Journal of Applied Sciences

ISSN 1812-5654

science alert

ANSInet
an open access publisher
http://ansinet.com

Journal of Applied Sciences 14 (17): 1898-1908, 2014
ISSN 1812-5654 / DOI: 10.3923/jas.2014.1898.1908

Job Vacancies, Skill Development and Training in Workplace: Evidence from Thai Manufacturers

Piriya Pholphirul
School of Development Economics, National Institute of Development Administration (NIDA),
International College of National Institute of Development Administration, Serithai Road,
Klong-Chan, Bangkapi, Bangkok, 10240, Thailand

Abstract: Skill training in the workplace is a major concern among manufacturers in most developing countries. Using Thai manufacture firm-level data, this study finds a positive relationship between firm size and skill training. Skill training is found to be more prominent among firms that are more capital/technology intensive. Firms employing labor as a major input, on the other hand, provide less training opportunities for their workers. Firms employing lower educated workers or lower skilled workers are likely to provide less skill training while firms employing a higher percentage of technical staff show more interest on providing training courses. This suggests that training opportunities are rather biased toward higher skilled, better educated, rather than unskilled workers with low education that tend to amplify skill gaps among employees. Vacancies and general dissatisfaction with low-level workers may discourage firms from offering their own training, in favour of relying more on outside training.

Key words: Training determination, job vacancies, inequality, Thailand

INTRODUCTION

For decades, the pursuit of export-led growth strategy forced Thai businesses to control costs of their production that relies on cheap labor. Labor-intensive production therefore has to rely on employing low-skilled workers. In the past, low-skilled workers were drawn from the domestic agricultural sector through urban-rural internal migration, but low-paid workers were drawn from cross-border immigrant workers mainly from neighboring countries.

To compete globally, we are all agreeing that merely relying on low-cost production is unsustainable. The country therefore aspires to the next stage of development, characterized by a more innovation-led growth in production. Innovation has already become a crucial factor in forming business-level strategies, especially in the current era of Information and Communication Technology (ICT). Without the ability to adapt itself in a timely manner, an enterprise may encounter strategic challenges and crises that it is not able to meet. Therefore, businesses are needed to enhance their competitiveness through innovative investment. One of the major approaches leading to greater competitiveness is to encourage innovation and research and development within organizations.

However, compared to the OECD international standard and countries in the region such as Japan, South Korea, Singapore and Malaysia, innovation and R and D investment among Thai enterprises still lag behind. The 2007 Thailand Productivity and Investment Climate survey (PICs) indicates that the main reasons preventing Thai firms from engaging in innovative and R and D investment come from, not only the high cost of financing innovative activities itself, but also from a lack of knowledgeable and trained personnel (World Bank, 2008). Based on over 1,000 firms surveyed throughout the whole country, 43.6 percent reported that innovation was constrained by its high cost, but 42.7% cited a lack of technical and trained personnel. Lack of technical and trained personnel, in this case, refers to workers who lack both the basic and technical skills required by Thai firms. This lack has both short and long-term effects on economic activity. In the short term, firms have to operate below their full capacity. In the long-term, it limits a firm's effort to enhance productivity through innovative investment.

In addition to basic education and higher education, skill development in the workplace also plays a critical role in helping workers upgrade their skills and in helping them gain new skills to make them more desirable employees in a changing market.

In most empirical studies, training is distinguished from formal school and post school-school qualification. Training is generally defined in terms of courses designed to help individuals develop skills that might be of use in their jobs. There are a number of studies looking at the returns to training and participation in training. Brundell *et al*. (1996), for example, quantify the private returns from employer-provided and vocational training to individual worker's real earning. The returns are found to be closer to 5-10% if the training also results in a middle or higher vocational qualification. Some studies, however, have found the returns from training to be larger for working women than for working men (Booth, 1991; Greenhalgh and Stewart, 1987) and also different sources and types of training courses. As to training type, managerial training show the most significant impact, followed by professional and technical training (Lilard and Tan, 2012; Bartel, 1991)

Given that the benefits of work-related training are quite significant, a number of research studies in the past try quantifying what sorts of individual receive this training. By using individual data, it is clear that individuals with high ability, with higher education attainment, or higher occupation status and skills are significantly more likely to participating in training (Blundell *et al*., 1999).

By using firm level, Hansson (2007) uses international dataset to examine what determines employee training from an organizational perspective. The results indicate that the provision of company training is largely determined by firm-specific factors, such as Human Resource Management (HRM) practices. The results further show that two widely used measures of training-incidence and intensity-are largely determined by different factors. Staff turnover (mobility) does however not appear to be a decisive factor in explaining the provision of training on a national or company level, although it is associated with lower profitability to some extent.

The observed patterns of provision of and participation in training therefore tend to amplify the skills gap rather than compensating for the low levels of education attainment to unskilled workers when they first enter the labor market. This section, on the other hand, tries answering this question in the supply side by using of firm-level data in Thai manufacturers.

Providing skill development through training and apprenticeship needs to vary according to not only firm-level characteristics and specific industries but also to macroeconomic conditions. This study will use the Productivity and Investment Climate Survey (PICS) firm-level data to analyze the realization of skill development in the workplace among Thai manufacturers, patterns of skill training and determining factors influencing a firm to invest on enhancing the skills of their workers. The next section will examine the situation of job vacancies among Thai manufacturers and how these vacancies constrain productivity growth and thus pressure companies to promote skill development.

