Authorized Architect and Builder in the National Technical Qualification Written Examination

-Exam Questions Analysis on Architecture Planning

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Abstract

This study analyzes the status of qualified architects and builders through the authorized architect and builder exam from 2009 to 2019. It not only examines the frequency and trend of the questions in architecture planning and engineering of the exam but also reviews the trends and characteristics of the questions by type to explore the exam trends. For the past ten years, the number of candidates peaked at 20,666 in 2010, slowly decreased, and increased again to 17,731 in 2016, then increased to 19,351 in 2019. The acceptance rate recorded the lowest at 20.8% in 2010, and gradually increased to 32.4% in 2019. The average rate for the last ten years was 27.28%. The acceptance rates rise steadily since 2016 because the level of difficulty seemed to be slightly lower than before 2010. In the annual analysis of the question patterns in the architectural planning, the frequency of the questions was highest in residential and commercial buildings, and the topics except for banks and shops were relatively well distributed every year. The history part, e.g., the western architectural history and Korean architectural history, appeared to be highly intense, but the number of questions was relatively low at 7.83% and 5.83%, respectively. They could be the most challenging and frustrating subjects for students who prepare for the National Technical Qualification Examination. This study analyzes the question patterns that have been examined in the architectural exam for the past ten years. Although there has been little research or discussion on the architecture planning field in the exam, this study can be meaningful in that providing fundamental insight that can be useful to students as well as candidates. Furthermore, future studies on the trend of questions will be needed for other architecture areas.

Keywords: National Technical Qualification Test, Type of Exams, Authorized Architect and Builder, Examination Tendency

1. Introduction

1.1 Research Background

The authorized architects and builders are qualified professionals for architectural design and

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construction of a certain size of buildings in accordance with the Article 2 of the Enforcement Decree of the National Technical Qualifications Act. Under the National Technical Skills Qualification Act No. 2672, this act has been in effect since 1974[1].

The qualification exam consists of five subjects: architectural planning, architectural engineering, architectural structural engineering, architectural equipment engineering, and building codes. The minimum score is 40 points out of 100 per subject and the average of 60 points or higher is required for all subjects. Architectural design covers not only the architectural design field itself but also the architectural construction field, which is mandatory for all architecture-related majoring students. As the core subject in the Department of Architecture and Architecture Engineering, it covers two semesters of architectural planning, one or two semesters of the western architectural history, one semester of the Korean architectural history, and one semester of the complex planning[1].

Since the foundation of the National Technical Qualification System in 1974, it has continuously helped develop national human resources. In particular, the system plays a leading role in establishing the qualification standard to meet industrial demands by providing major courses and vocational education at universities and in securing job competency for the industry. Students with the architectural engineering background, who wish to achieve a construction engineer qualification, must pass the National Technical Qualification Exam accredited by the Human Resources Development Service of Korea. According to data released by the Human Resources Development Service of Korea in recent years, the acceptance rate of the qualified architectural engineers was 20.8% in 2010; 23.4% in 2011; 23.2% in 2012; 25.5% in 2013; and 24.9% in 2014. This is significantly lower than the rate of forestry (40.0% in 2017), civil engineering (30.1% in 2017), and construction safety engineer qualification (43.4% in 2016). Such low rate puts high pressure on the students of architecture engineering who prepare for the qualification test.

According to So and Lim (2015), it was suggested that it is difficult to collect exam information because there is lack of universality in the exam questions of the Korean landscape architectural history and it is even difficult to predict from the textbook.

Although it is necessary to evaluate the Korean landscape architectural history exam questions so that current issues could be addressed, there has been little research on the exam of Authorized Architect and Builder.

1.2 Research Objective

This study aims to provide some implications on the exam questions in the architectural planning field by analyzing the exam questions for the last 10 years.

The National Technical Qualification exam is prepared according to the level of each grade, and it tests ability to perform technical tasks such as design, construction, materials, equipment, etc. In addition, it examines five subjects including architectural planning, architectural engineering, architectural equipment, architectural structural law, and architectural regulations, and also detailed sub-subjects are covered in each subject. The test is held three times a year. It is a multiple-choice based exam and each subject has the total of 20 questions and is run for two hours and 30 minutes[1].

1.3 Research Scope and Methodology

This study focused on the authorized architect and builder exam and it was collected for the last 10 years from 2010 to 2019. The total of 600 questions were extracted from the qualification portal site, the Korea Human Resources Development Service, Q-net[1].

