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Development of Skilled labors that Affecting Firms Labor Productivity of Automotive Multinational Enterprises in Thailand
การพัฒนาฝีมือแรงงานที่มีผลต่อการเพิ่มผลิตภาพแรงงานในอุตสาหกรรมรถยนต์ในประเทศไทย

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Abstract

The purposes of this study are to investigate the qualitative data of human resource development policies and to monitor policies related to productivity. An in-depth qualitative study is applied to explain the relationship between employee training and productivity in all nine automobile assembly firms located in Thailand. The quantitative data analysis is also applied to support the main findings, which results in a mixed-method summarization of the study. The results indicate that all companies have training programs for their employees to meet the government regulation, the company policy, the training needs, and the employee satisfaction. Moreover, there appear to be a negative relationship between training and labor productivity, while training expenses have a positive effect on labor productivity. Since training expenses have the positive effect on labor productivity, then the automobile companies in Thailand should develop additional training programs for vocational students who are future employees. Finally, the government should also improve Thai national skill standards to get ready for the opening of the AEC in 2015.

บทคัดย่อ

จุดประสงค์ของการศึกษานี้เพื่อตรวจสอบข้อมูลเชิงคุณภาพของนโยบายการพัฒนาบุคคลและติดตามนโยบายที่เกี่ยวกับผลิตภาพ การศึกษาเชิงคุณภาพในเชิงลึกจะนำมาอธิบายความสัมพันธ์ระหว่างการฝึกอบรมพนักงานและผลิตภาพของโรงงานประกอบรถยนต์ทั้งหมดจำนวน 9 โรงงานในประเทศไทย การวิเคราะห์ข้อมูลเชิงปริมาณจะนำมาสนับสนุนผลการศึกษาในเชิงคุณภาพ ผลการศึกษานำมาสรุปในรูปวิจัยแบบผสม ผลการศึกษาพบว่าทุกบริษัทมีโปรแกรมฝึกอบรมพนักงานตามกฎข้อบังคับของรัฐบาล, นโยบายบริษัท, ความต้องการฝึกอบรมและความพึงพอใจของพนักงาน นอกจากนี้พบว่าการฝึกอบรมมีความสัมพันธ์ทิศทางตรงกันข้ามกับ ผลิตภาพแรงงาน ในขณะที่ค่าใช้จ่ายในการฝึกอบรมมีความสัมพันธ์ในทิศทางเดียวกับผลิตภาพแรงงาน ดังนั้นค่าใช้จ่ายในการฝึกอบรมมีความสัมพันธ์ในทิศทางเดียวกับผลิตภาพแรงงาน โรงงานประกอบรถยนต์ในประเทศไทยควรพัฒนาเพิ่มโปรแกรมฝึกอบรมสำหรับนักเรียนอาชีวศึกษาซึ่งจะเข้ามาเป็นพนักงานหลังจากจบการศึกษา ในส่วนของรัฐบาลควรปรับปรุงมาตรฐานฝีมือแรงงานแห่งชาติเพื่อเตรียมพร้อมเข้าสู่ประชาคมเศรษฐกิจอาเซียน ในปี 2015

Keywords: Labor Skill Development Policy, Labor productivity, Automobile Assembly Industry in Thailand
คำสำคัญ: นโยบายการพัฒนาฝีมือแรงงาน, ผลิตภาพแรงงาน, อุตสาหกรรมประกอบรถยนต์ในประเทศไทย

Introduction

The rapid change of the world economy to globalization, basically the free flow of trade across border, has played a major role in business competition. All countries must adapt to improve their competitiveness. In Thailand, the automotive industry is considered as one of the key industries that drive country's economic growth because every economic sector consumes heavily in motor vehicles. The Thailand automotive industry is a large industry that demands a large number of employees, and is capable of gaining foreign currency from exports and by encouraging foreign direct investment (FDI). The structure of Thailand automotive industry can be divided into three types that are the automobile assembly industry, the motorcycle industry and the auto parts industry, where the automobile assembly industry has a large amount of investment on the productions that require high experience and technology (The Office of Industrial Economics, 2011). Table 1 shows the general information of the automobile industry in terms of units produced.

