

Skills Shortage: Chinese Firms and Labour Market in Laos

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Foreign direct investment has been an important driving force for the economic growth of Laos in the past 10 years, and direct investment from Chinese firms has been a crucial element of the country's economic structural change. However, Chinese firms continue to face shortages of skilled local labour. They try to employ more local labour, but the low productivity of underskilled Lao workers keeps labour costs stubbornly high. Although they have paid attention to training Lao employees, it has not had the desired effect; the core problem is the underskilled labour force. Our survey data indicates that workers' educational attainment tends to be overestimated by Chinese firms and Lao workers alike. Analysis of skill distribution shows that cognitive abilities have more important effects on skills shortages than non-cognitive abilities, but it is difficult to improve cognitive abilities through workplace training. Lao workers score poorly in literacy and numeracy skills and highly in conscientiousness and extraversion. Their strengths lie in non-cognitive skills, which Chinese firms need to give full rein to in their management. Estimation results show that skill inefficiency directly affects the incomes of Lao workers. First, shortages in general cognitive skills, especially reading and writing, significantly reduce income, while excesses in those skills have no significant effect on income. Second, non-cognitive skills have no significant effect on income. In addition, return to education is not significant, while return to experience is significant. Consequently, foreign-funded (including Chinese-funded) enterprises face the dual challenge of cognitive ability training and work skills improvement. For this purpose, this report puts forward policy measures and suggestions.

11.1 Introduction

Laos has sustained high economic growth averaging 7.8 percent over the last decade, driven in recent years by a large inflow of foreign direct investment (FDI). China's FDI in the Greater Mekong Subregion (GMS) has increased rapidly, almost tripling from USD0.457 billion in 2008 to USD1.281 billion in 2013 (National Bureau of Statistics of China 2013). China is now the top investor in Laos, which receives 31 percent of total Chinese investment in the GMS.

In a 2012 World Bank survey, firms in Laos complained that not enough workers were applying for jobs (World Bank 2014). Nearly half of them reported having no or few applicants even for unskilled jobs. Conversely, the country has large numbers of youth entering the labour market each year, but a large cohort of young people cannot find a job. Chinese firms, however, face different problems in the Lao labour market from those identified by the World Bank survey.

Chinese investors have mostly focused on energy, minerals and other natural resources, though in recent years have gradually shifted towards manufacturing and services. A survey of Chinese firms (Xiong 2017) found that the main motives of Chinese investors in Laos are market potential, availability of natural resources, and low-cost labour. Recruitment was not a problem, according to about 100 interviewed Chinese firms; the main problem they faced was stubbornly high labour costs due to the low productivity of local workers. Most of the firms reported a lack of qualified skilled Lao labour. Another observation was that Chinese skilled workers accounted for more than 50 percent of the workforce in some Chinese construction firms even though, according to Lao Foreign Investment Promotion Management Law, the ratio of skilled foreign workers to a firm's total workforce must not exceed 20 percent.

Skills shortages arise in a situation in which employers in specific sectors cannot find suitably qualified workers (Desjardins and Rubenson 2011). Simply put, skills shortage is a mismatch between supply and demand in the labour market. Labour economists use search and matching theory to study the labour market. If equilibrium is reached between the number of unemployed seeking jobs and the quantity of labour demanded by firms, the labour market realises the ideal person-job fit. But person-job mismatch is a more common phenomenon, usually including skills shortage and overmatched skills. In developing countries, foreign-funded firms have great difficulty recruiting suitable workers because applicants lack education and production skills (Bruni, Luch and Kouch 2013; World Bank 2014). Skill shortage is caused by excess demand, that is, the demand for skilled labour is greater than the supply

of skilled labour for a sustained period. If employers are unable to convert their labour demand composition, or if workers have asymmetric information on the demand for skills, substitution for factor of production could become a problem in the short term (e.g. the labour force is from different positions or departments) (Shah and Burke 2003; UKCES 2011). For firms, skill shortages appear as a lack of skilled labour and difficulties recruiting for the positions they need to fill. Skill shortage may be a direct result of job applicants' lack of skills, job qualifications or work experience; other reasons include applicants' general attitude, work ethic or personality traits, or insufficient applicants for a post. Another possible cause is the competency of the firm's human resources department.

Based on data from the Lao Skills Towards Employability and Productivity (STEP) Household Survey and STEP Enterprise Survey 2011–12 (Carpio, Ikeda and Zini 2013), the World Bank's latest assessment of skill needs identified two distinct problems: labour quality and labour quantity (World Bank 2014). Job applicants and workers lack critical job skills; even skilled workers do not have the right skills to match employers' expectations and only a small proportion of employers train their employees. Firms do not have sufficient available workers and have to hire workers with much lower qualifications than needed, even for elementary jobs.

Labour and skills shortages clearly represent a bottleneck for the development of many Chinese firms in Laos. But it is unclear exactly what skills are demanded by Chinese firms and lacking in the Lao labour force. Identifying skills shortages will contribute to the growth of Chinese firms and the skills development of Lao workers.

Assessment of the effects of skills mismatch on firm productivity and individual workers can help to evaluate losses. However, identification of exogenous factors resulting in skills match will enable policymakers and employers to understand the issue better. This paper aims to identify the gap between the skills demanded by Chinese firms and those offered by the Lao labour force. Exogenous factors resulting in such mismatches are analysed and the consequences assessed through micro-level analysis of the impacts on firm productivity and worker behaviour.

11.2 The research context

Laos has maintained rapid and stable economic growth over the last 10 years and is one of the fastest growing economies in Asia. Agriculture continued to play a major role in economic development even as the contributions of industry and service sectors grew, from 25 percent in 2005 to 31 percent in 2014 for industry and from 39 percent to 42 percent for services in the same

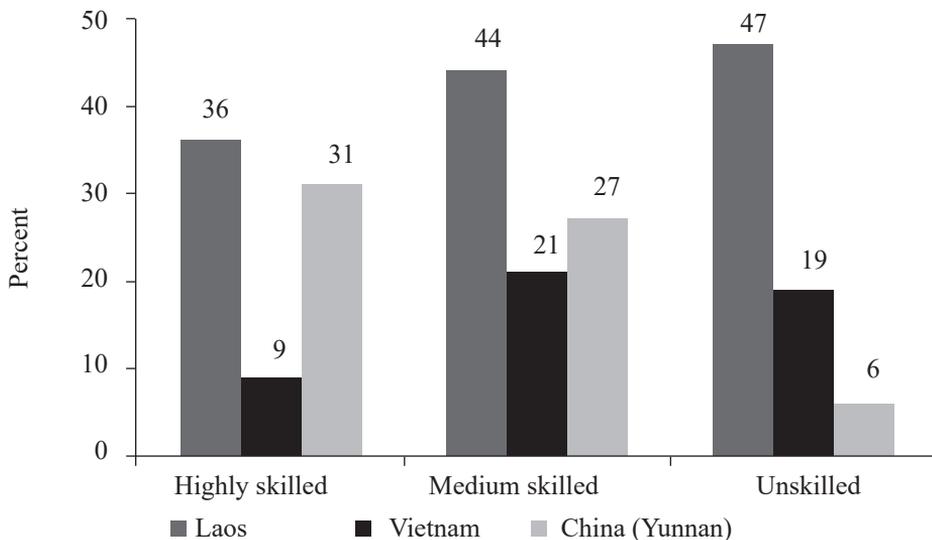
period. Rapidly rising FDI, especially in mineral extraction, hydropower development, construction, manufacturing and services, is the driving force of Lao economic structural transformation. China is the country's biggest investor, with cumulative investment between 1989 and 2014 of USD53.97 billion, accounting for 33 percent of total FDI inflows. In 2015 alone, new Chinese investments accounted for 7 percent of the increase in FDI, ranking third after Vietnam and Malaysia (Ministry of Planning and Investment 2015). As well as creating opportunities for structural transformation, Chinese firms investing in Laos are also creating new jobs: every 1 percent increase in China's FDI is estimated to stimulate GDP by 2.67 percent and improve unskilled workers' incomes by 2.39 percent and skilled workers' incomes by 0.56 percent (Xiong 2017).

Since Laos opened up to foreign investments in 1988, large numbers of Chinese firms have been investing and expanding their presence in mining, agriculture, electricity, rubber, and engineering construction. According to the Laos Investment Promotion Agency (Ministry of Planning and Investment 2015), total approved Chinese investments between January 2000 and June 2003 amounted to about USD4.85 billion. Mining ranked first, accounting for over 50 percent of total investment approvals, followed by hydropower development, agriculture and manufacturing, together accounting for less than 10 percent with a total investment stock of USD0.39 billion. Although the ratio of Chinese firms' investment in mineral extraction and hydropower development remains high, the types of investment have been changing quietly in recent years, gradually extending to processing and manufacturing, construction, hotel catering and other industries. China's main investments in 2014 were in leasing and services, construction, farming, forestry, livestock production and fisheries. These trends have transferred the labour absorption effect of China's FDI to labour-intensive industry, while the shift to manufacturing requires more skilled production workers.

According to the World Bank Enterprise Survey in 2012, a main complaint of firms in Laos was the lack of applicants even for unskilled jobs (Figure 11.1). Almost half of the firms surveyed indicated that they could not or rarely hired unskilled workers. Conversely, a large proportion of the youth cohort could not find a job. In addition, low-cost labour is what attracts Chinese firms to invest in Laos, according to a survey in 2014 (Xiong 2017). However, the firms surveyed complained that labour costs were not as low as expected because of the inefficiency of labour, mainly as a result of high employee turnover and skills shortages. The same survey (Xiong 2017) found that some Chinese construction firms were noncompliant with Lao Foreign Investment Promotion Management Law, which stipulates that the ratio of skilled foreign

workers to a firm's total workforce must be no more 20 percent, with Chinese employees accounting for more than half of their workforce. To meet project deadlines, Chinese firms have had to resort to hiring foreign workers, mainly from China and neighbouring countries, and shoulder higher-than-expected labour costs. In fact, because of time constraints and the shortage of qualified Lao welders and steel benders, the Yunnan Construction Group received support from the Lao government to employ skilled workers from Yunnan province while constructing the ASEAN Stadium.

