

The Core Competency Evaluation of Thai Engineers and Thai Architects after Accommodating ACPE and AA of the AEC in 2015

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Abstract - This research aims: 1) to specify the core competency of Thai engineers and architects after accommodating ASEAN chartered professional engineers and architects, 2) to evaluate the actual core competency of Thai engineers and architects after accommodating ASEAN chartered professional engineers and architects, 3) to analyze the causal model affecting the core competency of Thai engineers and architects, and 4) to propose policies for the development of the core competency of Thai engineers and architects after accommodating ASEAN chartered professional engineers and architects of the ASEAN economic community in 2015. Qualitative research methodology was employed in this research by obtaining in-depth interviews from the experts. This was to gain information for creating well-designed questionnaires. Quantitative research methodology was also employed by collecting questionnaires from Thai engineers and architects residing in Bangkok. The sample size was 140 participants, using the formula $n=50+8p$. The questionnaire covered all of the variables in accordance with the purposes of the study.

The study indicated that the core competency of Thai engineers and architects after accommodating ASEAN chartered

professional engineers and architects with respect to foreign languages, laws, and culture was at a moderate level (46.4-77.9%); competency with respect to professional skills for Thai engineers and architects was at a moderate level (average = 2.62 or 65.5%); competency with respect to Thai professional engineering and architectural experience in each area was at a moderate level (average = 2.69 out of 4, or 67.41%); competency with respect to the professional ethics of Thai engineers and architects was at a moderate level (49.3-64.3%); and competency with respect to human resource development in engineering and architecture was at a moderate level, by obtaining Continuing Professional Development (CPD) after accommodating ASEAN chartered professional engineers and architects. Causal model analysis revealed that the variables in Thai professional engineering and architectural experience in the ASEAN Economic Community and the variables in human resource development in engineering and architecture appeared to be intervening variables, playing a moderate role in the core competency of Thai engineers and architects. However, they have a significant effect on the professional ethics of Thai engineers and architects.

Keywords - Thai Engineers and Architects, Core Competency, Professional Ethics

I. INTRODUCTION

The ASEAN Economic Community has agreed upon ASEAN Mutual Recognition Arrangements (MRAs) working toward the adoption of seven practices, namely medical practitioners, dental practitioners, nursing services, architectural services, surveying qualifications, accountancy services, and engineering services. Provided that these professionals are qualified and meet the standards set by each country, they will be able to work freely in the ASEAN member countries and be treated like their citizens. The MRA in engineering services offers the principle of enabling qualified engineers to register as ASEAN Chartered Professional Engineers (ACPE) and ASEAN Architects (AA).

As a result, the licensing of engineers and architects in other ASEAN countries will be facilitated (otherwise having to abide by the internal rules of each country). In some countries, including Thailand, ASEAN professional engineers and architects are required to work with local engineers and architects. The engineers and architects who want to apply for such registration must be assessed by the Monitoring Committee (MC) in each country. In Thailand, for the engineers, this will be conducted by the Council of Engineers; and for the architects, this will be operated by the Architect Council of Thailand. For the ASEAN implementation of this task, it will be performed under the supervision of the ASEAN Chartered Professional Engineer Coordinating Committee and ASEAN Architects, consisting of representatives from the MCs of member countries. To best prepare Thai engineers and architects to meet the needs of the labor market, standards are as follows:

1. Preparation to meet the needs of the regional labor market of the engineers and architects.

2. Preparation for entry into the ASEAN Economic Community. The Council of Engineers, as the authority for the regulated

engineering profession, and the Architect Council of Thailand, as the authority for the regulated architectural profession, have established mutual agreements to facilitate the relocation of ASEAN professional engineers and architects by taking into account three principles, which are: 1) education; 2) professional practices; and 3) rules in each country. The ASEAN Mutual Recognition Agreement with reference to engineering and architecture had set the qualifications of Thai engineers and architects before the official announcement as follows: 1) having graduated from the accredited courses; 2) having experience acting as an expert or a professional, having graduated not less than seven years previously; 3) having completed at least two years of experience in engineering and architecture; and 4) having obtained Continuing Professional Development (CPD) at a satisfactory level.

