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Research Article

Development of a Competency Model for Foundation Foremen of Residential Construction Projects in the Digital Era

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ABSTRACT

The research objectives are: 1) to study the components involved in developing a competency model for foundation foremen in residential construction projects in the digital era, and 2) to develop a competency model for foundation foremen in residential construction projects in the digital era. A questionnaire was used as a research instrument for quantitative data collection. The respondents were those involved in construction projects, including 376 foremen responsible for overseeing the construction sites in Bangkok and its vicinity. Mean, standard deviation, and exploratory factor analysis were used for statistical analysis.

The results show that: 1) The most prevalent factors associated with the development of foremen's competencies consist of: 1.1) Knowledge competency - knowledge about foundations on piles; 1.2) Skill competency - skills for checking the center position of columns, foundations, and piles; and 1.3) Attributes competency - practical and theoretical experience in construction work. 2) The developed competency model consists of 11 components and 84 subcomponents, with key elements as follows: 2.1) Knowledge competence, with 4 components and 33 subcomponents, including foundation construction techniques, digital technology in construction, pile driving and testing, and reading the foundation construction plan; 2.2) Skill competence, with 4 components and 32 subcomponents, including foundation construction inspection, application of digital technology, inspection of plan and materials list, and groundwater level monitoring; and 2.3) Attribute competence, with 3 components and 19 subcomponents, inicluding work success, human relations, and creativity.

1. Introduction

The expansion of the construction industry today has quite a lot of economic growth due to the rapid expansion of cities from the demands of the increasing population. When the economy grows, investment in construction projects from both the public and private sectors will increase. Lunkam (2024) stated that the construction business trend in 2024-2026 is likely to grow in line with the total construction investment value, which is expected to expand by 3.0-4.0% per year, with the total construction investment value accounting for an average of 8.0% of the country's gross domestic product. (GDP) Most of the construction work is domestic, which is divided into 2

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types according to the type of employer: government and private sector, with a proportion of construction investment value of 57:43 in 2023. Most of the government construction work is infrastructure investment projects, accounting for 81% of the total government construction value in 2023. The rest are construction projects for government agencies (17%) and civil servant housing (2%). As for private construction work, most of it is residential construction, accounting for 52% of the total private construction value. The rest is construction of industrial plants and commercial buildings, such as shopping malls, hotels, and hospitals.

Good management in the construction industry therefore requires many operational factors, as there are many work steps and time periods involved, starting from the planning, control, and implementation of construction projects from the beginning to the end, with the goal of achieving the desired quality within the budget and on time. Construction management does not only involve technical management, but also includes coordination, human resource management, and risk management during the project implementation, along with the development of modern technology in the digital age that plays a role in the construction industry, which helps develop and improve the construction process to be more efficient in terms of time, cost, safety, and quality of construction work. Such as Artificial Intelligence technology, technology linking intelligent devices (Internet of Things), big data structure technology, 3D printing technology or intelligent machine technology (Robots), unmanned aircraft technology (Drone) and solar photovoltaic technology (Solar PV), etc. (Sridaranon, 2019) Kasamjaru *et al*. (2021) A study was conducted on the development of a comprehensive construction business management model to increase competitiveness. The objectives were to study the components and create a development model for a comprehensive construction business management model to increase competitiveness. The research was a combination of qualitative and quantitative methods by analyzing the components of a survey. (Exploratory Factor Analysis: EFA) From the factors studied, data collection used a questionnaire tool to collect data from personnel involved in construction projects, including entrepreneurs, project administrators, and project managers in Bangkok and its vicinity, totaling 469 people. The research results found that the business management development model consisted of 5 side and 13 components, namely: 1) Organizational management, including organization management; 2) Construction management, including construction law management, risk management, construction process management, occupational health and safety management, and construction machinery and technology management; 3) Financial management, including construction tools, machinery and equipment cost management, construction material procurement management, and financial accounting management; 4) People management, including human resource management and relationship management with key business partners; and 5) Customer management, including marketing and sales management.