Figure 11.1: Percentage of firms complaining of no or few applicants, by skill level



Source: World Bank Enterprise Surveys in Laos, Vietnam and China (2012)

Despite Laos' accelerated structural transformation, the share of the working-age population in agriculture is declining slowly. In 2010, the sector accounted for about 2.3 million or nearly 70 percent of the total labour force, industry about 17 percent and services about 13 percent (World Bank 2014). In 2013, agriculture still accounted for roughly the same number of workers though a slightly smaller share at 66.06 percent of total employment, construction and services 26.25 percent, manufacturing 7.07 percent, and power and mining 0.63 percent (World Bank 2014). The latter figure belies the sector's importance in the Lao economy: in 2013, it contributed about 18 percent of GDP with a workforce of just 22,000. Although the energy and mining sector attracts FDI, it generates relatively few jobs (World Bank 2014, 17). This partially explains why the employment structure is lagging behind

economic structural change. Two other reasons are the quality and quantity of labour. First, although resources have been poured into formal education to improve labour skills, one-third of the working-age population have limited formal education and basic skills. Net primary enrolments have increased, but grade-1 and grade-2 dropout rates have not improved, lowering human capital accumulation and resulting in a shortfall of labour efficiency (World Bank 2014). Second, skilled workers and tertiary graduates are in short supply, and most trained workers take up non-skilled positions. Without basic education and job skills, it is difficult for workers to move out of agriculture to better employment opportunities in industry and services.

To sum up, the sustainability of Laos' economic growth is increasingly tied to skill supply, which is essential both in its pursuit of economic structural change to absorb new labour market entrants and to develop and upskill the labour force for future economic growth. For Chinese firms in Laos, particularly those in construction, furniture manufacturing, rubber manufacturing, automobile and motorcycle maintenance and other labour-intensive industries, the negative impacts of local skills shortages are concerning.

11.3 Conceptual and empirical framework

11.3.1 Concepts on skills

“Skill” as a term in economics comes from human capital theory, which regards the knowledge, abilities, education and attributes of labour as human capital. The term is variously defined in the literature (see, for example, Heckman, Stixrud and Urzúa 2006). The current research defines skill as the ability to execute the tasks and duties of a given job. Skills can be obtained and developed through learning. For individuals, skills provide opportunities for job hunting, job reservation, career promotion and decent salary. For employers, skilled workers are those who either have the necessary job skills or the capacity to learn those job skills.

Labour market relevant skills can be measured using various means. The most reliable and accurate, but also the most expensive, method is to directly observe work skills and use skills tests (via individual interviews), with identified standards as benchmarks. In addition, because it is difficult to measure skill directly, substitutes for skill measurement are required. Job skills can be assessed indirectly based on professional experience and qualifications. Personal skills and abilities are recognised via formal professional or trade certification, professional qualification or certificate of competence. More and more jobs require formal qualifications, and qualifications are prerequisite for formal employment. But such qualifications are not always on a par with skill. The most widely used substitute variable

for skill is formal education. Formal education is not the only way to improve skills, however; skills are also developed through work, training, personal experience and informal learning.

11.3.2 Econometric modelling

The study of skills mismatch has a long history and has provided a fruitful analytical framework. Drawing on studies in developed countries such as the United States and Germany, Gibbons et al. (2005), Gervais et al. (2014) and Sanders (2014) find that workers maximise their comparative advantages through transfer between departments to promote the upgrading of skills. These studies also find that the longer workers can match their jobs, the faster the growth of their wages in line with their tenure, and the sooner mismatch problems can be eased. Guvenen et al. (2018) and Lise and Postel-Vinay (2015) used the Dictionary of Occupational Titles¹ to research skills mismatch from a multi-dimensional perspective and, using micro-data on worker-occupation match, decomposed mismatches into a collection of various tasks needed to perform the job.

Many studies focus on the economic impact of skill mismatches. Leuven and Osterbeek (2011) and Quintini (2011) analyse the consequences of mismatches for individual workers, such as income loss, job dissatisfaction, mobility and skill obsolescence. Fewer studies on the economic impact of skills mismatch on firm productivity exist. Kampelmann (2012) and Maida (2014) argue that over-skilling has a positive impact on productivity and under-skilling hinders productivity improvement. Other researchers believe that education/skills mismatch might have a positive impact on productivity improvement. Mahy, Rycx and Vermeyleylen (2015) found that the positive impact of overeducation/over-skilling in high-tech and knowledge-intensive sectors is much more significant than in other sectors.

Skills mismatch not only affects the individual worker, but also slows productivity of the firm. Many studies explore the relationship between education or skill mismatch and income (see, for example, Bourdet and Persson 2008). In fact, education mismatch, especially overeducation, has received most attention in the literature. Although taking education as a substitute variable for ability reflects a worker's skill, formal education is not the only way for people to accumulate skills, which can be improved through work, training, life experience and informal learning. It is necessary to consider the relationship between education and income and between skill mismatch and income.

¹ Refer to <https://occupationalinfo.org/> for more details.

Because of the difficulty of obtaining direct measurements, this project attempted to measure the skill levels of the Chinese firms and some employees before the formal survey. The firms said this might affect normal production and required shortening the interview time, which led to difficulty in conducting direct skill measurement. Therefore, in this project, the skill level of employees is obtained by synthesising direct and indirect skill measurements. In this research, skill mismatch is when personal skills fall short of or exceed those required for the job. Skill mismatch therefore refers to imbalances between skill supply and demand in the labour market.² In reality, skill mismatch is more common than skill match: workers may be either over-skilled or under-skilled (Quintini 2011). See Annex Table A1 for a glossary of skill mismatch terms.

Duncan and Hoffman (1981) decomposed educational attainment into three parts related to work requirements, expressed as $Educ = Edu_r + Over - Under$. In this decomposition, $Educ$ is educational attainment, Edu_r is the required educational level, $Over$ means that education exceeds that required by the job, $Under$ means that education is lower than that required; it denotes a match if both $Over$ and $Under$ are 0. This decomposition is introduced in the expanded Mincer wage equation to show the ORU (overeducation–required–undereducation) model:

$$\begin{aligned} \ln(wage_i) &= \alpha_0 + \alpha_1 EduR_i + \alpha_2 Over_i + \alpha_3 Under_i + \alpha_4 Smis + X_i b + u_i \\ &= \alpha_0 + \alpha_1 EduC_i + (\alpha_2 - \alpha_1) Over_i + (\alpha_1 - \alpha_3) Under_i + \alpha_4 Smis + X_i b + u_i \end{aligned}$$

We measure the skill mismatch of Lao workers in Chinese firms based on the ability level required by each career in O*NET, then take wage level, employee turnover rate and employee job satisfaction as dependent variables to observe the impact of skill mismatch on Lao workers.

Employer evaluation, vacancy rate, wage growth and comparison with international labour standards on wages, and firm data are commonly used as measurements of skill shortages.

11.4 Data

11.4.1 Questionnaire design

This project explores labour and skills shortages in Chinese firms in Laos. Because it is difficult to collect long-term data on workers' skills and abilities,

² Guvenen et al. (2018) argue that skill mismatch is a contradiction between skill sets based on a job (a task that can produce a result) and a skill combination owned by a worker. In other words, the skills required for a job may be higher or lower than the skill level possessed by the worker, and the result is a conflict between the worker's skill and the job requirement skills.

studies often neglect educational attainment, skills acquisition, and learning through work (formal or informal) and life experiences and use education as a substitute variable for ability. Researchers often attribute this to dependence on what is most easily measured, rather than on what should be measured or the feasibility of doing so (OECD 2013). A separate and possibly more substantial reason restricting the understanding of skills mismatch and shortages is that the supplier's and the demander's effects on the labour market have not been carefully considered.

The project involved a survey of Chinese firms and their Lao employees. Two Lao-language questionnaires, one for firms and the other for employees, were designed based on the templates of the World Bank STEP survey. The firm questionnaire collected information on firms' basic characteristics, workforce skill composition, and skills shortages to determine the retention and turnover rates. It was divided into six parts: basic information on the interviewee and firm, workforce size and structure of the firm, training input and content, skills of different employee types, subjective performance evaluation of the firm, and interviewer's observations. The employee questionnaire collected data on employee mobility and skill composition and basic employee characteristics. It comprised five parts: basic personal characteristics, education, job type, cognitive and non-cognitive abilities used at work, and interviewer's observations. Both questionnaires were pretested at five firms to ensure the wording and order of the questions were understandable. The questionnaires were modified several times before the surveys were rolled out.

11.4.2 Sampling frame and sample distribution

This project attempts to collect data on skill requirements and supply. Through collecting basic information on firms, employee composition and changes in the past 12 months, the project can compile data on occupations and turnover rates, as well as rough information on skill requirements for the next 12 months. The data collection involved: (1) firms' basic profile, including ownership, sector, production type and location; (2) deciding which type of firm should be included in the survey; (3) identifying the level of firms' regulatory compliance; (4) building a list of sample firms. The project collected data from firms engaged in mining, manufacturing and services. Before conducting the survey, the project team obtained a list of 172 Chinese firms in Laos and their contact information from the Chinese Ministry of Commerce. We contacted 86 enterprises for interview. Given that Chinese firms are switching from resources to manufacturing and services, the survey placed extra emphasis on manufacturing and services-based firms. Luang Namtha, Luang Prabang and Vientiane, and two southern areas, Khammouane and Savannakhet, were chosen as the survey areas.

