

Measures to Increase Efficiency of Provision and Validation of Information of Associate Fire Protection Engineer Certification: Focusing on Adverse Selection Theory

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Abstract: As solutions for adverse selection in the aspect of associate fire protection engineer certification, provision of usable and accurate information, accuracy of information verification and diversification of choice device were derived and following improvement plans were proposed according to the solutions. First, the undifferentiated qualification items should be reformed into qualification grading system that reflects the need of industrial settings like the associate fire protection engineer for construction, the associate fire protection engineer certification for inspection of construction, the associate fire protection engineer for design and so on. Second, to complement the problem of majority of people with certain level of education passing due to application qualification prioritizing level of education, level of education and work experience among application qualifications should be made equivalent or work experience should be prioritized. Finally, variety of choice of technical professionals should be secured by appointing both certified associate fire protection engineers and hands-on experienced workers while experienced workers are being excluded due to the regulation that only appoints certified associate fire protection engineers.

Key words: Associate fire protection engineer, adverse selection, information provision, information verification, choice device

INTRODUCTION

Associate Fire Protection Engineer is a national technical qualification given to people with ability to perform multiple tasks of functions like construction, design and inspection of fire protection facilities based on field of application, in other words the skilled technology on fire protection facilities. On fire protection industrial settings, even though the role of associate fire protection engineer certification is important, there have been only a few researches on associate fire protection engineer certification so far. However because assumptions can be made about associate fire protection engineer certification from studies on national technical qualifications which include Associate Fire Protection Engineer, we first want to analyze standard research on national technical qualifications.

Park (2016) analyzed cognitive map on the need of newly establishing national technical qualification system for coffee profession as an existing research on national technical qualification. Seo *et al.* (2000) studied the value of national technical qualification. Sin *et al.* (1999) first examined the current state of international mutual acknowledgements of national technical qualifications, then suggested enhancement of professionalism and public credibility of qualifications, enhancement of the level of national technical qualification, improvement of

application qualifications, establishment of unified qualification system as plans for mutual acknowledgements between nations. Won and Kang (2010) suggested research model to investigate the factors that affects the immediacy and interchangeability of national technical qualification on machinery field.

Lee (2010) analyzed awareness on career development of national technical qualification holders. Jeong (2009) tried to understand the change of qualification system sociologically by analyzing the introduction process of new qualification focusing on national technical qualification system. Cho and Park studied the improvement plans of classification system of national technical qualification work fields.

The existing studies developed their theses theoretically basing on comprehensive research on national technical qualification, relevant regulations, current status, survey and foreign cases. This study is different from previous studies in that it researched on associate fire protection engineer certification system which has not been studied before in Korea and it is significant in that unlike existing research directions, it approached associate fire protection engineer certification system with adverse selection theory as its theoretical basis.

MATERIALS AND METHODS

Adverse selection theory: Adverse selection refers to the occurrence of market failure due to information asymmetry on one contracting party's hidden characteristic at the time of the contract. In other words, it is the state when the chance of making not the most optimal transaction with the contract partner increases for the party without information when information is asymmetrically distributed (Kim and Kim, 2006). For example, it is the problem that occurs when the seller knows more information about the selling product than the buyer. As a result, there is a chance that the seller will sell poor quality product to the buyer. That is, the buyer with insufficient information has to make a 'selection' of 'adverse' product (Kim and Kim, 2006). Solutions for adverse selection that are frequently seen in the market are signaling and screening.

Meanwhile, providing accurate and practically usable information through advertisements (Kim, 2012a, b; Ann, 2012; Youn, 2003; Lee, 2003; Cha and Jo, 2008) increasing the accuracy of information verification through methods like providing higher income, employing new employees as interns, warranty, price and education (Lee, 2011, 2003; Jo, 2011, 2008; Ji and Kim, 1995) diversifying choice device like insurance product and various loan agreement (Kim and Kim, 2006; Lee, 2011, 1917; Lim, 2001) have been suggested as solutions for adverse selection.

Associate fire protection engineer certification of the US and Japan

The US: The US Associate Fire Protection Engineer is a certificate in the US. Table 1 shows its qualifications. The US Associate Fire Protection Engineers do not have to take extra tests. However, they are required to have a certain level of education. Together with this, they must have work experience in order to get the certificates. In terms of the level of education, they need to have graduated from high school or higher or completed engineering design courses or similar courses for 2 year from a college. In terms of the work experience, they have to have experience in working fire prevention technology, engineering design or related areas.

