

## The use of Core Competency Indicators for Employee Selection: The Case of Evaluation for the Firemen Selection in Fire departments

Yi-Chun Lin, Ph. D.

Associate Professor Department of Fire Science, Graduate School of Fire Science & Technology, Central Police University, Taiwan, R.O.C

**ABSTRACT:** Due to state policies and financial limitations, the few new firemen in Taiwan each year have resulted in a substantial shortage in firefighting personnel. As a result, it is critical to adopt an effective competency model in order to select the most qualified firefighting personnel. A literature review was conducted to compare the firefighting personnel systems of the United States, Japan, the United Kingdom, and New Zealand. The hierarchical analysis method was employed to build Taiwan's entry-level firefighting personnel competency indicators. The present study established a set of core competency indicators covering seven constructs, which in turn contain 46 factors in total. The experts ranked the importance of the seven constructs from high to low as follows: professional firefighting knowledge, firefighting work skills, fire engine and equipment operation, self-management, firefighter physical fitness, firefighting practical experience, and interpersonal skills. The validation results obtained from three firefighters showed that this study's firefighting personnel screening and selection model can indeed identify firefighting personnel with stronger work performance.

**Keywords:** Firefighting personnel systems, Core competencies, Hierarchical analysis method, personnel selection.

### I. INTRODUCTION

Firefighting is a stressful job because of the dangerous and unpredictable nature of the work. The long working hours, often 24 hours, the frequent overtime, and the limited vacation days further aggravate the stress levels of firefighting personnel. Aside from pressure from their families, firefighting personnel also have to deal with pressure from their superiors, criticism, blame, and other emotional responses from victims. That is probably why firefighting is ranked as the most stressful type of job in the United States (Su, 2006). Aside from having a strong sense of duty, firefighting personnel also need to value teamwork and collaboration, respond to emergency calls rapidly, and comply with laws and regulations. Due to the conservative organizational culture, the emphasis on organizational ethics and firefighting-related job attributes, family or marriage conflicts often arise (Huang, 2000). The work stress experienced by firefighters is the main cause of their high turnover rate (Chiang, 2008) as well as depression and suicide (Chen, 2010). Situations such as line-of-duty injuries, occupational injuries, death at the post, bribery, illegal lobbying, abuse of power, and other various misconducts, not only threaten their own safety and the safety of the general public, they also cause a series of complicated social problems. As a result, the key objective of this study is to construct firefighting personnel core competency indicators for effective firefighting personnel training, examination, and selection.

In 2015, there were a total of 12,264 firefighting personnel, including 919 new firefighting personnel recruited from the Level 3 state police examination (Level 3 for short) and Level 4 state police examination (Level 4 for short). In 2015, the Central Police University admitted 50 new firefighting police students, while the Taiwan Police Academy (Police Academy for short) admitted 449 firefighting students. According to the above figures, the fire organization is relatively a large system in Taiwan's public sector. Firefighting is a unique public sector because it is highly physically demanding, pressed for time, dangerous, and bring slots of work stress. It is therefore important to discuss the positive and negative types of personality traits and work attitudes, as well as the specific core competencies required for firefighting personnel to perform their job well. Therefore, the Ministry of Examination, when screening and selecting new firefighting personnel, should take the unique core competencies and personality traits of firefighting personnel into consideration for personnel to meet the needs of firefighting agencies and the expectations of the general public.

Based on the above concerns, the present study reviewed both domestic as well as foreign studies related to the competencies of firefighting personnel in drawing up the required competencies. A questionnaire was then designed and incorporated as a reference as well as a basis for this study. The present study also set up the competency classes and competencies under each class of firefighting personnel in Taiwan. Hierarchical analysis was employed to assess how each competency is associated with others and their importance, in order to determine the relationships between professional firefighting competencies. Social science statistical analysis was performed on the firefighting personnel's work performance and implicit competency inventory for determining the correlation between the two. Findings from this study on firefighting personnel screening, selecting can be referred to for the examination and selection of firefighting personnel in Taiwan in the future.

## II. LITERATURE REVIEW

### 2.1. The Origin and Implications of Competence and Competency

Competencies are motivation, beliefs, values, knowledge, attitudes, and skills that are closely related to work performance. Competencies can be assessed by accepted criteria, and they belong to the employees' personal potentials that allow them to complete their work and products to expected quality. Ralelin and Cooledge (1995) stressed that competencies are associated with sensitivity, creativity, instinct, and other hard-to-observe personal attributes. Learning and relearning, an organic type of capability, are also part of the competencies. The terms "competency" and "competence" are defined as follows according to McClelland (1973), Funk & Wagnalls Company (1917), and Hsu and Cheng (2002).

1. The condition and capability to perform the job.
2. Adequate means, sufficient.
3. Legal qualification (accepted).

According to the ideas proposed by researchers, the following are personal competencies:

1. Competencies can be divided into the personal mental state and the external knowledge and skills.
2. Competencies include unlearned (innate) and learned (acquired) parts.
3. Competencies vary by age, stage, job rank, and environment.
4. Competencies in general are associated with three aspects self-management, people, and work.

Taken together, this study considers that competencies comprise of motives, traits, self-concepts, knowledge, and skills, and that competencies are strongly associated with an individual's knowledge, techniques, capabilities, and traits. To objectively predict and understand the performance of an individual, one should employ an effective evaluation scheme to distinguish good and bad performance.

Among all competency-related theories and definitions, the most well-known competency theory is one proposed by Lyle M. Spencer and Signe M. Spencer based on Sigmund Freud's iceberg model. According to Spencer & Spencer (1993), competencies are the sum of the explicit and implicit traits of an individual. See diagram below.

Skills and knowledge are the explicit part, and they can be improved by training. As for self-concepts, motives, and traits, they are the implicit traits of an individual, i.e., at the bottom of the iceberg. These are harder to be explored and improved upon.



**Figure 1-1.** Iceberg model

Source: Competency Conceptualization (Spencer & Spencer, 1993)

The term core competence was first proposed by Prahalad & Hamel in 1990. They suggested that core competence is the total of the individual skills and expertise of each organization member that are used to provide service with specific effect and value. Core competencies also referred to as an integration of knowledge, skills, and ability (KSAs).

Chang (2006) proposed the following core competencies of entry-level police officers based on Taiwan's police education. See below:

- (1) Good sense of morality: It is important to have a perfect personality inside and out, practice what one

- preaches and be trustworthy.
- (2) Correct values: Includes self-growth, morality, work ethics, and organizational commitment.
  - (3) Good work attitude: It is important to have good emotional management and a clear work target. Be humble, friendly, passionate, and enthusiastic.
  - (4) Good confidence: It is critical to possess life experience, knowledge, and social skills.
  - (5) Sense of honor: It is important to be willing to sacrifice oneself for the public, be introspective, have a strong sense of honor, value one’s job, know one’s duty and what is right and wrong.
  - (6) Responsibility: It is important to have a good sense of responsibility and perform one’s job well.
  - (7) Extensive professional knowledge: It is important to possess official document handling capability, English language skills, legal knowledge, information skills, basic knowledge for performing police duties, and police-related professional knowledge.
  - (8) Professional skills: It is important to be good at judo, wrestling, criminal arresting techniques, grappling, fencing, taekwondo, shooting, and combat skills.

It was found that the professional knowledge and skills related to fire prevention, fire rescue, disaster prevention and fire investigation displayed by firefighting personnel, vary depending on the agency or department that they belong to. To determine the core competencies of entry-level firefighters in Taiwan, the present study examined and summarized available domestic and foreign studies on capabilities and characteristics required by entry-level firefighting personnel. The result is presented in Table 2-1. There are especially more capability oriented competencies, and the competencies were divided into three classes according to their attributes: self-management, relationship management, and knowledge and capability. Each class contains various personal professional competencies that fit into the class. As for the competency model for each type of firefighting organization, the content was adjusted according to the nature of the job.