This is the first study of the labour force of Chinese firms in Southeast Asia. Some of these firms had offices only but no production base, some had withdrawn from Laos, and some refused to be interviewed. The team could survey only 43 firms, 25 percent of those on the list. Borrowed from the STEP survey standard, the firms are divided into three groups by workforce size. Size stratification was defined in accordance with the standardised definition: small (five to 19 employees), medium (20 to 99 employees) and large (more than 99 employees) (World Bank 2014). The sampling frame for the employee survey was designed based on the firm size: 2–3 employees were interviewed in small firms, 5–10 in medium firms, and 11–20 in large firms. Because most large resource-based firms were remote and the survey cost would exceed our budget, the project could not cover all Chinese firms, but the sample is representative of Chinese firms in industry and scale.

11.4.3 Field survey

The firm survey was administered through face-to-face interviews with firm managers – the owner, human resource manager, director or a senior executive. The advantage of face-to-face interviews was that both quantitative and qualitative information could be collected. The survey was conducted from 26 July to 10 August 2016, and the average interview duration was 60 minutes.

The number of Lao employees selected for interview in each firm was based on firm size. The number of interviews was adjusted slightly during the actual survey depending on the production and operational status of the firm. As a result, 259 Lao employees were surveyed. The interviews were conducted by Lao interviewers. The average interview duration was 30 minutes. The employee survey was also conducted from 26 July to 10 August 2016. Employee composition is shown in Annex Table A3. Compared to the sample used for the STEP survey (2012), this survey paid more attention to Lao workers and therefore involved more production workers, process workers and service and sales workers.

11.4.4 Skill shortage

Skill shortage is important in skill mismatch. Measuring skill mismatch is challenging, mostly due to the lack of direct information about workers' skills and job requirements. Because existing skills measures imply different proportions of mismatched workers and lead to different conclusions regarding the relationship between skill mismatch and labour market outcomes, they entail different political implications.

Some researchers construct indicators using surveys asking employees whether they have the skills to do a more demanding job than their current one or whether they need training to carry out their tasks satisfactorily (Allen and van der Velden 2001; Green and McIntosh 2007). The advantage of self-reporting is that it is easy to survey, but it is prone to deviations. Respondents are likely to overestimate the skill requirements of the job.

Other researchers use direct measure, also known as objective measure. Direct measure usually compares a worker's skills with those required by the job. But this method also has deviations since respondents may overestimate their skills. The skills required by a firm can be obtained as a general or specific level of vocational skill (Pelizzari and Fichen 2013), but it is difficult to acquire this data. Direct measure also requires obtaining the actual skills possessed by workers. Skills have been investigated in some large surveys, such as the International Adult Literacy Survey, the Adult Literacy and Life Skills Survey, the Programme for the International Assessment of Adult Competencies, and STEP. However, the cost of large-scale measurement and determination of skills is high, so skill data on workers is scarce and can be obtained only for limited countries and limited times.

We synthesise the direct and indirect measurements of skill/education-job match. Skill matching usually has three outcomes: undermatched, matched and overmatched. The research adopted the questions of the STEP skills measurement study to obtain information about the skills of workers in the firms investigated, but data on the production and management skills required by those firms is limited. Because the skill level of a specific job or task is similar in the same area, and the skill requirements for specific jobs/tasks have been developed internationally, this research adopts three standards to measure skills/tasks at the firm level: sample occupational criterion, O*NET occupational criterion and STEP occupational criterion. O*NET provides the education/skill average value and standard deviation of each career.³ The STEP study offers rich information about the education and skills of workers.

Skills/education-job matching involves two stages. First, we calculate the education/skill average value and the standard deviation of the workers of a certain career according to the occupation, which is taken as the average

³ The O*NET program is the nation's primary source of occupational information. The O*NET database contains information on hundreds of standardised and occupation-specific descriptors. It is continually updated by surveying a broad range of workers from each occupation. Information from this freely available database forms the heart of O*NET OnLine, the interactive application for exploring and searching occupations. The database also provides the basis for our career exploration tools, a set of valuable assessment instruments for workers and students looking to find or change careers.

value of education/skills and the standard deviation of the career. Second, we build the education/skill matching interval of a career using the average value of education/skills and the standard deviation of a career. If a worker's education/skill falls into the matching interval, it is matched; if a worker's education/skill is lower than the left endpoint of the matching interval, it is undermatched; if a worker's education/skill is higher than the right endpoint of the matching interval, it is overmatched. In this research, undermatched education/skill represents education/skill shortage.

11.5 Results and discussion

11.5.1 The workforce composition of Chinese firms: native employment and skill gap

Chinese firms in Laos are gradually shifting to labour-intensive manufacturing and services. The company representatives interviewed concurred that Chinese firms commonly have trouble hiring skilled workers and tend to suffer from high turnover of unskilled workers.

11.5.1.1 The labour force structure in Chinese firms

Lao Foreign Investment Promotion Management Law stipulates that the proportion of foreign long-term production workers employed in FDI firms must not exceed 10 percent of total employees and the proportion of intellectual workers (managers, technicians, sales and administrative staff) must not exceed 20 percent of total employees. Lao employees therefore account for the bulk of the production workforce in Chinese firms. Few of them become high-level managers. Foreign employees hold the majority of the core high-level management and technical positions.

As shown in Table 11.1, Lao employees account for 86.39 percent of total (4, 652) workers in the 43 surveyed Chinese firms. Disaggregated by employee type, production workers make up 64.66 percent of the total workforce followed by administrative staff (7.30 percent), qualified elementary workers (7.19 percent), technicians (6.39 percent) and managers (5.91 percent). Female employees account for 38.67 percent of the total workforce. Foreign employees account for 13.61 percent of the total workforce and are mainly intellectual workers: managers (34.60 percent), technicians (24.64 percent), administrative (11.22 percent) and sales (8.69 percent) staff. The survey team noted that managers, technical and sales staff are often multitaskers, so the proportions of these four employee types cannot be summed. After excluding this factor, Chinese firms are found to be compliant with legal requirements concerning the employment of foreign workers. Qualified elementary Lao workers were employed in five of the surveyed firms. These firms were

engaged in auto parts, tobacco products, clothing and leather goods, and printing, which need skilled production workers.

Table 11.1: Workforce composition in the 43 surveyed Chinese firms (percent)

Employee type	Total workers (n=4,652)	Lao workers (n=4,019)	Foreign workers (n=633)
Total workforce	100.00	86.39	13.61
Manager	5.91	1.34	34.60
Administrative staff	7.30	7.12	11.22
Technician	6.39	3.41	24.64
Sales person	4.05	3.28	8.69
Production worker	64.66	67.40	12.64
Qualified elementary worker	7.19	8.04	2.21
Other	4.46	2.34	6.01
Female	38.67	42.35	14.85

Note: Due to missing observations, the sum of Lao workers is not 100%.

Source: Authors' calculation using survey data

Although Chinese firms comply with applicable Lao investment law and regulation, they are still mistakenly thought to hire Chinese employees and to replace Lao employees with “skill imports”.

11.5.1.2 The objective and outcome of Chinese firms' training

The above analysis shows that most Lao workers in the surveyed firms are employed on the production line, and foreign workers mainly in management and technical positions. This is consistent with employee distribution in FDI enterprises generally. Survey observations and data show that Chinese firms pay attention to employees' training and development. The main purpose of training is to impart and improve the skills workers need to perform job tasks, while safety training and enterprise-related skills training aim to improve workers' personal skills and job efficiency, thereby increasing the firm's productivity. Rubber Product Co., Ltd., for example, reported that its Lao workers have to learn from scratch because they lack basic skills. Every year since 2005, the firm has sent local workers to Xishuangbanna in China for rubber tapping and processing training. Even so, there are usually not enough skilled rubber tappers available at the start of the tapping season. By contrast, a tobacco company initially brought in experienced Chinese technicians and improved Lao workers' skills through workplace apprenticeship. However, although Lao workers are now responsible for basic technical or quality control, they still work on the production line. In the Chinese bank we surveyed, the

Lao employees were mostly tertiary graduates and postgraduates who had studied in China; besides needing professional skills training, their basic skills satisfy the bank's requirements.

The vast majority (94.36 percent) of the surveyed Lao employees received training from their employer in the three years before survey. On average, 70 workers per firm received training, ranging from 3 to 1,000 workers per firm. Training frequency in the same period was 4.75 times per person. Production workers account for 90.39 percent of total trainees and managers for 3.97 percent. Training mainly focused on safety and quality control, specialised skills (e.g. rubber tapping technology, metal grinding, ingredient composition, colour sorting, trouble shooting, furniture making, gear operation, customer service and service etiquette), and language skills. Only four of the surveyed firms sent their employees abroad for training. The mean number of workers trained abroad is 12 per firm (10 production workers and two managers), and the training frequency is 1.25 times per employee in three years. The training mainly covered safety management, financial management, corporate belonging, product design, corporate culture, control technology experience and skills promotion.

