

**The Roles of Formal Schooling in Workers' Job Self-selection and
Income in Village-based Industrial Clusters:
The Cases of Two Clusters in Northern Vietnam***

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ABSTRACT: While village industries are known to play an important role in the development of rural areas in developing countries, little is known about village industries in transition economies. Also, little attention has been paid to the question of how human capital contributes to the choice of jobs and income of workers in these village industries. This paper inquires into the determinants of the workers' choice of jobs and income in two village-based industrial clusters in Northern Vietnam. We found that formal schooling plays an important role in the self-selection of jobs and income of workers in all of the villages.

JEL classification: O14; O53

Keywords: Vietnam; Industrial cluster

** This paper is prepared for and presented at the Vietnam Economist Annual Meeting-VEAM 2009 organized at Foreign Trade University, Vietnam.*

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1. Introduction

In developing countries, the majority of the poor reside in the rural areas. To reduce poverty, the promotion of small and medium enterprises (SMEs) in the rural economy has been a major item on the agenda of these countries because SMEs create employment opportunities for the poor (Humphrey and Schmitz, 1996; Hayami, 1998; Otsuka, Estudillo, and Sawada, 2009). The knowledge and skills that have been acquired through formal education are an important factor that contributes to the success of the township- and village-enterprises (TVEs) as well as to the poverty reduction in China (Sonobe and Otsuka, 2006). The question arises as to whether it is possible to reduce poverty in other transition economies such as Vietnam through the enhancement of human capital needs to be investigated.

There are a large number of village-based industrial clusters consisting of household enterprises and SMEs in the rural areas of Vietnam, especially in the northern region (Japan International Cooperation Agency, 2004). Many of them produce products such as traditional silk and ceramics by hand. Some other villages have been transformed to produce more modern products such as improved silk and bamboo and rattan furniture. The role of human capital of workers in responding to such changes has been, however, largely undisclosed.

This paper presents two case studies in three different village-based industrial clusters in Northern Vietnam. Based on survey data collected from 152 workers in Phu Vinh bamboo and rattan village and 95 workers in Bat Trang pottery and ceramics village, this paper focuses on the determinants of the workers' decisions on job selection and their income. We hypothesize that education acquired through formal schooling of the workers play a key role in determining their job self-selection decision and their income.

The paper is organized as follows. After briefly describing the tradition of production in the two study villages, Section 2 advances testable hypotheses. Section 3 explains our sampling method and the characteristics of the sample enterprises, which is followed by the regression analysis in Section 4. Finally, the major findings are summarized and policy implications are discussed in Section 5.

2. Overview and Hypotheses

2.1 Tradition of bamboo and rattan production in Phu Vinh village

Phu Vinh village is about 25km away from the center of the old Hanoi.¹ In the past, household enterprises in the village produced simple bamboo and rattan products such as baskets and bags. Currently, the village enterprises are producing a large variety of products including dishes, flower vases, tables and chairs, beds, wardrobes, which are all from bamboo and rattan. These products are not only sold to the markets in large cities but also exported to about 50 countries all over the world. According to the statistics from the commune office, the village enterprises create about 1000 jobs for 50% of the village labor force and workers commuting from other villages to work there.

The production of bamboo and rattan products in the village can be classified into five major stages. Firstly, product designs are made or copied from others.² Secondly, raw bamboo and rattan are processed mainly by cutting them into long and thin wires and other small parts. Thirdly, Wires are sewed by hand and attached to other necessary parts to make intermediate products. Forthly, intermediate products are processed by using paints and/or chemicals to ensure the products' durability and resistance to changes in environment such as changes in temperature and humidity and possible attacks of termites. Finally, finished products will be delivered to the market. To rank these stages in terms of the ascending difficulty that workers face, the order is the third, the second, the fourth, the first, and the last, which can be called a product ladder.

The village enterprises can either organize all of these stages to sell finished products to the markets or specialize in certain stages. Within the enterprises that organize many production stages, there is a relatively fine division of labor. The knowledge and skills that workers are required to have to take part in these stages are increasing following the product ladder. It is not surprising to see that many children and elderly people are sewing the products at home during their free time. In contrast, those who design products tend to be young people, who are relatively highly educated, and it

¹ The old Hanoi did not consist of both the villages in this study. The two villages used to belong to another province, which was merged into Hanoi in 2008.

² Similar to many other village-based industrial clusters in Vietnam, new designs are imitated very fast by the enterprises in the village. Also, the number of product varieties is already large. It is, therefore, becoming more difficult for the enterprises in the village to create new designs. Even if the designs are from importers abroad, it is always difficult for to produce the first one, which will be taken as a model.

is always that the proprietors of the village enterprises, who are often the best educated among others, are responsible for marketing the finished products.