**Table 2-1.** Professional Competencies of Personal Capabilities/Traits Required by Entry-Level Firefighting Personnel

Capabilities and traits dimension (Professional competencies required by entry-level firefighting personnel)	Capability	Self-management	Independent operation, introspection, work management, executive power, awareness of risk and safety, adaptability, adaptability to change, crisis handling, and continual learning
		Relationship management	Understanding the importance of interpersonal interaction, good at public interaction, communication and coordination, team collaboration, conflict resolution, negotiation, and persuasion and influencing skills
		Knowledge and skills	Innovative thinking, critical thinking, decision making, problem-solving, conceptual thinking, information searching, expression skills, and mathematical knowledge and skills
	Traits and attitude dimension	Motive for achievement, active and initiative, caring and empathetic, friendly, honest and righteous, serious and has a good sense of responsibility, stress coping, emotion stability, persistence and endurance	

**2.2. Personality Connotation and Traits**

The term “personality” was derived from the Latin word “persona”, which refers to the mask worn by actors. Personality is explained as the part of an individual seen by others and can be viewed as a combination of various characteristics that generate a surface impression. Personality is the sum of personal traits, attributes, and characteristics and is what that differentiates each person from others continuously (Guildford, 1959). Personality is a unique mental state expressed at a unique time, space, and context. It determines an individual’s behavior and thinking for the individual to fit into the environment, and it also makes an individual differ from others in terms of motives, needs, emotion, temperament, physical condition, attitude, and explicit behavior. Personality is a dynamic structure rather than a static organization. Personality has the following features:

1. Complicity: The connotation of personality is extremely complicated, and it contains various elements including social attitudes, values, extroversion and introversion, locus of control, senses of independence and responsibility, motive for achievement, and emotional control. Each element is influenced by other elements.
2. Independence: Even for identical twins with the same DNA, their personalities would differ.
3. Durability: Once the personality of an individual becomes stable, it is hard to change the personality
4. Integration: Each personality element can adapt to each other and be coordinated and integrated to prevent conflicts

(1) Personality Traits and Classification

Personality traits refer to an individual’s personality structure that changes according to the environment and context and is stably expressed. Psychologists have proposed many methods for classifying personality traits. See Table 2-2 below:

**Table 2-2** Classification of Personality Traits

Researcher	Classification of personality traits
Sheldon(1943)	Endomorph: Relaxing, food-loving, social Mesomorph: Active, independent, and brave Ectomorph: Suppressed, in fear, introvert, and artistic
Cattell(1943)	Cattell (1943) used sixteen personality traits to predict the behavior of an individual in a specific context: warmth, reasoning, emotional stability, dominance, liveliness, rule conscious, social boldness, sensitivity, vigilance, abstractedness, privations, apprehension, openness to change, self-reliance, perfectionism, and tension.
Rotter(1966)	Internal locus of control: This type of person would believe that their behavior, attributes, and capabilities can be controlled or are predictable. External locus of control: This type of person would believe that reward is associated with the external world and is determined by fate, destiny, and luck and cannot be controlled by their behavior. The internal vs. external locus of control differ from each other only in degree. It is not black and white.
Friedman & Roseman(1974)	Type A: The type of person who is highly competitive, self-demanding, persistent and has a strong desire for success. They would work hard to overcome challenges, feel uneasy with delays or postponement. They also tend to be more nervous, lack patience, fast working, proactive, and aggressive when threatened. Type B: They are more relaxed, quiet, and calm and feel less pressed by time.

The most commonly accepted personality classification is the one proposed by Costa and McCrea(1992). See Table 2-3 for the connotation and traits of the classification.

**Table 2-3** The Meaning and Traits of Five Major Personality Traits

Fivemajor personality traits	Meaning	Stereotypical characteristics
Agreeableness	It is about being easy going and good at communication and collaboration.	People with agreeableness tend to be polite, trustworthy, friendly, and easy going.
Conscientiousness	It is about being more focused and concentrated when pursuing one’s goals. It has two constructs: one is achievement oriented and the other is a good sense of responsibility and discipline.	People who score high here work hard, are self-demanding and prudent, pursue excellence, follow rules and regulations, and have a good sense of responsibility.
Extraversion	It is about the level of comfort and frequency of an individual’s interaction with others.	Extroverts are more confident, active, and lively and enjoy friendship, social events, and stimulation and excitement.
Emotional Stability, Neuroticism	It is about the frequency and intensity for eliciting an individual’s negative emotion.	Good stability: People with good emotional stability are calm, relaxed, quiet, gentle, and do not get excited easily. Poor stability: These people are more nervous, depressed, easily upset, emotional, impulsive, and lack of control or a sense of security.
Openness to Experience)	It is about the level of accepting facts and novel events.	People with this trait are curious and imaginative and enjoy contemplation and change.

Many researchers have pointed out that a rigorously designed and developed personality inventory with high reliability and confidence is an effective instrument in predicting job performance. Using such an instrument can enhance the effectiveness of screening and selecting an individual suitable for the job, thereby increasing organizational productivity(Schneider and Hough,1995; Hogan, Hogan and Roberts, 1996; David and Silverman,1989). Gate wood and Field(1998) pointed out in the book Human Resource Selection that Murray and Mount, after reviewing 117 studies of the association between personality traits and work performance, made the following conclusion.

1. The hard working and prudence aspect is an effective work performance predicting variable for all work types.
2. Extroversion and emotional stability are two aspects that are effective predicting variables for the work performance of certain work types.

**2.3.Role Theory Connotation and Features**

From the social structure perspective, roles are a type of cultural modality linked to a specific identity, and they cover social and cultural conventions, attitudes, values, and behaviors, as well as the expectation from others in

the same culture. The concept of roles comprises of cultural, social, and personality aspects. Parsons (1961; cited from Yen (2010) considered that a role is the combination of all aspects related to the action taker, and it can cover the individual's action and expectation for the role for complementing others. The evolution of roles is influenced by changes in social ethos, structure, and the environment (Bernard et al. 2010; Hu & Chen, 2011). From a corporate organizational viewpoint, roles are beneficial for the learning process by defining appropriate behavior expected by others for a specific job or task (Scott et al., 1981; cited from Li & Lin, 1996). Here are some features. First, it is the position instead of the person that defines the expectation on of a role. To play one's role in the organization, it is important to behave as expected for the specific job. Roles can be quickly learned, and moreover, an individual can take on multiple roles. Taken together, roles can be defined as possessing a position in a society with a certain specific structured status and characterized behavior. It is a combination of rights and responsibilities and expectation from other members in the organization that needs to be met. In a work organization, aside from employees, the management role is a key component affecting the organization overall. The work dimensions of the management are also the work directions and goals of the organization, while the organization uses the existing resources and decisions to manage, command, and do other managerial tasks. The skills of the management vary between high and low level management. For example, low management requires higher technological skills, intermediate management requires interpersonal skills, while high management requires more conceptual skills. In terms of management work, Mintzberg (1973) analyzed the role of three main types of management: interpersonal-oriented type, information-oriented type, and decision-making type. Each of these three types contains ten roles, but each role is tightly linked with others. That is, management can possess the skills of more than one role because interpersonal relationship, information, and decision-making are inseparable.

## **2.4. Fire fighting Personnel Recruitment, Examination, and Training Systems Worldwide**

### **2.4.1. The US:**

In the United States, the fire chief of a fire fighting department is appointed by the mayor of the city, while other firefighting personnel are appointed by the chief or firefighting committee<sup>24</sup>. In principle, all firefighting personnel start from firefighters and there is no functional differentiation. After training and serving in a firefighting team for 3 to 4 years, the personnel will be assigned for a specific type of duty depending on their interests, and after taking a specific type of duty, they tend to stay in that area without change.

In the United States between 1920 and 1970, the recruitment tool for new firefighting personnel was based on the general intellectual quotient and personality or aptitude tests. Later, a police personnel specific test was given. Some commonly used intellectual quotient and personality or attitude tests are the Stanford-Binet Intelligence Scale and the Minnesota Multiphasic Personality Inventory. As for the police-specific test, there is the USA Police Practice Test.

