SOCIAL MOBILITY OF SCIENCE AND TECHNOLOGY HUMAN RESOURCES IN ASEAN COUNTRIES

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Abstract:

The social mobility of science and technology (S&T) human resources in each field, each country and region has different characteristics. But in the end, it is the "brain drain", "brain attraction" and policy that are the tool to solve the existing problem. There should be policies to promote social mobility of S&T human resources to encourage the flow of knowledge, especially the tacit knowledge between the research units in research institutes and universities and the production sector. The paper provides an initial picture of the current social mobility of S&T human resources in ASEAN countries and an in-depth study of Thailand's case in developing a talent mobility program. From there, the paper draws some suggestive recommendations for ASEAN countries, including Vietnam, on the policy of promoting social mobility of S&T human resources in the context of international and regional integration.

Keywords*: S&T human resource; Talent mobility; Social mobility.*

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1. Definitions and classification of social mobility of S&T human resources

1.1. Definitions

World Economic Forum (WEF) defines the social mobility of S&T human resources as "*talent mobility*[2] within or across organizations, industries or countries, and globally, or the professional movement of workers across occupations or skill sets *(World Economic Forum, 2012)*. It is a mechanism that contributes to create and diffuse various types of knowledge (both codified and tacit). Talent mobility particularly fits the transfer of any type of knowledge which cannot be codifined and shared as information through lectures, conferences or other communication channels.

This form of knowledge transfer is more effective through interaction between individuals that have common social context and close spacial distance *(Gibbons et al., 1994; Co-operation, O.f.E. and Development 2008).*

Talent mobility is not a target in itself but usually relates to the objective of sustainable economic growth. A study by WEF describes the topic of talent

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[2] Here, "Talent mobility" is understood as social mobility of S&T human resources of high quality.

mobility as policy and tool to achieve balance in global markets where the human resources are used as capitals and stimulating actors for national economic growth *(World Economic Forum, 2012)*. Also, a study conducted by European Commission shows that intersectoral talent mobility is seen as tool allowing transformation of research results to globally competing products. Therefore, talent mobility can promote research and innovation as well as enhancement of working capabilities, contribution for growth and vocational development for researchers *(European Commission, 2006)*.

As related to the notion of social mobility of scientists, according to *Geuna A*., the mobility can be defined as change and movement. Here, the main types of mobility are listed and noted as follows: (i) Educational mobility: changes between regular education levels; (ii) Labor mobility: changes of employers; (iii) Vocational mobility: changes of vocational state (e.g., work content); (iv) Field mobility: changes in occupational areas; (v) Geographic mobility: changes in locations; (vi) Social mobility: changes in social positions; and (vii) Sectorial mobility: changes of sector center *(Geuna A., 2015)*.

Nowadays, when the universities play important roles in the national innovation system (NIS) the vocational mobility includes not only learners and lecturers by tradition but other actors in S&T human resources of universities. As seen by a study by *Dao Thanh Truong*, the notion of "social mobility of S&T human resources" can be understood as a shift in social positions of S&T individuals or a group of S&T individuals; a shift in social positions between S&T individuals and/or various groups of S&T individuals in the system of social strata in scientific research activities, a shift from one geographic location to another one in the S&T system structure *(Dao Thanh Truong, 2016b)*.

In Vietnam, some recent studies also confirm a view that social mobility of S&T human resources between State owned research organizations (research institutes and research units of universities) and the production sector is a way to promote the organizational and institutional shift of Vietnam's innovation system *(Bach Tan Sinh, 2018)*.

1.2. Classification

WEF classifies the talent mobility into 4 groups depending on cooperation level as summarized in Table 1.