By employing the literature analysis method, this study analyzed previous question patterns related to architectural planning. This study is structured as follows: First, it analyzed the current status of the qualified architects and builders from 2010 to 2019. Second, it examined the question patterns in the architectural planning for the past ten years. Then, it selected four keywords, such as the architectural planning, the complex planning, the western architectural history, and the Korean architectural history. Each consisted of detailed sub-category as well. Based on the categorization, trends were identified and analyzed. The keyword selection and question patterns for each subject were extracted from the table of contents from the publishers e.g. Kimundang and Munundang, which are frequently used as educational materials at universities.

2. Analysis on the Status of Authorized Architects and Builders in the Last Ten Years

As shown in [Table 1], the number of the authorized professionals decreased from 2010 to 2015; increased from 2016; fell sharply in 2014; but then has increased since 2015. In the last ten years, the acceptance rate was the lowest at 20.8% in 2010; slightly increased to 23.2% in

2012; and reached the peak of 32.4% in 2019.

The average acceptance rate in the last decade was 27.28%. In order to rationalize the acceptance rate, it is considered that the faculty of the related departments should continuously improve the level of difficulty of the questions.

[Table 1] The Acceptance Rate of Authorized Architect and Builder Exam[1]

Division	Year										Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Candidate	20,666	18,437	17,351	16,514	16,015	16,082	17,489	17,731	18,070	19,351	177,706
Pass	4,301	4,319	4,024	4,210	3,981	5,002	4,502	5,028	5,583	6,275	42,924
Pass rate(%)	20.8	23.4	23.2	25.5	24.9	31.1	25.7	28.4	30.9	32.4	27.28

3. Analysis on Frequency and Trend by Question Type in the Last Ten Years

As shown in [Table 2], there are four subjects, specifically the architectural planning, the complex planning, the western architectural history, and the Korean architectural history. Under the architectural planning, it covers nine sections - general introduction, environmental planning, residential architecture, commercial architecture, educational facilities, industrial architecture, lodging facilities, medical facilities, and cultural facilities. As for western architectural history, there are eight groups of ancient architecture, classical architecture, medieval architecture, modern architecture, contemporary architecture, architects, and others. In the Korean architectural history, there are six groups - architecture by era, architecture style, palace architecture, temple architecture, modern and contemporary architecture, and others. In total, 600 questions were collected based on the categorization. Among the 32 sub-groups, the biggest question pool is the office from the commercial architecture with 61 questions (10.16%), followed by the single family housing from the residential architecture with 53 questions (8.83%), theaters from the cultural facilities with 45 questions (7.50%) and schools from the educational facilities with 38 questions (6.33%).

Among the larger groups, residential and commercial architecture accounted for 40.47% of the total, with the western architectural history accounting for 7.81%, and Korean architectural history for 5.82%.

From warehouses and lodgings of the industrial architecture, the questions on restaurants have not been on the exam in the last ten years. Although the western architectural history questions have been consistently covered in the architectural characteristics of each period throughout the era, there has been no question on the contemporary architecture.

4. Trends and Characteristics by Type of Examination in the Last Ten Years

4.1 Architectural Planning

4.1.1 Residential Buildings

In the residential buildings, the different questions between Korean and western-style homes were examined such as skip-floor styles; the standards of Chombard de lawve; the classification of town houses; the house flow planning; and the basics of multi-family houses. The level of difficulty of the overall questions was found to be not substantially high.

4.1.2 Commercial Buildings

In the commercial buildings, the concept and characteristics of office landscaping; types of cores; the considerations for core planning; the elevator planning; the detailed planning of banks; the composition method of stores; sales types of stores; direction of stores; anti-reflection method of showcase; placing method of showcases in department stores; the advantages and disadvantages of escalator; the functions of shopping centers; and the components of space questions were frequently found. The level of difficulty was analyzed to be not significantly high but most of questions were about specific terms and detailed contents.

4.1.3 Educational Facilities

In the educational facilities, the school building layout method; the operational method of school; the decision considerations of the block plan; and elbow access type and cluster type that are special placement methods applied in a detailed plan were covered. In the layout planning, the color planning and the characteristics of special classrooms were constantly presented.

In the library, determining factors such as the library size; the book deposit and withdrawal system; the characteristics of the special reading room carrel; the considerations of library planning; and the calculation of library capacity were questioned.