Since the 1980s, numerous firefighting personnel mental tests have been published; some examples are the Entrance Firefighter Test and the Fire Service Test. Between 1980 and 1990, these tests were very complicated and covered a wide area from knowledge and skills (i.e. achievement test) to general capability and aptitude testing (such as language comprehension, spatial perception, mechanical aptitude, and abstract reasoning). During the 1990s, revolutionary changes were made; competency analysis was applied to evaluate competencies including induction, deduction, observation and memory that are necessary for entry-level firefighting personnel. One example here is the Firefighter Exam published in 1994.

### **2.4.2. Japan:**

Except for having a few cadre transferred from police or other civil service areas, the majority of firefighting personnel in Japan start from entry-level firefighters. To be qualified, the candidates have to be a high school or college graduate. The hired firefighting personnel will first receive six months of beginner education and then be appointed as firefighters. The salary differs slightly between high school graduates and college graduate firefighters

### **2.4.3. United Kingdom :**

In the UK, firefighting cadres have to pass the state civil servant examination held by the Home Office. For firefighters, they only need to pass the local examination and take local training; no state examination is required.

### **2.4.4. New Zealand :**

The selection process in New Zealand is complicated and multidimensional. The applicants are asked to be equipped with basic capabilities and then they are trained together. The targeted subjects of recruitment are from the general public, and it is fair competition for everyone. To apply for recruitment, one can directly call 0800-347-373 for inquiry or download an application form from [www.fire.org.nz](http://www.fire.org.nz). The applicant shall fill out the



form and mail it to the responsible agency with a copy of his/her graduation diploma. The applicant will be notified to take a series of tests. If they reach the finals, they will take a cognitive test. Those who pass the cognitive test will take the pre-physical performance test (PPT) on the same day. Nevertheless, only those who have passed the cognitive test and entered the PPT can take the Practical Assessment Course (PAC). Afterwards, the applicants can take the official core competitiveness interview, and if they pass the interview, they still have to go through a drug test, safety inspection and other tests. Moreover, two weeks before taking the PAC, the applicants have to take the PPT to be officially accepted and employed as a firefighter. They have to go through the entire practical training and pass the test in order to become an official New Zealand firefighter.

2.4.5. Taiwan

Starting from 1937, the Police Agency of the Ministry of the Interior, Taiwan set the Police Intellectual Quotient Test Office for the development and implementation of police mental tests. Unfortunately, these tests were outdated and were rarely used in the police school admission examination. In 1962, Taiwan’s Provincial Police Administration invited experts to develop the Police Aptitude Test, which was viewed as the most comprehensive aptitude test. Nonetheless, it was a long test; it took four hours to complete the whole test. The Central Police University has modified the test several times since 1976, but because no competency analysis was conducted, the test was later found to have a low predictive validity. Eventually it stopped being used anymore. The present study decided to use the competency analysis method, which flourished in the 1990s in the United States, to explore the professional competencies required by firefighting personnel in Taiwan. The study results can be used for developing aptitude, personality, and competency inventories for the Central Police University and the Police Academy for admitting new students.

III. METHOD

3.1. Research Framework

To take both data accuracy and available time into consideration, the present study adopted a pluralistic approach to build its model. That is, the researchers of this study carried out direct interview, questionnaire surveys, and focus group workshops to build a competency model. Results from the literature review are summarized in the conceptual framework below.

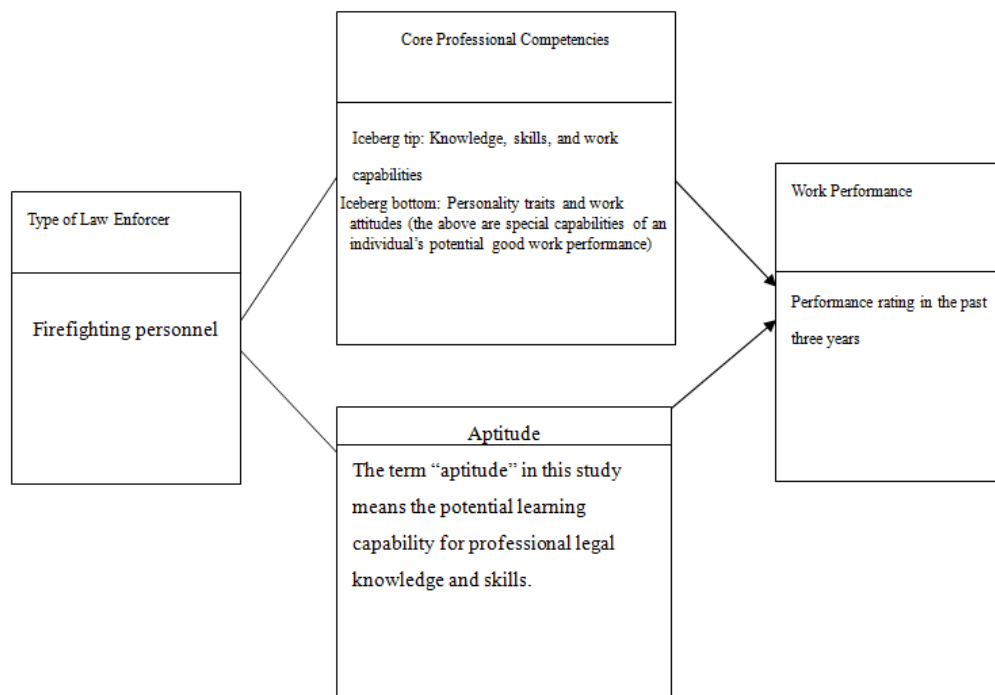
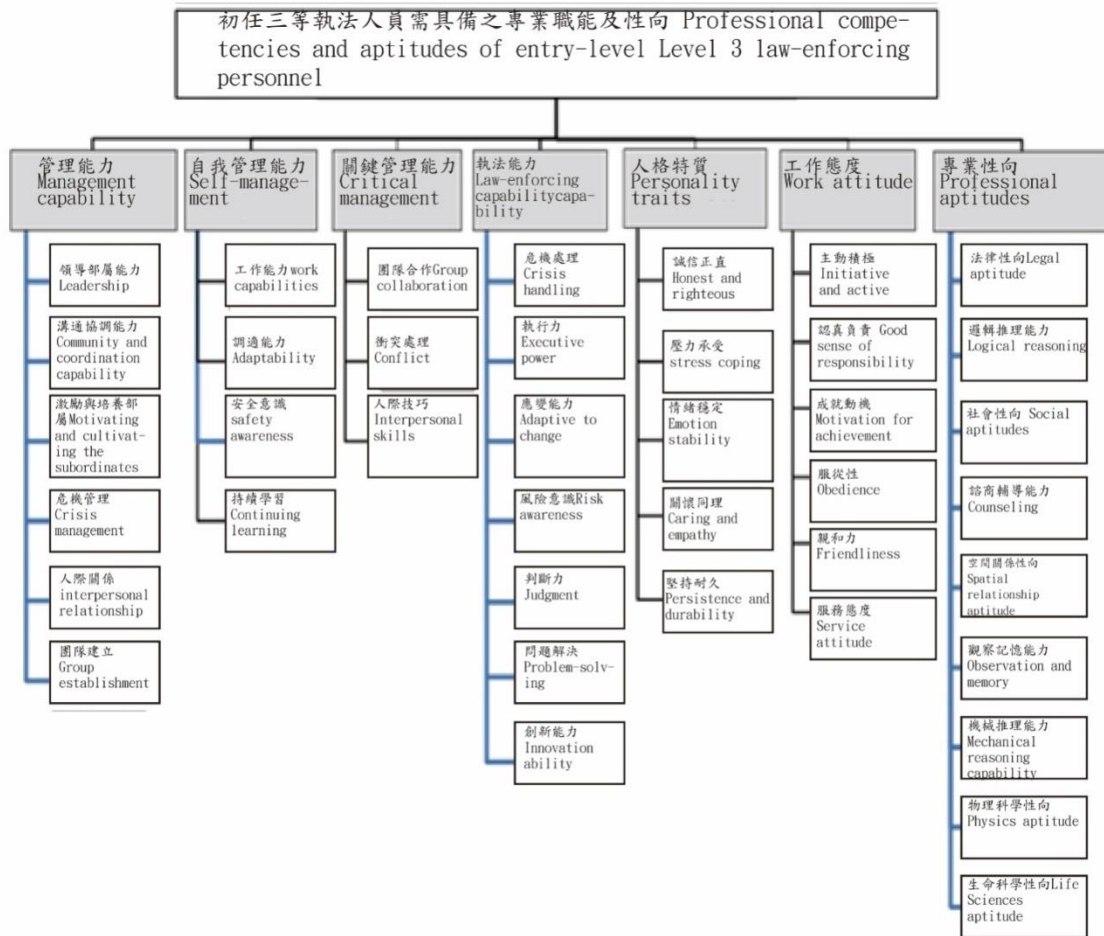


