

The Status of the *Hwaseong seongyeok uigwe* in the History of Architectural Knowledge: Documentation, Innovation, Tradition*

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Introduction

Korea's broad range of cultural heritage is reflected in its buildings. Palaces, temples, fortresses, as well as man-made monuments from almost every historical period of the peninsula, have been designated as examples of national heritage, some even registered as world heritage sites by UNESCO.¹ While a great number of these buildings have been severely damaged, or at one time completely destroyed and since reconstructed, particularly from the period of the Korean War onwards, they provide proof of the long history of the building trade and the architectural expertise of the different Korean dynasties.

The importance of construction for the state is manifest not only in its buildings, but also within the bureaucratic system of the Joseon (1392-1910) and Goryeo (918-1392) dynasties. The Gongjo 工曹 (Ministry of Public Works) was one of six ministries introduced by King Seongjong 成宗 (reg. 981-997), based on the Tang (618-907) Dynasty's model.² Despite dynastic upheavals and changes, the ministry, together with a number of *sogamun* 屬衙門 (specialised departments), existed until the end of the Joseon Dynasty and enjoyed the same status and privileges as the other

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¹ A detailed description is provided by the Munhwajae cheong (Cultural Heritage Administration). For further information please refer to <http://www.cha.go.kr>.

² John B. Duncan, "The Formation of the Central Aristocracy in Early Koryŏ," *Korean Studies* 12:1 (1988), 39-61 on 43.

ministries in terms of rank and personnel structure. Furthermore, special project organizations called *dogam* 都監³ were temporarily established to conduct single projects of major state importance, a good number of which were construction projects. They were staffed by a broad range of ranking personnel and regularly supervised by the highest-ranking central officials. In a considerable number of cases, the *yeonguijeong* 領議政 (chief state counsellor) himself took over the post as *dojejo* 都提調 (chief superintendent) or *jejo* 提調 (superintendent). Construction and the work associated with it were a vital part of the central bureaucracy, and deeply connected to state legitimacy and power politics.

However, their importance is belied by the scarcity of written sources regarding construction projects and the architectural knowledge that necessarily accompanies them. While discussions on particular topics of certain construction projects are scattered throughout official writings, such as the *Joseon wangjo sillok* 朝鮮王朝實錄 (Veritable Records of the Joseon Dynasty, hereafter *Sillok*) or the *Seungjeongwon ilgi* 承政院日記 (Diaries of the Royal Secretariat, hereafter *SJW*), comprehensive works on construction seem to be missing. The only full documentation of construction works is found within the genre of *uigwe* 儀軌 (Ritual Regulations). These were compiled and stored so that future officials could, amongst other purposes, use them as templates. Some scholars even refer to them as manuals.⁴

I have not been able to identify other official Korean state documentation or private writings of this kind or Chinese works on architecture that might have been present and frequently used in Korea in the eighteenth century, such as the *Yingzao fashi* 營造法式 (Treatise on Architectural Methods), the *Lu Ban jing* 魯班經 (The Classic of Lu Ban), or the *Gongbu gongcheng zuofa* 工部工程做法 (Technical Instructions for the Building Crafts by the Ministry of Public Works). According to Klaas Ruitenbeek, written sources on architectural knowledge are scarce in Chinese history as well. He attributes this to the fact that building generally took place at the private village level, without official participation, and few manuals were produced for major state construction—the *Yingzao fashi*, for example.⁵ However, major official publications existed and set the standards for future generations, as canonized forms of construction.

³ The term *dogam* will be translated as “project office” within the context of temporarily established institutions that conducted projects which were documented through the genre of *uigwe*. For the translation of Korean terms in general I refer to the Korean History Glossary provided by Harvard University, <http://projects.iq.harvard.edu/gpks> (accessed on June 1, 2017).

⁴ Sin Byeongju, “Joseon wangsil uigwe bullyu-ui hyeonhwang-gwa gaeseon bangan” 조선왕실 의궤 분류의 현황과 개선 방안 (Current System of Categorizing *Uigwe* Materials of the Joseon Royal Family, and Suggestions for Enhancing It), *Joseon sidaesa hakbo* 조선시대사학보 57 (2011), 243-277.

