that is part of a tri-university consortium providing research support to Vital Signs, a community-based indicator project for Toronto. She recently spoke in Porto Alegre, Brazil, and Chengdu, China, about Hamilton-Wentworth's experience in governance around sustainability, Vital Sign's indicators program, and the development of the local agenda VISION 2020. Her research interests include waste management, sustainable urban development, environmental assessment and South East Asia. She received her B.A. from Bishop's University, her M.Pl. in regional planning from the University of Ottawa, and her Ph.D. in regional science from Cornell University. She is a coinvestigator in Strengthening Canada's Environmental Community through International Regime Reform (the EnviReform project) at the University of Toronto.