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## **ASEAN and Thai Rubber Industry Labor Mobility Determinants: A Structural Equation Model**

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### **ABSTRACT**

The ASEAN rubber industry is in a state of crisis with prices in a continuing three year downward spiral but over the horizon is the 2015 AEC integration date promising closer integration, reduction of tariffs and the freer mobility of labor. This research therefore undertook a structural equation model to study and identify the determinants of ASEAN and Thai labor mobility of which 1 million families or more than 6 million people are dependent on rubber production while another 4.8 million households or 18 million people are dependent on rice farming which are both highly intensive foreign labor endeavors. The study revealed that the vast majority of Thai expatriates who choose foreign work have a very positive experience who state that foreign work should be supported by the government. For the structural equation model, 340 rubber industry management staff were queried using both quantitative and qualitative research tools including PLS-Graph software for qualitative analysis of in-depth interviews from 10 senior level executives involved in corporate policy. From the research it was determined that skill levels have a direct and positive influence on labor mobility and the factors that have the maximum overall positive influence are migration pull and push factors. Government labor policies include foreign worker and labor law policies which have both a direct and indirect effect on labor mobility. Although the rubber industry is in an extended period of falling prices, new applications and sectors are being explored, such as rubber use in road construction.

**Key words:** Labor mobility, ASEAN, Thailand, government labor policies, labor skills, labor relations

### **INTRODUCTION**

In 2014 global rubber prices have already witnessed a 27% in prices dramatically affecting the large ASEAN producers of Thailand, Indonesia, Vietnam and Malaysia (Fig. 1). This has led to governments stepping in to shore up prices and develop methods to curtail production and shift plantations away from rubber to other commodities such as palm oil. Additionally, meetings are underway to discuss how rubber can be used in new ways, such as in road construction (Bernama, 2014).

Although prices have continued to drop over the past several years, according to the latest Rubber Statistical Bulletin and the Rubber Industry Report (IRSG., 2014), there was a 4.3% growth rate in Q1 2014 for the world's total rubber consumption. However, much of the growth in the total rubber consumption was concentrated on China (8.1%) and the Asia-Pacific

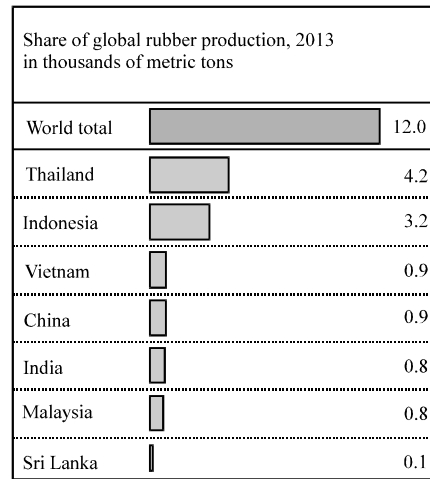


Fig. 1: Global rubber production, 2013

(excluding China), reflecting the regions' export orientated rubber products industry. World NR (natural rubber) consumption increased at a relatively slower rate, as compared to that of the total rubber consumption, not due to weakness in the fundamentals but due to a process of supply-chain adjustment.

Again, according to the International Rubber Study Group, IRSG (2014) global Natural Rubber (NR) consumption increased by 4.0% in Q1 2014, while NR production was up 1.2%. For the quarter, the world NR market was in a marginal deficit situation, resulting in a reduction of the world NR stocks level. Global Synthetic Rubber (SR) consumption increased by 4.6% in Q1 2014, while SR production was up 4.1%. For the quarter, the world SR market was in a marginal surplus situation. The robust growth rate of the SR production is a reflection of China's rapid build-up of its domestic SR capacity. An estimated 702,000 t of SR capacity will have been installed in China by the end of 2014 which will be addressing part of the needs of China's rubber industry that has been increasing its SR consumption by an average 310,000 t year<sup>-1</sup> in the past four years to 2103, as well as to substitute the 1.6 million tones of import that came into the country in 2013.

In spite of the increased consumption stated by the IRSG, rubber prices have steadily declined since October 2011 (TRA., 2014a) and according to the TRA falling rubber prices is being caused by several factors including concerns over the impact of the debt crisis in Europe, Chinese restriction of economic growth due to tightened liquidity, several years of high rubber stockpiles including 366,900 t in Qingdao, China in 2013 and the volatile nature of crude oil prices. However, the Thai Rubber Association (TRA., 2014a) has also stated that rubber prices has been somewhat supported by a tight supply due to global climate change caused by El Nino. In 2011, according to data from Thailand's Songkhla Central Rubber Market, prices were 80.01 Baht per kilogram in 2011, 78.93 Baht per killogram in 2012 and 72.14 Baht per killogram in 2013 which a continued downward trend.

To offset these continuing price drops, the Thai government plans to encourage farmers to chop down 350,000 rubber trees a year to stem this 60% slide in natural rubber prices over the past three years while converting the land to produce other commodities such as palm oil. With this global

rubber glut, in part due to record-high output in Thailand in recent years, prices in 2014 have fallen an additional 27% and the Thai government hopes farmers will cut 160,000 ha of rubber trees-around 8% of the nation's total rubber-growing area-to make room for oil palms (Malaysian Rubber Board, 2014).

Asian suppliers failed to agree on further new curbs in 2013 after reducing exports by 300,000 t in the six months through March, according to the International Tripartite Rubber Council which represents Thailand, Indonesia and Malaysia (Yulisman, 2013). Production from Thailand has declined as growers in the north and northeast regions stopped tapping because of drought according to Sri Trang Agro-Industry Pcl (STA), Thailand's largest listed rubber exporter.