Figure 3-1 Research Conceptual Framework (Source: Prepared by the study)

The above diagram shows that firefighting personnel should be equipped with 1) knowledge, skills, and aptitude, 2) core competencies, 3) work attitudes, positive personality traits, and other personality traits; 4) lack of unsuitable negative personality traits, and 5) core competencies and personality traits that may have a significant effect and predictability on work performance and the competency appraisal results given by the management.



**Figure 3-2** Professional Competencies and Aptitudes Required by Entry-level Firefighting Personnel. (Source: Prepared by the study)

This study first analyzed the background of the issue in terms of human resources administration and industrial and organizational psychology. Viewpoints from the mental test experts and results from the literature review and direct observation were also taken into consideration. With the above information, the study successfully summarized the competency classes and competencies for frontline firefighters. Secondly, this study employed the competency analysis and other techniques to explore the types of core competencies and personality traits required by firefighting personnel. Studies related to the classes of competencies and competencies of frontline firefighting personnel were summarized in the table in Chapter 2. The present study was based on the competency classification of Workitect 2007 and it also took the tasks of frontline firefighters into consideration. That is, frontline firefighters not only have to be physically fit but also have the capability of operating the equipment and devices as well as have practical experience. Therefore, firefighting personnel competencies were divided into seven classes: self-management, interpersonal interaction, professional knowledge, basic physical fitness, fire engine and equipment operation, and practical experiences. From these seven competency classes, there were in total 46 competencies, and they were used as the basic framework of frontline firefighting personnel’s competency assessment at the first stage of the study.

Next, the expert interview approach was used to determine the order of priority of these competencies and personality traits. Lastly, the researchers also examined the types of tests (including written test, oral test, physical test, and lie detection test) that should be appraised and the type of aptitudes and personal tests that can be used. Moreover, it is critical to determine the types of personality traits to be tested using which situational or projective tests or if there are any personality self-reported questionnaires that can be applied. It is important to clarify the core competencies (including personalities, knowledge, skills, and attitudes) and aptitudes of entry-level firefighters for firefighting personnel screening and selection as well as education and training. According to the core competency structure, this study explored aptitudes (implicit and special capabilities) and personality traits. See Figure 3-2 for professional competencies and personality traits required by entry-level firefighters. This figure provides useful information for developing entry-level firefighter aptitude and personality tests.

**3. Questionnaire Design and Analysis**

The respondents of the interview and questionnaire of this study were senior firefighting personnel with superior or inferior merit ratings and their supervisors (management). For good firefighting personnel, their morals and ethics should be taken into consideration, and their excellent merit rating should be given by not only their supervisor but also the ethics and service managers. The definition of senior personnel with superior or inferior merit rating in this study are as follows. Personnel with superior rating are those rated A in the appraisal over the past three years and have never been reprimanded over the past five years. As for personnel with inferior ratings, they are those with an appraisal rating of B or lower over the past three years. Regarding the roster of the study population, it was provided by all fire agencies.

**3.4. Result and Analysis**

**3.4.1. Analysis of Self-reported Implicit Mental Competency Questionnaire Survey Results**

Table 3.4.1. Profile of Experts for Reviewing the Competency Indicators

Age	Characteristics	No. of People	%
Age	20-30	3	18.75%
	31-40	3	18.75%
	41-50	5	31.25%
	51 or above	5	31.25%
Job Title	Squad leader	3	18.75%
	Branch head	8	50.00%
	Commander	2	12.50%
	Section chief	3	18.75%
Years of Work	0-5	3	18.75%
	6-10	0	0.00%
	11-15	2	12.50%
	16-20	3	18.75%
	21-25	3	18.75%
	26 or above	5	31.25%
Education	Master's degree	2	12.50%
	Bachelor's degree	6	37.50%
	Junior college	5	31.25%
	Others	3	18.75%
Fireman Education Background	Central Police University	13	81.25%
	Police Academy	3	18.75%
	State exam	0	0.00%

(Source: Prepared by the study)

**3.4.2. Profiles of Sampled Experts**

Table 3.4.2. Hierarchical Analysis of Profiles of Sampled Experts

Type	Characteristics	County and City Firefighting Agency	Central Agency	Education Agency for Recruitment and Selection
Years of Work	5-10 years	3	0	0
	10-15 years	2	0	0
	15-20 years	2	0	0
	More than 20 years	9	3	3
Job Position	Associate professor	0	0	1
	Director	0	0	1
	Group leader	2	2	0
	Special committee member	0	1	0
	Section chief	3	0	0
	Technical specialist	1	0	0
	Chief	1	0	0
	Commander	2	0	0
	Squad Leader	0	0	1
	Branch Head	2	0	0
Education	Squad Leader	5	0	0
	Master's or above	1	2	3
	Bachelor/associate degree	13	1	0
	Others	2	0	0

(Source: Prepared by the study)



## 3.4.3. Table of relative weights analysis of competency indicators

Table 3.4.3. Relative Weight Analysis of Frontline, Entry-Level Firefighting Personnel Competency Indicators

Criteria	Weights	Rank	Factor	Weights	Rank
a. Self-management	0.152	4	a1 Reliability	0.205	2
			a2 Honest and ethical	0.205	1
			a3. Self-improvement and emotion control	0.154	4
			a4 Adaptability to stress	0.179	3
			a5 Taking responsibility	0.051	7
			a6 Persistence and endurance	0.127	5
			a7 Attention to detail	0.079	6
b. Interpersonal Interaction	0.064	7	b1 Listening to others attentively	0.065	7
			b2 Caring about others	0.124	4
			b3 Coaching others	0.083	5
			b4 Empathy	0.149	3
			b5 Public relationship	0.069	6
			b6 Group collaboration	0.285	1
			b7 Communication and coordination	0.225	2
c. Firefighting Professional Knowledge	0.191	1	c1. Legal knowledge	0.168	4
			c2. Firefighting rescue and prevention	0.385	1
			c3. Fire engines	0.191	3
			c4. Disaster prevention and rescue	0.193	2
			c5. Social science	0.062	5
d. Firefighting Work Skills	0.178	2	d1. Language and application	0.063	5
			d2. Fire safety inspection	0.178	3
			d3. Disaster rescue and victim search	0.321	1
			d4. Swimming	0.087	4
			d5. Emergency rescue techniques	0.248	2
			d6. Fire investigation	0.052	6
			d7. Serving the public	0.051	7
e. Firefighter Basic Physical Fitness	0.141	5	e1. Muscle strength	0.149	4
			e2. Activity capability	0.231	2
			e3. Agility	0.191	3
			e4. Heart and lung function	0.277	1
			e5. Vision	0.086	5
			e6. Hearing	0.066	6
f. Firefighting Engine and Equipment Operation	0.165	3	f1. Rescue vehicles and tools	0.234	2
			f2. Personal protection gear	0.253	1
			f3. Equipment used for destruction	0.116	5
			f4. Communication equipment	0.083	6
			f5. Medical equipment	0.140	3
			f6. Rescue equipment	0.132	4
			f7. Positioning equipment	0.042	7
g. Firefighting Practical Experience	0.107	6	g1. Disaster prevention promotion	0.133	4
			g2. Fire safety inspection	0.148	3
			g3. Disaster rescue	0.295	1
			g4. Emergency rescue	0.243	2
			g5. Business operation	0.072	5
			g6. Fire investigation	0.059	6
			g7. Serving the public	0.050	7

(Source: Prepared by the study)

## IV. DISCUSSION

## 4.1. Core Competencies of Entry-level Firefighting Personnel

It is important to clarify the core competencies (including aptitude, knowledge, skills, and attitudes) of entry-level firefighters for firefighting personnel selection, recruitment. Police academies in the future should take the firefighting personnel's workplace conduct and performance into the consideration. Aside from knowledge and skills, it is also critical to consider the potential characteristics and leadership competencies of the students.