Table 1. Total automobile production and sales in Thailand during 2006 – 2010

Year	Production (unit)				Sales (unit)			
	Passenger car	Commercial car	Total	% Growth	Passenger car	Commercial car	Total	% Growth
2006	298,819	867,582	**1,166,401**	4.86	195,458	463,163	**658,621**	-2.67
2007	315,444	948,388	**1,263,832**	8.35	182,767	425,711	**608,478**	-7.61
2008	401,309	974,642	**1,375,951**	8.87	239,954	357,125	**597,079**	-1.87
2009	313,442	670,734	**984,176**	-28.47	238,774	292,831	**531,605**	-10.96
2010	554,387	1,066,759	**1,621,146**	64.72	362,561	414,533	**777,094**	46.18

Source: Thai Automotive Industry Association, 2010

The information from Table 1 shows that in 2008, the domestic production was 1,375,951 units, and then significantly decreased to 984,176 units in 2009 or decreased by 28.47%. This significant decrease in production was mainly contributed to the economic downturn and the political situation in Thailand. After the political situation became a bit more stable in 2010, there were substantial growths in both domestic production and sales by 64.72% and 46.18% respectively. This shows that the automobile assembly industry in Thailand has a strong potential to grow which is very important to Thai economic growth. Moreover, improving the quality of human resource will attract the foreign direct investment (Koike, 1996). Some studies also found that training and labor skill have impacts on productivity (Huruvilla, Erickson, and Hwang, 2002; Okada, 2004; Palazuelos and Fernt‡ndez,2009; Pennathur and Mital 2003; Ramstetter, 2004; Siang, Sakalsiz, and Amasaka, 2010). However, a more interesting question is whether training really affects productivity in the multi-factor daily working condition.

The primary objective of this study is to investigate labor skill development policies in relationship with the labor productivity of the automobile companies operated in Thailand. The labor productivity can be measured by taking the units of production divided by the number of employees. The objectives of this study are examined in four stages. First, this study examines labor skill development policies and how the automobile firms implement their policies that include information on labor skill development budgets and other factors relating to firm's labor skill

development such as the number of training days, the number of employees attending the training, and the actual spending of the training program during a fiscal year. Second, the effects of training on labor productivity are estimated using the Cobb-Douglas production function. Training factors are measured by the number of trained employees, the duration of training, and the training cost per head. The purposes are to figure out the labor productivity and to develop the labor skill development policy of each particular firm. Third, the researcher conducts the total productivity derived by the training of the automobile industry in Thailand that is regulated by Thai regulation. Fourth, the result obtained from the first objective, that is the labor skill development of firms, is validated by the result obtained from second objective that is labor productivity. Finally, the study summarizes all important details of trainings performed by selected firms using a mixed method of qualitative interviewing of key persons, and utilizes other information from specific firms with the quantitative data to support it.

Methodology

This study proposes to investigate the training and productivity of the automobile assembly companies in Thailand. The significance of this study is that it is conducted under a normal daily working condition of subjects, which is totally difference from the experimental studies where various variables can be controlled. Therefore, the result of this study is congruent with the actual multi-factor environment of the industry. The population of this study is nine automobile assembly companies in Thailand. These companies are Auto Alliance (Thailand) Co., Ltd. (Mazda, Ford), General Motors (Thailand) Co., Ltd. (Chevrolet), BMW Manufacturing (Thailand) Co., Ltd. (BMW), Thonburi Automotive Assembly Plant Co., Ltd. (Mercedes Benz), Honda Automobile (Thailand) Co., Ltd. (Honda), Isuzu Motor (Thailand) Co., Ltd. (Isuzu), Mitsubishi Motors (Thailand) Co., Ltd. (Mitsubishi), Nissan Motor (Thailand) Co., Ltd. (Nissan, Suzuki), and Toyota Motor Thailand Co. Ltd. (Toyota). The researcher conducts an in-depth analysis to investigate whether all nine automobile assembly companies have provided training programs to their employees, and whether those training programs affect company's productivity. Some quantitative data are also examined to support those qualitative findings, resulting in a mixed-method summarization.