⁵ Klaas Ruitenbeek, *Carpentry and Building in Late Imperial China: A Study of the Fifteenth Century Carpenter's Manual Lu Ban jing*, 2nd ed., (Leiden: E. J. Brill, 1996), 3ff.

Consequently, *uigwe* seem to be the only comprehensive official works on architecture in Korean history. Their tables of contents show that they consist of a number of chapters with a broad range of content, going from personnel and official correspondence to lists of materials and craftsmen. However, theoretical examinations of the methods and modes of construction themselves are missing, both as chapters and as parts of the correspondence. The same holds true for discussions on issues regarding matters of practical work, for example transportation, tools, and materials. *Uigwe*, as written sources, seem to be restricted to matters of bureaucracy. Furthermore, as far as I am aware, writings by non-scholar professionals such as craftsmen, which might contain this type of architectural knowledge, are non-existent.

When taking this into account, a question arises as to the kind of architectural knowledge that was documented by *uigwe*. Is it reasonable to refer to them as manuals? How was it possible for Confucian scholar-officials to successfully conduct construction projects on their basis? Jürgen Renn, Matteo Valleriani, and others from the Max Planck Institute for the History of Science created a framework for the history of architectural knowledge, which would have helped place Korean history within a wider context. This article will first give an introduction to this framework, and then provide an overview of the genre of *uigwe*, with a focus on the so-called *yeonggeon uigwe* 營建儀軌 (construction *uigwe*), and then contextualize the Korean case within the established pattern. Following this, the construction project of the Hwaseong fortress will be depicted, as the famous “exception to the rule,” which will support the argument presented.

A Framework for the History of Architectural Knowledge

In 2014, Jürgen Renn and Matteo Valleriani of the Max Planck Institute for the History of Science in Berlin published a paper in which they provided a framework for the history of architectural knowledge. Their focus was not confined to either a specific place or time; instead, the authors tried to broadly connect certain patterns that had developed between the Neolithic era and the early modern period, and within different cultural spheres, under the premise of knowledge being the decisive factor in the development of architecture. To that end, they analyzed diverse kinds of knowledge, its forms of existence, and dynamics of change.⁶

⁶ Jürgen Renn and Matteo Valleriani, “Elemente einer Wissensgeschichte der Architektur (Elements of a History of Knowledge on Architecture),” in Jürgen Renn, Wilhelm Osthus, and Hermann Schlimme eds., *Wissensgeschichte der Architektur. Vom Neolithikum bis zum Alten Orient* (History of Architectural Knowledge. From the Neolithic Age to the Ancient Near East), Edition Open Access 3 (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2014), 7-53 on 7. I will not deal with every single detail of the analysis but provide a comprehensive outline of the framework in regard to the purpose of this article. The authors specifically mention that certain regions, such as East Asia, and certain timeframes are still missing.

They divided architectural knowledge into implicit, practical, and theoretical knowledge. Implicit or everyday knowledge was defined as that shared by everybody through common experience. Practical knowledge is gained by specialized working experience, and is generally passed on orally. This is expert knowledge of the commonly illiterate practitioners (craftsmen), shared within distinct groups, such as families or guilds. Through this particular mode of transmission, practical knowledge can be easily lost when not continuously put into practice.

In contrast, theoretical knowledge originates from reflection on practical experience and means of action, detached from a single context and passed on in writing. It is regarded as sets of superior principles, which can be transferred and applied in a wide range of different cultural, historical, and geographical contexts, detached from the context in which it originated. In contrast to practical knowledge, theoretical knowledge thus has a high degree of reflexivity as well as distributivity.⁷ However, since theoretical knowledge is recorded in written form, it was exclusive to the literate elites for a long time.