## 4.1.1. Levels 3 and 4 Professional Capabilities and Traits

## Entry-level Firefighting Personnel Professional Capabilities and Traits (pre-test questionnaire)

The research team carried out a questionnaire survey among ten firefighting experts. One of the expert's questionnaires was invalid and eliminated. Importance analysis was performed and those capabilities and characteristics with an average score greater than 4 were considered as required by entry-level firefighting personnel. Items of the competency construct are presented below.

- (1) Core Competencies of Firefighting Professional Capabilities and Traits
- (2) Self-management class (n = 7): Risk handling, work management, risk awareness, safety awareness, adaptability to change, adaptive ability, and self-reflection ability
- (3) Relationship management class (n = 4): Conflict handling, communication skills, social interaction, and group collaboration
- (4) Cognitive capability class (n = 3): Information searching, problem solving, and decision making

During the process of building the professional capabilities and traits of each professional domain, the following results were obtained from comparison and contrast:

- (1) According to the number of competencies of professional capabilities and traits In the original questionnaire, there were a total of 30 professional capabilities and traits, and after screening based on the level of importance, 16 items were removed, leaving 14 items.
- (2) According to the importance of competency of professional capabilities and traits The most important competencies of firefighting personnel are group collaboration and safety awareness.
- (3) Professional capabilities and traits of firefighting It covers eight items: work management, safety awareness, adaptability to change, risk handling, group collaboration, social interaction, decision making, and problem-solving.

**4.1.2. Weights of firefighting personnel’s competencies and aptitudes**

Regarding the weights of entry-level firefighting competency analysis and model building, the study used the pre-test, the literature review of foreign studies, and the work features of firefighting personnel as well as those passing the Level 3 and 4 examinations. For those passing the Level 3 examination, the seven required competencies are management capability, self-management capability, relationship management capability, law-enforcement capability, personality traits, work attitudes, and professional aptitudes. As for Level 4 entry-level firefighting personnel, their six required competencies are self-management capability, relationship management capability, law-enforcement capability, personality traits, work attitudes, and professional aptitudes. The Level 3 and 4 entry-level firefighting personnel’s competencies and models are presented below:

**4.1.2.1. Level 3 Entry-level Firefighting Personnel**

**Table 4-1.1** All Firefighting Personnel’s Professional Competencies and Aptitudes Weights: Comparison and Analysis

	Firefighting
First	Work attitude
Second	Personality traits
Third	Professional aptitudes
Fourth	Self-management capability
Fifth	Law enforcement capability
Sixth	Management capability
Seventh	Relationship management capability

(Source: Prepared by the study)

For firefighting personnel, professional competencies and work attitudes were found to be relatively important.

**Table 4-1.2** Comparison and Analysis of Factor Weights of Firefighting Personnel’s Professional Competencies and Aptitudes:

		Firefighting
Management Capability	First	Leadership
	Second	Communication and coordination capability
	Third	Motivating and cultivating the subordinates
Self-management Capability	First	Work management
	Second	Adaptability
	Third	Continuing learning
Relationship Management Capability	First	Group collaboration
	Second	Social interaction
	Third	Conflict handling
Law-enforcement Capability	First	Executive power
	Second	Decision making
	Third	Adaptability to change
Personality Traits	First	Honest and righteous
	Second	Caring and empathy
	Third	stress coping
Work Attitude	First	Good sense of responsibility
	Second	Service attitude
	Third	Obedience
Professional Aptitudes	First	Legal aptitude

	Second	Logical reasoning
	Third	Social aptitudes

(Source: Prepared by the study)

4.1.2.2. Level 4 Entry-level Firefighting Personnel

Table 4-1.3 Comparison and Analysis of Weights of Professional Competencies and Aptitude of All Levels of Firefighting Personnel:

	Firefighting
First	Self-management capability
Second	Personality traits
Third	Relationship management capability
Fourth	Work attitude
Fifth	Law enforcement capability
Sixth	Professional aptitude

(Source: Prepared by the study)

Table 4-1.4 Comparison and Analysis of Factor Weights of Professional Competencies and Aptitudes of All Levels of Firefighting Personnel

		Firefighting
Self-management Capability	First	Work management
	Second	Adaptability
	Third	Safety awareness
Relationship Management Capability	First	Group collaboration
	Second	Social interaction
	Third	Conflict resolving
Law-enforcement Capability	First	Executive power
	Second	Risk awareness
	Third	Problem-solving
Personality Traits	First	Honest and righteous
	Second	Emotion stability
	Third	Caring and empathy
Work Attitudes	First	Initiative and active
	Second	Service attitude
	Third	Good sense of responsibility
Professional Aptitudes	First	Legal aptitude
	Second	Social aptitudes
	Third	Spatial relationship aptitude

(Source: Prepared by the study)

4.2. Firefighting Personnel Behavioral Indicators

A suggestion here is to invite psychology-testing experts in Taiwan to collaborate with firefighting experts to develop the aptitude test, personality test, or other competency inventories using the 46 competency factors determined by the present study (See Table 4-2.1).

Table 4-2.1 List of Entry-Level Firefighting Personnel’s Competency and Behavioral Indicators

<b>Self-management</b>	
Work Management	The term “work management” in this study refers to the ability to prioritize work that is more urgent, control the progress, make good use of time and resources, effectively manage the work procedure and progress, and timely report the situation to the direct supervisor.
Adaptability	The term “adaptability” in this study refers to the ability to adapt to the behavior and personalities of different people, being sensitive to people, matters, situations, and conditions, quickly detect and respond to work changes, and take action or make changes according to the condition immediately.
Safety awareness	The term “safety awareness” refers to being attentive to the safety and condition of an individual, agency or station, suggesting measures for improvement, and keeping track of the implementation and control.
Continuing learning	The term “continuous learning” refers to the awareness of self-development capability, ability to explore, plan, and manage one’s capabilities effectively, the attitude of continuing development and ambition for improvement, and the effort in enhancing one’s capability.
<b>Relationship Management</b>	
Group Collaboration	In this study, the term “group collaboration” refers to respecting comments from team members, supporting the decision of the group, performing one’s duty well, and if necessary, coordinating with other units, departments, or groups at work, and establishing a good partnership for attaining the goal of the group cooperatively.
Conflict Handling	The term “conflict handling” in this study refers to the ability to mediate parties in any conflict, understand the condition and cause of the conflict, and establish an effective communication channel to take care of the antagonistic relationship between the parties involved.
Social Interaction	In this study, the term “social interaction” refers to interacting or working with other parties using appropriate methods or styles according to the background of these parties.