II. METHODOLOGY

This research was conducted to evaluate the actual core competency of Thai engineers and architects, after accommodating ASEAN chartered professional engineers and architects who have been working as ASEAN Chartered Professional Engineers (ACPE) and ASEAN Architects (AA), by combining research methods as follows:

1. A field survey was quantitatively conducted by collecting questionnaires from Thai engineers and architects residing in Bangkok. Having attended the training sessions and seminars held by the Council of Engineers and the Architect Council of Thailand between 2016 and 2017, they, a sample of 140 participants, are licensed under a regulated engineering profession and a regulated architectural profession.

2. In relation to the practice of a regulated engineering profession and a regulated architectural profession, the interviews were qualitatively conducted with experts who have more than ten years of experience.

III. FINDINGS

A. Characteristics of the Research Sample

The sample of 140 participants consisted of 92.9% males and 7.1% females. They resided in Bangkok and obtained the Professional License of Chartered Professional Engineers from the Council of Engineers and ASEAN Architects from the Architect Council of Thailand. The sample included 17.9% of participants between the ages of 25-39, and 82.1% between the ages of 40-65. A total of 86.4% were married, and 13.6% were single. Those who had a bachelor's degree were at 82.9% while 17.1% had either a master's or doctor's degree. Those who were associate engineers or architects totaled 85% while 15% were professional / senior professional engineers or architects. Those who were non-engineers or non-architects totaled 89.3%. Those who had an average monthly income of more than 30,000 baht amounted to 87.1%.

The sample was comprised of 59.3% of participants who had never worked in ASEAN member countries, and the rest (40.7%) was comprised of: 80% used to work in ASEAN member countries for less than one year, 90% had been working in ASEAN member countries less than one year, and 97.1% had worked in a regulated engineering profession and/or a regulated architectural profession for less than one year.

From the sample, 50% had attended Continuing Professional Development (CPD) after registering for the Professional License of Chartered Professional Engineers and ASEAN Architects. From the sample, 54.3% had attended training for the promotion of a regulated engineering profession and a regulated architectural profession. A total of 75.7% had attended training for the enhancement of the practices of a regulated engineering profession and a regulated architectural profession. A total of 57.1% had attended training for the professional ethics of Thai engineers and architects. Finally, 51.4% had never attended any training for a regulated engineering profession and a regulated architectural profession.

B. Evaluation of the Actual Core Competency of Thai Engineers and Architects

1. Bodies of professional knowledge in working as ASEAN professional engineers and architects are divided as follows:

- English language skills: reading was at a high level (46.4%), writing was at a moderate level (57.1%), and speaking was at a moderate level (45.7%).

- ASEAN language skills were at a very low level or at the level of no ASEAN language skills for working as ASEAN professional engineers and architects (77.9-100%).

- Knowledge of international laws in ASEAN community countries, such as laws or practices concerning ASEAN professional engineering and architecture was at a moderate level (29.3%); knowledge of laws in each country was at a low level (80.7%); and knowledge of international law was at a low level (82.1%).

- Knowledge of each ASEAN community country's culture and/or norms was at a low level (52.9%); knowledge of traditions was at a low level (67.1%); and knowledge of culture was at a low level (65%).

- Knowledge of a regulated engineering profession and a regulated architectural profession in ASEAN community countries, as to the regulations for engineers, was at a moderate level (70.0%), whereas with regard to the laws for ASEAN professional engineering and architecture, knowledge was at a low level (57.9%).

2. Professional Skills for Thai Engineers and Architects:

- Computer skills were at a moderate-high level (51.1-75.0%) regarding program installation, such as Microsoft Office, AutoCAD, and other utility programs, with an average (\bar{x}) of 2.62 out of 4.

3. Professional Experience of Thai Engineers and Architects in Each Area:

- In consultancy (diagnosis, recommendation, and auditing proof), the level of experience was at a moderate-relatively high level (68.6-75.7%).

- In project planning (project study, appropriate analysis and planning of the project), the level of experience was at a moderately low or extremely low level (37.1-45.7%).

- In calculation and design, the level of experience was at a low-moderate level (35.7-67.9%) regarding the use of theoretical knowledge and expertise concerning the details of construction, creation, and production, as well as machine and factory planning that contains specific and estimated calculations, with an average (\bar{x}) of 2.09 out of 4.