Personnel in construction projects are one of the elements that have a significant impact on operations, according to the construction management concept in terms of human resource management. According to Kasamjaru *et al*. (2021), as it is a large industry that requires personnel to work together in many positions, such as construction workers, construction foremen, project engineers, project managers, project consultants, project owners, project administrators, etc., each position has a specific role and important responsibilities in each step of the construction process, from planning, construction design and quality inspection. The cooperation of teams with expertise in each area is important for the success of the construction project. One of the important roles of personnel in field work (Construction Site), for example the construction Foreman, is to oversee field operations. The construction Foreman works with craftsmen and other construction teams by coordinating and supervising the work of workers and other teams, such as electricians, masonry workers, ironworkers or other system technicians, etc., to ensure that the work performed complies with the specified requirements and standards and to ensure that the construction project proceeds according to the specified plan in

terms of quality, safety and time. Therefore, construction foremen must have competence in many areas to ensure efficient work, such as team management, techniques and work inspections, safety management, communication skills, time management, problem solving and budget management, etc.

The development of competence or potential of personnel in construction projects is therefore an important part to know the components of necessary factors in the work and for personnel development to improve their skills and abilities in the work to be able to manage construction work effectively and be able to cope with challenges that arise in the construction site. Wanitwat *et al*. (2023) conducted a study on the development of a potential model of project managers in the high-rise building construction industry in the digital economy era. The objective was to study the components and create a potential development model of project managers in the high-rise building construction industry in the digital economy era. The research was both qualitative and quantitative method using the Delphi technique. Data collection was conducted using a questionnaire tool to collect data from 26 personnel involved in construction projects, including experts from construction sites and civil engineering academics in Thailand. The research results found that the capacity development model consisted of 5 main components and 24 subcomponents, namely: 1) Planning aspect, including operational planning, digital technology planning, risk and safety planning, operational resource planning, and financial and budget planning; 2) Organizational management aspect, including organizational structure determination, responsibility determination, regulations determination, and personnel and work management; 3) Command aspects, including work assignment, decision making, work system development, construction technology and innovation use, and morale building; 4) Coordination aspect, including joint planning, internal and external coordination, information technology communication, information clarification meetings, and work consultation; and 5) Control aspect, including work tracking system determination, data recording and reporting, safety and work environment control, internal control and risk management, and contract management. In addition, a study was conducted by Panitanwong *et al*. (2019) on the development model of executives' potential in the construction industry group according to the Thailand 4.0 model. The objective was to study the components and create a development model of executives' potential in the construction industry group based on the Thailand 4.0 model. The research was a combination of qualitative and quantitative methods using stepwise multiple regression analysis. From the factors studied, data collection used a questionnaire tool to collect data from personnel involved in construction projects, including project executives, project managers, department managers, and project engineers, totaling 438 people in Bangkok and its vicinity. The research results found that the potential development model consisted of 3 potential areas, 15 components: 1) Knowledge, consisting of knowledge of construction engineering and quality control, knowledge of policies, visions, and strategies, knowledge of accounting and finance for executives, knowledge of risk management and safety, knowledge of procurement of construction materials and machinery, knowledge of construction contracting business, marketing, sales, bidding, and laws related to the construction contracting industry; 2) Skills, consisting of good negotiation in various situations, time management and project management, communication, coordination, networking, state relations, and the use of innovation and construction technology; and 3) Flexibility, adaptability, and learning new things, reliability, creating trust as a good example, organizational commitment, teamwork, and innovative thinking.

Therefore, to develop according to the principles of construction project management in the part of developing human resources of personnel in the residential building construction industry, especially the work of building foundation construction, foremen should have good competence and efficiency in their work. This research therefore aims to 1) Study the components of the development of a competency model for foundation foremen of residential construction projects in the digital era; and 2) Development of a

competency model for foundation foremen of residential construction projects in the digital era.

2. Materials and Methods

2.1 Sample group

2.1.1 The group of quality inspectors of the questionnaire instrument includes the group of inspectors of the consistency index. (Item Objective Congruence: IOC) From 5 experts in construction projects and human resource management academics, and the entire group of reliability auditors (Cronbach's Alpha) of questionnaire instruments by means of instrument testing (Try Out) from a sample group of 30 personnel involved in residential building construction projects in Bangkok and its vicinity. (Kasamjaru *et al*., 2021)

2.1.2 Quantitative Research: The research involved collecting data using questionnaires targeting personnel involved in residential building construction projects in Bangkok and its vicinity, including construction foremen. Referring to data from the National Statistical Office, Ministry of Digital Economy and Society, Thailand (1st Quarter, 2024), there are a total of 6,113 people who have been granted permission to construct residential buildings in Bangkok and its vicinity. (National Statistical Office, 2024) Sample size was determined using the calculation formula of Taro Yamane (Yamane, 1973) and was based on Silpcharu (2024) A simple random sampling method was used to select the experimental sample group. A total of 376 people were received.