<b>Law-enforcement Capability</b>	
Crisis Handling	The term “crisis handling” in this study refers to the ability to stay calm and react flexibly in an unexpected incident or condition according to the level of urgency of the matter and to adopt appropriate actions quickly to handle the crisis and reduce the harm.
Executive Power	In this study “executive power” refers to the ability to perform tasks, organizational strategy, and work plans commanded by the supervisor effectively according to the corresponding operation procedure and attaining the goal of the organization.
Adaptability to Change	The term “adaptability to change” in this study refers to the ability to stay calm if there is any change in the work or the environment, to understand the cause of the change, to view the change with an open mind, to adjust behavior accordingly, and to maintain existing work performance.
Risk Awareness	In this study the term “risk awareness” refers to the ability to be aware of risks, to evaluate possible risks at work, and to take measures timely or in advance.
Decision Making	The term “decision making” in this study refers to the ability to make comprehensive observations, to analyze the facts calmly, to identify the complicity and truthfulness of a problem, and to make the right decision at the right time from a multidimensional viewpoint.
Problem-solving	In this study the term “problem-solving” refers to the ability to grasp the key issue of a problem, read the message, make a conclusion, search for an appropriate solution, weigh up the pros and cons, and take legal and practical action to remove the hindrance.
Innovation Ability	The term “innovative ability” in this study refers to the ability to break existing working patterns by proposing new suggestions or ideas with initiative and presenting feasible methods to assist implementation by the supervisors.
<b>Personality Traits</b>	
Honest and Righteous	In this study the term “honest and righteous” refers to the personality of being frank, having good integrity, complying with the organizational and social norms, keeping commitments, and practicing what one preaches.
Stress Coping	The term “stress coping” in this study refers to the ability to use an appropriate approach to handle work stress, have good resilience, and to sustain work performance and interpersonal relationships.
Emotion Stability	In this study the term “emotion stability” refers to the ability to express feelings appropriately, to keep the emotions stable, to stay calm even in an unpleasant situation, and to not project one’s anger onto others.
Caring and Empathy	The term “caring and empathy” in this study refers to being sensitive to others and the ability to put oneself in someone else’s shoes, caring about others, and detecting the feeling and thoughts of others.
Persistence and Durability	In this study the term “persistence and durability” refers to one’s patience and persistence in taking care of difficult tasks and completing the tasks without giving up.
<b>Work Attitude</b>	
Active and Initiative	The term “active and initiative” in this study refers to the personality of taking the initiative to perform a task without instructions from others, to take action to resolve problems immediately, and to bear extra responsibilities to reach the goal.
Good Sense of Responsibility	In this study the term “a good sense of responsibility” refers to the ability to complete the duty and meeting the requirements, have the courage to bear one’s errors or failures without blaming others, and working on improvement.
Motivation for Achievement	The term “motivation for achievement” in this study refers to the personality of valuing concrete work performance and effect and the attitude of doing one’s work well. It is also about setting up a challenging goal, challenging oneself, and pursuing better performance.
Obedience	In this study the term “obedience” refers to the ability to take a legal or cooperating attitude or action when discovering and experiencing any unreasonable phenomenon.
Friendliness	The term “friendliness” in this study refers to the personality of being polite, friendly, and easy to get along with.
Service Attitude	In this study the term “service attitude” refers to the ability to offer high quality service and pay attention to the needs of the public and community.
<b>Professional Capability</b>	
Legal Aptitude	The term “legal aptitude” in this study refers to ability to learn laws and regulations and being capable of correctly enforcing the laws and regulations.
Logical Reasoning	In this study the term “logical reasoning” refers to the use of induction, deduction, and other rules of thumb to determine the relationship and the causality between various concepts.
Social Aptitude	The term “social aptitude” in this study refers to the good social skills when contacting with others in society and the ability to handle interpersonal affairs effectively and harmoniously and communicating and coordinating effectively.
Counseling Ability	In this study the term “counseling ability” refers to the potential ability to apply behavioral change and other counseling techniques to assist others to adapt to society.
Spatial Relationship Aptitude	The term “spatial relationship aptitude” in this study refers to good visual attention, observation, memory, comprehension, and imagination to the spatial relationship between images and concrete objects in the three dimensional space.
Observation and Memory	In this study the term “memory and observation” refers to the ability of accurate observation, immediate memory, and good recalling for identifying people, time, matters, and objects.
Mechanical Reasoning Aptitude	The term “mechanical reasoning aptitude” in this study refers to the potential ability to use mechanical principles, tools and accessories, and mechanical principles in real life situations.
Physics Aptitude	In this study the term “physics aptitude” refers to a good knowledge of physics and chemistry and the potential ability to use the knowledge for work.
Biology Aptitude	In this study the term “biology aptitude” refers to a good understanding of biology and the

	potential ability of using the knowledge for work (especially for forensic science).
<b>Subordinate Management</b>	
Leadership	The term “leadership” in this study refers to the ability to create a good working environment, share the responsibility with subordinates, give opportunities to subordinates with good potential, motivate subordinates to strive to achieve the organization’s goal, and to rally the people for the organization.
Community and Coordination Capability	In this study the term “community and coordination capability” refers to the ability to communicate and coordinate with the superiors, subordinates, and other organizations or departments with a clear, fluent, concise, and effective attitude. It is also about the ability to establish alliances and promote and develop cross-organizational activities.
Motivating and Cultivating Subordinates	The term “motivating and cultivating subordinates” in this study refers to the behavior of showing one’s care of and support for subordinates, praising excellent performance of the subordinate in public, helping the subordinates establish a sense of honor, being the role model, and encouraging subordinates for continuing education for growth and development.
Crisis Management	In this study the term “crisis management” refers to the ability to implement comprehensive preventions, detect crises timely and immediately, and handle crises calmly, rapidly, and effectively.
Group Establishment	The term “group establishment” in this study refers to the ability to use constructive methods to resolve conflicts, to improve collaboration, to share weal and woe with the team, and to establish a highly effective team.

1. In terms of the tools for screening and selecting firefighting personnel, a suggestion is to first prioritize logical reasoning capability, legal aptitude, social and emotional intelligence, observational and memory capability, mechanical aptitude, and spatial and perceptual capability, these five professional aptitudes in the entrance examination of the Central Police University and the Police Academy for selecting new law-enforcement personnel. Personality traits including honesty and righteousness, emotional stability, care and empathy, and stress coping should be second in priority to active and initiative, good sense of responsibility, and friendliness these five types of work attitudes.
2. For Central Police University students and Police Academy students during their study period and for Level 3 and 4 police candidates from the state police exam during their training period, various assessments and evaluations should be implemented and psychological counseling should be available for improving their tolerance and emotional management and for enhancing their stress coping skills and other related competencies. It is important to enhance various competencies to ensure that these police students can perform their job well in the future.
3. For the Central Police University students and the Police Academy students during their study period and for Level 3 and 4 police candidates from the state police examination during their training period, the examination and tests should be more pluralistic; for example, including written tests, oral tests, physical exams, physical fitness tests, mental tests, background and integrity tests, and lie detection tests to eliminate those who are not suitable for law enforcement.