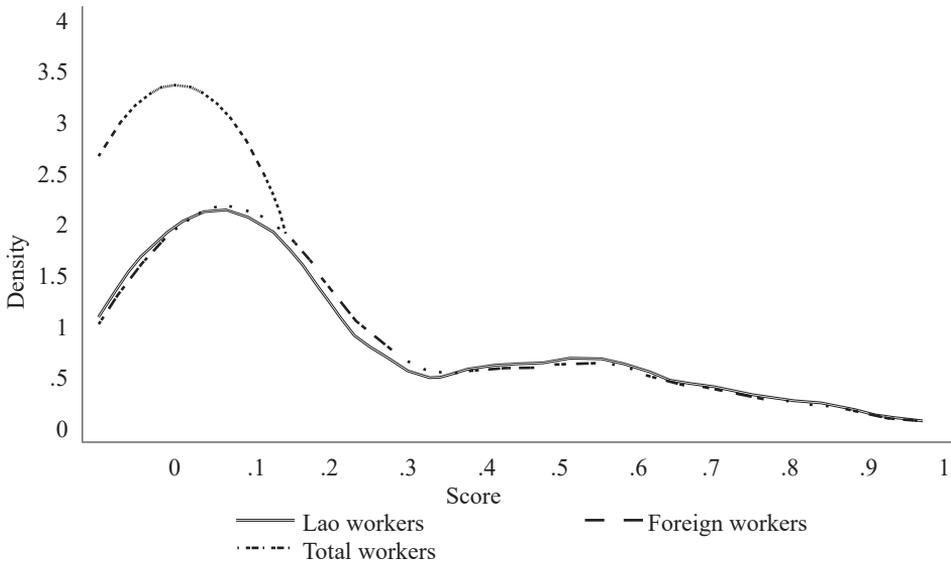
The impact of training on workers' productivity and efficiency is not satisfactory, according to the surveyed firms. They pointed to three common training challenges: high employee turnover, as workers are likely to leave the firm they trained with; the low level of human capital in the Lao labour force; and workers' little or no conscious effort to improve their abilities and lack of enthusiasm for learning.

High employee turnover directly affects firm productivity. The high mobility of Lao employees' means that the Chinese firms have high employee turnover rates. The high turnover of production workers is a problem, but a steady inflow of technical staff and senior managers should help Chinese enterprises to stabilise their local workforce.

Maintaining a stable workforce and a steady rate of output is the basis of continuous production. Workforce stability implies a relatively stable employee turnover rate. But that does not mean that staff mobility should be kept as low as possible. Without some staff mobility, firms will lack "fresh blood", resulting in an irrational human resource structure and ultimately affecting firm survival and development. Conversely, excessive employee turnover will lead directly to production instability, which can also affect a firm's survival and development. The average employee turnover rate of the surveyed firms in 2015 was 21.48 percent, with nearly half of the firms having

a turnover rate of 20.00 percent or lower.⁴ The employee turnover rate in small firms was 30.73 percent, in medium firms 23.22 percent and in large firms 12.21 percent.

Figure 11.2: Kernel density estimate of employee turnover in Chinese firms

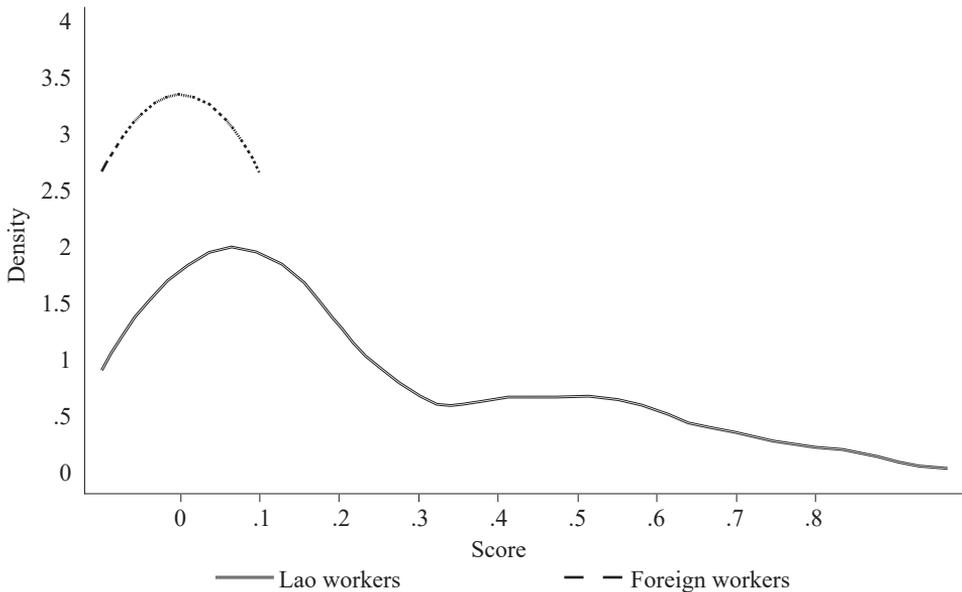


Source: Authors' calculations using survey data

Figure 11.2 shows that the trend of turnover rate kernel density is affected by Lao employees' turnover rate. The figure shows that the foreign employee turnover rate is far lower. From Figure 11.3, there is a thick tail for Lao workers. This means that there is high turnover rate for Lao workers. Further, we give the distribution of turnover rate of production workers (Figure 11.3), and find that the distribution is similar to that presented in Figure 11.3. This implies that Chinese enterprises' high turnover rate is mainly caused by production employee turnover.

⁴ The current study and literature show that an employee turnover of between 10 percent and 20 percent favours long-term business development. Turnover rate = number of employees leaving/(additional employees + starting employees).

Figure 11.3: Kernel density estimate of production worker turnover in Chinese firms



Source: Authors' calculations using survey data

In an interview with a China-funded rubber enterprise, we learned that the enterprise had its Lao employees trained in Xishuangbanna, China. However, those employees did not take the training seriously enough, so they did not learn how to tap correctly. As a result, the economic life span of rubber trees tapped by Lao workers is 10 years at most, compared with at least 30 years for those tapped by Chinese workers. A China-funded coffee enterprise in Phôngsali provided training in coffee tree planting for local workers. However, the local workers did not realise the importance of the planting method; they had other family members take part in the training and another person plant the coffee trees.

According to interviews and surveys, China-funded enterprises usually tried to employ Lao workers because this is specified in FDI law and regulations. However, they found their Lao employees had low productivity. To solve this problem, they trained them. However, the training did not have the desired effects because of Lao employees' high mobility, lack of awareness about long-term improvement of work skills, and low human capital. The biggest problem faced by firms lies in the skills of Lao workers.

11.5.2 Distribution of skills in Chinese firms

Chinese firms hire young people who have comparatively high levels of educational attainment. According to our survey of Chinese firms, the average age of Lao employees is 30.7 years, lower than the average age of 35.8 years in the World Bank's STEP survey (Carpio, Ikeda and Zini 2013). The average education for Lao workers in Chinese firms is 9.2 years. Among these workers, 9.21 percent are illiterate, 74 percent have at least primary education, and 47 percent have secondary (including junior secondary and high school) education, and around 12.0 percent have a tertiary degree or professional qualification.

STEP survey data shows that the average education in Laos is 7.78 years; 19.54 percent of workers interviewed are illiterate or have not completed primary education, and 30 percent of those in the second grade cannot read words, and 57 percent of those who can read do not understand the meaning. Comparison with our survey data suggests that Chinese firms hire a relatively higher quality labour force. However, the labour supply is slightly below the demand for higher quality. The Laos Business Survey (World Bank 2014) found that recruitment difficulties affect 49 percent of Lao firms and 41 percent of foreign firms, and skills shortages affect 65 percent of Lao firms and 71 percent of foreign firms. This section uses the survey data on Lao workers to explore this issue.

11.5.2.1 Distribution of cognitive skills of Lao employees in Chinese firms: disadvantages

Researchers often assess the abilities of workers by measuring basic cognitive and non-cognitive skills directly. Workers in the labour market have finished or quit the formal education system. In spite of a possibly low level of human capital acquisition, they have stopped basic cognitive skill accumulation. Ability can be measured through listening, speaking, reading and writing. However, it is difficult for both Chinese firms and the Lao government to deliver basic skills training to workers in the labour market. Work-related skills are more important for both firms and workers. These skills can be acquired from learning by doing. "Learning by doing" can result in Lao workers meeting the needs of firms and being loyal to their firms, improving firms' productivity. On the one hand, personal traits, such as work attention, mathematical ability and work seriousness, are important embodiments of learning by doing. On the other, if workers use basic skills in life more frequently, their abilities will be greater; if they use basic skills in work more frequently, their skills accumulated in work will be greater and their ability will increase more quickly and the productivity of their enterprises will be more

improved. Thus, the frequency of listening, speaking, reading and writing, the memory levels indicating attention, calculation ability and response speed, and the non-cognitive skills indicating seriousness of Lao workers in their work and life are used as the ability variables of Lao workers in Chinese firms in this project.

Table 11.2: Difficulty recruiting workers and finding skilled job applicants by occupation (percent)

Occupation	% of enterprises finding it difficult to recruit workers	% of enterprises struggling to find skilled job applicants
Manager	44 (33)	60 (67)
Professional	36 (50)	57 (75)
Technician and associate professional	57 (40)	80 (80)
Clerical support worker	39 (27)	70 (73)
Service worker	42 (38)	62 (88)
Sales worker	28 (29)	66 (71)
Skilled agriculture, forestry and fishery worker	67 (-)	67 (-)
Crafts and related trades worker	62 (64)	73 (64)
Plant and machine operator, assembler	63 (29)	67 (57)
Elementary occupation	47 (55)	47 (64)

Note: Bracketed figures indicate foreign enterprises only.