JOB VACANCIES AND THE PRESSURE ON PROVIDING TRAINING

Thailand is now facing a more competitive world market. Thus, the nation must change its development strategy from being labor-intensive to more one that encourages value-added types of production. Manpower requirements can no longer be filled by cheap, unskilled labor. What is needed is a more skilled and better-educated work force. Even though the Thai economy as a whole has relied on huge amounts of both investments and exports, the heterogeneity of firms means that they use different strategies. For example, smaller and medium enterprises are facing labor shortages since they lack the necessary contacts and experience to relocate production facilities abroad. According to the survey results, vacancies in all types of working skills indicate a serious problem among Thai manufacturers.

A 2007 investment climate survey that asked whether firms had any vacancies for both skilled and unskilled production workers in their establishments in the previous year (2006) found that Thai manufacturers faced serious shortages of both unskilled production workers and skilled workers. For skilled workers, the results can be intuitively explained. The vision of upgrading Thailand to an innovative economy had put pressure on Thai firms to find skilled laborers, resulting in 29.3% of firms reporting a shortage of skilled labor, especially those in capital-intensive sectors, such as auto parts (49.5%), machinery and equipment (33.7%) and electronics and electrical appliances (32.3%). Skill shortages and lack of educated workers was perceived as a major obstacle to Thailand's further development.

As shown in the figure below, even though skilled laborers are always in demand, Thai manufacturers have reported an even higher unskilled labor shortage (48.8%). This result has brought a new concern. Even though Thai industries, particularly firms in capital-intensive sectors, have reported shortages of skilled production workers, unskilled workers are in strong demand by all sectors,

Table 1: Time to fill job vacancies classified by region, industry and enterprise type

Parameters	Professional worker	Skilled worker	Unskilled worker
Region			
Thailand	7.4	5.2	2.2
Bangkok and vicinity	7.7	5.2	2.0
Central	6.3	4.4	2.0
East	6.6	7.0	2.7
North	6.0	3.6	2.6
Northeast	15.5	5.5	1.7
South	9.0	5.5	3.2
Industry			
Auto components	7.6	6.0	1.9
Electrical appliances	7.1	4.4	2.1
Electronic components	6.6	3.8	1.8
Food processing	6.8	4.0	2.7
Furniture	10.1	5.1	2.1
Garments	8.2	5.3	2.2
Machinery	8.0	5.3	2.2
Rubber and plastics	6.1	5.5	2.1
Textiles	7.2	5.4	2.2
Firm size			
Small	6.9	5.4	2.4
Medium	7.9	4.9	2.0
Large	7.0	5.3	2.0
Enterprise			
Foreign	5.5	3.5	1.3
Domestic	7.7	5.4	3.3
Non-exporting	6.6	5.2	2.3
Exporting	7.9	5.2	2.0

Thailand PICS 2007

regardless of the type of production, ranging from a minimum of 38.6% in machinery and equipment to as high as 56% in garments.

As generally explained by economic theory, job vacancies always create invisible costs for firms, as firms have to spend extra time and effort to find and recruit employees to fill the vacancies. Survey results show that, on average, Thai firms took around 7.4 weeks to find professional workers, 5.2 weeks to find skilled production workers, but only 2.2 weeks to find unskilled production workers as these workers were more abundant. The World Bank (2008) also reported that shortages of both skilled and unskilled production workers among manufacturers were much more prevalent in Thailand than in other countries in the region.

Table 1 provides a disaggregated picture by region of the time it takes to fill the most recent vacancy for different worker groups. This largely reflects the composition of the manufacturing sector in each region. For example, qualified professional workers are particularly scarce in the northeast (15.5 weeks compared to the national average of 7.4 weeks to fill a vacancy), where over half of firms are in the furniture/wood products and garments industries, the two industries that take the longest time to find professional workers. Similarly, skilled production workers are harder to find in the east due to the concentration of automotive parts and rubber and plastics firms, which suffers more from insufficient numbers of skilled workers than do other industries. Foreign firms seem to take less time to fill job vacancies, most likely because foreign firms typically offer more generous salaries and benefits than do domestic firms (World Bank, 2008). Finally, the disparity across firm size and type (exporting/non-exporting firms) seems to be less systematic.

Overall, a shortage of skilled technicians is much more prevalent in Thailand than in other countries. Out of 64 countries for which similar data are available, on average, these countries took fewer weeks (around only 3.8 weeks) to find skilled technicians compared to 7.4 weeks in Thailand (World Bank, 2008).

Mismatches between the skill requirements of jobs and the skill levels of workers, wage and recruitment activities by firms and the shortage of local workers as well as other factors explain the variations of labor shortages and vacancy rates across firms. In Thailand, job vacancies for unskilled workers were found to be more prominent than those for skilled workers. This leads Thai manufacturers to fill in vacant jobs by hiring workers outside the region or from neighboring countries (Pholphirul, 2013). Therefore, the immigration of foreign workers plays an important role in reducing the shortage. As the majority of immigrant workers from neighboring countries are relatively unskilled, employing immigrant workers not only helps to fill in job vacancies, but also helps manufacturers, especially those in labor-intensive production, save on wage expenditures to maintain cost competitiveness.

Nevertheless, the key reason for numerous job vacancies, many of which are hard to fill (by relying on immigrant workers), is the poor quality of the labor force. Over 40% of firm managers mentioned that vacancies arise because many applicants lack basic skills (23.4%), such as english language and numerical skills, including technical skills such as competence in computers and Information Technology (IT) (19.4%). Besides, non-cognitive skills such as creativity/innovative skills, leadership and communication skills are also listed in the report of poor quality of the Thai labor force as well.