International Rubber Study Group statistics (Bernama, 2014) in 2013 revealed that Malaysia (4th largest ASEAN rubber producer) had about 1.057 million ha planted with rubber trees out of which 400,000 stallholders accounted for 979,860 ha. In 2013, Malaysia produced 753,472 t of dry rubber against the previous year's output of 846,813 t. Latex production also dipped to 72,949 t last year versus 75,985 t in 2012. Malaysia consumed 56,210 t of dry rubber and 377,981 t of latex last year, down from 75,828 t of dry rubber and 365,571 t of latex consumed in 2012. Globally, the production of natural rubber increased to 12.036 million tones in 2013 against 11.603 million tones recorded in 2012. Consumption only increased marginally to 11.322 million tones from 11.027 million tones used previously.

In conjunction with the rapid and dramatic fall in rubber prices, there has also been a corresponding fall in automobile production in Thailand. This is important as the auto industry consumes about half the natural rubber produced, with the majority of that going into tires. Natural rubber content ranges from 10 to 17% in passenger tires to 39% or more in commercial tires, with the rest largely derived from crude oil (Markus, 2012).

Sales of passenger cars in Thailand fell by 45.93% in the first half of 2014 according to Thailand's Office of the National Economic and Social Development Board while total production in H1 2014 dropped 24.1% year-on-year to 964,968 units (NESDB., 2014). Thailand, as the self-billed 'Detroit of the East' is also a leading global tire manufacturer producing approximately 3.86 million tons of tires in 2013 for both domestic automobile production and foreign export (Suwannakij, 2014). With the drop in automobile production; another factor has contributed to rubber over supply.

However, output in Thailand will probably be about 4 million tons in 2014 which is little changed from 2013, as losses during wintering will be countered by gains in new plantation areas. Exports will be little changed at about 3.4 million tons and local consumption is expected to reach 550,000 t (Suwannakij, 2014). Production in Thailand increased in the past three years and was 3.86 million tons in 2013, according to the Office of Agricultural Economics. The global surplus may be 241,000 t in 2014 compared with 384,000 t last year, the Singapore-based International Rubber Study Group estimates.

This has led the new government to respond to the price crisis and as recently as August 2014 the Deputy Head of the Economic Department of the National Council for Peace and Order (NCPO), Gen. Chatchai Sarikalaya arranged the 1st/2014 Natural Rubber Policy Committee Meeting. The 2nd/2014 Natural Rubber Policy Committee Meeting was held shortly thereafter on September 19, 2014 and was chaired by Gen. Prayuth Chan-ocha (the new Prime Minister of Thailand). General Prayuth Chan-ocha, acting as Committee Chairman emphasized the importance of the connection among upstream, midstream and downstream sectors and considered rubber a national agenda and from the meeting 11 systematic rubber development projects were approved (TRA., 2014a).

They included:

- A 10 billion baht capital investment program for agricultural organizations in compiling rubber
- A 5 billion baht credit program for rubber processing farmer group
- A 15 billion Baht Credit program for rubber product manufacturing enterprises
- A market development project under a rubber market restructuring plan
- A new rubber market export project
- An investment and promotion project for domestic rubber product manufactures
- A 'Rubber Industry Development Institute' initiation and development project
- A program to oversee the implementation of limits on rubber production
- A program to review how to reduce production cost
- A technology transfer project
- An extra income generation project for rubber growers based on the Thai King's philosophy of self-sufficiency (OBG., 2014)

Additionally, the meeting also approved the establishment of Rubber Product Operation Center to serve as a center for solution to problems on rubber products.

From all this turmoil and chaos however comes the 2015 AEC (Association of Southeast Asian Nations Economic Community) integration date which looms large on the horizon. With this ASEAN integration under the AEC platform, the creation for bigger opportunities for the agricultural sector is possible for the members. In the past, Thailand's investment in ASEAN was largely in the form of contract farming in neighboring countries (Cambodia, Laos and Myanmar) under the Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS) (SCB and EIC., 2012).

The main objective was to encourage Thai private sector enterprises to cultivate and harvest crops in these neighboring countries in order to reap the benefits of cheaper land and labor cost, while importing these farm products into Thailand for further processing while adding more value and even exporting to third countries. In the first phase of this process of economic cooperation many agriculture and energy crops were identified (SCB and EIC., 2012).

Presently, many Thai investors have already made substantial investments in neighboring countries, both in the form of contract farming and government concessions for cultivated areas. For instance, Mitr Phol Group has granted concession to grow 60,000 rai of sugarcane and produce sugar in Laos; Thai Hua Rubber, PCL has expanded its rubber plantations and is building factories for processing rubber products in 3 locations in Laos; Charoen Pokphand Group (CP) was granted concessions to grow corn and forage crops in Myanmar and Laos; Chaiyo-AA Group (Double A) grows eucalyptus in Laos and Sutech Engineering is doing sugarcane contract farming in Myanmar.

These investments have enhanced the value of border trade between Thailand and its neighbors significantly and with the introduction of new AEC regulations help investors benefit from the reduction in tariffs for farm produce originating from countries which have Least Developed Countries (LDCs) status. In addition, they also serve as a channel for product distribution and an export base to the third countries outside ASEAN.

At the same time, with the AEC to become effective in the next 3 years, investment in the agricultural sector between Thailand and other ASEAN members can reach a new high. One of the key objectives of the AEC is to promote the development of a single market and production base to foster free flow of factors of production among the member countries. In particular, freer movement

of labor and capital would substantially benefit the ACMECS' initiatives already underway while enhancing and diversifying investment as well as agricultural development within ASEAN (SCB and EIC., 2012).

## CONCEPTUAL DEVELOPMENT

"If you look at the global economy from the perspective of people, its biggest structural failure is the inability to create enough jobs where people live." Juan Somavia, Director General-International Labor Organization (Misra, 2008).