Table 1. 4 groups of talent mobility

Cooperation level	Description	Concrete cases as example
1. Cooperation within organization	Cooperation between units and parts in different geological locations within an organization for development to cover	- Demand-supply forecast on key talents; - Development of occupations and leadership with focus to build up necessary skills; - Integration between diversification strategies and involvements;

	information shortage and to get better internal demand-supply balance.	- Global mobility concept fitting well talent development strategies; - Setting up of strategical inheritance plans; - Promotion of internal mobility within organization.
2. Cooperation between organizations in the same country	Cooperation between different organizations for creation of sources and development of talents.	- Assignment of employees to other organizations; - Establishment of cooperation relations between businesses, Government agencies and education system for talent development; - Initiatives by the State for sharing labor demand information; - State driven programs for lowering "brain drain" and facilitating immigration.
3. Cooperation at sectorial or regional levels	Public-private partnership gets set up for promotion of talent mobility and development of skills as well as close joint working between vocational associations and State agencies for attraction and development of talents.	- Strategic evaluation of talents with development at sectorial level; - Demand-supply links through job offer events, job information gates and visits to universities; - Lecture programs with participation in higher education consulting councils; - Establishment of programs of paid and subsidized internships.
4. Cooperation at global or multinational levels	Closely joint links of Government agencies, international organizations and research institutes from numerous countries and regions for settlement of complex problems of talent mobility.	- Search of human resources by private companies from educational organizations and non-government organizations (NGOs) in many countries; - International development initiatives for development of skills and commercial cooperation agreements.

Source: World Economic Forum, 2012.

According to *Dao Thanh Truong (2016b)*, the social mobility of S&T human resources can be classified into the following forms:

Table 2. Some forms of social mobility of S&T human resources

Forms	**Characteristics**	**Impacts**	
		Positive	**Negative**
Vertical mobility	- Shift in social positions of individual scientists or a group of researchers to other social positions in other scientific communities at other levels. - Vertical mobility emphasizes: (i) Shift in administrative position in science community; (ii) Changes in scientific	Linked to deep development of science.	- Administrative institutions in scientific activities. - Tough academic mindset in

	grades and titles; (iii) Changes in scientific reputations. - Vertical mobility "up" (promoted) or "down" (dismissed): (i) from an administrative position to another one in science community; (ii) Linked to scientific power and decision making status for science related problems; and (iii) Related to changes in professional grades and titles.		scientific community (high appreciation only for scientists with high grades and titles).
Horizontal mobility	- Shift in positions of S&T human resources of high quality: (i) from economic sector to another one; (ii) from State owned scientific organization to private one or NGO; (iii) from a scientific organization to another one. - Shift from university to research institute and inversely. - Shift of human resources between universities, research institutes and between localities. - Shift of scientific human resources from rural areas to urban ones and etc.	Facilitation for development of new science disciplines. Settlement of "brain shortage" problem. Propagation of science. Promotion of knowledge transfer activities.	Interest conflict of mobilized individuals versus receiving organizations.
Social mobility with immigration	Reflected in the shift of scientific human resources between scientific organizations, sectors and fields when scientists move to more convenient working conditions and scientific activities.	Easier "brain flow".	This mobility relates to "brain drain" and "brain flow" between countries, territories, scientific organizations and fields.
Social mobility without immigration	Taken as multifunctional role-position phenomena of works, professional position of individual scientist that means a scientist can simultaneously take charge of multiple work positions.	Development of capabilities of individuals	On-site "brain drain".
Structural mobility	Bound, as rules, with horizontal mobility and related to shift of certain volume of a social group or scientists group from one research field to another for development of a new research field; bound to a S&T policy for certain time period.	Development of a new scientific field.	Interest conflict of mobilized individuals versus communities in other research fields.
Social mobility with generations	Changes in professional levels, scientific grades and titles or changes in scientific qualification between generations within family.	Inheritance of professional experiences and	Inequality observed in management and assignment

		knowledge.	of human resources of the same age segment (privileged elites).

Source: Dao Thanh Truong, 2016b.

This paper makes focus on analysis of the two main types of mobility mentioned in the above table by *Dao Thanh Truong*, namely *Social mobility with immigration* and *Social mobility without immigration* which target to promote the "brain flow" between universities and research institutes.