2.2 Tradition of pottery and ceramics production in Bat Trang village

Bat Trang is a well-known for its pottery and ceramics production in Northern Vietnam. The village is located along Red River, which creates favorable conditions to transport materials to the village and finished products to markets, and about 10 km away from the center of old Hanoi. The village produces a large variety of pottery and ceramics products ranging from simple ones such as cups and rice bowls to sophisticated ones such as statues, candlesticks, and flower vases. With their skills, the craft-men in the village can produce incomparable pottery and ceramics products. The products of the village are not only popular in Vietnam but also are exported to many countries in the world including Japan, France, Korea, and Malaysia. The enterprises in the village, which include both household enterprises and companies, create high-income jobs for about 2,200 villagers and about 3,000 workers commuting from other villages.

The pottery and ceramics production mainly consists of five stages. First of all, the material is prepared by mixing different kinds of kaolin. There are enterprises that buy different types of kaolin and their workers will mix them up with a certain proportion of each kind, while other enterprises just purchase ready made material for their production. This stage is considered to be the simplest by our respondents. Then, intermediate products will be produced by shaping the kaolin mainly by hand and/or with simple machines. This stage is more difficult than the first because it requires higher skills of workers to make a perfect shape of any product. The next stage is to sharpen, to paint, to enamel, and to bake the intermediate products to make finished products. This stage is more difficult than the second one because the right enamel and the right temperature determine the quality of the products. Finally, finished products will be sold to different buyers including sales to tourists coming to the village, sales to distant customers, and sales to traders. It is, however, important to note that there is another important stage where workers design the products. Sometimes, new designs come from customers but it is more often that the village enterprises design the products by themselves. In terms of the difficulty, designing the products is only second to marketing them because it is becoming extremely difficult to design a new product when there are

already many varieties of products in the market. Rampant imitation in the village also contributes to the difficulty of making new designs as new designs even imported ones can be easily copied by workers in the village with high skills. In a nut shell, it is possible to rank the importance of the five major stages of pottery and ceramics production in the village in an ascending order as follows: material processing, producing intermediate products, finishing the products, designing the products, and marketing the products. Such ordered stages form a job ladder in the village.

Many enterprises in the village specialize in one or a certain number of production stages, while other may fully vertically integrate all of the production stages. In any of these enterprises, there is fine division of labor, where each worker is responsible for one production activity.

2.3 Testable Hypotheses

The two villages produce different products but they have many similarities. In the past, the two villages produced only simple products and less educated workers could take part in almost all of the production activities. Gradually, these villages have been transformed into modern industrial clusters, where household enterprises have improved their products and upgraded their production and marketing organization. As a result of such dynamic changes, only relatively highly educated workers are employed in more complex stages of production such as product design and marketing. In other words, knowledge and skills of workers have been becoming increasingly important.

Many people in the village including both the proprietors and workers have recognized the importance of knowledge and skills in their work. Indeed, many of our respondents told us that they would like to invest in the education of their children and would like them to go to university because they have realized the importance of formal education in such multi-faceted improvements and especially in exporting their products to the foreign markets.³

³ It is, however, not always the case because many of the respondents' children have not returned to the villages upon completion of the university study. Many of them have found their jobs in large cities more attractive than coming to the villages to work. Therefore, these two villages, like all of the other villages in Vietnam, lack high quality human resources severely.

To the extent that human capital is valuable to be able to adjust to the new opportunities resulted from these changes (Schultz, 1975), it is expected that the human capital of the workers is a critically important factor that affects the nature of the worker's jobs. Indeed, a strong link between general human capital measured by formal education and multifaceted improvements has been found in the recent literature on industrial development in other developing countries (Altenburg and Meyer-Stamer, 1999; Sonobe and Otsuka, 2006; Akoten and Otsuka, 2007). Important roles of human capital in the proprietors' choice of what to produce have also been analyzed in other studies (Vu Hoang Nam *et al.*, 2009). Therefore, regarding the roles of workers' formal education in the self-selection of jobs, it seems reasonable to postulate the following hypothesis:

Hypothesis 1: Workers who have acquired more formal schooling are responsible for more complex jobs than others.

If relatively more highly educated workers tend to be in charge of more difficult jobs, it may be reasonable to expect that they will be paid higher. In these two villages, because of the availability of non-farm jobs, few people migrate to big cities to work. Given that, the two major sources of income of the villagers are farming and engaging in the industrial production. It is important to note that the farm income is far below the non-farm income. The workers who have higher education tend to quit farming to concentrate on the non-farm activities. Therefore, it is reasonable to advance the following hypothesis:

Hypothesis 2: Workers who have acquired more formal schooling have higher income than others.