**Labor mobility:** In the context of worker rights, significant push factors for migration include poverty level incomes, low wages in rural areas and lack of employment opportunities in poor countries, coupled with higher wages and greater job opportunities in urban areas and rich nations. Despite its general economic benefits, globalization has created an ever-widening wealth gap between countries and rural and urban areas within countries (Chuang, 2006). The demand for cheap labor is a crucial pull factor for labor migration. Often, migrant workers fill positions that workers in the domestic workforce refuse to do because of low wages or harsh working conditions. Although, the 2015 ASEAN integration date, with its promises of free labor movement sound good, the reality is it will be much harder to accomplish than envisioned. Thai workers could benefit but they need to learn how to take advantage of it (TDRI., 2013).

Over the past few decades, Thailand has played an important role in international migration in the region and it is currently not only a country of origin but also of transit as well as of destination. Because of its relatively prosperous and stable economy, Thailand has become a safe haven for hundreds of thousands of asylum seekers and millions of migrant workers from its neighbouring countries (Sciortino and Punpuing, 2009). Simultaneously, many Thais continue to look for better opportunities overseas. However, these continuous changes in migration trends and patterns, coupled with the dearth of data and sound research on the topic, make it very challenging for government policies, legislation, institutions and programmes to respond to the evolving reality in a quick and effective manner. Furthermore, most available studies only focus on selected issues of migration and do not provide a comprehensive overview.

Yodtuga (2003) in the study 'Labor movement in Latex industry, a case study in Sadao, Songkhla Province' found that most of the laborers working in the latex industry were male, 26-35 years old, married, Buddhist and had completed high school. Most lived in private accommodations which were subsidized by the plant. Most laborers had no savings or loans and if additional funds were needed, borrowed the money. Most facilities had TV however, the main factors that influenced labor movement were dependent on income, the environment and work safety.

In addition, the study found that the workers attitudes to changing work were positive because of higher income than their previous Laotian employer. The impact of labor movements is both positive and negative. For the industry, there are problems in the cost of production, opportunities cost, time and efficiency in planning production. But laborers are positive due to the higher income and better social welfare conditions (Yodtuga, 2003).

This is consistent with Rungrirkrit *et al.* (2009) which discovered that despite the fact that jobs taken in foreign countries are mainly manual, unskilled and more risky with 2 h overtime a day for 6 days a week including language difficulties, Thai laborers do not feel tired but on the contrary feel that their quality of life is fairly good and are proud that they can send money back home

which is often times at least 10,000 baht a month. This is enough to help their family live comfortably and leave a sum of money that maintain themselves and to sets up an independent occupation.

It is not surprising, therefore, that almost all Thai labor and their families interviewed (92.1%) share the same view that working abroad is worthwhile, since it enables them to have savings, creates opportunity for their skill development and for their children's education, as well as helping to expatriate income back to Thailand. Furthermore, the vast majority of 97.15 suggested that the government should continue and help with the export of Thai labor, especially for skilled labor (Rungrirkrit *et al.*, 2009).

Suanmali and Saengsathien (2014) investigated factors influencing Thai engineers and ASEAN labor mobility in the upcoming 2015 integration. The results showed that a Thai engineer's intentions to work abroad within ASEAN countries differed according to "economic and political situations" and "benefits and advanced job".

One of the key objectives of the AEC is to promote the development of a single market and production base to foster free flow of factors of production among the member countries. In particular, freer movement of labor and capital would substantially benefit the ACMECS' initiatives already underway while enhancing and diversifying investment as well as agricultural development within ASEAN (SCB and EIC., 2012).

**Government labor policies:** Martin (2003) in the study, "Thailand: Improving the management of foreign workers", prepared a report to assist the Thai government in the development of policies to improve the management of unskilled foreign workers from Myanmar, Cambodia and Lao PDR who are employed in Thailand. Case studies were analyzed from employers, migrants and others who described the Thai migrant labor system and shared their own experiences of it. The report had three major sections:

- A review of the demand for migrants and alternatives to migrants in the context of Thai labor force and labor market trends
- An analysis of efforts to regularize the status of unauthorized migrants
- Suggestions for linking migration management policies with other economic, labor and education policies based on case studies and best practices from other countries

The study stated that there are two important observations worth stating which are both necessary and relevant. Firstly, it is good for a government to deal with the problem of managing migration, since the entry of foreigners seeking work signals that the country in question offers higher wages and greater job opportunities than those of its neighbors. Secondly, there is no single best way to manage migration. There are many different labor migration systems around the world, reflecting very different histories, migration patterns and economic circumstances. Since there is no best 'off-the-shelf model', experimentation, while adhering to fundamental principles, is the best way to develop a successful migration management model.

Today in Thailand, there is an increased need for workers in higher quantities, in particular, workers in the agricultural sector as well as less skilled levels. During the past 10 years, Thailand has needed foreign workers in a higher proportion to the labor force to replace the working class positions such as maids, security, construction, etc., which includes over 3 million people. Both legitimate and illegal foreign has increased in Thailand in all sectors of the economy.

Thailand's varied emigration and immigration flows are governed by multiple regulations that have yet to be harmonized into a comprehensive policy framework (Sciortino and Punpuing, 2009). Starting with emigration, legislation of outbound labor in Thailand is grounded in the Recruitment and Job Seekers Protection Act B.E. 2528 (issued in 1985 and amended in 1994) which regulates the rendering of employment and recruitment services for workers seeking to migrate abroad. The Act prohibits foreign employers from recruiting Thai workers directly and sets the conditions for exercising foreign employment services, including pre-departure examinations and training, the establishment of a Fund to Assist Workers Abroad and the provision of monitoring measures and sanctions for eventual violations, including the reimbursement of workers by recruitment agencies if the jobs and wages abroad are not as specified in the contract.