2. Social mobility of S&T human resources in ASEAN countries

Context

By 2015, ASEAN becomes a joint economic community with practice of free circulation of capital flows, resources, commodities and services. In this context, ASEAN countries have built "ASEAN Visions 2020" with long term objectives to "envision a technologically competitive ASEAN competent in strategic and enabling technologies, with an adequate pool of technologically qualified and trained human resources, and strong networks of scientific and technological institutions and centers of excellence".

For realization of this vision, ASEAN Committee on Science-Technology (COST) defines *"development of S&T human resources as a top priority"* (underlined by the author) with targets to settle demands from businesses and industries, create a life long learning and innovating environment, support lecturer training, update levels of S&T experts and learners and develop young technological businesses. Concrete initiatives by ASEAN COST in relation with social mobility of S&T human resources among ASEAN countries lead to establish ASEAN Talent Mobility Program, 2014-2015 period, under coordination by Thailand, the kick-off being defined as by 2014[3].

Almost all ASEAN countries are awere of challenges they are facing due to increasing demands in quality and quantity toward S&T human resources with narrowing and ageing trends of population. Together with that, social mobility of S&T human resources plays crucially important roles in socio-economic development, especcialy S&T human resource attraction.

S&T human resources have roles to supply knowledge and contribute renovations in various stages of S&T activities and thereby increase economic

[3] Workshops for ASEAN Talent Mobility Program (ATM) were held by March 2014, November 2014 and March 2015 in Thailand (www.aseantalent.net) with objectives: (i) Exchanges of points of view and experience on talent management and STI human resources development; (ii) Discussion on policies and mechanism for accelerating talent mobility in ASEAN countries and in the world; (iii) Exploration of potentials for ATM Program development as background for talent mobility between ASEAN and dialogue partners.

efficiency and growth. S&T human resource attraction will accelerate knowledge accumulation, innovation stimulation and, finally, "catalyze" faster economic growth. The "brain drain", in those countries, makes concerns due to shortage of S&T human resources and makes a precedent leading to "brain drain", especially in developing countries.

ASEAN countries take high view for S&T talen attraction policies for benefits from the both flows, inbound and outbound, of social mobility of S&T human resources. Table 3 gives illustrations of some typical policies of ASEAN countries

The context of integration and globalization in S&T sector brings in not only easier chances for attraction of S&T human resources of high quality but also, in another direction, difficulties in restricting the flow of S&T human resources to other markets, not only ASEAN countries. Therefore, all the ASEAN countries pay great cares to building up qualified S&T human resources for absorption and use of S&T knowledge for socio-cultural-economic development. Globally, ASEAN countries make focus on measures to restrict disadvantages and negative impacts from social mobility of S&T human resources as follows:

- Offering scholarships for talents to make studies in S&T fields. They can follow graduate level and higher in reputed universities in developed countries;
- Calling home their overseas peoples who are high qualified experts to return for development of the homeland;
- Stimulating students to follow studies in S&T fields as well as revising and updating teaching programs in universities.

Table 3. Policies for attraction of S&T human resources in some ASEAN countries

Countries	Policies
Vietnam	The Vietnamese Government issued 6 policies in relation to immigration and residence, recruitment, labor, study, salary, accommodation, information access, bonus, honor and etc., typically, Decree No. 87/2014/ND-CP on 22 September 2014 governing the attraction of S&T individuals in Vietnam.
Thailand	The Thai Government issued the project "Reverse the brain flow" by 1996 and coordinated with Association of Thai Overseas Experts in granting finances to attract overseas Thais from North America, Europe and Japan to come back temporarily.
Singapore	The Singaporean Government established Talent Recruitment Committee and 4 centers to support resettlement of overseas human resources, namely: (i) Center to search talents; (ii) Center to help students get working skills and accumulate experience; (iii) Center to link businesses and education system; and (iv) Center to support development of talents. In addition, grants are offered for talent students from the countries in the region who have to commit to stay for 6 years of work as at least.