- In supervision and manufacturing, the level of experience was at a moderate-high level (48.6-64.3%) regarding the direction of supervision, control of construction, control of manufacturing, control of installation, control of maintenance, control of modification, control of demolition, and control of movement, in accordance with the requirements of engineering and architectural professions, with an average (\bar{x}) of 2.45 out of 4.

- In inspection, the level of experience, with regard to researching, analyzing, testing, and data collecting was at a moderate-high level (52.0-58.6%). The experience was attained in principle and in inspection, with an average (\bar{x}) of 2.45 out of 4.

- In operation direction, the level of experience was at a moderate-high level (50.0-56.4%) regarding operation direction of an individual's work or the whole system, in accordance with the requirements of engineering and architectural professions, with an average (\bar{x}) of 2.43 out of 4.

4. Thai engineers and architects attached importance to professional ethics at a high-highest level (49.3-64.3%); for example: they must never do anything that ruins professional honor; they must get the work done properly according to certain principles; they must work with honesty; they must never use their power improperly; they must never take advantage of others, such as contractors or any other persons involved in the operation, etc., with an average (\bar{x}) of 3.37 out of 4.

5. Thai engineers and architects, when compared with engineers and architects from ASEAN community countries, had some higher core competency in areas, such as human relations, communicative skills, knowledge of technology, and the capacity for developing equipment (50.7-54.3%). The core competency areas with a similar level were: knowledge of their work, professional ethics, human relations, communicative skills, and social responsibility; knowledge of technology; knowledge of laws and regulations of each country; adaptability to the ASEAN Community; development of educational institutions and knowledge; development of technology and equipment for teachers; potential development for engineers and architects; and promotion of employment, with an average (\bar{x}) of 3.39 out of 4.

6. Thai professional / senior professional engineers and architects who were seniors, with regard to age, and had a high income were those having had overseas engineering and architectural experience, with statistical significance ($\beta_{\text{age}} = 0.135, p \leq 0.01$); $\beta_{\text{career}} = 0.165, p \leq 0.01$).

7. Thai professional / senior professional engineers and architects who were seniors, with regard to age, and having had a high education level were those who had more engineering and architectural human resource development mechanisms than those who were associate engineers and architects, with statistical significance ($\beta_{\text{type}} = 0.187, p \leq 0.05$; $\beta_{\text{age}} = 0.193, p \leq 0.05$; $\beta_{\text{education level}} = 0.337, p \leq 0.001$); ($F = 6.831, p \leq 0.001$), and similarly, they had a greater influence on engineering

and architectural human resource development than their counterparts (29.4-25.1%).

8. Thai engineers and architects who had a high monthly income also had a high level of professional ethics, with statistical significance ($\beta_{\text{income}} = 0.352, p \leq 0.001$).

9. Thai professional / senior professional engineers and architects had a higher income and more engineering competency than ASEAN engineers, with statistical significance ($\beta_{\text{income}} = 0.400, p \leq 0.001$; $\beta_{\text{status}} = -0.188, p \leq 0.05$; $\beta_{\text{type}} = -0.265, p \leq 0.01$; $\beta_{\text{career}} = -0.137, p \leq 0.05$); ($F = 4.838, p \leq 0.001$). That is, particular characteristics of an individual had an influence on professional engineering and architectural competency compared with engineers in ASEAN community countries (22.8%-18.1%).

10. Thai professional / senior professional engineers and architects who had a high level of education and income are those who had a high level of core competency in engineering and architecture with statistical significance ($\beta_{\text{type}} = 0.288, p \leq 0.001$; $\beta_{\text{education}} = 0.240, p \leq 0.05$; $\beta_{\text{income}} = 0.226, p \leq 0.05$); ($F = 6.627$ and $p \leq 0.001$). To conclude, personal characteristics had an influence on the core competency of Thai engineers and architects with statistical significance (28.8-24.5%).

11. The core competency of Thai engineers and architects was significantly correlated with the professional ethics of Thai engineers and architects ($\beta = 0.013, p \leq 0.01$).

12. There was a negative correlation between the registration period of the ASEAN professional engineers and architects and their comparative competency in engineering and the core competency of Thai engineers and architects with statistical significance. In other words, Thai professional / senior professional engineers and architects with a shorter registration period than those of other ASEAN professional engineers and architects had less competency than those of ASEAN engineers and architects ($\beta = -0.214, p \leq 0.05$).