Thailand also has laws relating to the management of foreign workers, including several editions of the, (1) Immigration Act (2009), (2) Working of Alien Act (2008), (3) The Foreign Business Act, (4) Foreign Business Act, (5) Define Career and (6) Promotion Professional Prohibition Act and for Investment. Industrial Estate Authority of Thailand Act Special Act for export (EPZX) and Trafficking Act (Sciortino and Punpuing, 2009).

Moonstan *et al.* (2010) using Ethnographic Futures Research (EFR) developed management scenarios of Laotian migrant workers in Thailand in the year 2020. From it, under the optimistic scenario, it was determined that formal recruitment and migrant employment policy are likely to be continued while allowing for longer duration of work permits, improved protection of labor rights and benefits according to Thai labor laws. Additionally, status of the management office for migrant workers is likely to be upgraded along with the decentralization of an improved labor data base and research on migrant workers will likely to be in place.

However, under the pessimistic scenario, there will be no progress in relation to formal recruitment and migrant workers management. Most of the workers will likely be undocumented, unprotected and have no access to public services and benefits. Law enforcement will be weak and corruption will prevail.

Under the most probable scenario, Thailand would likely continue the policy on formal recruitment and formal employment but with improved work procedures. It is likely that a higher proportion of the Laotian migrant workers will be documented. Concerned laws and regulations will likely to be adjusted while effective and transparent law enforcement will continue to be issue of concern. There will be adjustment of the national committee overseeing migrant workers. The status of the agency dealing with migrant workers might be upgraded. Most probably, special economic zones will be set-up in Lao PDR. It is also likely that there will be an improvement in the labor database system and awareness building. Moreover, there would be improved cooperation in research and skills development in the sub-region. The research therefore led to the following 3 hypotheses:

- **Hypothesis 1 (H1):** Government labor policies influences labor skills
- **Hypothesis 2 (H2):** Government labor policies influences labor relations
- **Hypothesis 3 (H3):** Government labor policies influences labor mobility

**Labor skills:** It is clear from data that worker movements in ASEAN, like elsewhere, are dominated by unskilled and semi-skilled workers. It is also well-known that movements of these types of workers are dominated by irregular migration mainly because of lack of avenues for legal migration for them (Abella, 2006).

In research prepared by Saraithong (2012), it was stated that under the AEC, Thai workers could be forced to deal with both favorable and negative situations and in order to either reap



benefits from liberalization or survive the strong competition among themselves and from ASEAN workers, Thai skilled workers need to improve their necessary working skills. Examples include both English language and computer usage skills. It was therefore very crucial for Thai skilled workers to improve their working skills so that they can catch up with the globalizing trend and increase their job performance.

Rungrirkrit *et al.* (2009) studied the advantages and disadvantages of Thai labor exporting promotions analyzing 240 interviews of male and female laborers coming back from working overseas. It was discovered that most resided in northeastern and northern provinces with the majority being males aged between 31-50 years who had only finished only elementary school. Furthermore, these individuals were married with an average of 2 children. They have successively engaged in farming for more than 10 years before leaving Thailand to work in foreign countries and were responsible for 4-5 dependent family members. The majority had debts with no savings.

Factors pushing them to work abroad were to free themselves from debt and to gain more income. More than half of the sampling group interviewed had worked abroad for two years at a time through the arrangement of private employment agencies. Most of them chose to go to Taiwan where they received high compensation although they had to pay their own airfares which was between 50,000-100,000 baht. This entailed them having to borrow money from the black market at rates ranging from 3-5% per month (Rungrirkrit *et al.*, 2009).

In a study conducted by the University of the Thai Chamber of Commerce, along with interviews carried out by The Nation newspaper, Thailand was found to lack a concrete strategy in developing opportunities for skilled labor within the AEC (Pratruangkrai, 2013). In 2015, ASEAN member states will be committed under the Mutual Recognition Arrangement to allow the free flow of workers in seven key professions including doctors, dentists, nurses, engineers, architects, accountants and surveyors. ASEAN professionals in these areas of expertise will be able to work in another ASEAN country, providing they meet qualification and work permit requirements in each market.

According to the Thai Ministry of Labour in preparation for the AEC 2015 when there would be a free flow of labour in the Southeast Asian region, the ministry hopes to improve four areas of Thai labour, including languages, especially English, technology, specific skills and preparation for working in cross-cultural environments. The improvement would be carried out by organising high technology-based training programmes and developing a national labour skills standards system (MCOT., 2014).

In a program from the Thai the Department of Skill Development, around 60,000 Thai skilled workers will be provided with training to further develop their skills in the next three years, in preparation for the ASEAN Economic Community (AEC) (PRD., 2014). The training which begun in 2014 will continue until 2016 with about 20,000 skilled workers on average being trained each year during the three-year period. Training will be focused on the use and repair of electrical appliances, as well as related technology. The skilled workers under this program include electricians, carpenters, welders and tilers. Therefore, the following hypothesis is proposed:

- **Hypothesis 4 (H4):** Labor skills influences labor mobility

**Labor relations:** Thosuwonchinda (2011) studied the concept of good labor relations in order to create cooperation and reduce conflicts between employers and employees by analyzing patterns of labor relations promotion specified by the Thai Department of Welfare and Labour Protection to find out the similarities and differences while comparing these with the good labor relations concepts. The results showed that although the pattern of labour relations promotion specified by

the Thai Department of Welfare and Labour Protection was partly successful and lead to good labour relations, it still lacked in-depth quality examination abilities especially in the areas of trust, information disclosure, employee consultation and employees' participation at all levels. For these reasons, it was suggested that a questionnaire be developed which helped with better labour relations and labour welfare while also helping with the accreditation process and setting an example of excellent labour relations.