Malaysia	The Malaysian Government issued specific policies to attract talents such as the 15% individual tax rate imposed during 5 years for those who come back and the tax exemption for related assets. In addition, other programs are set up to attract talents, namely: a program to receive Malaysian and overseas scientists (implemented since 1995) and a program to repatriate overseas Malaysian scientists (implemented since 2000).
Philippines	The Philippine Government issued a large scaled program in S&T fields though Law on S&T Scholarship (1994) and certain national development programs, 2002-2020 period, deal with attraction of high class S&T human resources.

Source: Dao Thanh Truong, 2016a.

Singapore is seen as exemplary successful of effective management and use of domestic and overseas S&T human resources of high quality. As demonstrated, Singapore was highly successful in attracting and retaining international S&T human resources and considered the world's center of talent attraction. For gaining the today's success, the Singaporean Government, since the time of Prime Minister Lee Kuan Yew, has followed a methodical policy for talent attraction and actually implements *Singapore Policy Document 2000*. In addition to that, the Government, for attracting S&T human resources of high quality, focuses not only on income remuneration and jobs but also working environment, rescpectful care and dedication for advanced education systems. It was really a good policy orientation for both talent attracting and retaining policies by Singapore.

In Malaysia, as noted in *"International Immigration Report 2013" (UN Report, 2013)*, the program of receiving Malaysian and external scientists was implemented since 1995. The policies of this program include: (i) Reduced income tax for the transferred remittances during 2 years since the immigration date; (ii) Reduced import tax for family use commodities including 2 cars for every family; (iii) Status of permanent residence granted for the spouse and children within 6 months after the return. As observed, this policy brought in optimist results, namely: 361 applications were submitted by September 2001 where 287 applicants entered to works in fields of industry, finance-accounting, medical services and others.

The following part of this paper gives an in-depth presentation of Thailand experiences in promoting social mobility of S&T human resources in relation to National Innovation System (NSI) with objectives to accelerate the flow of knowledge, especially tacit one, through social mobility of S&T human resources of high quality. The choice of Thailand for in-depth study topic and then suggestive lessons for Vietnam was made due to similarity of the two countries in socio-economic context and development visions.

3. Social mobility of Thailand S&T human resources

Thailand economy can be described as export orienting with multisectoral markets of products, from agricultural products (rice, rubber, sugar and

tapioca) to heavy industry commodities (textile-garment, cars and electro-electronic components) *(Intarakumnerd, P., 2015)*. With contributions from multinational corporations, the production volume and growth of groups of industrial sectors get improved considerably. This makes Thailand one of the most important centers of these corporations in ASEAN countries and other developing countries. With the strategies of diversification of national economy, Thailand achieved impressive export growth. As example, the GDP contribution from export of electro-electronic products and cars increased from 0.04% and 0.25% by 1970 to 25.20% and 6.68% by 2006 respectively *(Yusuf, S. and K. Nabeshima, 2009)*. As results, the annual economic growth rate of Thailand was 6.1% during 1960-2014 period. As reported by World Bank, Thailand becomes a high middle income country by end 2011. However, recently the Thailand economy gives signs of lowering trends of GDP growth rate, investment and export after 2001, in comparison to the ones of the time before Asian financial crisis.

Actually, Thailand has to face the "middle income trap". This gets exhibited when the national economy cannot be longer based on cheap labor and low qualified and low skilled labors in works of research nature, and then faces difficulties in manufacturing deep technological and valuable products. In this situation, Thailand has to compete with other countries that have low average income rate per capita. This leads Thailand to have possibly to face shorted labors for competition at middle and high levels of qualification and skills. The problem is found more difficult to be controlled due to future changes of demographic rate that lead to higher average working age and thereby reduces the overall working productivity of Thailand's economy. Also, only a limited number of big sized and multinational corporations with technological capacities are able to get high positions in global chains of trademarks and values. Industrial sectors of Thailand are found under pressure from application of minimal salary policies and then higher production costs. As results, industries have to improve labor productivity and shift to manufacturing higher added value products. Therefore, the application of science-technology-innovation (STI) policies for higher industrial productivity is the key to lead Thaland's economy to future success.