2.2 Research instruments

A quantitative research instrument was used to collect data from questionnaires. Estimation scale type (Rating Scale) 5 level according to Likert's concept (Likert) (Likert, 1932) and used the theoretical framework of McClelland (McClelland, 1973) . The questionnaire consists of three sections: Section 1, General status information of the respondents; Section 2 , Information on the level of importance of factors in the development of a competency model for foundation foremen of residential construction projects in the digital era, consisting of three factors and 84 variables, as follows: 1) Knowledge competence, with 33 variables; 2) Skill competence, with 32 variables; and 3) Attribute competence, with 19 variables; and Section 3: Additional comments and suggestions on the factors for the development of a competency model for foundation foremen of residential construction projects in the digital era.

2.3 Data collection

2.3 . 1 Data collection for quality control of questionnaire instruments includes: 1) Checking the consistency index value (Item Objective Congruence : IOC), the results of the data collection found that the questions had a consistency index between 0.80-1.00, which is in the appropriate range for use; and 2) Checking the entire reliability value (Cronbach's Alpha) The results of the data collection found that the questionnaire tool had a reliability value of 0.978, which is appropriate for use.

2.3.2 Quantitative research data were collected by sending questionnaires to a sample group involved in residential building construction projects in Bangkok and its vicinity, including construction foremen, with a total of 400 questionnaires distributed. The data collection resulted in 383 responses, representing a 95.75 percent response rate.

2.4 Data analysis and statistics used in the research

2.4.1 Quantitative research data analysis from the questionnaire on factors in the development of a competency model for foundation foremen of residential construction projects in the digital era, including: 1) General status information of the respondents; and 2) Data on the level of importance of factors in the development of a competency model for foundation foremen of residential construction projects in the digital era, analyzed using statistical methods such as calculating the mean ($\bar{X}$) and standard deviation (S.D.). (Kasamjaru *et al*., 2021)

2.4.2 Exploratory Factor Analysis (EFA) of the factors for the development of a competency model for foundation foremen of residential construction projects

in the digital era. This analysis aimed to determine the weight or relationship between the studied variables and to group related elements within each aspect. The suitability of the data was assessed by calculating the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO), with a value greater than 0.50, and by conducting Bartlett's Test of Sphericity, with a p-value less than 0.05. Factor Extraction is used in Principal Components Analysis (PCA) and the Varimax rotation method. The number of elements obtained will be considered from the Eigen values more than 1 and the weight of the components is more than 0.30. (Kasamjaru *et al*., 2021)

3. Results and Discussion

3.1 Results of the analysis of the general status of the respondents

From Table 1, the results of the analysis of the respondents' general status show that most of the respondents were male (92.95 percent). The majority were aged between 36-45 years (43.86 percent), had average work experience of 5-10 years (41.51 percent), held an associate degree or vocational certificate (69.71 percent), and most worked on detached house project (38.12 percent).

Table 1 General status data of the respondents

General status information		Percentage
1. Sex	- Male	92.95
	- Female	7.05
2. Age	- Under 25 years old	2.61
	- 25-35 years old	14.62
	- 36-45 years old	43.86
	- 46-55 years old	24.54
	- Over 55 years old	14.36
3. Experiences	- Under 5 years	12.27
	- 5-10 years	41.51
	- 11-15 years	24.80
	- 16-20 years	17.49
	- Over 20 years old	3.92
4. Education level	- High school / Vocational Certificate	8.36
	- Associate degree / Vocational Certificate	69.71
	- Bachelor's degree	21.93
	- Higher than bachelor's degree	0.00
5. Construction project types	- Detached house project	38.12
	- Townhouse project	11.75
	- Shophouse project	36.03
	- Apartment project	14.10

3.2 Analysis of factors for developing the competency model of construction foremen of the residential building construction industry in the digital age

3.2.1 The results of the analysis of the importance level of the knowledge factor found that the overall average importance level was at a moderate level of ($\overline{X}$ =3.25), with the top 5 factors with the highest importance levels, as follows: 1) Knowledge about foundations on piles ($\overline{X}$=4.67); 2) Knowledge about shallow foundations or spread foundations ($\overline{X}$=4.65); 3) Knowledge about installing reinforcing steel must be in accordance with the model and use cement balls to support the distance of the reinforced concrete cover, according to the requirements of the reinforced concrete standards ($\overline{X}$=4.53); 4) Knowledge about installing formwork must be in the correct size according to the model ($\overline{X}$=4.48); and 5) Knowledge about pouring concrete in layers and shaking it using a concrete vibrator to make it compact at every stage ($\overline{X}$=4.45); respectively as shown in table 2.