Ng and Ofreneo (2009) addressed ASEAN Industrial Relations (IR) issues and stated that the "ASEAN way" of taking decisions has exhibited a weak record in industrial relations when it comes to the issue of core labor standards. However, the ASEAN has been focusing in recent years on positive IR without touching on the sensitive topics of trade unionism and core labor standards. This it did in October 2008 in an "HR Summit" with the highlights of the Summit being released in the "Mercer Report" on HR in the ASEAN which bats for "progressive and flexible" IR and HRM practices. It came up with the following recommendations: Review of "labour practices to create a more favorable investment environment", promotion of "Labour law flexibility" as "one of the key drivers of competitiveness", maintaining the "unique 'ASEAN way' of partnership" as an "ASEAN's comparative advantage", promotion of skills training to raise "labour quality" and "Capacity building in the area of labour market statistics" (Mercer Consulting, 2008). These arguments lead to the following hypothesis:

- **Hypothesis 5 (H5):** Labor relations influences labor mobility

From the above conceptual review and development, the researchers developed the above five hypotheses for the study concerning ASEAN labor mobility within the rubber industry which is depicted in Fig. 2.

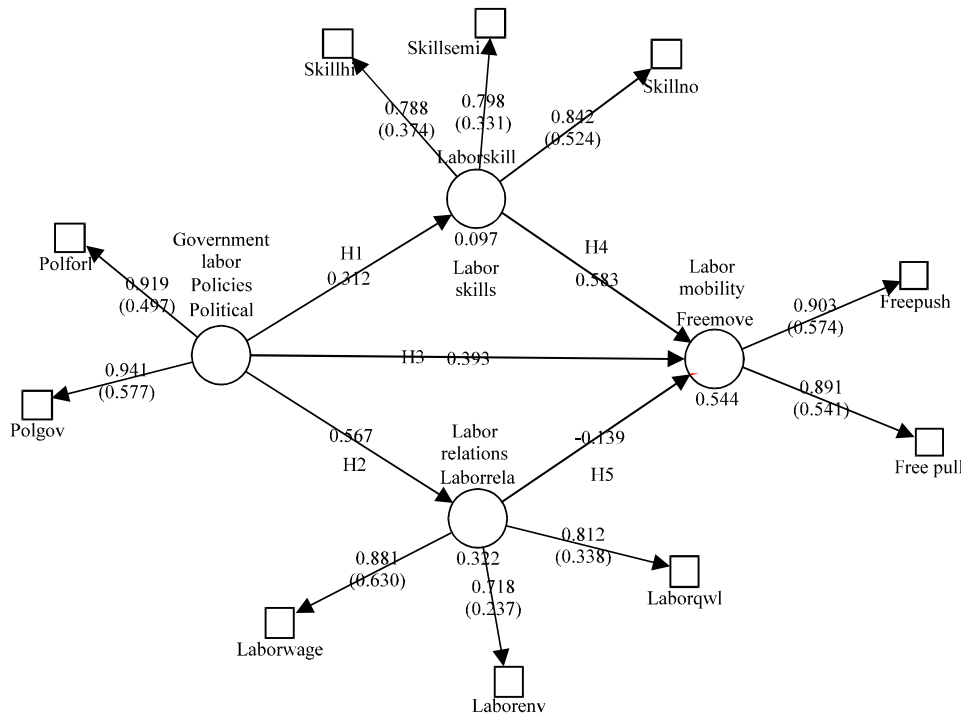


Fig. 2: Final model of factors affecting ASEAN labor mobility

**METHODOLOGY**

The sample population or unit of analysis for this research included questionnaires obtained in 2014 from 340 lower and middle-level managers employed by small and medium sized Thai rubber enterprises (SMEs) (Hair *et al.*, 2006).

**Data collection:** The population or unit of analysis for this study consisted of lower and mid-level executives within the rubber processing industry. The group’s rubber processing characteristics were as follows:

- Production controllers who were in operational control of the workers
- Lower to mid-level managers who worked in close contact with workers

Senior managers were not selected because their position mostly consisted of policy decisions such as the minimum wage of workers and were not involved in the day-to-day recruitment and supervision of the mostly unskilled labor force. Government policy makers however play a key role in rubber industry labor mobility and wage policies. Since the industry uses many foreign workers from Myanmar, Laos and Cambodia, expanded cooperation is a key to resolve the shortage of labor and help with the promotion of rubber latex production in the rubber plantations (Table 1).

Additionally, Schumacker and Lomax (2010) stated that Structural Equation Modeling (SEM) uses a variety of models to show the relationships between observed variables with the same basic goal of providing a quantitative test of a theoretical model hypothesized by a researcher. SEM models can be tested to show how variable sets define ideas and how they are related. SEM’s objective is to determine the extent to which the model is supported by the data that is gathered during research (Schumacker and Lomax, 2010) and since SEM is capable of statistically modeling and testing complex phenomena, it has therefore become the preferred method for confirming (or not) theoretical models, quantitatively. Another very important consideration is the intended sample size with most authors recommending a sample size of at least 100 to generate good results (Cunningham, 2008; Schumacker and Lomax, 2010; Weston and Gore Jr., 2006; Worthington and Whittaker, 2006), so therefore a sample size smaller than 100 should not be used as it is unreliable and consequently SEM should not be used (Meldrum, 2010).

As such, this study drew upon a sample population or unit of analysis which included 340 lower and middle-level managers employed by small and medium sized Thai rubber enterprises (Hair *et al.*, 2006). From the sample size determined by Schumacker and Lomax (2010), the researchers used the 10-20 sample size suggested for each variable. As the research consisted of 10 variables, a minimum of 200 samples were deemed as acceptable of which 340 were obtained which is considered highly reliable.