13. The core competency of Thai professional / senior professional engineers and architects who had a relationship between overseas engineering and architectural experience had positive causal relationships ($\beta = 0.095, p \leq 0.05$). That is, the overseas engineering and architectural work experience had an influence on the core competency of Thai engineers and architects with statistical significance ($F = 5.989, p \leq 0.001$).

14. The engineering and architectural human resource development mechanisms were positively correlated with the core competency of Thai engineers and architects ($\beta = 0.328, p \leq 0.001$). That is, the engineering and architectural human resource development mechanisms helped enhance the core competency of Thai engineers and architects with statistical significance ($F = 16.581, p \leq 0.001$).

15. The engineering and architectural human resource development mechanisms were negatively correlated with the comparable engineering and architectural competency of Thai engineers and architects and the ASEAN engineers and architects ($\beta = 0.394, p \leq 0.05$). Engineering and architectural human resource development mechanisms helped enhance the comparable engineering and architectural competency of Thai engineers and architects with statistical significance ($F = 7.320, p \leq 0.001$).

16. The engineering and architectural human resource development mechanisms were positively correlated with the professional ethics of Thai engineers and architects ($\beta = 0.394, p \leq 0.05$). Engineering and architectural human resource development mechanisms helped enhance the professional ethics of Thai engineers and architects and the ASEAN engineers and architects.

17. Personal characteristics and overseas engineering work experience had an influence on the core competency of Thai engineers and architects with statistical significance ($F = 5.989$ and $p \leq 0.001$), with an influence on the core competency of Thai engineers and

architects amounting to 29.3% ($R^2 = 0.293$). That is, Thai professional/senior professional engineers and architects had higher core competency than Thai associate engineers and architects with statistical significance ($\beta_{\text{education}} = 0.247$, $p \leq 0.05$; $\beta_{\text{type}} = 0.276$, $p \leq 0.01$; $\beta_{\text{income}} = 0.227$, $p \leq 0.05$).

18. Personal characteristics and the professional ethics of Thai engineers and architects had an influence on the core competency of Thai engineers and architects with statistical significance ($F = 6.081$ and $p \leq 0.001$), with an influence on the core competency of Thai engineers and architects amounting to 29.6% ($R^2 = 0.296$). That is, Thai professional/senior professional engineers and architects had higher core competency than Thai associate engineers and architects with statistical significance ($\beta_{\text{type}} = 0.287$, $p \leq 0.001$; $\beta_{\text{education}} = 0.249$, $p \leq 0.01$; $\beta_{\text{income}} = -0.259$, $p \leq 0.01$).

19. Personal characteristics and competency of ASEAN professional engineers and architects had no significant influence on the core competency of Thai engineers and architects with statistical significance ($F = 7.090$ and $p \leq 0.001$), with an influence on the core competency of Thai engineers and architects amounting to 32.9% ($R^2 = 0.329$). Thai engineers and architects had a moderate income, when compared with ASEAN engineers, with statistical significance ($\beta_{\text{income}} = -0.231$, $p \leq 0.001$; $\beta_{\text{education}} = 0.249$, $p \leq 0.01$; $\beta_{\text{career}} = 0.318$, $p \leq 0.01$). See in Fig. 1.

IV. DISCUSSION

1. The core competency of Thai engineers and architects consisted of knowledge, skills, and experience as follows:

- English language skills (reading, writing, and speaking) were at a moderate level because Thai engineers and architects had practiced their English skills perpetually with the support of government agencies and educational institutions. On the other hand, ASEAN language skills were at a very low level, as was knowledge of international laws

and culture in ASEAN community countries. This may be due to a lack of communication among ASEAN professional engineers and architects.

- Professional skills for Thai engineers and architects were, in general, at a high level because Thai regulated engineers and architects normally used the tools of their professions.