Private sector is the core component of economic systems. Therefore, actually it is important for the Thailand Government to enhance creative capability, promote R&D works and renovate activities in private companies. By 2013, the global expenditure on R&D (GERD) of Thailand makes 0.47% GDP that is found far lower than the one of other Asian countries such as Japan (3.35%) and Singapore (2.04%) by 2012. By 2013, the private sector of Thailand makes 47% of total expenditure on R&D (coming from 41% by 2006) while the one of Japan and Singapore are 77% and 61% respectively *(National Science Technology and Innovation Policy Office, 2016)*. Even with promising increasing trends in investments for R&D in private sector the growth rate is

very low that causes difficulties for Thailand in objectives to achieve the level of other countries with industrial development orientations.

The number of R&D human resources of Thailand is low. By 2012, the number of the manpower of R&D sector per 10,000 habitants (by Full Time Equivalent - FTE) of Thailand is 10.05 while the one of Japan and Singapore is 68.1 and 74.3 respectively. Majority of manpower in R&D sector of Thailand (64% FTE of year) are working in public organizations, higher education systems and non-profit organizations *(National Science Technology and Innovation Policy Office, 2014)*. The condition for getting the Thai Government scholarship requires the applicants, after finishing the studies, to return to work in the State organizations which sent them to study. As results, only one third R&D staffs decide to work in private groups. However, it is 2-8 years to wait to develop a good quality R&D staff and then the regular training approach might not be a choice of feasible solutions for a private company in short term views.

Thailand companies also are not active in cooperation with universities in R&D and innovation activities. A STI survey conducted in 2015 shows that only 26% of surveyed businesses have cooperation activities with universities in the field. The main mode of cooperation (17% of surveyed businesses) is to offer chances for internship terms by graduates. Also, the rate of activities for higher learning capabilities by employees of companies, such as joint research programs, exchanges and training courses is low *(National Science Technology and Innovation Policy Office, 2015)*.

For mitigation of impacts from that, the National STI Policy Office (STI Office) - the State agency in charge of promoting STI activities in Thailand - started the "Talent Attraction" program. The target of this program is to facilitate mobilization of R&D human resources from public research institutes and universities to work in private companies. The Thailand Congress had approved a rule for converting the time of their participation in the program to the working time in their organizations.

Governments of many developed countries encourage a large mobilization of researchers to work in industries as measure for dissemination of knowledge in national scales of innovation systems. Development programs and policies in different countries have differences in certain aspects including mobilization terms, financial incentives, priority groups and focus fields. Singapore had set up Agency for Science, Technology and Research (A*STAR) as leading public research institute that takes initiatives to enhance capabilities of businesses or T-ups. These programs allow scientists and research ingeneers of A*STAR to work in local companies with a time share of 30% of the working time, as minimum, and in two project, as maximum, per year. The program grants also supports with values up to 70% of salaries for researchers if they work at the same time for SMEs. In France, Institut National de la Santé et de la Recherche Médicale - INSERM - (the French National Institute of Health and Medical Research)

allows researchers to work in hospitals, universities or production facilities in the same research system within a period of 3-5 years. INSERM takes charges to pay two-thirds of their salaries while the partners take charges of the remaining part *(European Commission, 2006).*

Similarly, the Spanish Government had built up a program of support for R&D activities by SMEs through provision of 75% of salaries of researchers during a time term up to 3 years.

Another program, Marie Curie Industry-Academia Partnerships and Pathways (IAPP), is a project by EU to support and mobilize researchers from research institutes and universities in EU member countries to work in industrially oriented R&D sectors, especially in SMEs. This program provides a support for the full salaries of researchers.

In Thailand, recently STI Office proposes a policy to allow researchers from public research institutes and universities to work in private companies. For mobilization of these human resources, researchers are allowed to conduct research activities in private companies including: (i) R&D activities; (ii) Solutions of technical problems; (iii) Standardization and tests; and (iv) Management renovation. The program requests a scheme of one day work per week in private companies in a time term from 3 months to 2 years. In case, if partners are SMEs, the program provides supports for families of researchers during their long absence due to required mission trips and development of businesses. However, if researchers are not able to fit the time schedule and required quality of works, they are required to repay these supports and their families do not get any supports from this program. In addition, the program provides annual allowances for graduate and post-graduate students as sources of research assistants for projects in this program.