4.1.4 Industrial Buildings

From the industrial buildings, items such as the classification by factory type and roof type; windowless factory; and loading and unloading method were mostly asked. The level of difficulty was analyzed to be somewhat low.

[Table 2] Exam Items of Architecture Planning for the Past 10 years from 2009 to 2019

Division			Year									Total	Rate(%)	
			2010	2011	2012	2013	2014	2015	2016	2017	2018			2019
Architecture Plan	An introduction		1		1					2	2	2	8	1.33
	Environment Plan		1	1				1					3	0.50
	Residential architecture	House	4	5	6	3	4	5	8	6	7	5	53	8.83
		Housing	6	2	4	4	5	6	4	4	5	6	46	7.66
		Housing Planning	4	6	4	4	4	4	6	3	1	4	40	6.66
	Commercial architecture	Office	7	3	5	6	9	6	7	6	6	6	61	10.16
		Bank	2	2	1	2	1	1	2	2	1		14	2.33
		Store		2	1	3	2	3	1		1	4	17	2.83
		Shopping center, Department store	4	5	5	2		2	1	4	4	2	29	4.83
	Educational facilities	School	4	3	5	5	4	3	3	3	4	4	38	6.33
		Library	2	5	4	4	4	4	3	4	3	3	36	6.00
	Industrial architecture	Factory	4	2	2	4	3	2	3	3	3	3	29	4.83
		Warehouse												0.00
	Accommodation facilities	Hotel	3	4	5	4	3	3	3	3	2	1	31	5.16
		Restaurant												0.00
	Medical facilities	Hospital	3	5	2	3	5	3	3	3	3	2	32	5.33
	Cultural facilities	Theater	7	4	4	3	4	4	4	5	5	5	45	7.50
		Museum	4	2	4	4	4	4	4	3	4	4	37	6.16
History of Western architecture	Ancient architecture			1	1	1	1	2	2	1	2	2	13	2.16
	Classical architecture		1	1		1	1					1	5	0.83
	Middle architecture				1			1	1	2			5	0.83
	Early modern architecture				2								2	0.33
	Modern architecture										1		1	0.16
	Contemporary architecture													0.00
	Architects		1	2	2	2	1	1	2		1	3	15	2.50
	The others		1	1				1		2	1		6	1.00
History of Korean architecture	Architecture by period													0.00
	Architectural style			1		3	2	1	1	1	2	1	12	2.00
	Palace Architecture							1					1	0.16
	Temple architecture		1	1		2	1		1	2	1	2	11	1.83
	Modern/Contemporary architecture			1			1				1		3	0.50
	The others		1	1	1		1	2	1	1			8	1.33
Total			60	60	60	60	60	60	60	60	60	600	100.00	

4.1.5 Lodging Facilities

From the lodging facilities, questions such as the type of hotel; the selecting conditions for the land of city hotels and resorts; the separation of the flow lines between employees and customers; and terms used for other related spaces were mostly covered.

4.1.6 Medical Facilities

In the medical facilities, it covered questions such as the comparison between the hospital type (e.g., pavilion type and block type); the comparison between the open system and closed system for outpatient medical departments; the size of the operation room, and significant issues in planning; the features and explanations of nursing unit; and the considerations of hospital room planning. It suggested that it is critical to understand medical terminologies.

4.1.7 Cultural Facilities

In the cultural facilities such as the theaters and cinemas, the description of the open-stage; and arena, and proscenium (picture frame stage) types; audience's visibility; distance between screen and the audience; sound planning of the audience seat; preventing noise; terminologies of the main equipment and devices in the stage; and the terminologies of the backstage rooms were examined. In the museum-related questions, exhibition method (observation), special exhibition method, and lighting method in the exhibition were mostly found.

4.2 Western Architectural History

The western architectural history covered questions such as the characteristics of Babylonian architecture and Ziggurat, the chronological aspects of medieval architecture; the features of Greek and Roman architecture; the architectural factors, and cathedrals of medieval architecture; and works and books of renown architects. The level of difficulty was highest in the architectural planning field due to the vast range of the questions.

4.3 Korean Architectural History

In the Korean architectural history, the characteristics of classic architecture such as Jushimpo, Dapo and Ilgong; famous architects and major works; modern architectures were dominantly found. The level of difficulty was quite high.