In general, firms are much more positive about the quality of their professional staff, although two-thirds of them believe local professionals are not proficient in english (World Bank, 2008). Issues regarding professional level vacancies seem to be obviously not quantity-related but rather quality-related. The low number of establishments experiencing skill mismatches indicates that the supply of university graduates falls short of demand University in Thailand, therefore, already provide in enough quantity, while quality is still questionable.

Since, universities are not producing adequate quality graduates demanded by firms, providing non-formal training in the form of either in-house training or public training should therefore be an option. Not only does it help to enhance workers' basic and technical skills, but a firm taking the initiative to provide worker training can also create greater employee loyalty. In fact, 15% of firms viewed loyalty as more valuable than common attributes such as education level and experience. As for the 31.6% of firms reporting high turnover of new recruits as the most important cause of job vacancies, this number could be even higher in some industries for example, 45% in the textiles industry. High staff turnover can be detrimental and discourages firms from providing in-house training, thus, further weakening labor skills. Nevertheless, interviews with a leading Thai automotive parts company reveal that the intense competition for talented, newly trained workers motivated firms to prioritize training programs to upgrade worker's skills and maintain their loyalty.

Shortages of capable staff can have both short- and long-term effects on economic activity. In the short term, firms might have to operate below full capacity because they cannot find enough competent and experienced workers. In fact, nearly 20% of firms in the garment and machinery/equipment industries cited this as a key reason for capacity underutilization. In the longer run, shortages of well-trained staff limit a firm's effort to enhance productivity. Nearly all firms believe investment in innovation activities yields high returns.

HUMAN CAPITAL WITHIN THAI MANUFACTURERS

Generally, manufacturing sectors employ workers depending on their production structures and processes. Overall, survey results show that Thai workers in various manufacturing sectors are mainly unskilled production workers (73%), followed by skilled production workers (13%). The top positions in such organizations, management and professionals, make up only 2-3% of employees. On average, managers, professionals and non-production workers all either have university degrees or at least higher elementary education or higher technical and vocational education. So, all categories have at least 14-16 years of education. Skilled production workers, on average, have a higher secondary education or technical and vocational education, amounting to around 11 years of education. Unskilled production workers have attained a lower secondary education and have spent, on average, eight years in formal education. This evidence clearly shows a strong relationship between educational attainment and skill level, as classified by firms.

Traditionally, the norm is for management positions to be filled by more senior employees who, on average, have 12 years of work experience. Unskilled production workers, on the other hand, are for the most part relatively young employees who have the lowest educational attainment and the least work experience. Given these production worker's limited education and dearth of working experience, there is a need to upgrade their skills, which can be accomplished through training programs. Improving skills through training can help fill the vacancy gap between unskilled and skilled workers.

Worker's education also varies by industry. On average, a majority of workers has had at least some secondary education (67.6%). Workers with a university/college education make up 20.4% and those with only a primary education, 12%. There are some industries, such as food processing, that are well known for employing workers with only some primary education. Industries with relatively high capital-intensive production, such as auto parts, electrical appliances, electronic components and machinery and equipment, employ a high proportion of workers with some higher education or higher technical and vocation education.

Among all permanent workers, around four percent are considered technical staff-scientists, engineers, research staff, analysis staff and information technicians. A majority of technical staff are engineers (66%), followed by scientists (12%), information technicians (9%), research staff (6%) and analysis staff (4%). For the most part, technical staff are employed in industries with relatively high capital and technology-intensive production such as electronic components (4.8%) and machinery and equipment (4.3%).

IN-HOUSE TRAINING AND OUTSIDE TRAINING AMONG THAI MANUFACTURERS

The 2007 PICS survey found that Thai manufacturers clearly realized the importance of promoting skill development in the workplace. They actively engaged in both in-house training and outside training-63.5% of surveyed firms reporting in-house training and 64.1% reporting outside training. Classified by industry, both types of training were prominent in relatively capital-intensive industries, especially auto parts, electronic components and food processing. The positive direction of capital intensity and worker training makes it crucial to ensure that workers have the skills necessary to mesh with these improved means of production.

In addition, skill training is recognized by Thai manufacturers as critical to maintaining their competitiveness in the global market. Surveyed results show that 75% of firms engaging in export vactivities

provided training to their workers. On the other hand, only 25% of non-exporting firms provided such training. The results were not significantly different between in-house and outside training.

Implementation of skill development programs in the workplace also varied according to firm size. Table 3 shows that larger firms engaged in labor training to a greater extent than did medium-sized firms and much more than did small firms. Almost 93% of large firms with more than 200 employees conducted in-house training and 88% conducted public training programs. It is little surprise that due to limited financial resources and non-financial resources (such as time and experience), smaller firms find it much more difficult to allocate sufficient resources to foster skill development. The survey shows that only 29.1 and 37.3% of small firms with the employment less than 50 employees engaged in in-house training and public training, respectively. This finding should hopefully generate policy responses by either local or national governments to find ways to alleviate these practical barriers, for example, through grants, low-interest loans, or tax incentives for training support in small firms.

Trained workers tend to be concentrated in the ranks of production workers. Unskilled workers made up 69.3% of those receiving in-house training. Similarly, public training was also focused mainly on production workers 31.4% for skilled workers and 33.3% for unskilled workers. Firms seem to recognize that training production workers is one way to fill in the gap in skill requirements.

Classified by training areas, employees who received formal in-house training worked in factory-related activities such as safety procedures (35.9%), management/quality technologies (25.1%) and production technologies (24.9%). Similarly, workers who participated in outside training were also trained mostly in the areas of production technologies (27.8%), management/quality technologies (27.2%) and safety procedures (21.1%). Non-technical-related training, for example, in language skills, marketing skills and information technologies, has made up only a small share of both in-house and outside training.