Japan: The fire protection qualification in Japan is divided into 2 categories. They are for the fire protection system engineer (the 1st class) and the fire protection system engineer (the 2nd class). The fire protection system engineer (the 2nd class) is equivalent to the Associate Fire Protection Engineer of Korea. As shown in Table 1, the qualification for the fire protection system of

Table 1: Qualifications for the US associate fire protection engineer

Class	Qualifications
Associate fire protection engineer	High school graduates or 2 year of completing courses related to engineering design and work experience related to fire prevention technology or engineering design

Table 2: Current state of production of fire safety educator

Rate	

Class (sub class)	Scope of work
Fire protection system engineer (the 2nd class)	
The 1st	Indoor/outdoor hydrants and water spray extinguishing systems
The 2nd	Foam fire extinguishing systems
The 3rd	Carbon dioxide fire extinguishing systems, halogenated compound product fire extinguishing systems and dry powder fire extinguishing systems
The 4th	Automatic fire detection systems, gas leakage alarm systems and automatic alarm systems
The 5th	Metal evacuation ladders, rescue devices and descent devices
The 6th	Fire extinguishers
The 7th	Electric leakage alarm systems

engineer (the 2nd class) is divided into 7 subcategories. The fire protection system engineers (the 2nd class) can carry out maintenance and inspections excluding engineering design and installation work for fire protection systems.

Adverse selection issue of associate fire protection engineer certification

Inaccuracy of information provision: Associate fire protection engineer certification fails to provide accurate information that is practically available because of Inaccuracy of information provision. Firstly, the categories of the associate fire protection engineers are not classified well. For this reason, associate fire protection engineer certification provides inaccurate information. The government classifies the classes of the qualifications by means of the regulations of the National Technical Qualifications Act and the of the same law (Table 2). On the other hand, the categories of the qualifications are not classified in detail. In fact, the categories of fire protection related businesses are classified into Firefighting System Installation Business, Firefighting System Inspection Business and Firefighting System Engineering Business among others.

However, the categories of the qualifications for engineers to be appointed in these businesses do not exist. The qualifications are all in one category. As the categories of the qualifications are not classified in accordance with the categories of the businesses, the qualification categories of the certified associate fire protection engineers cannot provide accurate information

to companies (Kim, 2012a, b; Park and Shin, 2002). In Japan, the qualification breakdown structure is more in detail compared to Korea. The scope of work for each category of qualification is divided in accordance with each fire protection system. Therefore, it can be considered that the categories of qualifications for the certified fire protection system engineers of Japan provide accurate information to companies.

Secondly, associate fire protection engineer certification puts the level of education above all others. A lot of engineers with the level of education pass the qualifications. However, this provides inaccurate information, considering the description of the relevant government law. The government classifies the classes of the qualification by means of the regulations of the National Technical Qualifications Act and the (Attached Table 2 of the same law. In accordance with these, the government qualifies various applicants for the National Technical Qualifications who have certain levels of education, certain work experience or both. This means that certified engineer's classes and qualifications for application are important. At present, regulations on qualification for application tend to prioritize academic ability more than work experience, causing people with high education but no career work experience to pass more than the experienced. Due to this situation, accuracy of information is not secured through certificate at industrial site where work experience is considered important.

Although, Human Resources Development Service of Korea has internal evaluation standards such as academic ability and work experience depending on qualification for applicants, precise evaluation standards on academic ability are incomplete, compared to evaluation standards on work experience. Therefore, cases occur when people without corresponding academic conditions apply for a qualification test (Kim, 2013).

Contrastively, qualification for test application is given to people who have both academic ability and work experience in United States of America. It does not differentiate academic ability against work experience and rather consider work experience more important. There is no special condition on academic ability and work experience in Australia in order to complete educational training. However, since educational training subjects are mainly composed of actual work, it is difficult for those who do not have on-site work experience to take the courses.

Thirdly, provision of information about practical ability of on-site practice is insufficient due to traditional test. National qualification test is in an open-book format

and question types in the test consider practical ability of on-site practice important in advanced countries such as the United States of America. Therefore, it is noticeable that it regards practical ability of on-site practice more important than studying way of simply memorizing in Republic of Korea. In case of traditional test operated by Human Resources Development Service of Korea, it limits the thoughts of examinees which causes difficulty in providing accurate information about practical ability of on-site practice to a company through certificate (Kim, 2012a, b, 2011; Jo, 2008).