5. Frequency and Trend by Architectural Planning

5.1 Architectural Planning

5.1.1 Residential Buildings

In the residential buildings, 8.83% of single-family housing, 7.66% multi-family housing and 6.66% of complex planning questions were presented and there were no significant changes.

5.1.2 Commercial Buildings

In the commercial buildings, 10.16% of offices, 2.33% of banks, 2.83% of stores, 4.83% of shopping centers and department stores questions were presented and there were no significant changes.

5.1.3 Educational Facilities

In the educational facilities, 6.33% of schools and 6.00% of libraries questions were presented and there were no significant changes.

5.1.4 Industrial Buildings

In the industrial buildings, 4.83% of factories questions was presented and there were no significant changes.

5.1.5 Lodging Facilities

In the lodging facilities, 5.16% of hotels was presented and there were no major changes.

5.1.6 Medical Facilities

In the medical facilities, 5.33% of hospitals questions was presented and there were no significant changes.

5.1.7 Cultural Facilities

In the cultural facilities, 7.50% of theaters and 6.16% of art museums questions were presented and there were no significant changes.

5.2 Western Architectural History

In the western architectural history, a small number of questions was presented, including 2.16% of the ancient architecture; 0.83% of the classical architecture; 0.83% of the medieval architecture; 0.33% of the modern architecture; 0.16% of the contemporary architecture; 2.50% of the architects; and 1.00% of others questions. It was difficult to predict the scope and type of

the questions.

5.3 Korean Architectural History

In the Korean architectural history, 2.00% of the architectural styles; 0.16% of the palace architecture; 1.83% of the temple architecture; 1.33% of the modern and contemporary architecture; and 1.33% of others questions were presented. It was difficult to predict the scope and type of the questions.

6. Conclusion

The study aimed to understand the question trends of the architectural planning section in the National Technical Qualification Test. It analyzed the status of authorized architects and builders through the test for the ten years between 2010 to 2019. Also it examined the frequency and trend of questions in the architectural planning of the exam. Also, the trends and characteristics of the questions by type were discussed to explore the exam patterns. Our results are as follows.

From 2010 to 2019, the number of candidates peaked at 20,666 in 2010; gradually decreased in 2016; then increased to 17,731 in 2017; and 19,351 in 2019. The number of successful candidates was lowest with 20.8% in 2010; and then steadily increased to 32.4% in 2019. The average in the last ten years was 27.28%. The acceptance rates steadily rose since 2016, because the level of difficulty seemed to be slightly lower than before 2010.

Second, it analyzed the question frequency and patterns in the architectural planning as shown in [Table 2]. The architectural planning is divided into 3 major categories: The architectural planning, the western architectural history, and the Korean architectural history. The architectural planning is divided into 9 sub-categories: general introduction, environmental planning, residential buildings, commercial buildings, educational facilities, industrial buildings, lodgings, medical facilities, and cultural facilities. The western architectural history is divided into 8 sub-categories of ancient architectural history, classical architectural history, medieval architectural history, recent architectural history, modern architectural history, contemporary architectural history, architects, and others. The Korean architectural history is divided into 6 sub-categories of architecture by era, architectural style, palace architecture, temple architecture, modern and contemporary architecture, and others. Based on the 32 sub-categories, the most frequently found questions were the office sub-category from commercial buildings with 61

questions (10.16%); followed by single family housing sub-category from residential building with 53 questions (8.83%); theater sub-category from cultural facilities with 45 questions (7.50%); and school sub-category from educational facilities with 38 questions (6.33%). From the main category, residential and commercial buildings accounted for 40.47% of the total, with the western architectural history for 7.81% and Korean architectural history for 5.82%.

Third, in the annual analysis on the existing questions in the architectural planning, the highest frequency was shown in residential and commercial buildings and the questions except for banks and shops were evenly presented every year.

The western architectural history and the Korean architectural history were relatively difficult subjects but the number of questions was low at 7.83% and 5.83% respectively. They could be the most challenging and frustrating subjects for students who prepare for the National Technical Qualification Examination.

This study analyzed the question patterns that have been examined in the past ten years in the architectural exam. Although there is little research or discussion on the architecture planning section in the exam, this study can be meaningful in that providing basic insight that can be useful to students as well as candidates. Furthermore, future studies on the trend of questions will be needed for other architecture areas.

References

- [1] <http://www.q-net.or.kr>, June 30 (2020)