For in-house training, trainers came mainly from internal staff, for example, supervisors/foremen (23%) and managers (20%). But external trainers also played an important role in in-house training, 19% came from government institutions/NGOS and 12% were external training consultants.

Nevertheless, the general dissatisfaction with workers' basic and technical skills and the high employee turnover may discourage firms from offering their own training. So, instead, effective and affordable outside skill development can possibly lessen the problem. Currently, such alternatives are not widely available. Survey responses show that this is mainly because those skill-development services that are available are not relevant for firm's needs.

Survey results show that business-university linkages for outside skill training were relatively low. Outside training provided by universities (at five percent) and vocational and technical schools (at one percent) have played quite small roles in providing outside training to the business sector. On the other hand, government institutes (providing 53% of outside training) have become key agents in providing skill development outside the workplace, as have private training schools (providing 31%). Among government and non-government training institutes, key players are the Department of Skill Development (Ministry of Labor), the Thailand Productivity Institute (FTPI), the Federation of Thai Industries (FTI), the Thailand Management Association (TMA), the Technology Promotion Association (Thailand-Japan), etc.

In terms of monetary expenditure, the 2006 survey found that, manufacturers spent around 82,216 baht per year on outside training. This training expenditure, however, varied according to particular industry; electrical appliances was the top spender on outside training (203,414 baht), followed by food processing (136,772 baht) and auto parts (132,316 baht).

Not only does skill training improve the productivity of trained workers themselves, leading to higher firm-level performance, but it also creates opportunities for advancement to better-paying jobs. On average, around 8.6% of employees that participated in either in-house training or outside training enjoyed pay increases right after completing their training. Around 1.5% of them also immediately advanced to better positions. The benefits of moving to a better position and receiving higher pay due to skill training are clearly attractive to workers, especially since around 96% of training costs were covered by employers while trained workers only had to pay around 4%.

DETERMINATIONS OF TRAINING

Average Fig. 1-12 from data of Table 1-8 should be taken with a grain of salt, however, since there are large variations among firms in terms of their location, industry type, production intensity, use of technology, education level of workers, etc. To identify any missing link to the demand for skill development in the workplace, this section analyzes, in terms of training expenditure, how such an independent factor determines the probability of skill training as well as the extent of its positive effects.

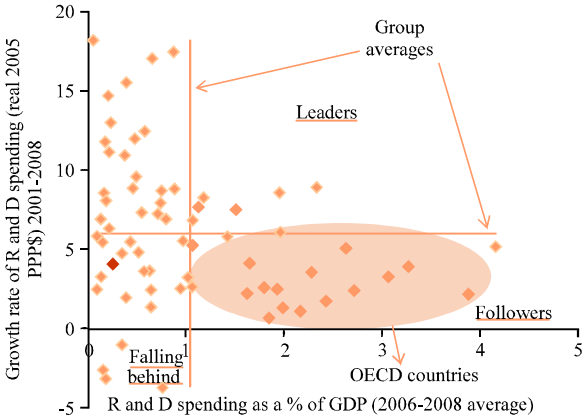

Fig. 1: R and D spending as a percentage of GDP and growth rate of R and D spending in Thailand compared to the Global average, Braga (2010)

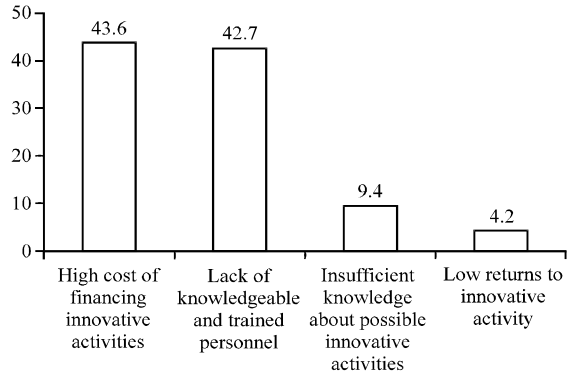

Fig. 2: Reason reported by firms for not engaging in innovative and R and D investment (percentage of surveyed firms), World Bank (2008)

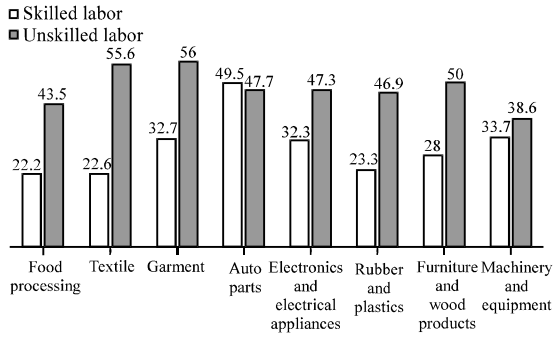

Fig. 3: Percent of firms reporting vacancies in 2007, computed from PICS 2007

Simple econometrics should make results more convincing and reliable regarding the controlling effects of various factors. First, control variables in measuring firm-level characteristics were listed, for example, firm age,

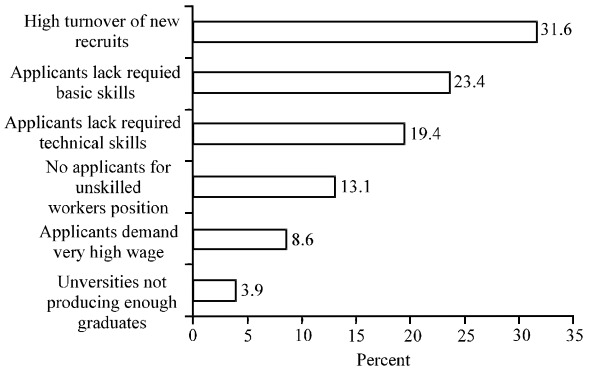

Fig. 4: Most important cause of job vacancies (percent of firms), Thailand PICS 2007