Thailand's talent mobility program

By 2010, STI Office started studies for possible implementation of talent mobility for the first time. The program was officially announced by 2013 with continuous improvement in 4 implementation stages as noted in Table 4. The compulsory conditions of the program, as discussed in advance, did not change during the 4 stages. Details of every stage are presented as follows:

Table 4. Development of the talent attraction program

Stages	Participants	Financial support
I	National Science-Technology Development Agency (NSTDA)	Up to 70% of costs for every project but not exceeding THB400,000.
II	Support center (CH)	1) 1.5 time of salaries of researchers and additional supports for universities; 2) Monthly amount of support of THB8,000-12,000 THB for research assistants.

III	Support center (CH) and universities	1) 1.5 time of salaries of researchers and additional supports for universities; 2) Monthly amount of support of THB8,000-12,000 THB for research assistants.
IV	Ministry of Education and Training (OHEC)	1) THB400,000 based on FTE of researchers; 2) THB200,000 for tests and materials. Projects can get financial supports from OHEC and STI.

Source: National Science Technology and Innovation Policy Office 2016

Stage I: Test stage by STI Office and NSTDA (2013-2014)

During the first stage, STI Office had initiated the project by cooperation with Industrial Technology Assistance Program (ITAP) under National Science-Technology Development Program (NSTDA - Thailand's leading Government research agency). The program is in charge to enhance productivity of SMEs by provision of consulting experts and supporting funds for businesses to develop products or production procedures. Then, ITAP sets up links with S&T experts called Industrial Technology Advisor (ITA) and a mechanism to mobilize experts. ITA cooperates with companies and help them settle technical problems. ITA supports SMEs by provision of suitable funds up to 70% of the total project cost but not exceeding THB400,000. The program requests ITA to contribute 20% of their working time as minimum for a time term from 2 months to 3 years for the project. In this stage, 25 projects from 18 SMEs and 4 large businesses were completed with assistance from 53 experts (who are advisors).

Stage II: Establishment of support centers (since mid 2014 to now)

After testing activities, ITAP program proposes researchers, if being unable to participate in the program, can be mobilized and work with private companies in other support programs of the Government. In Stage 1, Government owned research institutes and universities did not develop any mechanism for their personnel officially to cooperate with private companies. Therefore, Stage 2 of the program orients to establish larger links, allows amendment of internal rules, intersectoral mobilization of researchers and recruitment of support staffs for linking talent researchers with private companies, all of these activities targeting changes of awareness, communication and intellectual properties.

STI Office established support centers within universities in 4 regions of Thailand, namely North, South, North-East and Central regions. This meets demands of private companies in accessing talent resources from universities in the same region. These support centers help universities set up visions for talent management meet needs from industries. Also, these support centers can build up a network of researchers through cooperation with universities in the same region. STI Office had established a talent attraction unit to link the 4 support centers with the National Talent Mobility Committee.

Stage III: Extension of the network of universities (since end 2014 to now)

The program, after certain time of implementation, shows the demands from private companies were not satisfied due to a limited number of researchers from partner universities. For better satisfaction of demands, STI Office agreed to sign MOUs for further promotion with numerous universities over the whole country including national technological universities and technical colleges. Almost all these universities locate in Central Region and the number of partner universities increased from 4 to 20. Thereby, the program can become more efficient in meeting increasing demands from businesses in Central Region for participation in this program. At this time, the regulations related to talent mobility were accepted and implemented by universities. These regulations are different in level of restriction and flexibility of application because they depend on awareness, culture and status (public or private) of partners.