Source: Authors' calculation based on data from www.enterprisesurveys.org

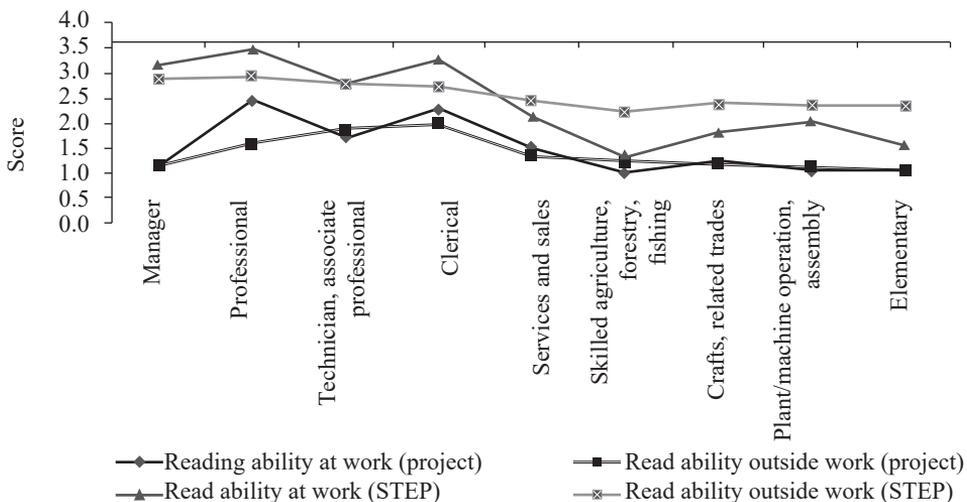
People accumulate basic listening, speaking, reading and writing skills in work and life after leaving formal education. The STEP survey of households (World Bank 2014) measured the cognitive and non-cognitive skills of Lao workers directly⁵ (personal traits) and found that numeracy skills are the most used among the cognitive skills in daily work and life (World Bank 2014). These skills are accumulated dynamically and need to be used frequently, maintained and strengthened to adapt to technical and structural changes in the economy.

After detailing reading and writing skills, investigating their degree of use in work and life and comparing project data and STEP survey data, it was found that Lao workers' average use of reading skills in work was 1.5 (on a scale of 1 to 7 where 7 represents the highest use and 1 the lowest) or, after

⁵ According to the STEP survey, people finishing primary education have basic word recognition skills; however, they rarely use the skill. Approximately 60 percent of the interviewees failed the reading comprehension test or were unable to understand the texts.

sampling weight, 0.61 in the STEP survey. If the pass mark is 60 (out of a full score of 100), the average degree of use of reading skills is expected to be 4.2. However, it was only 2.1 among Lao workers, much lower than the pass mark and almost half of the average score of 3.36 obtained in the O*NET test. We can therefore assume that Lao workers have low reading skills at work. According to ISCO-08 (International Standard Classification of Occupations), the use of reading skills in and out of work by Lao workers in Chinese firms was a little lower than the result in the STEP survey, which is more concerned with managers, professionals and technicians. Almost all senior managers and senior technicians in Chinese firms are recruited from China (Figure 11.4).

Figure 11.4: Reading ability scores of Lao workers in Chinese firms and STEP survey by occupation



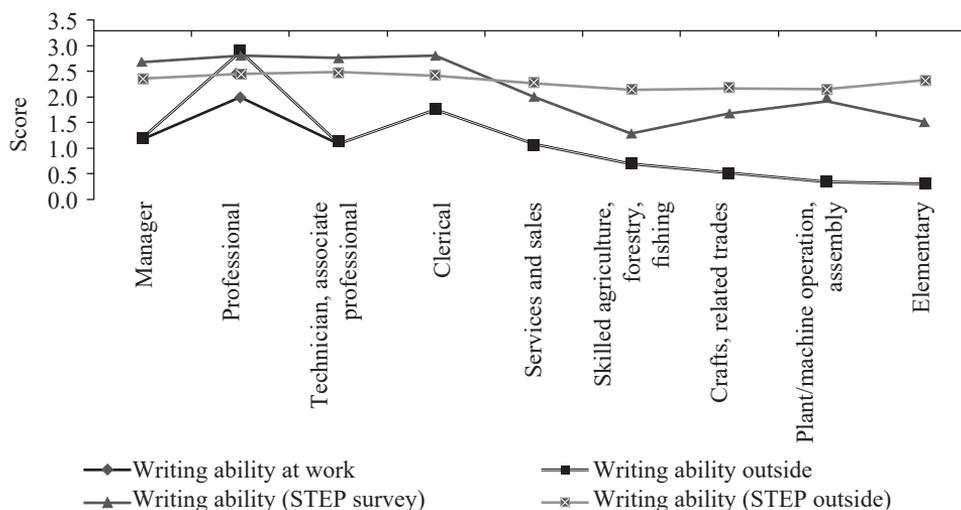
Note: The blue horizontal line refers to the average score obtained in the O*NET reading skill test.

Source: O*NET OnLine (www.onetonline.org/)

The average degree of use of writing skills by Lao workers in Chinese firms was 0.9 in work and 1.27 out of work.⁶ These were 1.81 and 2.22, respectively, in the STEP survey or 3.28 in the O*NET test. The use of writing skills by Lao workers in Chinese firms was very low: only half of the figure in the STEP survey or one fourth of that in the O*NET test. The low use of writing skills is common among Lao workers in Chinese firms: both professionals and Lao workers of other occupations (including management) do not fill out many forms or reports at work (Figure 11.5).

⁶ The scale is same as for STEP and O*NET: the lowest score is 1 and the highest is 7.

Figure 11.5: Writing ability scores of Lao workers in Chinese firms and STEP survey by occupation



Notes: The blue horizontal line refers to average obtained in the O*NET writing skill test.

The project team also tested Lao workers' memory and numeracy skills and their use of numeracy skills. As shown in Table 11.3, out of a possible score of 100, the mean memory test score was lower than 60 in the first test. Some specific articles or events can be memorised without careful observation, but generally speaking, things can be better memorised if they are observed carefully and for a long time. The memory tests conducted by the project team could indicate to some extent the level of Lao workers' attention or concentration. Suppose the average score for attention was 60. The attention scores of Lao workers (including managers, professionals and technicians) were lower than that but high enough to suggest potential for improvement. On the other hand, numeracy test scores were too low: the mean score for all the Lao workers tested was 23.49 points. Production workers and machine operators/assembly workers had scores of 8.42 and 15.83, respectively. Clerical workers and skilled farming, forestry and fishing workers had the highest scores, at 41.05 and 40.00 points, respectively. To our surprise, the numeracy scores of managers and professionals were 32.00 and 38.18 points, respectively. According to the World Bank Skills Survey, among all basic cognitive skills, numeracy is the most commonly used at home and work by people of all educational levels.

Table 11.3: Memory and numeracy skill test scores for Lao workers in Chinese firms

Occupation	Memory 1	Memory 2	Numeracy
Manager	47.50	47.50	32.00
Professional	53.81	56.88	38.18
Technician and associate professional	39.57	43.57	26.45
Clerical support worker	56.44	57.78	41.05
Services and sales worker	46.05	50.77	20.00
Skilled agricultural, forestry and fishery worker	55.00	55.00	40.00
Craft and related trades worker	41.10	43.95	27.90
Plant/machine operator and assembler	39.27	42.61	15.83
Production workers	33.38	38.00	8.42
Mean	42.82	46.39	23.49

Notes: The highest possible score is 100. Participants took two memory tests with an interval of five minutes.

Source: Authors' preparation using survey data

Combining the skill levels and the occupation classifications of Lao workers and calculating the results according to the occupational status scores, 61.85 percent of the workers interviewed work at jobs with the score below 50, and 68.5 percent of them worked at the jobs with the score below 50 in their last jobs; thus most Lao workers are at the occupational bottom. Comparing their occupational status in Chinese firms with their last jobs, the occupational status of about 23.16 percent of Lao workers had risen, while that of about 54.45 percent of Lao workers had fallen.

In sum, the average reading, writing and numeracy skills of Lao workers in Chinese firms is lower than the international average and the average in the World Bank Labour Market Survey in Laos; the average reading, writing and numeracy skills of Lao managers and professionals are only slightly higher than those of general workers. There are four possible reasons. First, the surveyed Chinese firms are new on the Lao market, with an average history of 7.64 years. Only 10 of the 43 firms had been established for more than 10 years. As new investors, they tend to have new employees. Second, in recent years Chinese firms have been investing in labour-intensive manufacturing and services, so our survey aimed at studying the skills of Lao workers in those industries. Third, Chinese firms and the samples in our survey are mainly located to the north of Vientiane, which is a largely mountainous area where educational levels are generally low (for example, the people in

Luangnamtha have only completed 6.5 years of education on average⁷). Thus, our survey covered those at the tail end of the cognitive distribution of the total population, meaning skill acquisition is lower than the national average. Fourth, our survey may have test errors because the skill tests were not done strictly within the specified test methods.

11.5.2.2 Distribution of non-cognitive abilities among Lao workers in Chinese firms: advantages

The cognitive skills of Lao workers in Chinese firms are generally low, posing a constraint on production efficiency. Because it is difficult to improve cognitive skills in a short time, this represents a human resource shortage. Non-cognitive ability plays a more important role than cognitive ability in determining occupation and social status. Heckman and Lochner (2006) found that non-cognitive ability was easier to train than cognitive ability. At the same time, more and more studies have found that cognitive ability plays a significant part in determining economic and social success. Non-cognitive ability is critical for workers to adapt to the environment and to perform tasks with a more professional attitude. Many studies have found a clear relationship between employment, career status and non-cognitive ability. In the long run, comparing the soft skills of non-cognitive ability with the hard skills of cognitive ability, improvement of non-cognitive skills can compensate for the loss of efficiency caused by lack of cognitive skills and can promote the production efficiency of firms through their direct impact on labour productivity and on education and work experience.