Table 2: Education level of employees classified by industry (%)

	Education		
Industry	Primary (<6 grades)	Secondary (6-12 grades)	Higher (>12grades)
Auto parts	3.0	69.5	27.5
Electrical appliances	3.1	68.9	28.0
Electronic components	2.5	66.4	31.1
Furniture and wood products	14.8	67.5	17.7
Food processing	21.8	56.1	22.1
Garments	16.1	69.8	14.1
Machinery and equipment	8.5	63.5	28.0
Rubber and plastics	11.1	69.6	19.2
Textiles	14.8	71.8	13.4
Average	12.0	67.6	20.4

Thailand PICS 2007

Table 3: In-house training and public training classified by industry (percentage of surveyed firms)

Industry	In-house training	Outside training
Auto parts	89.9	84.4
Electrical appliances	57.1	50.0
Electronic components	83.1	81.5
Furniture and wood products	51.0	53.0
Food processing	71.3	78.7
Garments	50.9	53.4
Machinery and equipment	54.2	56.6
Rubber and plastics	62.4	60.4
Textiles	59.4	62.4
Average	63.5	64.1

Thailand PICS 2007

Table 4: In-house training and public training classified by firm size (percentage of surveyed firms)

Firm size (employees)	In-house training	Public training
Small firm (<50)	29.1	37.3
Medium-sized firm (50-200)	72.3	70.0
Large firm (>200)	92.6	88.0
Total	63.5	64.1

Thailand PICS 2007

firm size, factor intensity, R and D investment, computer control in production, education quality of workers and number of technical staff employed. From the evidence presented above, some variables were found to predict a strong likelihood of initiating skill training. For example, a

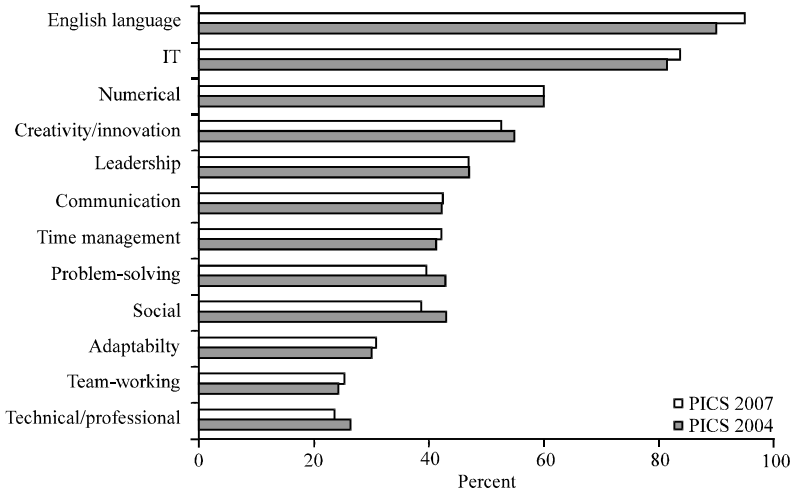

Fig. 5: Percentage of firms that rate certain labor skills as poor or very poor, Thailand PICS 2004 and PICS 2007.

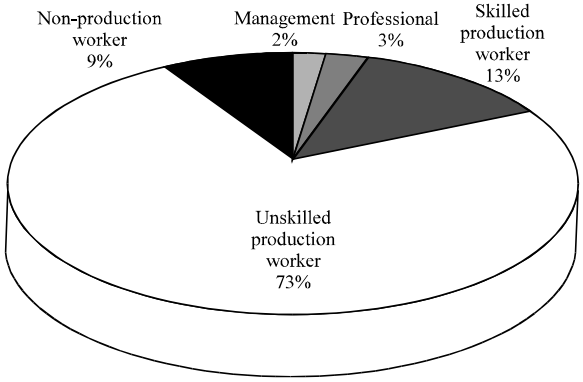

Fig. 6: Permanent workers employed in manufacturing firms classified by position (percent of permanent workers), Thailand PICS 2007

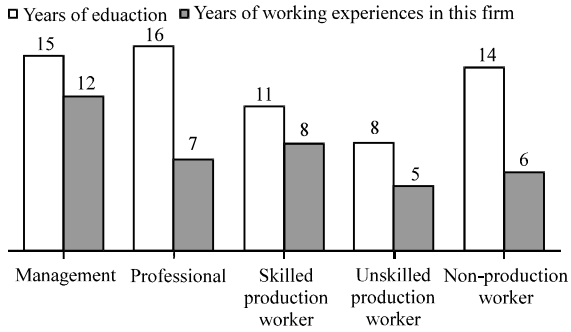

Fig. 7: Years of education and years of work experience in percent firm classified by position (No. of years), Thailand PICS 2007