2. Experience in the regulated engineering profession and the regulated architectural profession consisted of consultancy [3] (recommendation, diagnosis, and auditing proof), which was at a moderate level, and project planning (project study, appropriate analysis, and planning of project), which was at a moderate level. This was due to the small number of present senior professional engineers and architects. Skills for tasks having to do with calculation and design (use of theoretical knowledge and expertise concerning the details of construction, creation, and production, as well as machine and factory planning that contains specific and estimated calculations) were at a moderate level, due to the fact that professional and senior professional engineers were the ones performing the tasks. For supervision and manufacturing tasks (control of construction, control of manufacturing, control of installation, control of maintenance, control of modification, control of demolition, and control of movement) the skill level was high because these tasks were performed by professional and senior professional engineers. Skills for inspection tasks (researching, analyzing, testing, and data collecting, which are all used in principle and in inspection) were at a high level because these tasks were performed by professional and senior professional engineers. Skills for operation direction tasks (operation direction of an individual's work or the whole system, in accordance with the requirements of the engineering and architectural professions) were at a high level.

3. Licensed ASEAN professional engineers and architects attached importance to professional

ethics at a moderate-high level. Thai engineers and architects with core competency at a high level had high professional ethics because they worked under the framework of professional conduct.

4. Licensed ASEAN professional engineers and architects had professional development at a very low-moderate level because the development of professional engineering and architecture depended mainly on training sessions and seminars where there was no enforcement with regard to regular attendance. According to the data analysis, it was found that, with regard to engineering and architectural human resource development mechanisms for associate, professional, and senior professional engineers and architects, regular training sessions or seminars were rarely held.

V. RECOMMENDATIONS RELATED TO THE DEVELOPMENT OF THE CORE COMPETENCY OF THAI ENGINEERS AND ARCHITECTS

1. The academic sectors of professional councils, including the Engineering Institute of Thailand under His Majesty the King's Patronage, the Association of Siamese Architects under Royal Patronage, educational institutes, universities, the Council of Engineers [4], and the Architect Council of Thailand, should stipulate that associate, professional, and senior professional engineer and architect licensees must have specific levels of English skills so that they will prepare themselves accordingly. The professional sectors, i.e., the Council of Engineers and the Architect Council of Thailand, should build public relations and encourage the associate, professional, and senior professional engineer and architect licensees to take courses, attend training sessions, and improve their English skills, as well as their general knowledge, experience with governmental policy, customs and traditions, and basic knowledge of local dialects, all of which are factors affecting the potential opportunities for Thai engineers and architects who wish to register as ASEAN professional engineers and architects.

2. With regard to the professional skills of Thai engineers and architects, the professional councils should create regulations for the associate, professional, and senior professional engineer and architect licensees that require them to attend seminars and / or training sessions in order to extend their licenses, so that they will have skills in presentation, negotiating, and management, and become well-disciplined and responsible.

3. Pertaining to working in ASEAN member countries, the Monitoring Committee (MC), the supervisory authority for ASEAN professional engineers and architects, should coordinate with the professional councils to create regulations, set standards, and build public relations regarding the registration of ASEAN Chartered Professional Engineers (ACPE) and ASEAN Architects (AA) in order for them to work in ASEAN member countries. The MC, in coordination with the ASEAN Chartered Professional Engineers Coordinating Committee (ACPECC), must supervise Thai engineers and architects in the ASEAN Community to work in Thailand.

4. The professional sectors i.e., the Council of Engineers and the Architect Council of Thailand, must supervise the complicated issues concerning the professional ethics of Thai engineers and architects. It must be required that the associate, professional, and senior professional engineer and architect licensees who want to apply for a license in the regulated engineering and architectural profession must create a portfolio, record annual performance [5], and present those documents to the Council of Engineers and the Architect Council of Thailand through the Ethics Committee which oversees and reviews professional ethics as well as imposes penalties against Thai engineers and architects in accordance with the form prescribed. This procedure is to be used when the licensees are applying for extensions or promotions with regard to the category of all types of licenses.