Regarding the analyzed time and space, the authors state that up to the early modern period, written sources included few partial aspects of practical knowledge, and were less concerned with the transmission of construction site practices. Architectural knowledge was also recorded and passed on, using tools and the buildings themselves. Nevertheless, written sources provided the means to integrate and combine knowledge from diverse fields, including architecture, mathematics, and mechanics.⁸ They became more and more important when, in the European context, planning and realization were separated from one another from the thirteenth century onwards. Construction drawings began to develop, as did depictions of tools, machines, and working techniques, and these were used with increasing regularity as the basis for on-site work.

Until this time, complete buildings had existed only in the minds of the responsible master builders. When they died or left the project, their knowledge and plans vanished with them.⁹ The term *architect* now appeared more often in the context of the planning processes, indicating the beginning of a socio-historical transformation that would lead to the important and prestigious position architects have enjoyed since the Renaissance.

Drawings, and written sources in general, were produced and used by people and institutions to plan construction projects separately from practical work. The

⁷ Ibid., 9.

⁸ Ibid., 10.

⁹ For further information on the reasons why construction drawings started to appear in the early 13th century, see for example: Günther Binding, "Bauwissen im Früh- und Hochmittelalter (Architectural Knowledge in the Early and High Middle Ages)," in Jürgen Renn, Wilhelm Osthues, and Hermann Schlimme eds., *Wissensgeschichte der Architektur* (cit. n. 6), 36-44.

knowledge of architects focused on the mastery of the architecture of European antiquity as a template, which was then creatively adopted for their individual works. Written sources conveyed knowledge of these canonical forms, resources, and materials, and could thereby be used at different times and places for other projects of similar kinds. In this way, the architect's occupation was not confined to practical experts, but to all literate intellectuals, according to a humanistic ideal.¹⁰

Consequently, the content of these writings was closely related to the demands of planning. The higher the level of canonization, the lower the demand for detail, theoretical knowledge, and graphical depictions. In many cultures, the visualization of buildings or details, and records of the modes of construction, were unnecessary because buildings were constructed according to canonized types. While standardized architecture led to increasing repetition, the planning confined itself to the calculation of material, manpower, and construction costs on the basis of these canonical models. This information, however, was recorded in writing.¹¹ Successful construction until that time was in the hands of the master builders who possessed knowledge gained through practical experience.

How was innovation realized in such a context? What were the dynamics of architectural knowledge? Renn and Valleriani state that innovation originated "from the interplay between external and often contingent challenges and the resulting internal development of the knowledge of practice," most obviously at the beginning of the early modern period.¹² The authors provide a broad range of examples of these external challenges, amongst them new architectural tasks, changes in aesthetic principles, new materials, changes in the environment, military demands, foreign or trans-local influences, and social and cultural breaks. The authors differentiate between three general fields affected by external challenges: material resources, which include the materials available, the experience of their usage, and the buildings themselves and the modes of their construction; institutions and social structures, including the organization of labor, logistics and administration; and the epistemic system, including the means of planning, cultural techniques, and eventual scientific knowledge. Furthermore, all three areas also inherit potential internal dynamics, which gain momentum in their interplay.¹³ However, whether solutions to these and other problems led to sustainable innovation was highly dependent on the interplay of single solutions and the overall knowledge system.¹⁴

¹⁰ Renn and Valleriani, "Elemente einer Wissensgeschichte der Architektur," 44.

¹¹ *Ibid.*, 26.

¹² *Ibid.*, 49.

¹³ *Ibid.*, 49-51.

¹⁴ *Ibid.*, 10.

Architectural Knowledge Documented in *Uigwe*

How does this relate to the context of late Joseon Dynasty construction projects? As stated in the introduction, the only comprehensive official writings in this context are the so-called *Ritual Regulations* (*uigwe*). From the beginning of the dynasty onwards, *uigwe* were published on particular matters of state and dynastic legitimation. Most tellingly, one of the first *uigwe* that we know of through the sources deals with the construction of the Gyeongbokgung 景福宮 Palace. A memorial written approximately 100 years after the actual construction of the palace and the publication of the *uigwe* proves that it must have been stored and existent at least until the late fifteenth century.