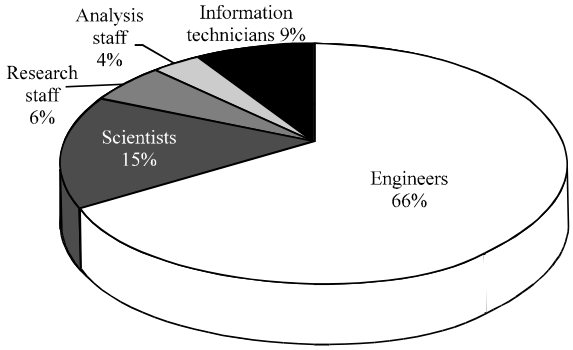

Fig. 8: Types of technical staff (percent), Thailand PICS 2007

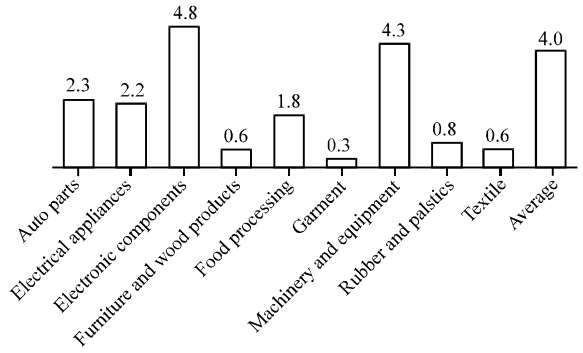

Fig. 9: Technical staff per labor ratio classified by industry (percent), Thailand PICS 2007

larger firm with more capital/technology-intensive production seems to be likely to engage in providing training to their workers compared to a smaller firm engaging in labor-intensive production.

Four estimation models will be adopted here. The first two models use binary probit regression to quantify the

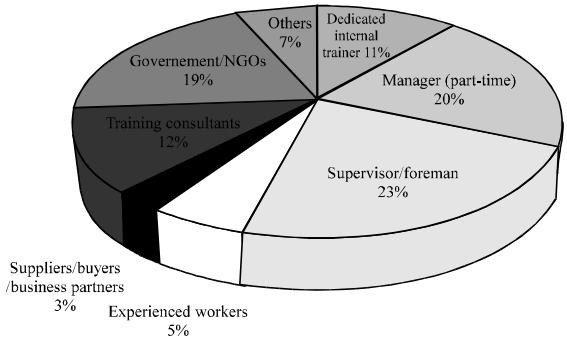

Fig. 10: In-house training classified by types of trainers, Thailand PICS 2007

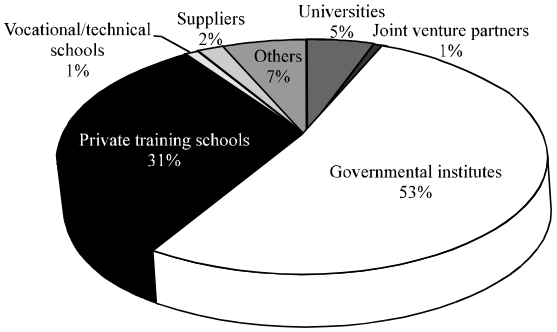

Fig. 11: Outside training classified by categories of training organization, Thailand PICS 2007

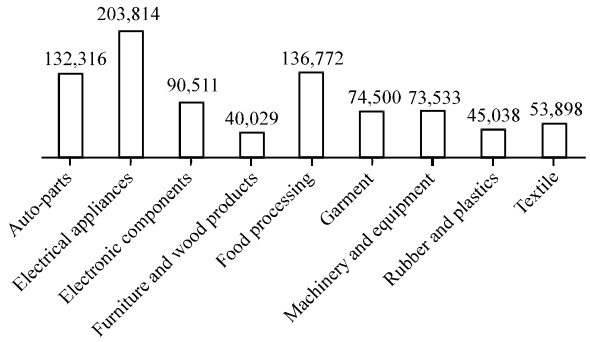

Fig. 12: Spending on outside training classified by industry (Baht in the year 2006), Thailand PICS 2007

Table 5: In-house training and outside training classified by position (percentage of trained workers)

Position	In-house training	Outside training
Management	1.8	7.1
Professional	3.0	11.8
Skilled worker	16.9	31.4
Unskilled worker	69.3	33.3
Non-production worker	8.9	16.0
Total	100.0	100.0

Thailand PICS 2007

Table 6: In-house training and public training classified by areas of training (percentage of total trained employees)

Areas of training	In-house training	Outside training
Production technologies	24.9	27.8
Safety procedures	35.9	21.1
Management/quality technologies	25.1	27.2
Marketing	2.8	5.3
Information technology	2.2	3.1
Language skills	1.2	0.6
Intellectual property	0.4	0.7
Others	7.7	14.3
Total	100.0	100.0

Thailand PICS 2007

probability that a Thai firm will or will not provide training to their workers-the first model for in-house training and the second model for outside training. The third and fourth models focus on the magnitude of training expenditure. The third model uses the ordinary least-square method to estimate firm-level characteristics on training expenditures in semi-log function. The fourth model will correct for any biases from cases in which firms reported "zero" (not at all spending on outside training), which causes the dependent variable (outside training expenditure) to be left-censored to zero. The Tobit model, also called a censored regression model, was designed to estimate linear relationships between outside training expenditures where there is left-censoring (also known as censoring from below). Summarized statistics and definitions of those variables are shown below.

As shown in Model 1 and 2 (Table 8), a larger firm is more likely to provide both in-house training and outside training to its workers. Compared to small firms, the probabilities of larger and medium-size firms providing in-house training are 50.4 and 36.5% greater, respectively. Similarly, compared to small firms, the probability that a large or medium-size firm will provide outside training is 37.2 and 25.2% higher, respectively. Similar results found by tabulation show that larger firm size is statistically significant in predicting whether a firm provides in-house training and/or outside training.

Positive coefficients of the capital-labor ratio are also statistically significant. This clearly supports our early prediction that a firm with more capital-intensive production is more likely to provide skill training for its workers. Estimated coefficients show that for each increase of one million baht of capital per worker the probability of providing in-house training increases by 38.6%. The capital-to-labor ratio, however, is not significant in predicting whether outside training will offered. This result reconfirms the prediction of high complementarity between capital (technology) and skills of workers. The more usage of capital (technology) in the production process, the higher the skill level of workers.