Table 1: Number and type of establishments surveyed involved in Thai rubber production

Ranking	Production type	Number
1	Ribbed smoked sheet rubber factories	114
2	Block rubber production	62
3	Air Dried Sheet (ADS) rubber drying facilities	22
4	Latex and skimming production facilities	96
5	Rubber compressing ‘crepe’ facilities	28
	Total	322

**Questionnaire design:** Quality and content was monitored with tools used in the research and as a measurement of quality. Both content validity and reliability was assured by 5 experts in their respective fields with an evaluation index consistent with the content and the purpose of the research. Additionally, the index of Item-Objective Congruence (IOC) developed by Rovinelli and Hambleton (1977) was employed to carry out the screening of questions. The IOC is a procedure used in test development for evaluating content validity at the item development stage. This measure is limited to the assessment of unidimensional items or items that measure specified composites of skills. The method prescribed by Rovinelli and Hambleton (1977) results in indices of item congruence in which experts rate the match between an item and several constructs assuming that the item taps only one of the constructs which is unbeknownst to the experts. The research then proceeded to select items that with an IOC index higher than 0.5 which were considered acceptable.

Questionnaires were constructed to be a tool to measure concept definition and practice. The instrument or questionnaire used the 7-Point (Likert, 1972) as the measurement scale and the conceptual framework for determining the internal consistency measured by coefficient alpha ( $\alpha$ -coefficient) of Akron BAC (Cronbach) to calculate the average value of the correlation coefficient which ranged from 0.725 to 0.856 which were considered to be highly reliable as all values lower than 0.50 were eliminated from the measurement.

**Quantitative measurement:** Labor Mobility analysis of the ASEAN and Thai rubber industry used a measurement instrument or questionnaires utilizing a 7-Point Likert Scale (Likert, 1972).

**Dependent variable:** Labor Mobility analysis of the ASEAN and Thai rubber industry used a measurement instrument or questionnaires utilizing a 7-Point Likert Scale (Likert, 1970) which were developed and constructed from scales enabling the measurement of Migration Pull Factors (FREEPULL) and Migration Push Factor (FREEPUSH) (Chuang, 2006; Rungrirkrit *et al.*, 2009; TDRI., 2013; Sciortino and Punpuing, 2009; Yodtuga, 2003; SCB and EIC., 2012).

**Independent variables:** The scales for Government Labor Policies were developed using an analysis tool with a 7-point Likert scale (Likert, 1972) and have been constructed with 2 aspects (Table 2) including Law (Polforl) and Civil Servants (Polgov) (Martin, 2003; Sciortino and Punpuing, 2009; Moonstan *et al.*, 2010).

The scales for Labor Skills were developed using an analysis tool with a 7-point Likert scale (Likert, 1972) and have been constructed with 3 aspects (Table 2) including Skilled Workers (Skillhi), Semi-Skilled Workers (Skillsemi) and Unskilled Workers (Skillno) (Saraithong, 2012; Rungrirkrit *et al.*, 2009; Pratuangkrai, 2013; MCOT., 2014; PRD., 2014).

The scales for Labor Relations were developed using an analysis tool with a 7-point Likert scale (Likert, 1972) and have been constructed with 3 aspects (Table 2) including Laborer Wages (Laborwage), Laborer Environment (Laborrenv) and Laborer Quality of Life (Laborqwl) (Thosuwonchinda, 2011; Ng and Ofreneo, 2009; Mercer Consulting, 2008).

## RESULTS

Partial least squares has been applied for analysis of quantitative data by the researcher. It is data analysis for Confirmatory Factor Analysis (CFA) relating to the determination of manifest variable and latent variable and testing of research hypothesis exhibiting in structural model

analyzed by using the applications of PLS-Graph (Chin, 2001). According to the analysis result of scale validity and reliability, scale investigation was conducted using internal consistency measurement coefficient alpha ( $\alpha$ -coefficient) of Akron BAC (Cronbach) to calculate the average value of the correlation coefficients which ranged from 0.775-0.910 which is considered to have high reliability.

In case of measure variables with reflective analysis, convergent validity has been conducted. Loading is used as consideration criteria and must be positive quantity and indicator loading has been more than 0.707 and all values have been statistically significant ( $|t| \geq 1.96$ ) representing convergent validity of scales (Lauro and Vinzi, 2004; Henseler *et al.*, 2009; Wingwon and Piriyakul, 2010) and analysis results as shown in Table 2.

Government Labor Policies (POLITICAL) factors underlying the external variables influencing Law (Polforl) and Civil Servants (POLGOV) which have values of 0.919 and 0.941, respectively and a significance level of confidence of 95% ( $t\text{-stat} > 1.96$ ) which considers such factors highly reliable. Government Labor Policies (POLITICAL) has a direct influence on Labor Mobility (FREEMOVE) (Fig. 2, Table 2).

Labor Skills (LaborSkill) factors underlying the external variables influencing Skilled Workers (SKILLHD), Semi-Skilled Workers (SKILLSEMI) and Unskilled Workers (SKILLNO) have values of 0.788, 0.798 and 0.842, respectively and a significance level of confidence of 95% ( $t\text{-stat} > 1.96$ ) which considers such factors highly reliable. Labor Skills (LABORSKILL) has a direct influence on Labor Mobility (FREEMOVE) (Fig. 2, Table 2).

Labor Relations (LABORRELA) factors underlying the external variables influencing Laborer Wages (LABORWAGE), Laborer Environment (LABORENV) and Laborer Quality of Life (LABORQWL) have values of 0.881, 0.718 and 0.812, respectively and a significance level of confidence of 95% ( $t\text{-stat} > 1.96$ ) which considers such factors highly reliable. Labor Skills (LABORSKILL) has a direct influence on Labor Mobility (FREEMOVE) (Fig. 2, Table 2).