Yi Geukbae, [an official of the] Jungchubu 中樞府, submitted the following petition: I have thoroughly read the *Gyeongbokgung joseong uigwe* 景福宮造成儀軌, the preface of which gave a written account of the meaning of its construction and designation, so that the names of the palace halls and gates all have their proper meaning [...]¹⁵

Uigwe are nowadays commonly categorized along the *orye* 五禮 (five major state rites). The Kyujanggak database, for example, provides the categories of *gillye* 吉禮 (auspicious rites), *garye* 嘉禮 (wedding rites), *billye* 賓禮 (rites for embassies), *gullye* 軍禮 (military rites), *hyungnye* 凶禮 (mourning rites), as well as *gita* 其他 (others). The last category comprises all *uigwe* that do not belong to the state rites, such as the compilation of *Sillok* or construction projects.¹⁶ This systematization was also used by Han Yeong-u, who unfortunately failed to elaborate on all those *uigwe* which do not fit into these categories.¹⁷ While it is not clear when the term *uigwe* was first used for written texts, the Buddhist canon recorded in the *Palman dae janggyeong* 八萬大藏經 (Tripitaka Koreana) includes writings given this name. This textual category was taken over by the founders of the Joseon Dynasty, though the exact reasons are not entirely clear. A *Sillok* entry suggests that the category was used because of its importance for state legitimation since Goryeo times, while its content was changed from Buddhism to Confucianism in the course of the dynastic change.

¹⁵ *Seongjong sillok* 成宗實錄 (Veritable Records of King Seongjong), the 4th day of the 11th lunar month, 15th year of King Seongjong's (1484) reign, 1st entry: “領中樞府事李克培來啓曰: 臣觀景福宮造成儀軌, 其建立命名之意, 作文以序之, 至於殿堂門名, 亦皆有義 [...].”

¹⁶ Meanwhile, other sortings have been added, for example alphabetical and periodical sortings. For a discussion of the categorisation of *uigwe*, see, for example, Sin, “Joseon wangsil uigwe bullyu” (cit. n. 4).

¹⁷ Han Yeong-u, *Joseon wangjo uigwe* 조선왕조 의궤 (Seoul: Iljisa, 2005), 34-37.

The Ministry of Rites again petitioned: the Great State Rites were reformed because they were missing in the *uigwe*. What was not reformed are the state shamans.¹⁸

One possible explanation for a considerable number of *uigwe* being categorized as “others” is that historians have put too much emphasis on artificially fitting the publications into the system of the *orye* in the first place. This might have stressed ‘ritual’ (*ui* 儀) to the detriment of “regulations” or “standards” (*gwe* 軌). Interpreting *uigwe* from the viewpoint of state and dynastic legitimization could also provide an approach much better suited to the content of the whole genre. This approach would take into account the possible intentions of the founders of the dynasty to continue a genre that was already connected with these legitimacy purposes, while at the same time the explanation would not be limited to the context of Confucian rites alone. It would thus reasonably encompass construction works and the compilation of the *Sillok*.

However, all *uigwe* produced before the end of the sixteenth century were destroyed during the Japanese invasions.

The Ministry of Rites reports that after the invasion all *uigwe* of the three offices within the ministries are lost without exception. [...] ¹⁹

The oldest *uigwe* in existence therefore seems to be the *Euin wanghu yureung sal-leung dogam uigwe* 懿仁王后裕陵山陵都監儀軌 (*Uigwe* by the Project Office for the Royal Tomb Yureung of Queen Euin). The oldest construction *uigwe*, however, is the *Changgyeonggung suriso uigwe* 昌慶宮修理所儀軌 (*Uigwe* by the Office for Repair Measures of the Changgyeonggung Palace), published in 1633. In general, *uigwe* represent a compilation of event-related official communications and other information, possibly collected and re-written after the events took place.²⁰ Although they have a specific internal order, their structure as a distinct table of contents was only provided from the mid-seventeenth century onwards, and only in occasional publications.²¹

¹⁸ *Taejong sillok* 太宗實錄 (Veritable Records of King Taejong), the 15th day of the 7th lunar month, 11th year of King Taejong (1411), 2nd entry: “禮曹且啓: 革大國祭, 以儀軌所無也, 所不革者, 國巫堂耳.”