Table 2 Mean level of importance of the studied factors

Factors in developing competency models	$\overline{X}$	S.D.	Level of importance
1. Knowledge competence, with 33 variables.	3.25	.63	moderate
1.1 Knowledge about foundations on piles.	4.67	.44	maximum
1.2 Knowledge about shallow foundations or spread foundations.	4.65	.62	maximum
1.3 Knowledge about installing reinforcing steel must be in accordance with the model and use cement balls to support the distance of the reinforced concrete cover, according to the requirements of the reinforced concrete standards.	4.53	.50	maximum
1.4 Knowledge about installing formwork must be in the correct size according to the model.	4.48	.73	a lot
1.5 Knowledge about pouring concrete in layers and shaking it using a concrete vibrator to make it compact at every stage.	4.45	.56	a lot
2. Skill competence, with 32 variables.	3.87	.71	a lot
2.1 Skills for checking the center position of columns, foundations and piles.	4.75	.38	maximum
2.2 Skills for checking the correct size of reinforcing bars, placing them in the correct position, spacing, fastening, bending hooks, connecting bars, and placing special reinforcing bars.	4.73	.58	maximum
2.3 Skills for checking the level of concrete poured into each hole.	4.61	.45	maximum
2.4 Skills in inspecting pile integrity as specified by the engineer.	4.56	.66	maximum
2.5 Skills to check the strength of the formwork, supports, no warping, subsidence and leakage that may occur during concrete pouring.	4.48	.72	a lot
3. Attribute competence, with 19 variables.	4.71	.31	maximum
3.1 Have both practical and theoretical experience in construction work.	4.82	.34	maximum
3.2 Be meticulous in your work.	4.81	.51	maximum
3.3 Have dedication, devotion and time for work.	4.79	.56	maximum
3.4 Can prioritize tasks.	4.76	.47	maximum
3.5 Can make decisions in unclear and complex situations.	4.74	.68	maximum

3.2.2 The result of the analysis of the importance level of the skill factor found that the average value of the overall importance level was at a high level of ($\overline{X}$=3.87), with the top 5 factors with the highest importance level, as follows: 1) Skills for checking the center position of columns, foundations, and piles ($\overline{X}$=4.75); 2) Skills for checking the correct size of reinforcing bars, placing them in the correct position, spacing, fastening, bending hooks, connecting bars, and placing special reinforcing bars ($\overline{X}$=4.73); 3) Skills for checking the level of concrete poured into each hole ($\overline{X}$=4.61); 4) Skills in inspecting pile integrity as specified by the engineer ($\overline{X}$=4.56); and 5) Skills to check the strength of the formwork, supports, no warping, subsidence and leakage that may occur during concrete pouring ($\overline{X}$=4.48); respectively as shown in table 2.

3.2.3 The results of the analysis of the importance level of the attribute factors found that the overall average importance level was at a high level of ($\overline{X}$=4.71), with the top 5 factors with the highest importance levels, as follows: 1) Have both practical and theoretical experience in construction work ($\overline{X}$=4.82); 2) Be meticulous in your work ($\overline{X}$=4.81); 3) Have dedication, devotion and time for work ($\overline{X}$=4.79); 4) Can prioritize tasks ($\overline{X}$=4.76); and 5) Can make decisions in unclear and complex situations ($\overline{X}$=4.74); respectively as shown in table 2.

3.3 Analysis of the exploratory components of factors for developing a competency model for foundation foremen of residential construction projects in the digital era

From Table 3, the results of the analysis on the appropriateness and relationship of the factors for the development of a competency model for foundation foremen in residential construction projects in the digital era show that: 1) The KMO index for the three factors falls within the appropriate range for component extraction, exceeding 0.50. Specifically, the values are as follows: Knowledge competence (0.938), Skill competence (0.940), and Attribute competence (0.916); and 2) The Bartlett's Test of Sphericity for the three factors shows statistical significance at the 0.05 level (p-values < 0.05) for Knowledge competence (0.000), Skill competence (0.000), and Attribute competence (0.000).

Table 3 Suitability index and relationship of studied factors.

Factors in developing competency models	KMO	Bartlett's Test of Sphericity		
		Approx. Chi-Square	df.	Sig.
1. Knowledge competence, with 33 variables.	0.938	6736.313	528	0.000
2. Skill competence, with 32 variables.	0.940	5799.474	496	0.000
3. Attribute competence, with 19 variables.	0.916	3147.167	171	0.000

Table 4 Statistical values for the extraction and naming of the components of the studied factors.