The Data Collection Procedure and Data Transformation Process

A structural interview approach is used to collect qualitative data on company policies about their labor training programs. Following Bills and Hodson (2007), which concludes their qualitative study that a new approach is necessary in order to understand employee training and to provide an empirical framework that guides its growth and development, this study conducts a qualitative study on the basis of management strategies focusing on the human resource management, especially on the employee training program. Not only training programs but also other factors such as cost reduction, problem resolution, quality of works, and accident reduction are investigated for productivity. The process of data analysis is conducted according to Mariam (2001) that categories should reflect the purpose of the research and be conceptually congruent. Thus, the analysis starts by first categorizing groups of data on company strategies that affect human resource management, human resource policy, productivity, training programs, and training procedures. Second, the interview data are revised for usage, and then several subjects are interviewed again to complete the summary for each company. Third, the quantitative analysis is performed using the Cobb-Douglas production function to

acquire productivity. Finally, summarizes the analysis in terms of a mixed method.

The researcher interviews a total of 14 subjects who have insight information on training and productivity. These subjects include 12 executives from all nine automobile assembly firms located in Thailand and two senior government officers from the Ministry of Labor. Table 2 provides the information on organizations and positions of all subjects.

Table 2. Organizations and positions of all 14 subjects

Company	Position
TOYOTA MOTOR THAILAND CO., LTD.	Deputy General Manager Human Resources Development Department
MITSUBISHI MOTORS (THAILAND) CO., LTD.	Vice President Office of Manufacturing and Office of Production control
	Branch Manager Human Resources & Training Division
NISSAN MOTOR (THAILAND) CO., LTD.	Assistant General Manager Center of Expertise (TM&RM) Human Resources Department
	Employee Development & Training Section Human Resources Department
ISUZU MOTOR (THAILAND) CO., LTD.	Advisor Labor Relation and Legal Group
	Managing Staff Employment and Training Group Labor Relation and Training Department
HONDA AUTOMOBILE (THAILAND) CO.,LTD.	Manager General Affairs Department Human Resources Development Department
AUTO ALLIANCE (THAILAND) CO., LTD.	Assistant Manager Human Resources Department
THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD.	Chief Section Recruitment &Training Human Resources
GENERAL MOTORS (THAILAND) CO., LTD.	Manager Learning & Development Department
BMW MANUFACTURING (THAILAND) CO., LTD.	Manager Human Resources &Administration-Plant
MINISTRY OF LABOR	Inspector General
	Director Department of Skill Labor

The results from the qualitative analysis will answer the questions of what policies companies have employed regarding their training programs including the training expenses, the average duration of training, the number of trained employees, and the level of training. Moreover, the concept of human resource staff that monitors the training and productivity is also acquired.

In addition to the results obtained from the qualitative analysis, this study uses the quantitative approach to estimate the effects of training on labor productivity in order to support the qualitative findings. The empirical analysis is based on the original panel data of the automotive industry during the period of 2006 – 2010. The data are used to compute for the labor productivity and the real value of tangible assets from the balance sheets. Then, the researcher conducts the structural interview with each company to collect the quantitative data on company's training expenses, average duration of training and number of trained employees.

For implementation, the Ordinary Least Squares (OLS) regression, Generalized Method of Moments (GMM) estimation and Fixed Effects Model (FEM) are performed to estimate the effects of training on the average level of labor productivity. The dependent variable is the proportion of units produced to number of workers, while the explanatory variables include the proportion of trained

workers in the company and the average value of company's tangible assets per worker. The data on units of production come from the 2011 Thailand Automotive Industry report. The data on employees are obtained by interviewing company's representatives who are in charge of organizing employee's records. Lastly, the data on company's assets come from the balance sheets of those companies presented in the Corpus source (2012). Following Dearden et al. (2000) under the assumption of constant returns to scale, we can specify a linear production function as:

$$\ln\left(\frac{Q}{N}\right) = \ln A + (1-\beta)(\gamma-1)Train + \beta \ln\left(\frac{K}{N}\right) \quad (1)$$

where Q is the units of production, N is the total number of workers, A is Hicks-neutral technology, $Train$ denotes (N^T/N) where N^T is the number of trained workers, K is the real value of tangible assets from the balance sheets (including plant and machinery, land and buildings, and tools and equipment), and γ is a parameter that characterizes trained workers' relative productivity.