The reflective model in Table 3 shows the discriminant validity of the internal latent variables and the correlation of variables. It also depicts the scale reliability which has been analyzed from Composite Reliability (CR) as well as the Average Variance Extracted (AVE) and R2. The CR value should not go below 0.60 and the AVE values should also drop below 0.50 and R2 values should not be under 0.20 (Lauro and Vinzi, 2004; Henseler *et al.*, 2009; Wingwon and Piriyakul, 2010). In Table 4 the Confirmatory Factor Analysis (CFA) of the independent variables of Research and Development and Technology Capabilities on the dependent variable of Competitive Advantage is shown.

**AvCommun:** The average communality measures the convergent validity of the manifest variables to describe the latent variable (Chatelin *et al.*, 2002). For example, for the first latent variable image:

Table 2: Research hypotheses test results

Hypotheses	Coefficient	t-stat	Results
H1: Government labor policies has a direct and positive influence on labor skills	0.312	6.6190	Supported
H2: Government labor policies has a direct and positive influence on labor relations	0.567	19.4259	Supported
H3: Government labor policies has a direct and positive influence on labor mobility	0.393	6.7001	Supported
H4: Labor skills has a direct and positive influence on labor mobility	0.583	15.9055	Supported
H5: Labor relations has a direct and positive influence on labor mobility	-0.139	3.8068	Supported

Table 3: Statistic values presenting convergent validity of reflective scales of latent variables

Construct/item	Loading	t-stat
<b>Government labor policies (Political)</b>		
Law (Polforl)	0.919	13.047
Civil servants (Polgov)	0.941	15.232
<b>Labor skills (Laborskill)</b>		
Skilled workers (Skillhi)	0.788	16.950
Semi-Skilled workers (Skillsemi)	0.798	13.857
Unskilled workers (Skillno)	0.842	14.324
<b>Labor relations (Laborrela)</b>		
Laborer wages (Laborwage)	0.881	7.955
Laborer environment (Laborrenv)	0.718	9.621
Laborer quality of life (Laborqwl)	0.812	14.185
<b>Labor mobility (Freemove)</b>		
Migration pull factor (Freepull)	0.891	28.693
Migration push factor (Freepush)	0.903	26.741

Table 4: Results of Confirmatory Factor Analysis (CFA) for measurement model

Construct	CR	AVE	Political	Laborskill	Laborrela	Freemove	R <sup>2</sup>	AvCommun	AvRedund
Political	0.825	0.545	0.738				-	0.544	0.000
Laborskill	0.853	0.659	0.376	0.811			0.097	0.658	0.093
Laborrela	0.867	0.621	0.322	0.644	0.788		0.322	0.621	0.258
Freemove	0.892	0.805	0.656	0.465	0.245	0.897	0.544	0.805	0.405
Average							0.321	0.634	0.163

Statistically significant at the 0.01 level with the numbers in the diagonal. CR: Composite reliability, R<sup>2</sup>: Square of the correlation, AVE: Average variance extracted, statistical significance level is at 0.01 and diagonal figures mean  $\sqrt{AVE}$

$$AvCommun(\text{Image}) = \frac{1}{5} \sum_{k=1}^5 \text{cor}^2(x_{1/t}, Y_i)$$

**AvRedund:** The average redundancy measures the overall capacity of the model to predict the manifest variables related to an endogenous latent variable (Chatelin *et al.*, 2002).

The overall quality of the models of Table 4 shows that the R<sup>2</sup> coefficient is between 0.097 to 0.544 with an average of 0.321 which is higher than 0.20, indicating that the structural equation predictive quality level. Furthermore, the fit index structure with the GoF (Goodness of Fit) of 0.451 indicates a moderate overall prediction performance is equal to 0.634 Average Communality Construct which shows that the metric can reflect the behavior quite well. A value of 0.163 indicates that the Average Redundant Path variable in the equation can predict the measure of the variable in the path well enough, by using the an acceptable level of quality.

The Hosmer-Lemeshow test (Table 5) is a statistical test for goodness of fit or logistic regression models. It is used frequently in risk prediction models (Hosmer *et al.*, 1997). The test assesses whether or not the observed event rates match expected event rates in subgroups of the model population. The Hosmer-Lemeshow test specifically identifies subgroups as the deciles of fitted risk values. Models for which expected and observed event rates in subgroups are similar are called well calibrated.

Table 5: Influencing factors affecting the credit support to small entrepreneurs and the influence of the Hosmer-Lemeshow Goodness of Fit (GoF) test

	Government labor policies	Labor skills	Labor relations
Direct effect	0.393	0.583	-0.139
Indirect effect	0.103	-	-
Total	0.496	0.583	-0.139

Model validation or PLS fit index is a measure of the following GoF equation as follows (Wingwon and Piriyaikul, 2010):

$$GoF = \sqrt{\text{Commin} \times R^2} \quad R^2 = \frac{1}{J} \sum_j R^2(\xi_j, \xi_{q(\xi_i \rightarrow \xi_j)})$$

It can be concluded that the accuracy of the overall structural equation model and measurement equation is greater than 96%.

## DISCUSSION

The results of the research concerning the influencing variables of government labor policies, labor relations and labor skills on ASEAN and Thai labor mobility in this study opened the door to an even larger discussion concerning regional competitiveness issues associated with the upcoming 2015 ASEAN integration and the cross border industry cost savings from migration push and pull strategies.

Soon after becoming head of Thailand’s new military government, General Prayuth Chan-ocha took control of the Thai rubber industry’s strategic vision as well and emphasized the importance of the connection between upstream, midstream and downstream sectors and stated that the rubber industry was now part of the Thai national agenda (TRA., 2014a).