Non-cognitive ability is usually divided into big five personality⁸ traits in the literature. In the project survey, traits are measured on a scale of 1 (the least frequently used in work) to 5 (the most frequently used). A person's job performance can be determined by status and personality factors. The working environment is an example of status. A person's actions and reactions to specific circumstances at work, including resourcefulness, dealing with problems, ability to fulfil tasks and getting along with others are factors

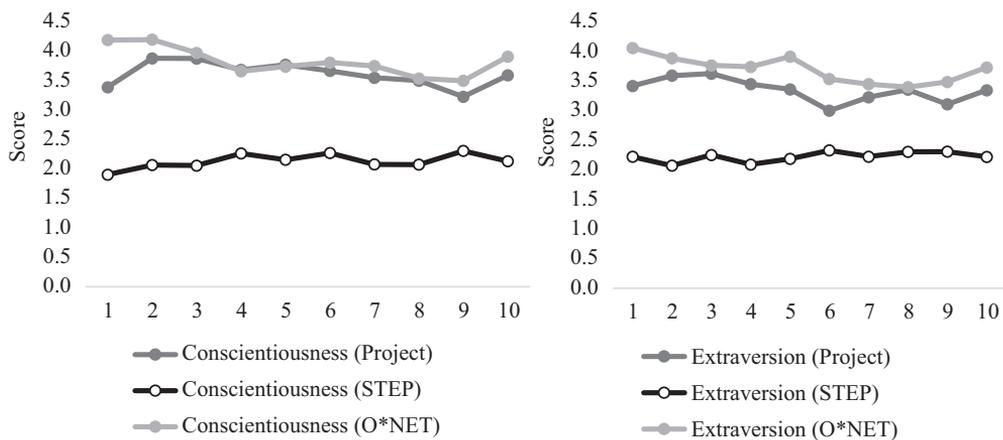
⁷ Calculated by the project team based on STEP survey data (Carpio, Ikeda and Zini 2013).

⁸ The "big five personality" model of McCrae and Costa (1997) includes five personal traits: emotional stability, extraversion, openness, agreeableness and conscientiousness. These traits are independent stable behaviour patterns or tendencies. Neuroticism is the tendency to experience negative emotions such as anxiety, depression and anger; extraversion refers to higher vigour, self-confidence and social behaviour; openness represents participation in intellectual activities and preference for new ideas and experiences; agreeableness includes friendliness, consideration, modesty and other behaviours; conscientiousness is related to effectiveness, determination, responsibility and persistence (Chamorro-Premuzic and Furnham 2004).

related to the person's personality (Boshoff and Arnolds 1995). Studies in the United States and Europe show that conscientiousness is the best predictor of job performance (Salgado 1997). Other studies emphasise extraversion and conscientiousness as predictors of job success in different occupational categories. Although conscientiousness is often taken as a good predictor, the relationship among other the big five traits still cannot be clearly defined and discussed.

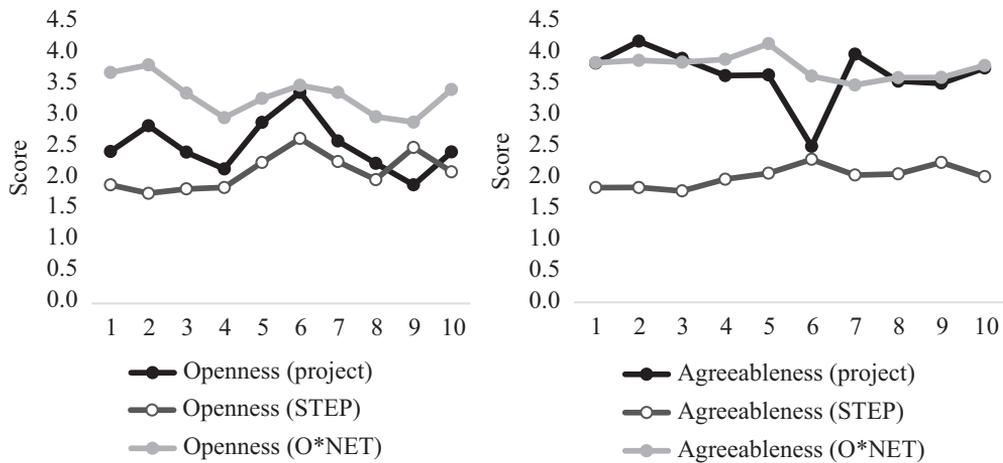
Conscientiousness refers to self-control. It is associated with dependability, being careful, thorough, responsible, organised and resourceful. A conscientious person is focused on achieving a goal, making such an employee indispensable or important. The conscientiousness score of Lao workers in Chinese firms is much higher than that in the World Bank Laos Household Survey and is close to the O*NET standard, except for managers, whose score is slightly lower. As shown in Figure 11.6, the conscientiousness score of Lao workers in Chinese firms is 3–4 on the whole. The conscientiousness of Lao workers with a tertiary degree is slightly higher (mean value is 4.1), but there is no significant difference with conscientiousness of other educational backgrounds (the mean value is 3.3–3.8).

Figure 11.6: Non-cognitive ability scores of workers



Extraversion usually refers to sociality, self-confidence and being easy going. An extraverted person shows a positive outlook and consequently produces positive results. Therefore, some researchers believe that this trait is most suitable for managers and customer service suppliers who must motivate others. The extraversion score of Lao workers in Chinese firms is higher than the survey result of STEP, but slightly lower than the O*NET result, especially in service and sales occupations.

Figure 11.7: Non-cognitive ability scores of workers

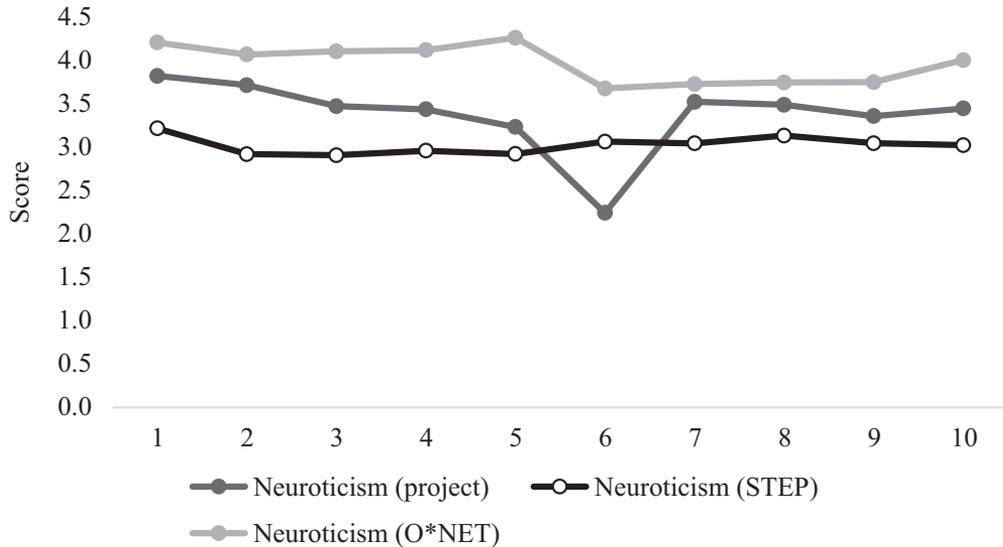


A person who is open to new experiences and ideas is often associated with innovativeness. Openness is defined as a thirst for knowledge. An open person is interested in change, willing to try new things and welcomes change. The relationship between openness and individual success is mixed. Johnson (1997) and other studies have found that successful employees have lower scores for openness. On the other hand, some studies have found that openness plays a role in personal success in specific occupations (e.g. as a coach) (Vinchur et al. 1998). People in manufacturing and agriculture, for example, especially those who engage in repetitive, low-skilled jobs, may not face as much change as those in services. As shown in Figure 11.7, the overall openness score of Lao workers in Chinese firms is higher than the STEP and lower than the O*NET results. The openness score of service and sales staff, skilled workers in agriculture, forestry, animal husbandry and fishing, technical and industrial workers is high; the openness score of other occupations is not very different from, and the score of production workers is lower than, the STEP result.

Agreeableness shows friendliness and considerateness. An amiable person is sympathetic and willing to help others, accepts others and believes they have good intentions; on the other hand, an unfriendly person may be suspicious of others' opinions and intentions. Some studies have found that because easygoing people prefer to cooperate rather than compete, they are advantageous members in a team and can succeed in team-oriented tasks and environments (Judge et al. 1999). As shown in Figure 11.7, the agreeableness of Lao workers in Chinese firms basically coincides with the O*NET result and is much higher than the STEP result. Except for skilled workers in agriculture, forestry, animal husbandry and fishing, the agreeableness of Lao workers is

high. Only two observed values for skilled workers in agriculture, forestry, animal husbandry and fishing in the project survey are not representative. Employees high in agreeableness help to create a good working atmosphere and promote a firm's production efficiency.

Figure 11.8: Non-cognitive ability scores of workers



Note : 1= manager, 2=professional, 3=technician/associate professional, 4=clerical worker, 5=services/sales worker, 6=skilled agricultural/forestry/fishery worker, 7=crafts/trades worker, 8=plant/machine operator and assembler, 9=elementary, 10=sample mean.

Finally, the emotional stability of Lao workers in Chinese firms is better than the STEP result and slightly lower than the O*NET result, similarly to the distribution of other non-cognitive skills.

11.5.3 Analysis of skills mismatch in Chinese firms: shortage or surplus?

The educational attainments and educational level required for Lao employees in Chinese firms are obviously mismatched. According to their self-evaluations, 63.32 percent of workers' education exceeded the requirements of their current job, 12.36 percent believed their educational levels did not meet requirements, and 24.32 percent believed their education met requirements. According to the Chinese firms, 56.76 percent of employees were overeducated, 39.38 percent were undereducated, and only 3.86 percent were match-educated. However, according to O*NET, 56.69 percent of Lao employees in Chinese firms were match-educated, 31.50 percent were undereducated and only 11.81 percent were overeducated (Table 11.4).

Compared with the O*NET study, in Chinese firms, both managers and employees overestimated the overeducation of Lao employees by 20 to 30 percent and underestimated the mismatch between educational levels and educational requirements; Lao employees underestimated their undereducation by 19.14 percent. However, Chinese firms realised the undereducation of their Lao employees and their estimate was close to the O*NET figure. Thus, Chinese firms overestimated the educational levels of their Lao employees, and the Lao employees overestimated their educational levels. These misunderstandings have two possible reasons. One is described in World Bank (2014, x): “One reason for skill shortage and mismatch of the labours in Laos is that there were no enough workers with a higher educational level and the labours finishing occupational education or higher education do not acquire the skills that the firm required [sic]”. Another reason is that managers of Chinese firms were not aware of the education needed by employees; in other words, HR managers of Chinese firms, particularly SMEs, were incompetent.