5. The academic sectors of the professional councils, including the Engineering Institute of Thailand under His Majesty the King's

Patronage, the Association of Siamese Architects under Royal Patronage, educational institutes, universities, the Council of Engineers, and the Architect Council of Thailand, should conduct seminars and workshops in order to provide more experience for the development of Thai professional engineers and architects. The professional sectors i.e., the Council of Engineers and the Architect Council of Thailand, should encourage associate, professional, and senior professional engineer and architect licensees to attend seminars and take CPD training sessions on a periodic basis. The provision of certificates for the renewal of professional licenses must be conducted. There should be organized activities for the professional development of Thai engineers and architects [1-2], such as training in skills and knowledge based on the core competency needed by Thai engineers and architects.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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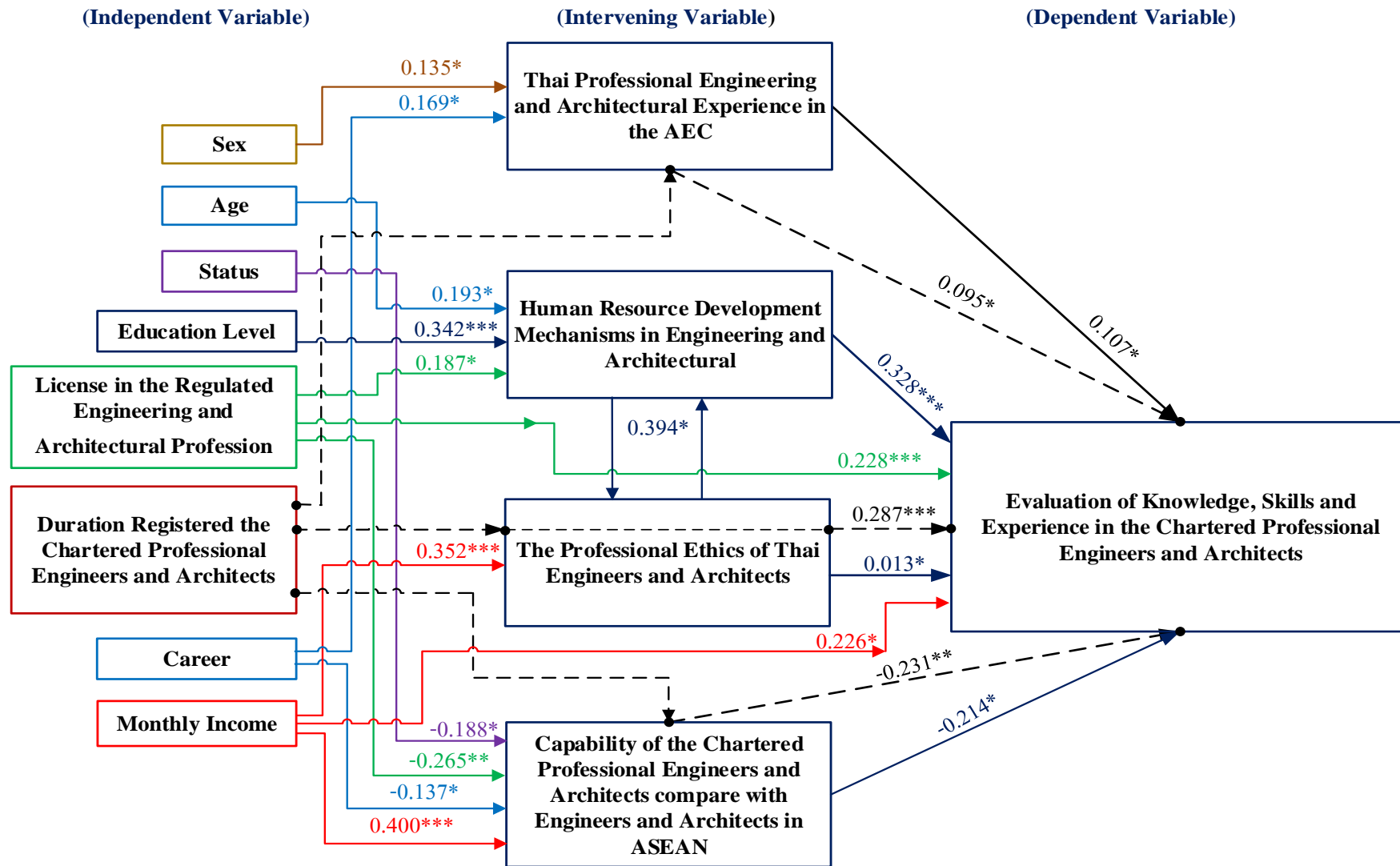


Fig. 1 Shown the Relation of the Independent, Intervening and Dependent Variable of Thai Engineers and Thai Architects after Accommodating ASEAN Chartered Professional Engineers and ASEAN Chartered Professional Architects of the ASEAN Economic Community in 2015.