As has been seen from this study, industrial rubber production is vital to the ASEAN economies such as Thailand, Indonesia, Malaysia and Vietnam. The region is the largest producer and exporter of natural rubber in Asia and the world with the market share of 80% (TRA., 2014b). From a report in July 2012 it was stated that there are “1 million families or more than 6 million people across the country” in Thailand dependent on the labor intensive rubber industry as well as 4.8 million households or 18 million people being rice farmers (Bangkok Pundit, 2013).

Natural rubber is a plant of economic importance of Thailand and South East Asian region. Among the region, Thailand is the top with a global market share of 33.1% and is the world’s largest producer and exporter of natural rubber, generating export revenue from rubber and rubber products of over \$8.511 billion USD per year (Ministry of Commerce, 2013), involving not less than 6 million people (TRA., 2014b). How much Thailand will benefit from the establishment of ASEAN Economic Community (AEC) depends on adaptability to changes and challenges.

Natural rubber is one of the 12 priority sectors in the AEC and Thai NR exports to ASEAN market account for 14% of its total exports with ASEAN serving as the world leader of rubber development. It cooperates with other regions i.e., ASEAN+3 (China, South Korea and Japan) and ASEAN+6 (China, South Korea, Japan, Australia, New Zealand and India) (TRA., 2014b). Apart from combining into a single production base and single market, ASEAN seeks to reduce cost of production and increase production and its value through the use of modern technology. Therefore, Thailand needs to strengthen its rubber products and quality through information management

and skill improvement and solve the weak points i.e., cost of production (particularly labor and transport), quality control and the rubber industry supply chain through integration and connectivity.

In the future however, without changes to the production process in line with market demand, Thailand will lose its competitiveness. The government needs to support the development of research and development along with the commercialization of newer technologies. Furthermore, entrepreneurs need to embrace change and expand their investments into neighboring countries that have lower production, transportation and logistics cost such as the CLMV countries of Cambodia, Laos, Malaysia and Vietnam.

Additionally, the government needs to support and develop entrepreneurship and personnel with better labor skills and craftsmanship that can be adapted to new technological innovations amid the upcoming ASEAN intense competition climate. This includes not only the expansion of plantation and production into AEC counties but the simultaneous development of new marketing strategies along with adding value to the raw materials by the use of innovative research and development technologies along with increasing the quality of the finished products and goods.

## **CONCLUSION**

Although prices have continued to drop over the past several years, in Q1 2014 there was a 4.3% growth rate for the world's total rubber consumption. However, much of the growth in the total rubber consumption was concentrated on China (8.1%) and the Asia-Pacific (excluding China), reflecting the regions' export orientated rubber products industry. Global Natural Rubber (NR) consumption increased by 4.0% in Q1 2014, while NR production was up 1.2% and global Synthetic Rubber (SR) consumption increased by 4.6% in Q1 2014, while SR production was up 4.1%. For the first quarter of 2014, the world SR market was in a marginal surplus situation (IRSG., 2014).

In spite of this increased consumption, rubber prices have steadily declined since October 2011 (TRA., 2014a) and according to the TRA falling rubber prices is being caused by several factors including concerns over the impact of the debt crisis in Europe, Chinese restriction of economic growth due to tightened liquidity, several years of high rubber stockpiles including 366,900 t in Qingdao, China in 2013 and the volatile nature of crude oil prices. However, the Thai Rubber Association (TRA., 2014a) has also stated that rubber prices has been somewhat supported by a tight supply due to global climate change caused by El Nino.

To offset these continuing price drops, the Thai government plans to encourage farmers to chop down 350,000 rubber trees a year to stem this 60% slide in natural rubber prices over the past three years while converting the land to produce other commodities such as palm oil. With this global rubber glut, in part due to record-high output in Thailand in recent years, prices in 2014 have fallen an additional 27% and the Thai government hopes farmers will cut 160,000 ha of rubber trees-around 8% of the nation's total rubber-growing area-to make room for oil palms (Malaysian Rubber Board, 2014). Added to this, the new Thai government has stated that rubber is now on the 'national agenda' and laid out a 11 step program to tackle the problems of over production, falling prices, poor marketing and lack of technical skills and innovation (TRA., 2014a).

The findings have some implications for both government policy and management in the rubber industry in Thailand. As can be seen, production is not falling and when officials do make attempts to curtail production, workers are allocated to other industries such as palm oil and maybe even rubber road construction in the future. The bottom line is that the need for labor mobility is not decreasing and is most probably going to increase as Thai enterprises shift their resources to



neighboring countries to take advantage of cheaper means of production. Added to this is the ASEAN push for integration which will most probably see large shifts in worker locations as well as the needed technical skills. Some are predicting severe labor shortages while others are calling for better protection for migrant workers and their families under the law as well as equitable wages and benefits. The study suggests that the Thai government is on the right track in its 11 point program and hopes new vision from organizations such as the Malaysian Rubber Board and the Thai Ministry of Agriculture and Cooperative concerning new applications and diversification for rubber and rubber products are quickly embraced. ASEAN countries need to find ways to conduct further research on additional use for natural rubber as well as to undertake a government subsidized replanting phase while global prices are so low, an example being Malaysia's replacement of some 50,000 ha of rubber trees that were older than 20 years.

There are some limitations in any study with this research being no different. Recent changes within the Thai government however have quickly shifted the manner and level of the government's focus on overproduction and falling global prices. A decrease of 8% in total rubber-growing area is being suggested by the new government but enforcement appears to be non-existent. Further research needs to address enforcement and regulatory issues. New areas of use such as road paving using rubber is being discussed as well as the conversion of 160,000 ha to oil palms. These ideas however are only in their infancy with much additional research to be done in these areas.

A wise man once said, "The wealth in agricultural occupations is the wealth of people and also of the national security" (Rubber, 2012).

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