Table 11.4: Educational mismatch results based on different estimation methods

Mismatch type	Self-reported		Firms' estimate		O*NET estimate	
	Number	%	Number	%	Number	%
Undereducated	32	12.36	102	39.38	80	31.50
Matched	63	24.32	10	3.86	144	56.69
Overeducated	164	63.32	147	56.76	30	11.81

Source: Authors' preparation using survey data

11.5.4 Structure of skill shortage

11.5.4.1 Cognitive skill mismatch

It is difficult to judge whether an individual has a skills deficiency or surplus. The key is to select an appropriate criterion of comparison. In this project, the expected value for an occupational skill is the sum or difference between the use of the skill according to the O*NET criterion and a standard deviation. Compared with the expected values, reading, writing and numeracy skills all had a large percentage of mismatch. Shortage is the main form (Table 11.5).⁹ Even when the skill mismatch of the Lao employees was measured with the looser O*NET criterion, skills shortage, particularly of reading and writing, was the greatest problem. One reason for shortage of the three skills was that

⁹ Each standard value was added or deducted by a matching interval of a standard deviation in the comparison in the project. Even with this method, Lao employees have large skill gaps compared to O*NET standards.

137 Lao interviewed employees had not used these skills in their work, 65 percent of them being manual workers.

Table 11.5: Mismatch of use of skills tested with O*NET criterion

Mismatch type	Reading		Writing		Numeracy	
	Number	%	Number	%	Number	%
Under-skilled	231	90.94	222	87.40	190	74.80
Matched	3	1.18	9	3.54	26	10.24
Over-skilled	20	7.87	23	9.06	38	14.96

Source: Authors' preparation using survey data

Lao employees' understanding of skills depends on skill usage. Work skills are classified as either "not used or used little" or "used frequently". The significance of skills was underestimated or overestimated according to how much they used them (Table 11.6).

Table 11.6: Use of skills in work and understanding of their significance (percent)

	Reading			Writing			Numeracy		
	Mismatch	Under-estimated	Over-estimated	Mismatch	Under-estimated	Over-estimated	Mismatch	Under-estimated	Over-estimated
Not used or used little	74.52	38.22	36.29	77.99	33.59	44.40	83.78	63.71	20.08
Used frequently	12.74	6.56	6.18	13.51	5.02	8.49	16.22	3.86	12.36

Source: Authors' preparation using survey data

11.5.4.2 Non-cognitive skill mismatch

The results of non-cognitive skills mismatch calculated for the big five traits are shown by the three criteria in Table 11.7. First, comparing the three criteria, the matching of non-cognitive ability of Lao workers is higher in the similar results of the self-reported and O*NET criteria than in the Lao household survey. This confirms that the non-cognitive ability of Lao workers in Chinese firms is generally higher than the average level in Laos and closer to international criteria. The following judgments are based on a comparison between the self-reported standard and the O*NET criterion.

Second, the matching of conscientiousness and extraversion is basically consistent between the two criteria, and the matching ratio is high. Thus a

preliminary judgment can be made that the conscientiousness and extraversion of Lao workers in Chinese firms are mostly in line with their occupations. For openness, agreeableness and emotional stability, self-reported matched skill is higher than for the O*NET criterion, possibly reflecting subjective overestimation in self-reporting.

Third, the estimates of overmatched skills may indicate that Lao workers in Chinese firms overestimate their non-cognitive abilities. The result of the O*NET criterion shows a shortage in Lao workers' openness and emotional stability.

Table 11.7: Matching of non-cognitive ability of Lao workers in Chinese firms

Non-cognitive ability	Measure	Undermatched	Matched	Overmatched	Undermatched	Matched	Overmatched
		Number			%		
Openness	Self-reported	58	162	39	22.39	62.55	15.06
	STEP	111	92	56	42.86	35.52	21.62
	O*NET	124	94	41	47.88	36.29	15.83
Conscientiousness	Self-reported	46	166	47	17.76	64.09	18.15
	STEP	17	96	146	6.56	37.07	56.37
	O*NET	73	153	33	28.19	59.07	12.74
Extraversion	Self-reported	39	180	40	15.06	69.50	15.44
	STEP	13	129	117	5.02	49.81	45.17
	O*NET	65	177	17	25.10	68.34	6.56
Agreeableness	Self-reported	25	189	45	9.65	72.97	17.37
	STEP	17	93	149	6.56	35.91	57.53
	O*NET	65	110	17	25.10	42.47	6.56
Emotional stability	Self-reported	31	177	51	11.97	68.34	19.69
	STEP	56	136	67	21.62	52.51	25.87
	O*NET	121	88	50	46.72	33.98	19.31

Source: Authors' preparation using survey data

11.5.5 Effect of skill shortages on Lao workers' income

The analysis in Section 4.3 shows that skills shortage is a common problem for Lao workers in Chinese firms, which need to understand what effects will follow. This part tests the effects on incomes of Lao workers using the project survey data.

11.5.5.1 Effects of education mismatch on income

Studies have focused on income loss due to overmatched education or skills in developed countries. In a developing country like Laos, undermatched education or skills can have far greater effects. Perry, Wiederhold and Ackermann-Piek (2014) claimed that the income of underskilled workers could increase due to pay premium or decrease due to wage punishment. This conclusion does not apply to developing countries, but whether skills are matched is a decisive factor for wages in all economic entities. This part compares educational level and cognitive skills in the project survey with those required by the O*NET criterion and calculates the degree of overmatched and undermatched education/skills.

First, education mismatch can affect income, as shown in Table 11.8. Model 1, which considers only the effects of education and experience, shows that the number of years of completed education does not have a significant impact on the wage of Lao workers in Chinese firms, while experience has a significant impact, which conforms to the characteristics of an inverted U curve. After considering education mismatch, experience still has a great impact on income. Education still has no significant impact on income, but unlike the findings for other countries, overmatched or undermatched education has no significant impact.

Table 11.8: Effects of education mismatch on workers' incomes dependent variable: Ln (Wage)

	Model 1 Baseline	Model 2 Education mismatch
Undereducation	-	-0.221 (0.175)
Overeducation	-	-0.135 (0.215)
Schooling	0.02629 (0.0168)	0.0168 (0.0210)
Experience	0.046764** (0.02316)	0.0447* (0.0243)
Experience squared	-.00106*** (0.00048)	-0.00101** (0.000415)
Constant	7.5156*** (0.4301)	7.778*** (0.577)
Observations	236	236
R-squared	0.114	0.145

Notes: We control for gender, marital status, insurance and country. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

11.5.5.2 Effect of cognitive skills mismatch on income

The effects of cognitive ability mismatch on income are shown in Table 11.9. Considering that strong reading ability is often related to good writing ability but is rarely related to numeracy, we introduced mismatched reading ability and writing ability in Model 3 and Model 4. As shown, overskilled numeracy has significantly positive effects on Lao workers in Chinese firms in both models, while underskilled numeracy has no significant impact. In other words, workers with good numeracy can have a higher income but reading ability has no significant impact. The results for Models 3 and 4 indicate that the income of workers under-skilled in reading decreases by 77.1 percent and of workers underskilled in writing decreases 28.1 percent. Experience still has significant effects.

Table 11.9: Effects of skill mismatch on workers' incomes

Dependent variable	Model 3	Model 4
	Skill mismatch	Skill mismatch
	Ln(Wage)	
Under-skilled numeracy	0.0418 (0.177)	0.00115 (0.182)
Overskilled numeracy	0.476* (0.256)	0.447* (0.261)
Underskilled reading	-0.771*** (0.206)	-
Overskilled reading	-0.0888 (0.249)	-
Underskilled writing	-	-0.281* (0.169)
Overskilled writing	-	0.306 (0.195)
Schooling	0.0290 (0.0199)	0.0255 (0.0197)
Experience	0.0512*** (0.0155)	0.0592*** (0.0146)
Experience squared	-0.00103*** (0.000306)	-0.00123*** (0.000283)
Constant	7.462*** (0.397)	6.900*** (0.323)
Observations	234	234
R-squared	0.113	0.126

Notes: We control for gender, marriage, insurance, and country. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

An obvious inverted U-shape relationship exists between experience and labour income, which is different from the experience and research of developed countries. In China-funded enterprises in Laos, the level and mismatched education of Lao workers have no significant impact on income. Cognitive ability mismatch can largely affect income, and better numeracy can bring higher income although underskilled numeracy has no impact on earning ability, while underskilled reading and writing will reduce Lao workers' incomes, reading playing a more important role. A possible explanation is that employees who can understand forms and financial statements used in a firm's production and operation will have a higher income.

11.5.5.3 Effects of non-cognitive skill mismatch on income

The impact of non-cognitive ability mismatch on Lao workers' incomes is shown in Table 11.10. The impact of education on income is still unremarkable, and, similarly, the impact of experience on income is still significant. The impact of the non-cognitive ability mismatch on Lao workers' income is mostly not significant, except that excessive openness has a significant negative impact at the 10 percent level, the income level of Lao workers with excessive openness is lower by about 37.7 percent.

Table 11.10: The impact of skill mismatch on Lao workers' income: non-cognitive ability mismatch

Variable	Model 5
Dependent variable	Ln(Wage)
Insufficient openness	-0.0135 (0.147)
Excessive openness	-0.377* (0.204)
Insufficient conscientiousness	-0.0859 (0.175)
Excessive conscientiousness	0.275 (0.225)
Insufficient extraversion	0.117 (0.172)
Excessive extraversion	0.214 (0.372)
Insufficient agreeableness	-0.172 (0.157)
Excessive agreeableness	0.0272 (0.172)

Insufficient emotional stability	-0.00942 (0.150)
Excessive emotional stability	-0.199 (0.198)
Education level	0.0473 (0.0280)
Experience	0.0523*** (0.0155)
Experience squared	-0.00102*** (0.000312)
Constant term	6.748*** (0.317)
Sample size	236
R ²	0.089

Note: The model controls for gender, marriage, region and other variables. The standard deviation is in brackets. *** p<0.01, ** p<0.05, * p<0.1.