Competency Development Factors	Rotation Sums of Squared Loadings		
	Total	%of Variance	Cumulative %
1. Knowledge competence, 4 components, 33 subcomponents.			
1.1 Foundation construction techniques, 10 subcomponents.	5.191	15.729	15.729
1.2 Digital technology in construction, 8 subcomponents.	4.668	14.145	29.874
1.3 Pile driving and testing, 8 subcomponents.	4.121	12.489	42.363
1.4 Reading the foundation construction plan, 7 subcomponents.	3.499	10.602	52.965

Table 4 (Continuous)

Competency Development Factors	Rotation Sums of Squared Loadings		
	Total	%of Variance	Cumulative %
2. Skill competence, 4 components, 32 subcomponents.			
2.1 Foundation construction inspection, 20 subcomponents.	4.675	14.609	14.609
2.2 The application of digital technology, 8 subcomponents.	4.487	14.023	28.632
2.3 Inspection of the plan and materials list, 2 subcomponents.	4.133	12.915	41.547
2.4 Groundwater level monitoring, 2 subcomponents.	2.994	9.355	50.902
3. Attribute competence, 3 components, 19 subcomponents.			
3.1 Work success, 12 subcomponents.	3.888	20.464	20.464
3.2 Human relations, 4 subcomponents.	3.409	17.943	38.407
3.3 Creativity, 3 subcomponents.	2.824	14.862	53.269

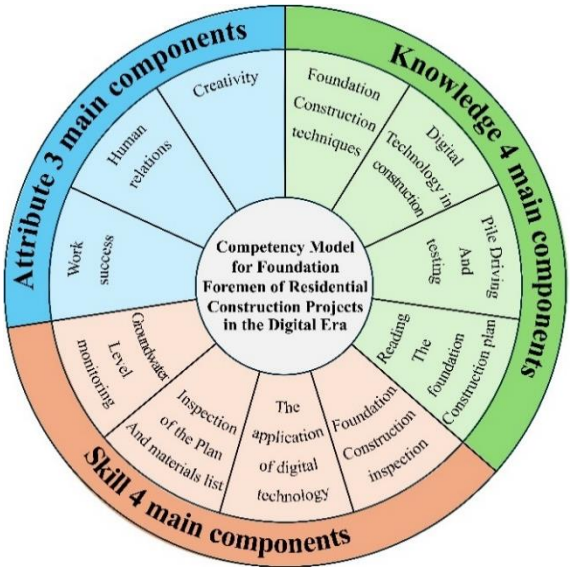

Figure 1 Competency model for foundation foremen of residential construction projects in the digital era

From table 4 and Figure 1, the results of extracting and naming elements, as well as creating a competency model for foundation foremen of residential construction projects in the digital era, show that, based on the number of elements with eigen values greater than 1, the components and names of the competencies studied in all three competencies were extracted. This resulted in a total of 11 components and 84 subcomponents, as follows:

Knowledge competency found that 4 components and 33 subcomponents, could be extracted and named: 1) Component 1: Foundation construction techniques, with 10 subcomponents; 2) Component 2: Digital technology in construction, with 8 subcomponents; 3) Component 3: Pile driving and testing, with 8 subcomponents; and 4) Component 4: Reading the foundation construction plan, with 7 subcomponents.

Skill competence found that 4 components and 32 subcomponents, could be extracted and named: 1) Component 1: Foundation construction inspection, with 20 subcomponents; 2) Component 2: The application of digital technology, with 8 subcomponents; 3) Component 3: Inspection of the plan and materials list, with 2 subcomponents; and 4) Component 4: Groundwater level monitoring, with 2 subcomponents.

Attribute competency found that 3 components and 19 subcomponents could be extracted and named: 1) Component 1: Work success, with 12 subcomponents;

2) Component 2: Human relations, with 4 subcomponents; and 3) Component 3: Creativity, with 3 subcomponents.