According to data analysis procedures, I perform the OLS regression to measure the factor of training on the average level of labor productivity for the economy using the following general specification adopted by Conti (2005):

$$Y_{it} = \alpha + \beta_1 Train + \beta_2 X_{it} + \varepsilon_{it} \quad (2)$$

where Y_{it} is labor productivity, X_{1t} is the expense of training programs, X_{2t} is the duration of training per year, X_{3t} is the number of trained employees, and η_{it} is the error term.

However, some quantitative data from several companies are unavailable due to either their confidentiality policies or the incompleteness of data collection. As a result, the estimates from the empirical analysis are based on the data availability from a total of six out of nine companies.

Results and Discussion

This study concentrates on the narrative of the relationship between company strategies and training programs that would consequently affect labor productivity. Company strategies typically start with the vision, mission, and philosophy that companies have on their operations because these features will consequently transmit to their policies and finally to daily operations. The researcher illustrates that the value of training may or may not affect company operations by means of qualitative information such as higher level of production, fewer material loss during production process, cost reduction, better working environment and resolution, and accident reduction. Then, the quantitative analysis is summarized to support the information received from each key person in human resource development under the actual working environment.

The results show that only three companies, two from Japan and one from Europe, have vision, mission, or philosophy recognized in Thailand, while others adopt global vision from their headquarters. When considering operational policies regarding human resource development, every company that clearly expresses its vision on human resource development also develops a global vision on human resource development even if its core vision has not been recognized in Thailand. However, companies that do not present a clear vision on human resource development may pay attention to employee training. It is obvious that each Japanese automobile assembly firm has a long-term philosophy, which concentrates on the corporate culture, continuous improvement, challenge, problem solving, respect, and teamwork. In contrast, that philosophy has not been noticed in either European or U.S. firms.

When considering training programs, the results indicate that all companies have provided training programs to their employees. However, there are various reasons why all companies have provided training programs for their employees, e.g., under the supervision of Thai law, following company policies, fulfilling training needs and employee satisfactions. In this study, training refers only to formal training programs and trainings that meet the minimum requirement of government regulations.

The other important training program is on-the-job training. On-the-job training is more important than formal training in the production process for every position in all companies. The reason why on-the-job training is so important is that the technological development occurs continuously particularly when new models are being launched. The on-the-job training is usually monitored by both supervisors and foreign technicians from headquarter when new models are assembled. Since on-the-job training improves productivity, the government regulation such as the Skill Development Promotion Act, aiming at enhancing labor quality, may encourage firms to focus more on on-the-job rather than classroom trainings. The shortage of technicians also encourages firms to focus more on employee's experiences than levels of education: hence, personal experiences will influence employee's incomes, not just only the level of education. Unfortunately, neither time nor cost of on-the-job training is included in the company transactions.

For the sources of training, it is found that every company focuses on training programs conducted within the company. The external trainings usually come from the special needs of experts or specific skills from external sources, while training abroad only occurs when companies need for either knowledge transfer or cultural exchange for their executives. Japanese firms mostly train employees inside their companies because they have certain philosophies associated to their culture. Besides, they also apply on-the-job trainings that are cost savings and more effective in terms of the curriculum design. On the other hand, European and U.S. firms concentrate more on training effectiveness as they train fewer employees inside the companies than the Japanese firms, and are more likely to outsource their training programs. Table 3 presents the comparative method of training among all nine automobile assemblers in Thailand.

Table 3. The comparative method of training among automobile assemblers in Thailand

	The method of training		
	Training inside	**Training outside**	**Training abroad**
1. TOYOTA MOTOR THAILAND CO., LTD.	95%	4%	1%
2. MITSUBISHI MOTORS (THAILAND) CO., LTD.	89%	10%	1%
3. AUTO ALLIANCE (THAILAND) CO., LTD.	65%	25%	10%
4. NISSAN MOTOR (THAILAND) CO., LTD.	90%	5%	5%
5. HONDA AUTOMOBILE (THAILAND) CO., LTD.	90%	9%	1%
6. ISUZU MOTOR (THAILAND) CO., LTD.	85%	13%	2%
7. GENERAL MOTORS (THAILAND) CO., LTD.	80%	18%	2%
8. THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD.	90%	9%	1%
9. BMW MANUFACTURING (THAILAND) CO., LTD.	85%	14%	1%