We will test these two hypotheses by examining the effects of formal education on the choice of jobs and income of workers in both villages.⁴

4. Data

⁴ An alternative hypothesis would be workers who have acquired more formal education choose more complex jobs and, thus, have higher income. We are, however, trying to avoid such hypothesis because of the lack of information to test it. Further details will be discussed in Section 4.

In the summer of 2009, we conducted a survey in the Phu Vinh bamboo and rattan village. In the winter of 2009, we conducted a similar survey in the Bat Trang pottery and ceramics village. These two surveys are structurally the same. We first contacted with the commune office to collect a list of enterprises in the village, which include both household enterprises and companies.⁵ We then randomly selected enterprises in the village. In the Phu Vinh bamboo and rattan village, we selected 31 enterprises and in each of these enterprises we interviewed both the proprietor and randomly chosen 5 workers to interview.⁶ Information about 3 workers is not complete. Therefore, there are 152 workers in our sample in the Phu Vinh village. In the Bat Trang pottery and ceramics village, we selected 19 enterprises and in each of these enterprises we also interviewed both the proprietor and randomly chosen 5 workers to interview. There are, thus, 95 workers in our sample in the Bat Trang village.⁷ Our data on the workers consists of information about their personal information, the types of jobs they are taking, and their average daily income and the number of days they work each year.

Table 1 presents the characteristics and income per month of workers by type of job, which is ordered from the easiest to the most difficult, in Phu Vinh bamboo and rattan cluster. It is interesting to observe that the workers who are responsible for more difficult jobs tend to be more educated than others because the percent of workers who have more than five years of formal schooling, i.e. having finished compulsory elementary schools and gone to further education, is higher among those who are taking care of more difficult jobs. According to the third row of this table, more than 95% of the workers who are in charge of selling products to the market, which is the most difficult job among others, have at least gone to lower-secondary school, while only about 51% of the workers who are doing weaving, which is the easiest job, have gone to lower-secondary school. This observation supports Hypothesis 1 on the importance of formal education on the job self-selection of workers in Phu Vinh cluster. There is, however, not much difference in the average years of working experience in the industry, percent of

⁵ Household enterprises are generally not registered, while companies are officially registered. Companies are often larger in operation size than household enterprises. We, however, treat these two kinds of enterprises the same and call them enterprises.

⁶ Because the proprietor is self-employed we name both the proprietor and worker by the same term, which is worker.

⁷ We have also collected information about the products and production and organization of the enterprises in the two villages. We, however, do not analyze such information in this paper.

workers who are villagers, percent of male workers, and average age among the workers. The percent of workers who are still single is lowest in the group that does weaving and the group that does marketing activities.

Another interesting observation is that workers who are responsible for more difficult jobs tend to earn higher income than others. The average income per month of those who are in charge of marketing is double that of those who are simply weaving. Because the workers are taking care of more difficult jobs are also who have attained higher formal education, it is reasonable to infer that the highly educated workers earn better livings than others. Given that the wage paid to workers who engage in bamboo and rattan production is higher than that paid to farming activities, it is obvious that the highly educated workers tend to not only deviate more from farming activities but also choose more difficulty jobs in bamboo and rattan production, which pay higher. This observation supports Hypothesis 2 on the importance of formal education to the level of income of the workers.

Table 2 presents the characteristics and income per month of workers by type of job, which is ordered from the easiest to the most difficult, in Bat Trang pottery and ceramics cluster. Similar to Table 1, it is interesting to observe that the workers who are taking care of simpler production activities tend to be less educated than others.⁸ According to this Table 2, more than 90% of workers who are responsible for marketing activities, which is the most sophisticated and difficult, have completed lower secondary school, while only 30% of those who are processing materials, which is the easiest, have the same level of education. This finding supports our Hypothesis 1.

Table 2 shows that there are differences in the experience of workers, which is measured by the percent of workers who have more than 10 years of experience in the industry. The average percent of male workers, percent of single workers, and their average ages are also different among groups. It is, moreover, interesting that there is difference in income per month between the groups of workers. Generally, we observe that the average income per month of the workers who are taking simpler jobs, tend to be

⁸ The workers' level of formal schooling in this village is higher than that in the Phu Vinh village. In this village, out of 95 sampled workers, 57 have completed upper secondary school of which one even went to university. All of them have completed at least elementary school.

small than that of the workers who are responsible for more difficult jobs. This finding supports our Hypothesis 2.