Stage IV: Talent mobility with cooperation from Office of the Higher Education Commission_(since 2015 until now)

During the most recent stage of implementation of the program, the participation of the Higher Education Commission (OHEC) is seen in provision of research funds for SMEs. Otherwise, SMEs face finance shortage for realization of projects. At present time, both OHEC and STI Office are working closely and setting up a joint plan for implementation of the program, especially in terms of future budgets. This would help universities and support centers with budgets for their personnel participate in realization of mobility programs by universities and companies and activities for program evaluation, capacity building and awareness rising. Also, additional funding sources from OHEC help better the program through supports for research institutes and universities, provision of allowances for researchers and students as well as research equipment and materials.

Evaluation of Thailand's Talent Mobility Program

The program was continuously developed and improved during implementation stages. This program extends considerably the scope after issuance of the resolution for promoting Thailand's talent mobility on 18th February 2015. The number of projects increased from 9 to 44 with 95 researchers and 122 research assistants mobilized to private companies. Despite of difficulties in terms of time, complexity in program participation and shortage of support centers in some research institutes and universities, the number of mobilized talents keeps increasing continuously.

For implementation of Stage 2 and Stage 3, the talent mobilization process was started by helping researchers meet with private companies. Applications for participation were submitted to STI Office for approval within a week time. Obviously private companies highly wish to start their projects as soon as better. In Stage 4, the procedure to make researchers and businesses meet gets slightly

different. OHEC calls for proposals from researchers every 2-3 months. The implementation of activities under OHEC support programs shows considerable progress with a bigger number of project proposals. This maybe comes from familiar practice of university researchers to write proposals and then submit to research sponsoring organizations. In addition, from view of university researchers, the support grants from Government agencies require conditions less than the ones of private companies where the latters usually require higher level of industrial experience and credibility from researchers.

After two year of the program implementation, 240 researchers and 157 research assistants were mobilized to private companies in 27 cities and provinces over the whole country. However, as shown by a survey made by STI Office, the number of private companies wishing to participation in the program comes up to 1,374 which is much higher than the meeting capacities by the program *(National Science and Technology Development Agency, 2015)*. For addressing these over-demands, it is necessary to call universities to put the objectives of the program in high agenda of priorities.

In optics of researchers, research funding are one of attractive factors of the program. Therefore, the integration of research supports from other institutions makes great impacts to the program. As usual, it may take a long time, sometimes coming up to several months that businessmen never want to see, for researchers to get permission for participation from faculty heads or university heads. Now, the approval for participation can be made before presentation of project proposals due to high demands of researchers to participate in this program. The procedure with pre-approved permission includes the check of work and experience volumes of potential researchers. This would be made before every university semester starts.

Since the demands from industries are high the program called for participation from many universities. Also, the program is initiated by STI Office then the support would be limited within S&T activities while the scope of problems from private companies may include other aspects. Therefore, other supporting organizations such as OHEC and Thailand Research Foundation (TRF) wish to establish a similar program to support talents in S&T non-related fields.

Business secrets are barriers to cooperation potentials between universities and businesses in industrial sectors. Some private companies may be highly careful in allowing external researchers to work in their facilities for a long time period. Therefore, it is necessary to develop reciprocal trusts between universities and industrial development companies. Therefore, any talent mobility program in future needs to turn more attentions for creation of links between universities and companies. The procedure of this type of programs would provide researchers with possibilities to link with, meet together and participate in exploration of new topics of research with companies before

drafting research projects. Joint working would enhance trusts between partners.

Some suggestive lessons for Vietnam

Policies to promote social mobility of S&T human resources of high quality are to ensure development of potential resources of S&T organizations including attraction, training and development of talents, facilitating development of S&T human resources of high quality. Thailand issued some concrete measures, such as Talent Mobility Program, with a linking network established in some key economic regions of the country. In Vietnam, up to now, there is no interministerial program (coordination between concerned ministries such as Ministry of Science and Technology, Ministry of Education and Training, Ministry of Labor, War Invalids and Social Affairs) announced to promote talent mobility as Thailand does.