¹⁹ *Seonjo sillok* 宣祖實錄 (Veritable Records of King Seonjo), the 4th day of the 10th lunar month, 26th year of King Seonjo (1593), 2nd entry: “禮曹啓曰: 經亂以後, 曹中三司儀軌, 蕩失無餘, [...]”

²⁰ The exact mode of how *uigwe* were produced is not yet completely clear and still needs further research.

²¹ As I argued elsewhere, the formalization of the structure of *uigwe* can partly be interpreted within the context of the self-legitimization of Joseon due to the Chinese dynastic change from Ming to Qing.

Architectural Details Documented in the Textual Parts

Uigwe were intended to serve as templates to be used by officials for future projects. We know of a number of examples where this occurred. This practice was not limited to ceremonies which happened in a more or less regular way and which followed strict ritual patterns, such as weddings and funerals. The reference to previous tasks of a similar kind also seems to have been common in the context of construction and repair works.

Petition from the project office for rebuilding [works]: this office dares to petition if, regarding the task schedule, it may prepare and submit earlier examples so that it can consult them.²²

Additional entries can be found in the *uigwe* themselves. The chapter entitled “Work Schedule” in the *Munhuimyo yeonggeoncheong deungnok* 文禧廟營建廳謄錄 (Records by the Office for the Construction of the Shrine Munhuimyo) specifically refers to the consultation of prior examples, possibly written sources that also comprised *uigwe*, to ensure a smooth execution.

Now in this writing, regarding the Construction of the Shrine Munhuimyo, to deal with the conduction of all the tasks, should we consult previous examples and prepare [everything accordingly]? To conduct the works in compliance with this, how about that? The king permitted it accordingly.²³

However, when looking at the actual content of the texts, one finds little discussion of matters of technical nature. The bullet points following this initial phrase deal with matters of personnel, mostly high ranking official posts for administrative purposes, but without providing specific names. All of this information is merely stated. It is not discussed, for example, in terms of tasks or benefits that could be brought to the project. From time to time, the text refers to earlier examples, using phrases such as *ui tarye* 依他例 (according to other examples).

The same pattern can be observed in the chapter entitled “Auspices,” which documents favorable days for the beginning of specific works. Again, the dates and re-

²² *Gyeongmogung gaegeon dogam uigwe* 景慕宮改建都監儀軌 (Uigwe by the Project Office for the Reconstruction of Gyeongmogung Palace) (1777), “Gyesagil” 啓辭秩, the 22nd day of the 4th month: “[...] 改建都監啓曰, 本都監事目, 參考前例, 磨鍊書入之意, 敢啓 [...]].” All the *uigwe* examined in this article can be found in the “Uigwe jonghap jeongbo” 儀軌總합정보 (Comprehensive Digital Archive of Uigwe), Kyujanggak Institute for Korean Studies, Seoul National University (<http://kyujanggak.snu.ac.kr/center/main/main.jsp>).

²³ *Munhuimyo yeonggeoncheong deungnok* 文禧廟營建廳謄錄 (Records by the Office for the Construction of the Shrine Munhuimyo), “Samok” 事目 (Work Schedule): “今此文禧廟營建時, 應行諸事, 參考前例磨鍊爲白去乎, 依此舉行, 何如? 啓依允.”

spective works are given without explanations or discussions of their adequacy regarding technical practical contexts, such as seasons, weather conditions, and preparation of materials and workforce. Further, it remains unclear whether the dates were calculated as auspicious dates beforehand, or documented afterwards.