Table 7: Definition and mean of independent variables

Variables	Definition	Mean
Computer control	Percent of production machine controlled by computer	10.84
Firm age	A number of years since a firm commenced operations in Thailand	15.29
Small firm	Defined to be equal to 1 if firm employing less than 50 employees and 0 otherwise	0.34
Medium-sized firm	Defined to be equal to 1 if firm employing between 50-200 employees and 0 otherwise	0.37
Large firm	Defined to be equal to 1 if firm employing equal or more than 200 employees and 0 otherwise	0.29
Capacity utilization	Percent amount of output a firm actually produced relative to the maximum amount that can be produced	77.73
Capital-labor ratio	Amount of machinery and equipment rented or owned by a firm divided by total employees (Million baht)	0.05
R and D investment	Defined to be equal to 1 if firm spending on research and development last year and 0 otherwise	0.09
Primary education workers	Percent of workers to total labor who earn less than 6 grades (primary education)	12.00
Secondary education workers	Percent of workers to total labor who earn more than 6 grades but less than 12 grades (Secondary education)	67.61
Technical staff	Percentage of workers who are engineers, scientists, research staff and analytical staff	1.53
Skilled vacancies	Percent of unskilled/skilled vacancies reported last year	6.65
Unskilled vacancies	Percent of skilled vacancies reported last year	9.09

PICS-2007

Table 8: Estimation of probability of in-house training and outside training and training expenditures

	Model 1	Model 2	Model 3	Model 4
	Probit (marginal effect)	Probit (marginal effect)	OLS	Tobit
Variables	In-house training	Outside training	Log (outside training expenditure)	Outside training expenditure
Large firm = 1	0.5043***	0.3721***	1.5549***	126,485.8271***
	[0.028]	[0.032]	[0.184]	[27,587.408]
Medium-sized firm = 1	0.3647***	0.2522***	0.6915***	44,236.5942*
	[0.031]	[0.033]	[0.167]	[25,013.426]
Computer control (%)	0.0010	0.0008	0.0025	1,019.7943**
	[0.001]	[0.001]	[0.003]	[427.912]
Firm age (years)	0.0001	0.0024	0.0058	573.1239
	[0.002]	[0.002]	[0.006]	[980.702]
Capacity utilization (%)	0.0005	0.0017*	0.0095***	591.0673
	[0.001]	[0.001]	[0.003]	[496.281]
Capital-labor ratio (million baht)	0.3861*	0.4063	0.8984*	78,097.9422
	[0.233]	[0.250]	[0.463]	[69,005.864]
R and D investment = 1	0.1158*	0.0922	0.0439	7,928.0855
	[0.059]	[0.060]	[0.181]	[27,715.389]
Primary education workers (%)	-0.0038***	-0.0032***	-0.0046	-41.5978
	[0.001]	[0.001]	[0.004]	[637.910]
Secondary education workers (%)	-0.0016	-0.0028***	-0.0067*	-388.0663
	[0.001]	[0.001]	[0.004]	[536.270]
Technical staff (%)	0.0143**	0.0327***	0.0652***	5,477.9072**
	[0.006]	[0.009]	[0.016]	[2,447.508]
Skilled vacancies	-0.0008	0.0009	-0.0010	94.3778
	[0.001]	[0.001]	[0.003]	[510.587]
Unskilled vacancies	0.0011	0.0013	0.0073*	87.1603
	[0.001]	[0.001]	[0.004]	[605.037]
Constant	-	-	9.1862***	39682.76
	-	-	[0.400]	[61,392.338]
Observations	928	928	576	637
R-squared	0.322	0.231	0.262	0.006

Standard errors are in brackets, significant at 10%, **Significant at 5%, ***Significant at 1%, Estimated coefficients of industry dummy and regional dummy are not shown in this table

In addition, there is also a positive relationship between the educational level of workers and skill training. A firm employing a higher share of educated (or less educated) workers is also likely to provide more (or less) training. Estimated results show that a firm employing about 10% more workers (relative to the total number of workers) with only a primary education can be expected to reduce its probability of providing in-house training by 3.8%. Similarly, 10% more workers with only a primary education or a secondary education also reduces the probability of providing outside training by 3.2 and 2.8%, respectively.

The relationship between education level of workers and skill training is also strongly supported by observing the percentage of technical staff employed. The percentage of technical staff (for example, scientists, engineers, IT personnel) is found to be statistically significant in predicting whether a firm will provide

training. A firm with 10% more technical staff is more likely to provide both in-house and outside training by 14.3 and 32.7 %, respectively. As technical staff are associated with the level of R and D investment within firms, the estimation also predicts that a firm investing in R and D the previous year is also 11.6% more likely to provide in-house training to their workers.

Estimated results to the probabilities of skill training mentioned above are also consistent with training expenditures. A large firm is more likely to spend about 126,456 baht per year (or around 155%) more on outside training than a small firm in the same industry and same region. Similarly, a medium-sized firm is also likely to spend 44,236 baht per year (or around 69%) more on outside training than does a small firm. Those expenditures are likely to be statistically significant for a firm with a relatively more capital-intensive production process. A firm is more likely to spend about 90% more on outside training when it has a million-baht increase of capital per worker. This result is also consistent with results gotten by observing the percentage of capital used in the production process. A firm with around 10% more computer-controlled production is likely to spend more on outside training by around 10,198 baht per year. These findings reflect the complementary effect between the magnitude of training expenditure and the degree of capital and technology used in production. Furthermore, higher capacity utilization also implies a higher probability of outside training and firms' expenditure on this training. The evidence is even stronger for those workers with technical skills. A firm employing 10% more technical staff is likely to spend 65.2% or around 54,800 baht more per year on training.