5. Regression Analyses

To test the hypotheses advanced in Section 3, we estimate the functions of job ladder and logarithm of income per month of workers in both Phu Vinh bamboo and rattan cluster and Bat Trang pottery and ceramics cluster. We regress these two explained variables on the same set of explanatory variables as presented in Tables 1 and 2.⁹ Because the job ladder takes the value of cardinal numbers, i.e. 1, 2, 3, 4, which are corresponding to the category of jobs that are listed from the easiest to the most difficult, we apply the Ordered Probit model. For the regression of the logarithm of income per month of workers, we apply the Ordinary Least Square model. In these two models, we calculate t-statistics based on heteroskedasticity-robust standard errors. If education of the workers has positive and significant effect on the job ladder, our Hypothesis 1 will be supported. Hypothesis 2 will be also supported if the effect of education of the workers on their income is positive and significant.

Table 3 presents the regression results of the Phu Vinh bamboo and rattan cluster. The second column of the table shows that the education dummy variable has positive and highly significant effect on the job ladder. In other words, the workers who have completed elementary school tend to choose more difficult jobs to do than the others. This finding supports Hypothesis 1 on the effect of formal education on the self-selection of job of workers. The third column of the table presents the regression function of the workers' income. Similarly, the workers' education variable has positive and significant effect on their income. On average, those workers who have completed elementary school tend to earn about 792 thousand VND, i.e. $e^{2.07}-1$, more than those who have not completed the same level of schooling. This observation supports our Hypothesis 2. It is interesting to observe that the workers with higher formal education tend to choose more difficult jobs and at the same time have higher income. Based on the basic statistics in Table 1 that those workers who are responsible for more difficult jobs have higher

⁹ As presented in Tables 1 and 2, there are slight differences in the indicators.

average income than others, we can roughly say that more capable workers tend to choose more difficult jobs and, therefore, have higher income.¹⁰

We also observe in Table 3 that the workers who are living in the Phu Vinh cluster do not necessarily choose more difficult jobs but still have higher income than others. It is often that the workers who are living in the village were born there.¹¹ As a result, they have been not only exposed to the work much earlier but also embedded in the culture of the village more deeply and, hence, have better skills than the workers who are coming from outside or commuting to work in the village. Obviously, skills can be built up through many years of working in the industry. The years of experience variable, however, has no effect on both the decision to choose jobs and income of the workers. The living in the village dummy variable may, hence, reflect the skills of workers that have not been formed by on-the-job training.

The regression results of the determinants of the job ladder and income of workers in the Bat Trang pottery and ceramics cluster are presented in Table 4. According to this table, the education variable has positive and highly significant effect on the choice of jobs of workers in the cluster, implying that highly educated workers tend to self-select to do more difficult jobs. This observation again supports our Hypothesis 1. Additionally, it is interesting to observe in Table 4 that the schooling dummy variable has positive and significant effect on the average income per month of the workers. On average, the income of the workers who have completed lower secondary school is about 649 thousand VND, i.e. $e^{1.87}-1$, higher than the income of the workers who have not completed that schooling level. It is important to note that except the schooling dummy variable, other variables have no significant effects on both the choice of jobs and income per month of workers. In other words, the two regression functions in Table 4 are not much different. It is, therefore, likely that more educated workers tend to choose more difficult jobs and, hence, have higher income even though we are not able to regress income on the choice of job for the reason as discussed earlier.

¹⁰ It will be very interesting if we can apply the Heckman two-step estimation method, in which workers self-select jobs in the first step and, thus, have higher income in the second step. Due to the lack of instrumental variables, we are, however, not able to do so.

¹¹ All of our respondents, who are living in the Phu Vinh village, were born there.

6. Concluding Remarks

Many existing studies have analyzed the role of enterprise proprietors' human capital in general and formal schooling in particular in their choices of products to produce and the performance of their businesses in industrial clusters. There is, however, no rigorous empirical study on the importance of human capital measured by formal schooling of the workers in their choice of jobs and income. Based on two similar surveys conducted in the two village-based industrial clusters in Northern Vietnam, which are producing completely different products, we found a similar pattern that more educated workers tend to choose more difficult jobs to do and, therefore, receive higher income. To the extent that the quality of workers plays an essential role in the development of the enterprises, it is important that formal education should be further provided by the public sector to not only the proprietors but also workers of the enterprises in the village-based industrial clusters in Northern Vietnam. Further studies should inquiry more into the question of whether vocational training provided by the governments at various levels can partly make up for the lack of formal education, which may well take a long time to be improved.