4. Conclusion

Guidelines for developing a competency model for foundation foremen in residential construction projects in the digital era consist of three competencies, 11 components and 84 subcomponents, as follows:

4.1 Knowledge competence

Consists of 4 components and 33 subcomponents, as follows: 1) Component 1: Foundation construction techniques, with 10 subcomponents, should focus on installing foundation reinforcement, installing and removing foundation concrete formwork, pouring foundation concrete. Foundation concrete curing, anchor bolt installation, water stop installation in the pit wall, and measurement of the bottom of the borehole and slope; 2) Component 2: Digital technology in construction, with 8 subcomponents, should focus on artificial intelligence technology, internet of things technology, big data technology, 3d printing technology, robots technology, drone technology, and solar photovoltaic (solar pv) technology; 3) Component 3: Pile driving and testing, with 8 subcomponents, should focus on pile driving with cranes, mobile cranes, and diesel hammers, checking details in pile shop drawings, and checking the specifications of the pile testing contract; and 4) Component 4: Reading the foundation construction plan, with 7 subcomponents, should focus on checking foundation plans, checking pile work plans, checking structural expansion and shop drawings, and checking the properties of materials specified in the related plans. Consistent with Phaphan (2017) who studied the problems affecting the control of construction work. A case study of the provincial waterworks authority, region 8, to study the factors of the performance of construction foremen found that the important factors related to the basic knowledge of engineering are as follows: the foreman must check the condition of the construction site with the blueprints every time before starting construction. The foreman must study the format of the blueprints, employment contracts, and contract documents every time before starting construction. The foreman must have a good understanding of the construction work procedures. The foreman must send samples of materials used in the construction to test the quality according to the criteria specified in the blueprints. And the foreman must have a good understanding of the procedures and regulations of supplies, respectively.

4.2 Skill competency

Consists of 4 components and 32 subcomponents, as follows: 1) Component 1: Foundation construction inspection, with 20 subcomponents, should focus on inspecting the size and depth of the foundation pit, inspecting the materials used and the strength of the foundation formwork, inspecting the size and position of the foundation reinforcement, inspecting the level of pouring foundation concrete, inspecting the completeness and level of the pile head, and inspecting the size and center position of the column, foundation, and pile; 2) Component 2: The application of digital technology, with 8 subcomponents, should focus on the application of artificial intelligence technology, the application of smart device connection technology (internet of things), the application of big data technology, the application of 3d printing technology, the application of robots or smart machines (robots), the application of drone technology, and the application of solar photovoltaic (solar pv) technology; 3) Component 3: Inspection of the plan and materials list, with 2 subcomponents, should focus on inspecting the foundation construction plan to ensure that it can be completed with quality. Not conflicting with the main plan, in accordance with the correct construction sequence according to the principles of architecture, engineering and management, and checking the list of materials requested for approval that their properties are complete and correct, do not conflict with the construction plan according to the contract, or are consistent with the list approved for material used by the hiring inspection committee or any other orders; and 4) Component 4: Groundwater level monitoring, with 2 subcomponents, should focus on checking water and mud in the foundation pit, checking the groundwater level and finding ways to prevent water from seeping into the pit. Consistent with Thana-

amornkan *et al*. (2023) who studied the development guidelines for a competency-based curriculum for construction foremen in the high-rise building construction industry to study the competencies of foremen and present guidelines for developing a competency-based curriculum. It was found that important factors related to construction techniques of high-rise building construction include pile inspection skills, structural evaluation and inspection skills, construction engineering design skills, construction blueprint reading skills, construction material inspection skills, construction quality management skills according to the plan, materials, tools and machinery management skills in the project according to the plan.

4.3 Attribute competency

Consists of 3 components and 19 subcomponents, as follows: 1) Component 1: Work success, with 12 subcomponents, should focus on dedication, devotion and time in working, discipline and compliance with the organization's rules and regulations, love and pride in one's position and organization, meticulousness in working, punctuality, self-confidence, ability to prioritize work, social responsibility and safety awareness in working, ability to make decisions in unclear and complex situations, experience in both practical and theoretical construction work, professional honesty and strict ethics in controlling construction work; 2) Component 2: Human relations, with 4 subcomponents, should focus on human relations and being able to get along well with colleagues, being able to communicate and coordinate with other departments, being able to work well with others, and being flexible and adaptable to situations; and 3) Component 3: Creativity, with 3 subcomponents, should focus on creativity, being eager to learn and always wanting to develop oneself, and being brave to think. Dare to do new things that are beneficial to the organization. Consistent with Borisutnarudom and Khuncumchoo (2015) who studied the characteristics of construction foremen in terms of achievement motivation to study the factors affecting the success of construction foremen. It was found that the factors affecting the success of construction foremen at a high level of importance were having skills in managing the work system, the need to know the results of their own decisions, foresight, diligence, and risk-taking. The factors affecting the success of construction foremen at a medium level of importance were being competitive and having self-responsibility.

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