For the interview regarding the Skill Development Promotion Act, the Inspector General and the Director of Division of Skill Labor Development, Ministry of Labor suggest that the duration of appropriate training hours should not be less than 6 hours per year, and the context of the curriculum should be fitted to the Act's objective in terms of gaining higher productivity and competitiveness. All companies should plan to access the Act as soon as possible even if they have only one employee before the opening of the AEC. Moreover, in view of the shortage of technicians, they notice one important problem that is most students will start looking to pursue their bachelor's degrees right after finishing from vocational and higher vocational colleges. They also suggest several ways to solve this problem. First, the government should apply the Act on those students so that they have to work before pursuing their further studies. Second, the wage rates between skilled technicians and bachelor scholars should be different to attract more students to improve their vocational skills. Third, the government should encourage firms to change their job qualifications to focus more on experiences rather than degrees, and also include in their job announcements that wage rates depend on both experiences and degrees, not just the degrees only.

In addition, this study uses the Cobb-Douglas production function to clarify the quantitative result. The OLS regression and GMM estimation are performed to obtain the primary results. However, the OLS and GMM are commonly used when we have time series or cross sectional data. Therefore, the FEM is also estimated as it is considered to be more appropriate in this study. Table 4 provides the results from estimating the Cobb-Douglas production function (1) using the OLS, GMM, and FEM.

Table 4. Results from estimating the Cobb-Douglas production function (1)

	OLS		GMM		FEM
Variable	***Q/N***	**ln(*Q/N*)**	***Q/N***	**ln(*Q/N*)**	**ln(*Q/N*)**
Constant	98.6259***	4.0589***	98.6259***	4.0589***	9.3146***
	(10.4351)	(1.423)	(13.4012)	(1.1458)	(1.7690)
Proportion of training (*Train*)	-103.5698***	-4.4355***	-103.5698***	-4.4355***	-1.3617**
	(13.2004)	(0.4803)	(14.1878)	(0.5713)	(0.5873)
Average asset per worker (*K/N*)	0.0048***		0.0048***		
	(0.0016)		(0.001381)		
ln(*K/N*)		0.3098*		0.3098**	-0.6389**
		(0.1807)		(0.1422)	(0.2385)
R-squared	0.7292	0.7621	0.7292	0.7621	0.4534
F-statistic	36.34	43.25			9.12
Wald Chi-squared			128.13	64.27	
Number of observations	30	30	30	30	30

Notes:
[1] Standard error in parentheses
[2] *** Significant at 1%
** Significant at 5%
* Significant at 10%

The results from the FEM show that all three coefficients are significant at 5% level or better. The F-value of 9.12 also indicates that we can reject the null hypothesis that all coefficients are zero at 1% level of significance. The negative coefficient of ln(*K/N*) implies that when the average asset per worker increases by 1%, productivity will decrease by 0.64%. The coefficient of *Train* is -1.36 meaning that when the proportion of training increases by 1%, productivity will decrease by 1.36%. The reason why we find the negative relationship between training and productivity is that companies normally perform operations at high levels of productivity

where a large number of units are produced by their employees during a specific period of time. Consequently, such a time like that, employees have to work with high efficiency without having time to take any training course. On the other hand, when companies have fewer units to produce, employees may have time to attend some training courses.

Furthermore, training objectives of each company may also be different depending on different policies from their oversea headquarters. In this study, we take into account only formal training programs and trainings that meet the minimum requirement of government regulations, while leaving out another important training program that is on-the-job training. This is crucial to our findings since the automobile companies also employ on-the-job training to their employees. However, neither the time nor cost of on-the-job training is included in the company transactions. This indicates that on-the-job training is important for the working condition of the automobile assembly industry in Thailand. This result is similar to the results found by Acemoglu and Pischke (2000) and Destre, Levy-Garboua and Sollogoub (2008).