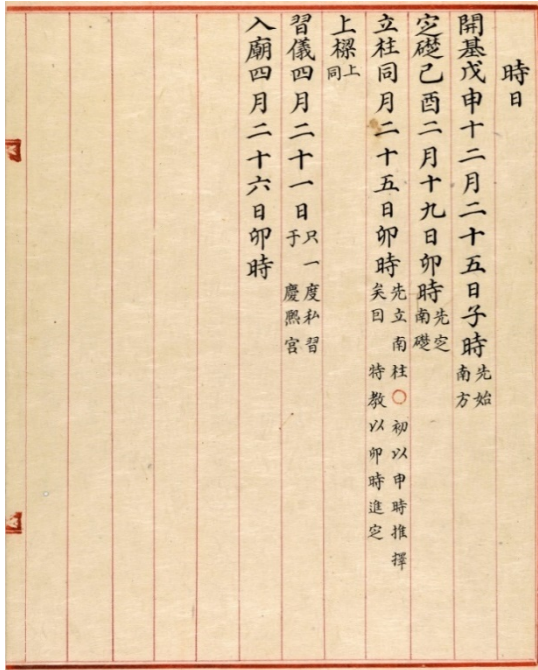


Figure 1. Chapter entitled “Auspices” of the *Munhuimyo yeonggeoncheong deungnok*. (Source: *Munhuimyo yeonggeoncheong deungnok*, Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

While the exact calculation of these days was the responsibility of the *Gwansang-gam* 觀象監 (Royal Astronomy Bureau), *uigwe* as a manual would be expected to provide not only the specific dates of the respective construction, but also certain standards of calculation.²⁴ These were given in the Chinese manuals, specifically the *Lu Ban jing*.

²⁴ The postponed work on the Gyeonghuigung Palace, documented in the *Seogweol yeonggeon dogam uigwe* 西闕營建都監儀軌 (1832), can be regarded as a typical case. To resume work after a break forced by an overrun of the budget, the official Bak Juhwan 朴周煥 (1793-?) was supposed to calculate the respective auspicious date. Bak is referred to as *ilgwan* 日官, commonly a *chungin* official. His career is documented through a considerable number of entries in the *SJW* and the record of his *eumyanggwa* 陰陽科 (Yin-Yang-Examination) degree in 1810, taken from

However, a considerable number of construction *uigwe* provide detailed measurements of buildings, as well as the respective numbers of pillars and further structural elements. For example, the *Injeongjeon yeonggeon dogam uigwe* 仁政殿營建都監儀軌 (Uigwe by the Project Office for the Construction of the Throne Hall Injeongjeon), published in 1805, contains four subchapters to the main chapter, “Doseol” 圖說 (Illustrated Descriptions), which deal with measurements of the building (*jeonu cheongnyang* 殿宇尺量), measurements of the throne (*dangga cheongnyang* 唐家尺量), measurements of the *jwtap*-seat (*jwtap cheongnyang* 座榻尺量), and measurements of the rear folding screen (*gokbyeong cheongnyang* 曲屏尺量).²⁵ On the face of it, these details appear to be proof of technical specifications that qualify the *uigwe* as a manual, and the officials who supervised the project as carriers of architectural expert knowledge, but a closer examination of the textual content reveals that it uses the standardized measurement system for bays, along with the term *gan* 間 (bay). Using this measurement, it was possible for non-craftsmen to outline buildings according to their wishes and without relying on detailed floor plans. The number of bays determined the number of the pillars necessary, and only their heights had to be fixed.²⁶

Figure 2 shows the first page of the subchapters on the construction of the Injeongjeon. The commentary to the title indicates that the building is supposed to be a 20-*gan* building, with the central front section (*eogan* 御間) measuring 20 *cheok* 尺 and the sections to the sides measuring 15 *cheok*, while on the upper and lower stories the outside consists of seven *po* 包 and the inside of nine. On the lower floor, the high columns should each have 46 *cheok*, be of round shape at the end, and have a diameter of one *cheok* eight *chon* 寸. Rather than discussing these numbers in terms of material or structural qualities, the commentary on the high columns briefly provides bureaucratic knowledge on the regions that delivered or had to deliver pillars. This segment of the text can be regarded as exemplary for the other subchapters, which in most cases lack even bureaucratic commentaries.²⁷ Structural specifications were not something to be discussed either because of standardization in terms of canonization, or because this section of the *uigwe* was not the part in which these discussions were documented.

the *Ungwa bangmok* 雲科榜目, which is accessible online via the database of the Academy of Korean Studies, <http://people.aks.ac.kr/index.aks> (accessed on June 29, 2017). Bak was not listed as an official within the construction project, meaning that these as well as other works were requested as external services.