**4.3. Applying the Analysis Results on the Evaluation of Firefighting Personnel (n=3)**

**4.3.1. Sampled firefighting personnel for evaluation:**

Profiles of three sampled firefighting personnel:

**Table 4-3.1 Profiles of Sampled Firefighting Personnel for Evaluation**

Code	Sample No.	Gender	Age	Position	Years of Work	No. of A Grades	Grade A Ratio	Performance Rank
A	97	Male	31	Member	3	2	.67	2
B	128	Male	35	Member	13	10	.77	1
C	146	Male	31	Member	5	3	.60	3

Source: Prepared by the study

**4.3.2. Weights, Scores, Final Scores, and Rank of three Sampled Firefighting Personnel**

**Table 4-3.2 Weights, Scores, Final Scores, and Rank of Sampled Firefighting Personnel**

Factor level	Factor Weight	Bench mark	Total Weight	Sample Weight			Sample Score		
				A	B	C	A	B	C
a1 Reliability	0.205	0.153	0.031	0.333	0.310	0.357	0.010	0.010	0.011
a2 Honesty and ethics	0.205	0.153	0.031	0.347	0.293	0.360	0.011	0.009	0.011
a3 Self-improvement and emotion control	0.154	0.153	0.024	0.429	0.232	0.339	0.010	0.005	0.008
a4 Adaptability to stress	0.179	0.153	0.027	0.354	0.304	0.342	0.010	0.008	0.009
a5 Taking responsibility	0.051	0.153	0.008	0.343	0.328	0.328	0.003	0.003	0.003
a6 Persistence and endurance	0.127	0.153	0.019	0.361	0.306	0.333	0.007	0.006	0.006
a7 Attention to detail	0.079	0.153	0.012	0.409	0.303	0.288	0.005	0.004	0.003



b1Listening to others attentively	0.065	0.064	0.004	0.387	0.306	0.306	0.002	0.001	0.001
b2 Caring about others	0.124	0.064	0.008	0.377	0.311	0.311	0.003	0.002	0.002
b3 Coaching others	0.083	0.064	0.005	0.377	0.321	0.302	0.002	0.002	0.002
b4 Empathy	0.149	0.064	0.010	0.368	0.303	0.329	0.004	0.003	0.003
b5 Public relationship	0.069	0.064	0.004	0.377	0.279	0.344	0.002	0.001	0.002
b6 Group collaboration	0.285	0.064	0.018	0.368	0.309	0.324	0.007	0.006	0.006
b7Communication and coordination	0.225	0.064	0.014	0.400	0.300	0.300	0.006	0.004	0.004
c1. Legal knowledge	0.168	0.191	0.032	0.365	0.365	0.270	0.012	0.012	0.009
c2. Firefighting rescue	0.385	0.191	0.074	0.365	0.365	0.270	0.027	0.027	0.020
c3. Fire machinery	0.191	0.191	0.037	0.365	0.365	0.270	0.013	0.013	0.010
c4. Disaster prevention	0.193	0.191	0.037	0.365	0.365	0.270	0.013	0.013	0.010
c5. Social science	0.062	0.191	0.012	0.365	0.365	0.270	0.004	0.004	0.003
d1. Language application	0.063	0.178	0.011	0.333	0.333	0.333	0.004	0.004	0.004
d2. Fire safety inspection	0.178	0.178	0.032	0.333	0.333	0.333	0.011	0.011	0.011
d3.Disaster rescue and victim search	0.321	0.178	0.057	0.333	0.333	0.333	0.019	0.019	0.019
d4. Swimming	0.087	0.178	0.016	0.437	0.232	0.331	0.007	0.004	0.005
d5.Emergency rescue techniques	0.248	0.178	0.044	0.326	0.356	0.319	0.014	0.016	0.014
d6. Fire investigation	0.052	0.178	0.009	0.333	0.333	0.333	0.003	0.003	0.003
d7. Serving the public	0.051	0.178	0.009	0.333	0.333	0.333	0.003	0.003	0.003
e1. Muscular strength	0.149	0.141	0.021	0.314	0.336	0.350	0.007	0.007	0.007
e2. Activity capability	0.231	0.141	0.033	0.333	0.333	0.333	0.011	0.011	0.011
e3. Agility	0.191	0.141	0.027	0.313	0.438	0.250	0.008	0.012	0.007
e4. Heart and lung function	0.277	0.141	0.039	0.339	0.341	0.319	0.013	0.013	0.013
e5. Vision	0.086	0.141	0.012	0.333	0.333	0.333	0.004	0.004	0.004
e6. Hearing	0.066	0.141	0.009	0.333	0.333	0.333	0.003	0.003	0.003
f1. Rescue vehicles and machines	0.234	0.165	0.039	0.333	0.333	0.333	0.013	0.013	0.013
f2. Personal protection gears	0.253	0.165	0.042	0.333	0.333	0.333	0.014	0.014	0.014
f3. Equipment used for destruction	0.116	0.165	0.019	0.333	0.333	0.333	0.006	0.006	0.006
f4. Communication equipment	0.083	0.165	0.014	0.333	0.333	0.333	0.005	0.005	0.005
f5. Medical equipment	0.140	0.165	0.023	0.333	0.333	0.333	0.008	0.008	0.008
f6. Rescue equipment	0.132	0.165	0.022	0.333	0.333	0.333	0.007	0.007	0.007
f7. Positioning equipment	0.042	0.165	0.007	0.333	0.333	0.333	0.002	0.002	0.002
g1.Disaster prevention promotion	0.133	0.107	0.014	0.143	0.619	0.238	0.002	0.009	0.003
g2. Fire safety inspection	0.148	0.107	0.016	0.143	0.619	0.238	0.002	0.010	0.004
g3. Disaster rescue	0.295	0.107	0.032	0.143	0.619	0.238	0.005	0.020	0.008
g4. Emergency rescue	0.243	0.107	0.026	0.143	0.619	0.238	0.004	0.016	0.006
g5. Business operation	0.072	0.107	0.008	0.143	0.619	0.238	0.001	0.005	0.002
g6. Fire investigation	0.059	0.107	0.006	0.143	0.619	0.238	0.001	0.004	0.001
g7. Serving the public	0.050	0.107	0.005	0.143	0.619	0.238	0.001	0.003	0.001
Sample's total score							0.327	0.365	0.308
Sample's rank							2	1	3

Source: Prepared by the study

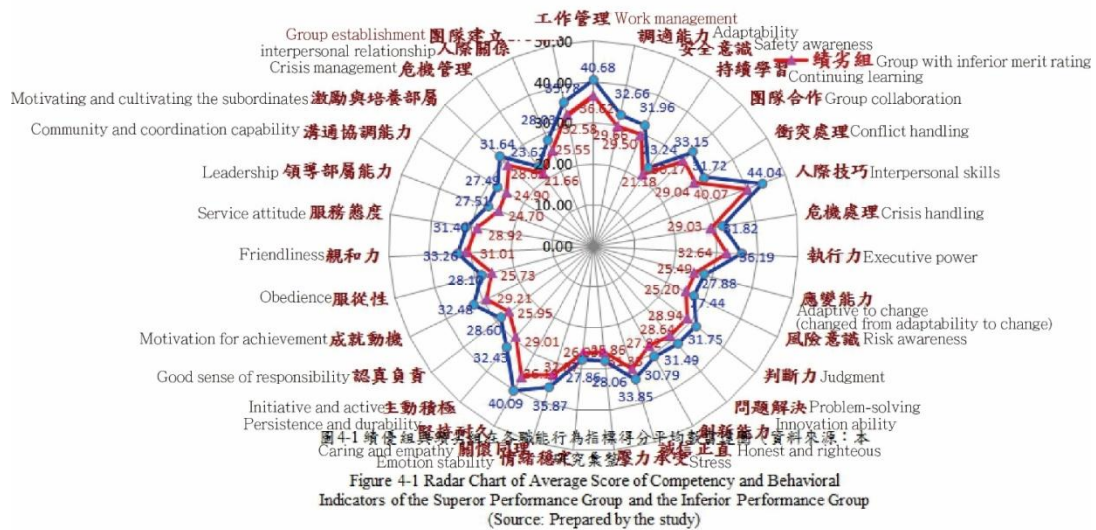
#### 4.4. Analysis of the Survey of Superior and Inferior Competency and Behavioral Indicators

##### 4.4.1. Analysis of Firefighting Personnel's Competency and Behavioral Indicator Scores

According to the above-mentioned analyses and findings, this study summarized the average scores and differences in professional competencies, personality traits, work attitudes, management competencies and other behavior indicators between firefighting personnel with superior performance and those with inferior performances in order to explore and analyze the relationship between competency levels (competent, neutral, incompetent) and the scores of various competency and behavioral indicators of firefighting personnel of different levels (personnel who had passed Level 3 and 4 examinations). It has been found that the competency indicators developed by the study can identify the percentage (for alert) of incompetent firefighting personnel of a specific level and their scores. The analysis result also indicated that Level 3 and 4 firefighting personnel had different average scores of competency indicators, and their percentage (for alert) of incompetency and their average scores also differ. In other words, firefighting personnel who had passed the Level 3 examination performed better overall than those who had passed the Level 4 examination. This finding also revealed that the reliability, validity and identification of critical competency and behavioral indicators developed by the present study for people who have passed Level 3 and 4 state examinations were excellent and can be referred to by the Central Police University and the Police Academy as a mental test model.