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Table 1: Characteristics and income per month of workers by type of job in Phu Vinh bamboo and rattan cluster*

| | Weaving | Material processing | Finishing | Product designing | Marketing |
|--|---------|---------------------|-----------|-------------------|-----------|
| | (1) | (2) | (3) | (4) | (5) |
| Percent of workers who have more than 5 years of schooling | 51.4 | 75.7 | 78.4 | 81.8 | 95.7 |
| Years of experience in the industry | 28.7 | 16.0 | 19.7 | 19.9 | 19.4 |
| Percent of workers who are villagers | 97.0 | 100.0 | 86.5 | 95.2 | 100.0 |
| Percent of workers who are single | 2.8 | 32.4 | 27.0 | 38.1 | 17.4 |
| Percent of male workers | 37.1 | 21.6 | 18.9 | 59.1 | 56.5 |
| Age of workers (years) | 43.5 | 30.1 | 34.5 | 32.9 | 34.4 |
| Income per month (100,000 VND) | 9.8 | 10.7 | 13.5 | 12.9 | 19.8 |
| Number of workers | 35 | 37 | 37 | 22 | 23 |

* Average values; Workers consist of both proprietors of enterprises and hired labors; If a worker is doing more than one job, he/she will be classified into the group whose type of job is the same as the most difficult job he/she is taking care of.

Source: authors' calculation

Table 2: Characteristics and income per month of workers by type of job in Bat Trang pottery and ceramics cluster*

| | Material processing | Intermediate products | Finalizing the products | Product designing | Marketing |
|--|---------------------|-----------------------|-------------------------|-------------------|-----------|
| | (1) | (2) | (3) | (4) | (5) |
| Percent of workers who have more than 9 years of schooling | 30.0 | 48.6 | 67.9 | 72.7 | 90.9 |
| % of workers with more than 10 years of experience in the industry | 60.0 | 25.7 | 46.4 | 27.3 | 18.2 |
| Percent of workers who are single | 10.0 | 42.9 | 35.7 | 54.5 | 63.6 |
| Percent of male workers | 70.0 | 45.7 | 75.0 | 81.8 | 9.1 |
| Age of workers (years) | 32.8 | 29.4 | 28.8 | 26.8 | 24.4 |
| Income per month (100,000 VND) | 11.5 | 10.5 | 13.1 | 15.0 | 10.3 |
| Number of workers | 10 | 35 | 28 | 11 | 11 |

* Average values; Workers consist of both proprietors of enterprises and hired labors; If a worker is doing more than one job, he/she will be classified into the group whose type of job is the same as the most difficult job he/she is taking care of.

Source: authors' calculation

Table 3: Determinants of job ladder and logarithm of income per month in Phu Vinh bamboo and rattan village

| Dependent variable | Job ladder | ln(income per month) |
|---|----------------------|----------------------|
| | Ordered probit model | OLS model |
| Schooling dummy (=1 if more than 5 years) | 0.618** (2.61) | 0.207* (1.85) |
| Years of experience in the industry | -0.005 (-0.33) | -0.007 (-0.99) |
| Living in the village dummy (=1 if yes) | -0.160 (-0.52) | 0.130** (1.99) |
| Marital status dummy (=1 if single) | -0.014 (-0.06) | -0.178* (-1.91) |
| Gender dummy (=1 if male) | 0.273 (1.25) | 0.078 (0.82) |
| Age (years) | -0.003 (-0.19) | 0.004 (0.48) |
| Constant | | 13.612*** (57.69) |
| R-squared | 0.04 | 0.07 |
| No. of observations | 152 | 152 |

Numbers in parentheses are t-statistics based on heteroskedasticity-robust standard errors. *, **, *** indicate 10%, 5%, and 1% significant levels, respectively.

Table 4: Determinants of job ladder and logarithm of income per month in Bat Trang pottery and ceramics village

| Dependent variable | Job ladder | ln(income per month) |
|--|----------------------|----------------------|
| | Ordered probit model | OLS model |
| Schooling dummy (=1 if more than 9 years) | 0.672*** (2.76) | 0.187** (2.07) |
| Having experience in the industry more than 10 years dummy (=1 if yes) | 0.032 (0.11) | 0.027 (0.26) |
| Marital status dummy (=1 if single) | 0.244 (0.72) | -0.044 (0.41) |
| Gender dummy (=1 if male) | -0.161 (-0.70) | 0.081 (1.07) |
| Age (years) | -0.003 (0.32) | 0.006 (1.55) |
| Constant | | 6.684*** (37.68) |
| R-squared | 0.05 | 0.08 |
| No. of observations | 95 | 95 |

Numbers in parentheses are t-statistics based on heteroskedasticity-robust standard errors. *, **, *** indicate 10%, 5%, and 1% significant levels, respectively.