There is no special test taken in Australia (Kim, 2010). In other words, the qualification is given through completion of educational training. Subjects in education training are composed of courses for the experienced which regards practical ability of on-site practice important, therefore, it can be seen that accurate information about practical ability of on-site practice is provided through certificate.

RESULTS AND DISCUSSION

Inaccuracy of information verification: Associate fire protection engineer certification lacks accuracy in verification of information. Firstly, it is difficult to verify the ability because it is a qualification grade where ability gap does not surface. Thus it does not properly perform a role as a device where qualification grade verifies ability (Kim, 2012; Park and Shin, 2002). Contrastively in the United States of America, it falls into two categories: certificate given without any special test if academic ability and work experience are prepared at certain point and license which is given only to those who passed a test which specified practical knowledge followed by technical changes with particular academic ability and practical working experience in fire protection. Therefore, ability gap followed by grade gap can be more accurately verified.

Secondly, reaction to technology in industrial site is late due to complicate process of amending the law, causing insufficiency in verification of information. In order to change guidelines for making questions in accordance with speed of change in industrial site, it takes an average 14.5 month to prepare a policy plan after an agenda is chosen. It takes 7.3 month until definite decision by competent authority is made after preparation of a policy plan. It takes 7 month for the administration to decide and pass over to the National Assembly and it takes at least 5.9 month until it is enforced after passing the National Assembly. To sum up, it turns out that total time required is about 35 month.

Diversification of preference device: Preference device is limited due to exclusion of the experienced because of appointment regulations that are only for certified associate fire protection engineers. When managing firefighting facility business, there are no special appointment regulations in Australia. Due to this, it can be seen that it is easy for a company to recruit various technical personnel necessary, regardless of whether the personnel acquired a qualification or not.

Improvement plan for associate fire protection engineer certification

Provision of accurate information practically usable:

Associate fire protection engineer certification is not providing accurate information which is practically usable due to inaccuracy in providing the information. Firstly, in order to improve firefighting qualification system to qualification grading system which reflects the demand of industrial site, it is desirable to categorize into the associate fire protection engineer for construction, the associate fire protection engineer certification for inspection of construction and the associate fire protection engineer for design. This is based on firefighting facility business categorized into firefighting facility construction business, firefighting facility construction supervision business and firefighting facility design business.

Secondly, there is a need to improve qualification for examination which is focused mainly on academic ability. The government should reinforce examination standards on academic ability more than examination of work experience and prevent from people whose academic ability does not correspond with the condition to take a qualification test.

Thirdly, there is a need to improve verification method in an open-book format. In case of fire protection qualification, it is deemed that a test in an open-book format is appropriate since jobs requiring application are more than knowledge about learning.

Accuracy of information verification: Firstly, it is necessary to change into qualification grading system which reflects the demand of industrial site. The government should let accuracy of verification of information about practical ability be provided only with the qualification owned by an individual by improving into qualification grading system which reflects the demand of industrial site.

Secondly, there is a need to reinforce the sense of on-site in guidelines for making questions through simplification of the law system. It is necessary to quickly

update guidelines for making questions so that it matches with situations on-site in order to secure accuracy of information verification about associate fire protection engineer certification. This should be done through simplification of the law system.

Variety of choice on technical personnel: There is a need to improve the law that regulates so that only certified associate fire protection engineers can be appointed when registered as technical personnel for firefighting facility business and firefighting facility management business.

CONCLUSION

This study suggested a solution for associate fire protection engineer certification based on adverse selection theory as theoretical evidence. It deducted provision of accurate information practically usable, accuracy of information verification and diversification of selection device as solutions of adverse selection in terms of associate fire protection engineer certification. It also suggested the following improvement plan followed by the solutions. Firstly, it is necessary to improve qualification categories that are not categorized by type of business into qualification grading system of the associate fire protection engineer for construction, the associate fire protection engineer for inspection of construction and the associate fire protection engineer for design which reflects the demand of industrial site.

Secondly, it is necessary to treat academic ability and work experience among qualification for application same or prioritize the working experience in order to supplement the problem where many people with academic ability pass due to qualification for application that prioritize academic ability. Lastly, there is a need to secure variety of the choice on technical personnel by appointing both certified associate fire protection engineers and the experienced. At current point, the experienced are excluded due to appointment regulations only for the certified associate fire protection engineers. We hope one has competence as an associate fire protection engineer and sincerely fulfills one's responsibility at industrial site through right policy on industrial engineer fire protection system.

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