11.6 Conclusion

Although there is a long history of investment and trade between Chinese and Lao firms, most investments have been made in the past 10 years. Rapidly growing investment from Chinese firms not only plays a key role in the economic growth of Laos but, along with other foreign investment, has also become a major driving force of economic structural transformation. Chinese firms face many problems while they are profiting from their investments, enhancing local employment and promoting local workers' incomes. The first difficulty concerns workers' skills. As pinpointed by the World Bank in Lao Development 2014, the first issue Laos faces in economic development is to develop and skill its labour force. Inevitably, the efficiency of Chinese firms in Laos is directly affected by this labour issue.

In August 2016, this project collected data from 259 Lao workers in 43 Chinese firms on skill deficiency and interviewed 6 companies' executive managers in five provinces. The following are the findings from the survey data:

1. Chinese firms try to realise full local employment. Lao workers are the main labour source of Chinese firms. Chinese firms are considering hiring or training middle and senior managers or professional technicians from Laos, but this needs to be further improved.

2. Chinese firms have engaged in a variety of employee training, but the effect is not satisfactory. Lao workers have poor education and low skills, and their enthusiasm for training is not high. Furthermore, high employee turnover has led to higher training costs and more difficulties in improving the overall skill level of Lao workers.
3. Lao workers' educational level tends to be overestimated by Chinese firms and Lao workers. Lao workers in Chinese firms are underskilled, and few Lao workers realise the low level of their education.
4. The cognitive ability of Lao workers is seriously low, especially in reading, writing and numeracy. Memory and numeracy tests for Lao workers in Chinese firms show that attention and mathematical logic are all below average. It is difficult to improve cognitive ability through enterprise training;
5. Non-cognitive abilities, especially conscientiousness and extraversion, are Lao workers' advantages, and Chinese firms need to optimise this advantage; however, a lack of openness and emotional stability are common problems for Lao workers. Team spirit (agreeableness) is not only most needed in Chinese firms, but also a common ability of Lao workers.
6. Skill deficiency directly affects the incomes of Lao workers. Deficient cognitive ability directly reduces workers' incomes, and the impact of illiteracy is more prominent. Excessive openness may reduce incomes of Lao workers in Chinese firms, while other non-cognitive abilities have no significant impact on income.
7. Education level has no significant effect on income in our samples, which is not in line with the Mincer equation. On the other hand, experience has significant effect on incomes, which is in line with the Mincer equation.

Lao employees in the Chinese firms surveyed cannot meet the educational levels and occupational skills that the firms have formulated in recruitment. One important reason is that most of them do not finish compulsory schooling. This means that Chinese firms have a long way to go to improve the currently low occupational skills of their Lao employees. Compared with foreign-funded enterprises in developed countries and emerging economies, the foreign-funded enterprises in Laos need to improve vigorously the cognitive and work skills of their Lao employees. Therefore, Chinese firms need to pinpoint the skill requirements for different industries, occupations and jobs and implement targeted flexible and detailed training policies.

First, an action effective in both the short and the long run against the skills deficiency of Lao employees is to employ a number of foreigners by stages. New foreign-funded enterprises need to increase moderately their

foreign technical employees, particularly skilled technicians and production workers. One-to-one on-site training is feasible for solving skills deficiency in the short term. To make this policy effective in the long term, the foreign employees can be reduced year by year until the maximum percentage of foreign employees specified in foreign investment law is reached. Coupled with “learning by doing” assisted by foreign employees, this method could solve skills deficiencies of Lao employees and improve their cognitive and work skills. Further more, it could solve skills deficiencies in the labour market in the short run and guarantee sustainable development for foreign-funded enterprises in the long run.

Second, reducing or eliminating the barriers to skill acquisition and skill upgrading of Lao workers is a must for the long-term sustainable development of Chinese firms.

Moreover, the Lao government, Chinese firms and local training institutions should optimise the skills Lao workers already process. Although the project survey focused on Lao workers’ skills, it was also obvious that the managers of Chinese firms were making the most of current workforce skills. The project team observed in some medium and small firms that efficiency was low and the management slack, lacking detailed and effective human resources management. Chinese firms need more worker-oriented management as they could curb turnover rates by drawing on Lao workers.

Finally, strengthening international cooperation in the area of skill policies should be a win-win situation for Chinese and Laos firms. Although the cognitive ability of Lao workers is insufficient, their work attitude is highly conscientious. The low level of cognitive abilities is mainly due to the lack of opportunities in the national education system, so Chinese firms should cooperate with the vocational schools and parent firms’ human resources departments in China to provide more on-the-job training in professional skills.

This project is the first to collect matching data between overseas Chinese firms and their employees. Due to sampling difficulties, language barriers, accommodation of the firms and other limitations, there are discrepancies between the datasets obtained and our original research design, such as the sample size, the quality of datasets and the depth of problems that could be probed. During the survey, some firms refused to provide information about skill requirements; some firms and workers worried about the survey slowing down production and were reluctant to take part in time-consuming surveys. All these factors make it difficult to develop further analysis. These limitations will be dealt with in future research with more consideration of investigation sampling, questionnaire design and other factors.

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Annex

Table A1: Glossary of some skill mismatch terms

Overeducation	A situation in which an individual has more education than the current job requires.
Undereducation	A situation in which an individual has less education than the current job requires.
Overskilling	A situation in which an individual is not able to fully utilise his or her skills and abilities in the current job.
Underskilling	A situation in which an individual lacks the skills and abilities necessary to perform on the current job to acceptable standards.
Skill shortage	A situation in which the demand for a particular type of skill exceeds the supply of available people with that skill
Skill surplus	A situation in which the supply of available people with a particular skill exceeds the demand for it.
Skill gap	A situation in which the level of skills possessed by those currently employed is less than that required to adequately perform the job or the type of skill does not match the requirements of the job.
Economic skills obsolescence	A situation in which skills previously utilised in a job are no longer required or have diminished in importance.

Source: Cedefop (2010, 13)

Table A2: Sampling frame for the survey of Chinese firms by workforce size

	Small (10–19)	Medium (20–99)	Large (>100)	Total
Agriculture	0	1	1	2
Mining	0	1	1	2
Industry	5	15	7	27
Services	5	5	2	12
Total	10	22	11	43

Source: Authors' preparation

Table A3: Composition of interviewees by occupation

Occupation	Project survey (Chinese firms)		STEP study (2012)	
	Number	%	Number	%
Manager	6	2.32	71	2.95
Professional	33	12.74	114	4.73
Technician and associate professional	32	12.36	92	3.82
Clerical support	19	7.34	38	1.58
Services and sales	39	15.06	521	21.64
Skilled agricultural, forestry and fishery	2	0.77	1,076	44.68
Crafts and related trades	43	16.60	210	8.72
Plant and machine operation and assembly	24	9.27	47	1.95
Elementary occupation	61	23.55	239	9.93
Total	259	100.00	2,408	100.00

Source: Authors' preparation using survey data and STEP 2012

Table A4: Workforce composition in the 43 surveyed Chinese firms, by workforce size (percent)

Firm size	Total workforce	Manager	Administrator	Technician	Sales person	Production worker	Qualified production worker	Other	Female	
Small (<20)	Total employees	100.00	14.57	8.61	16.56	11.92	37.75	3.31	7.28	25.17
	Lao employees	56.95	3.49	10.47	9.30	4.65	60.47	5.81	5.81	27.91
	Foreign employees	43.05	34.55	7.27	30.91	25.45	0.00	0.00	1.82	14.55
Medium (20–99)	Total employees	100.00	10.40	4.03	10.93	6.05	62.00	1.59	4.78	50.11
	Lao employees	75.58	1.97	5.02	2.25	3.79	79.21	1.83	5.90	61.80
	Foreign employees	24.42	36.52	9.57	36.96	13.04	1.74	0.87	1.30	18.26
Large (>100)	Total employees	100.00	4.56	8.53	4.98	3.34	69.92	9.30	4.47	38.04
	Lao employees	89.62	1.23	8.02	3.76	3.36	69.62	10.15	3.86	41.05
	Foreign employees	10.38	33.33	12.93	15.52	3.16	1.84	3.45	9.77	12.65

Note: small firms n=10; medium firms n=22, large firms n=11.

Source: Authors' compilation using survey data

List of GMS-Net publications

- GMS-Net 9b: *Health and Education in the Greater Mekong Subregion: Policies, Institutions and Practices* (2015)
- GMS-Net 9a: *Inclusive Development in the Greater Mekong Subregion: An Assessment* (2014)
- GMS-Net 8: *Assessing China's Impact on Poverty Reduction In the Greater Mekong Subregion* (2013)
- GMS-Net 7: *Agricultural Trade in the Greater Mekong SubRegion* (2012)
- GMS-Net 6: *Cost and Benefits of Cross-Country Labour Migration in the GMS* (2012)
- GMS-Net 5: *Pro-Poor Tourism in the Greater Mekong SubRegion* (2007)
- GMS-Net 4: *The Cross Border Economies of Cambodia, Laos, Thailand and Vietnam* (2005)
- GMS-Net 3: *Off-farm and Non-farm Employment in Southeast Asian Transitional Economies and Thailand* (2003)
- GMS-Net 2: *Labour Markets in Transitional Economies in Southeast Asia and Thailand: A Study in Four Countries* (2001)
- GMS-Net 1: *Impact of the Asian Financial Crisis On the Southeast Asian Transitional Economies* (1999)



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