The present study also found, from the six behavioral indicators including the leadership of the management competency, a significant difference between Level 4 and Level 3 incompetent police personnel in terms of their average scores and the cumulative percentage of the number of these personnel. When comparing the data with actual performance of the firefighting personnel, the phenomenon may be because of a high percentage of Level 3 personnel taking an administrative position. In contrast, personnel who had passed the Level 4 state examination were mostly taking an entry-level position. As a result, those people who had passed

the Level 4 state examination did not score as high as those who had passed the Level 3 state examination in behavioral indicators for management competency. Therefore, instead of using one questionnaire for all personnel regardless of whether they are Level 3 or Level 4, it is better to develop a specific questionnaire for specific levels or to pay attention to the work content of the personnel when analyzing the results.



4.4.2. Analysis of Differences in the Behavioral Indicators between Law-enforcement Personnel with Superior and Inferior Merit Rating

The main objective of this study is to explore differences in firefighting core competencies between firefighting personnel of different levels in order to develop suitable aptitude and personality questions for the above-mentioned four types of law-enforcement personnel. Therefore, the present study analyzed the differences between firefighting personnel who had passed Level 3 or 4 state examinations from the competency aspect. In addition to the analysis of the firefighting personnel’s self-reported scale, this study also compared differences between the evaluation results of three core competency classes (professional competencies, personality traits, and management competencies) given by supervisors and the results of the aptitude tests. The study results showed a significant difference in the professional competencies, personality traits, and management competencies among incompetent, neutral, and competent firefighting personnel who had passed Level 3 or 4 state examinations. For those firefighting personnel who had passed the Level 3 or 4 state examinations and were rated as competent (the competent group), their performance of all professional competencies were better than those of the neutral group or of the incompetent group. As for the aptitude test, the self-reported evaluation result revealed that possessing physics and biology knowledge was the most significant factor. When further examining the differences between Level 4 personnel with inferior and superior merit ratings in the aptitude test results, performances in the personality test and competencies also differed.

As for the analysis of the differences between firefighting personnel with superior merit ratings and inferior ratings on their self-reported behavioral indicators, it was found that first, according to self-management competencies, those who had passed the Level 3 state examination showed a higher score in self-management competencies, relationship management competencies, law-enforcement capability, personality traits, and work attitudes than not only those competent personnel who had passed the Level 4 state examination but also all law-enforcement personnel. As for incompetent personnel who had passed the Level 3 or 4 state examinations, their average score was significantly lower than competent and neutral personnel who had passed the Level 3 or 4 state examination as well as all law-enforcement personnel. What is worth noting is that those incompetent law enforcers passing the Level 4 state examination scored consistently higher in interpersonal skills and behavior than those incompetent personnel who had passed the Level 3 state examination. It is known that there is a larger proportion of personnel who had passed the Level 3 state examination and are taking an administrative role, and the finding here also showed that those law-enforcement personnel who had passed the Level 3 state examination did not perform as well as those passing the Level 4 state examination in terms of caring about and being friendly to subordinates, keeping a friendly and collaborative relationship at work, interacting with others happily, and spending time to build interpersonal relationships with others willingly. Kakabadse, Siobhan, Collin, and Andrew (1993) pointed out that building a good interpersonal relationship is helpful for the higher management to enhance management quality, while the philosophy and values of the management as well as the trust between the superiors and subordinates is the foundation influencing the

interpersonal relationships. Nonetheless, Tsai, Cheng, Chou, Chiang, Cheng (2009) found from exploring the superior-subordinate relationship that power distance may have weakened the recognition of the effective relationship with the superior. Therefore, as shown by the present study, the finding that firefighting personnel who had passed the Level 3 state examination did not perform as well as those who had passed the Level 4 state examination may be due to the interpersonal relationship, one's own feeling, and the large power gap between those who had passed the Level 3 state examination and their subordinates. In terms of management competencies, those competent personnel who had passed the Level 3 state examination performed better than those competent personnel who had passed the Level 4 state examination as well as overall fire fighting personnel. On the other hand, the incompetent personnel who had passed the Level 3 state examination were found to perform significantly better than the incompetent personnel who had passed the Level 4 state examination in leadership capability, communication and coordination capability, subordinate motivation and cultivation, interpersonal relationship, and group building, these five behavioral indicators. This finding revealed that even though some fire fighting personnel who had passed the Level 3 state examination were incompetent, their management competency was better than those law-enforcement personnel who had passed the Level 4 state examination. Taken together, this study found that there is room for improvement for all competencies of incompetent firefighting personnel, regardless of whether they had passed the Level 3 or 4 state examinations. Therefore, a suggestion for the relating authority is to strengthen the competency training for firefighting personnel who have passed the Level 3 or 4 state examinations, especially the management competencies of firefighting personnel who have passed the Level 4 state examination. Although it is rare for firefighting personnel who have passed the Level 4 state examination to take an administrative position, in order to reach a consensus on and to better understand management-related concepts and values among firefighting personnel who have passed the Level 3 or 4 state examinations, it is necessary to enhance training on the management competencies of firefighting personnel who have passed the Level 4 state examination and the communication of concepts with personnel who have passed the Level 3 state examination.

#### **4.5. Management Connotation of Firefighting Personnel Screening and Selection**

The present study comprised of three stages of analyses for generating the method for screening and selecting frontline firefighting personnel. It can be found that the shared and critical professional competence behavioral indicators had relatively good reliability and identify ability for differentiating between incompetent and competent personnel effectively as well as indirectly revealing the capabilities, aptitudes, and personality traits that firefighting personnel should possess.

The frontline firefighting personnel's shared and core professional competency structure established in this study covers seven constructs: leadership management capability (five competencies), self-management capability (four competencies), relationship management capability (three competencies), law-enforcement capability (six competencies), personality traits (four competencies), work attitudes (five competencies), and professional aptitudes (five aptitudes). In total, there are 28 competencies and five professional aptitudes.

## **V. CONCLUSION**

In general, the work contents of firefighting personnel differs depending on their task arrangement and work nature, but there are also tasks, such as 24-hour on-call and handling of emergencies or accidents, that are shared by all firefighting personnel. As for the source of firefighting personnel, most of them are graduates from the Central Police University or the Police Academy, while others are hired after passing the Level 3 or 4 state police examinations. In this study, the core competency indicators for entry-level firefighting personnel were established in two stages. In stage 1, an open expert questionnaire was adopted to find out competencies required by entry-level firefighting personnel and the definitions according to the viewpoints of experts. For stage 2, hierarchical analysis was adopted to find out the weighting of the competencies, which can also be used as an objective and systemic approach for selecting and training firefighting personnel/candidates by the education/training authority or the examination authority.

According to the viewpoints of the experts in this study, the core competency indicators of entry-level firefighting personnel at the benchmark level arranged in descending order are: firefighting work skills, fire engine and equipment operation, self-management (capability), firefighting personnel basic physical fitness, and firefighting practical experience. As for the less valued competency by the experts in this study, that was interpersonal interaction (capability). All firefighting personnel require a high mechanical aptitude and spatial-related perceptual capability in order to do the job well.

In this study, three firefighting personnel were sampled and their evaluation results and training data input into the model. It was found that the rank of these three sampled firefighting personnel based on their scores was consistent with their work performance (the ratio of Grade A merit rating), suggesting that the results of the present study can be applied on actual firefighting personnel evaluation because of its good predictive power.

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