Thailand's policies to promote talent mobility is a set of measures of managing agencies to ensure the "brain circulation" by encouraging and pushing social mobility of S&T human resources between organizations and sectors in the country and, thereby, contributing and enhancing innovation potentials of the country, sectors and businesses, and serving sustainable development. Thailand's experiences would help Vietnam consider necessity to build up a policy to promote talent mobility. In these activities, Vietnam has issued and implemented certain strategies and policies for development of S&T human resources such as Decision No. 4009/QD-BKHCN on 29th December 2011 by MOST approving Master Plan for development of S&T human resources, 2011-2020 period, Decision No. 418/QD-TTg on 11th April 2012 by the Prime Minister approving Strategies for S&T development, 2011-2020 period[4], Decision No. 20-NQ/TW on 1st November 2012 by the Party Central Committee on S&T development for industrialization and modernization in context of socialist oriented market economy and international integration[5].

[4] Strategies for S&T development, 2011-2020 period has many contents renewed in break-through moves. One of them deals with necessity to offer focus for solutions in fields of human resources and financial investments for S&T sectors. They are basic conditions to ensure realization of S&T tasks. In terms of human resources, attentions should be focused for certain groups. They are experts capable to indicate S&T problems and settlement tasks, general constructors capable to design and lead effective realization of S&T tasks of national large scale and intersectoral research teams for realization of S&T tasks. Especially, it is necessary to upgrade the level and capacities of S&T management staffs. Training is a solution for long term vision but, for short term vision, it is possible to issue special policies for attraction and immediate use of S&T workforces available domestically and abroad. These policies would be fast effective, low cost and less time consuming than renovation of training activities which are able to produce useful effects in a long future (after 10 to 15 years).

[5] For concretization of views and objectives of the Decision, some tasks were drawn out for development of human resources, namely "Building and implementing policies for training, development, respectful use, remuneration and honoring of S&T staffs, especially high qualified and contribution rich experts; Offering convenient working environment and facility condition for S&T staffs to develop their talent and get worthy benefits from their creative work values; Enhancing competences, qualification and quality of S&T management staffs at all sectors and levels". "Effective use of students, post-graduate students and S&T experts who actually study or work abroad; Issuance of policies to support S&T staffs for their overseas trips with working and training purpose within limited time for realization of national valued S&T tasks".

4. Conclusion

Social mobility of S&T human resources in each field, in each country and region has different characteristics. But in the end, it is the "brain drain" problem, “brain drain” and the policy are the tools to solve that existing problem. There should be a policy on social mobility of talents to encourage the flow of knowledge, especially the tacit knowledge between the research area at research institutes and universities and the production sector, which includes specialized programs and organizations on mobile social talent.

Successful development of ASEAN region, in great part, depends of the way the member-countries implement policies to achieve the common objectives of the region. ASEAN countries are creating an environment of institutions and policies to promote the social mobility of qualified human resources and S&T human resources. However, majority of national programs have achieved modest results (except Singapore, Malaysia and Thailand) in quality of S&T human resources.

In future, the countries should focus efforts on promoting social mobility of S&T human resources through screening programs instead of policies to support immigration and migration of population. The promoted flow of knowledge and “brain” requires combination of various policies such as policies for managing labour market, innovation, education and cooperation with national and regional policies. In addition to agreements such as RCEP, TPP, AFTA and AEC, the countries need to create suitable tools and policies to promote changes by regional members to target close coordination between them for social mobility of human resources, especially S&T ones. Up to now, ASEAN countries have implemented a pilot project of talent mobility (ATM, 2014-2015) and expect to get certain lessons and experiences from this pilot program.

The reason leading to social mobility of S&T human resources is the uneven chances to access resources (information, material, human resources) and science rewards. The shortage in salary policies and low life level of S&T workers, gaps between countries and scientific organizations, remuneration schemes for scientists are reasons leading directly to social mobility of S&T human resources. It is the actual sign of impacts from socio-economic factors, economic ones as first, and other S&T resources to social mobility of S&T human resources.

The deep shift of objectives in policies to promote social mobility of S&T human resources from preventing the “brain drain” and retaining S&T human resources to orienting the “brain flow” and creating favorable environment for S&T activities and talent attraction is the concrete solutions as contributions to direct the flow of S&T human resources in ASEAN countries./.

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