Lastly, as predicted above, job vacancies and general dissatisfaction with low-level workers may discourage firms from offering their own training, in favour of relying more on outside training. Estimates show a positive relationship between the number of unskilled worker vacancies and the expenditure on outside training. A firm with 10% more unskilled vacancies is more likely to spend 7.3% more on. Thus, even though skill vacancies are challenges, enhancing skills of workers (in both basic and technical skills) can be a practical and effective way to not only maintain firm-level productivity and competitive advantage, but also to reduce turnover and boost worker loyalty. Our findings here are nevertheless consistent to Hansson (2007) in which firm-specific factors are major determinants to training. However, staff turnover and their vacancies seem to appear to be a decisive factor in explaining the provision of training among Thai firms.

CONCLUSION

In conclusion, skill development in the workplace is a major concern among Thai manufacturers, as can be seen by the fact that 63-64% of firms provide skill training to their workers. This perhaps reflects the fiercer competition in the global market. Indeed, exporting firms seem to promote skill training more than do non-exporting firms. Both in-house and outside training courses focused on production/factory-related skills, for example, production technologies and safety procedures. Enhancing skills in this area should therefore be regarded as a direct link to productivity improvement in factories.

However, there is other evidence that might create some concern. First, there is a positive relationship between firm size and skill training. Due to the limitation of both financial and non-financial resources, smaller firms are likely to provide less training to their workers.

Second, skill training is found to be more prominent among firms that are more capital/technology intensive. Firms employing labor as their major input, on the other hand, provide fewer training opportunities for their workers.

Third, skill training is more likely to take place in firms using more computers in the production process, engaging more in R and D investment and having higher capitalization.

Fourth, similar to what occurs in capital/technology-intensive firms, skill training also varies according to the education level of workers. Firms employing lower educated workers or lower skilled workers are likely to provide less skill training. Firms employing a higher percentage of technical staff (scientists, engineers, researchers), however, show more interest in providing training courses. This implies that training is rather biased toward higher skilled, better educated and production workers rather than unskilled workers with low education.

Fifth, university-industry linkages for outside skill training are still relatively few compared to the outside training provided by government and other training institutes. Both university and technical and vocational education still play a limited role in providing training to business operators in Thailand.

Lastly, facing unskilled vacancies may encourage firms to rely more on outside training. This is likely to occur when a lack of qualified workers and a higher percentage of worker turnovers discourage firms from providing training themselves (in-house training).

These unbalanced training provisions among heterogeneous firms open up some key issues for policymakers. Since, more than 99% of business

operations in Thailand are considered small firms (less than 50 employees), direct and indirect support from the government for skills training therefore faces some challenges. Support can be in the form of removing some barriers that small firms face, for example, by providing grants, low-interest loans, or tax incentives for training programs in small firms, or by taking a more direct role by providing outside skill trainers. This topic having been thoroughly researched already, it is time for the government to consistently support and strengthen linkages between business and educational institutions, in particular with respect to linkages that enhancing the skills of low educated workers employed within small firms.

Even though facing unskilled vacancies may encourage firms to rely more on outside training, a large number of firms are also unsure how to contact training institutions or are unaware of them (World Bank, 2008). Skill development support agencies, both private and public, will therefore need to improve their outreach activities and interact more with manufacturing firms on how to design training and other services.

ACKNOWLEDGMENTS

The Author would like to thank for supportive funding from the International College of National Institute of Development Administration, Bangkok, Thailand. Funding: International College of National Institute of Development Administration.

REFERENCES

Bartel, A.P., 1991. Productivity gain from the implementation of employee training programme. NBER Working Paper No.3893, National Bureau of Economic Research, Cambridge.

Blundell, R., L. Dearden, C. Meghir and B. Sianesi, 1999. Human capital investment: The returns from education and training to the individual, the firm and the economy. Fiscal Stud., 20: 1-23.

Booth, A.L., 1991. Job-related formal training: Who receives it and what is it worth? Oxford Bull. Econ. Stat., 53: 281-294.

Braga, C.A., 2010. Innovation and growth: Policy lessons from catching up experiences. Proceedings of the World Bank-Office of National Economics and Social Development Board Workshop on Skill for Innovation-Led Growth, December 7, 2010, Bangkok, Thailand.

Brundell, R., L. Dearden and C. Meghir, 1996. The Determinants of Work-Related Training in Britain. Institute for Fiscal Studies, London.

Greenhalgh, C.A. and M.B. Stewart, 1987. The effects and determination of training. Oxford Bull. Econ. Stat., 49: 171-189.

Hansson, B., 2007. Company-based determinants of training and the impact of training on company performance: Results from an international HRM survey. Personnel Rev., 36: 311-331.

Lilard, L.A. and H.W. Tan, 2012. Introduction to Private Sector Training: Who gets it and what are its Effects? In: 35th Anniversary Retrospective (Research in Labor Economics Volume 35), Tatsiramos, K. and S.W. Polachek (Eds.). Emerald Group Publishing, Bingley, UK., ISBN-13: 9781781902196, pp: 245-308.

Pholphirul, P., 2013. Immigration, job vacancies and employment dynamics: Evidence from Thai manufacturers. J. Asian Econ., 24: 1-16.

World Bank, 2008. Thailand investment climate assessment update. The World Bank, Washington, DC., USA.