The next step is to analyze the training factors that can determine the labor productivity by estimating Equation (2). In this case, the productivity is measured by the average output or output per labor. One of the most important factors that can determine the output per labor is the proportion of trained labors (*Train*). Other factors that can determine the output per labor are the expense of training program (X_1), the duration of training program per year (X_2), and the number of trained employees (X_3). The effect of *Train* on labor productivity is expected to be positive, while the effects of X_1, X_2 and X_3 on labor productivity are expected to be positive as well. Table 5 presents the OLS estimates of the determinants of labor productivity described by Equation (2).

Table 5. The determinants of labor productivity described by Equation (2)

Variable	Model A	Model B	Model C
Constant	91.5185*** (11.7291)	91.8638*** (10.9458)	93.2314*** (10.7332)
Proportion of trained labors (*Train*)	-91.5136*** (14.2331)	-91.5921*** (13.9400)	-89.5043*** (13.5831)
The expense of training program (X_1)	0.0025 (0.0016)	0.0026* (0.0013)	0.0033*** (0.0010)
The duration of training program per year (X_2)	0.3352 (0.4505)	0.3419 (0.4373)	
The number of trained employees (X_3)	0.00028 (0.0027)		
R-squared	0.7509	0.7508	0.7449
F-statistic	18.84	26.11	39.43
Number of observations	30	30	30
Tests for model specification errors:			
- Link test for model specification	Do not reject	Do not reject	Do not reject
- Ramsey RESET test for omitted variables	Do not reject	Do not reject	Do not reject

Notes:
[1] Dependent variable is the output per labor
[2] Standard error in parentheses
[3] *** Significant at 1%
** Significant at 5%
* Significant at 10%
[4] The details on Link test and Ramsey RESET test are available upon requested to the author.

From Table 5, the coefficients of the proportion of trained labors are negative and highly significant in all models. These findings are consistent with the results shown in Table 4. The coefficients of all three training factors are also positive as expected even though they are not all significant. When considering Model A, none of the training factors has a significant effect on labor productivity. When the number of trained employees is removed from Model A, the expense of training program starts to have a significant impact at 10% level of significance, while the effect of the training duration remains insignificant. In Model C, where both the number of trained employees and the training duration are removed, the coefficient of the expense of training program becomes highly significant at 1%.

These results indicate that the ratio of trained employees and expense of training program affect the labor productivity. The expenses of training programs include expenses on trainers, training materials, and foods. The largest expense belongs to the expense on trainers. For training outside and abroad, the expenses include admission fees, accommodations, and traveling expenses. In addition, the amount of training expenses also depends on the company policy that consequently becomes company training budget.

Limitations of study

This study conducts the qualitative analysis of training and productivity covering all automobile assembly companies in Thailand. The qualitative data are completed by the cooperation of the subjects. The quantitative approach is also employed, resulting in a mixed- method summarization. However, some quantitative data from several companies are unavailable due to either their confidentiality policies or the incompleteness of data collection; hence, the quantitative data may not be expressed in terms of the total population but come from six companies whose data are available. Instead of using the value added as dependent variable, this study uses the units of production because the data on cost of productions are not available. The training program includes only formal while excluding on-the-job trainings. The readers of this study should be aware of the quantitative data not being drawn from all populations being studied as expected. In addition, the researcher conducts this study under actual circumstances in Thailand that are obviously affected by unexpected events such as political chaos and floods. The readers in other countries should also determine the difference between factors in different countries since those factors may contribute to the differences in results.

Implications for Practice and Future Research

The automobile assembly firms should consider market plans, production plans, and human resource development plans in an integrated form. In addition, training needs to be completed earlier with needed specifications. The training programs should be conducted in response to employee's needs without interrupting their daily works. Since there is a shortage of labor in the automobile industry in Thailand, the preparation of the employees before working with the company is strongly recommended. The complier can perform this strategy by cooperating with educational institutions, including vocational colleges and universities in order to prepare student's skills to serve company needs. This can directly help company's policies on human development that fit the requirements without interrupting the production process. Other researchers should attempt to conduct the study on experimental research where quantitative data on training and development, and environment can be controlled. The study can be attempted in both broad and specific areas. In broad area under the controlled environment, the relationship between training

and development can be summarized. In specific area, the relationship between training and particular areas such as cost reduction, material loss, working resolution, work improvement, and quality of working life should be quantitative investigated in depth.

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