²⁵ *Injeongjeon yeonggeon dogam uigwe* 仁政殿營建都監儀軌 (Uigwe by the Project Office for the Construction of the Throne Hall Injeongjeon), 21-50.

²⁶ For further information, see for example: Kim Wangjik 김왕직, *Algi swiun Han'guk geonchuk yong'eo sajeon* 알기 쉬운 한국 건축 용어 사전 (Paju: Dongnyeok, 2008), 86-91.

²⁷ Comparable to the aforementioned calculation of the auspicious date, due to the particularities of the classical Chinese text, it is unclear whether the commentaries were made during the planning of the project or afterwards as documentation of the actual results.

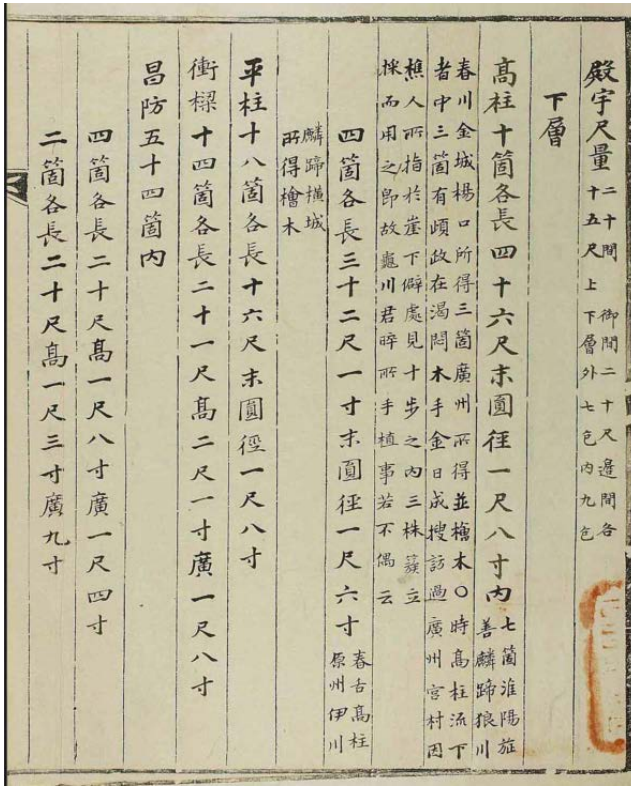


Figure 2. “Jeonu cheongnyang” 殿宇尺量 (Measurements of the Hall), *Injeongjeon yeonggeon dogam uigwe*. (Source: *Injeongjeon yeonggeon dogam uigwe*, 21; Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

Similar to these lists of measurements and structural elements, other main chapters are equally confined to what seems to be bureaucratic knowledge. Typically subdivided into order by chronology or province, the chapters contain correspondences between offices on the setup of the *dogam*, information and issues concerning the materials to be delivered, and on personnel, payment, and contributions by the different central offices. Nowhere do *uigwe* give information on the planning processes that would clearly have had to be conducted before the commencement of the project, however brief they may have been in such a canonical context. Nor were discussions on the forms and styles of the buildings, matters of construction practices, tools, and machines, or on-site labor organization documented. Furthermore, information on structural details given in the *Injeongjeon yeonggeon dogam uigwe* is by no means

the norm, but rather an exception. Other construction *uigwe* from different periods and on different buildings provide little information on structural details, other than the amounts and measurements of certain elements, for example pillars or beams, which could easily have been calculated by officials according to the standardized forms of the buildings in earlier examples. This information is spread over different chapters, but can generally be found in the chapters entitled “Communication from the Project Office,” “Communication from the Provinces to the Project Office,” and “Actual Input.”

Up to this point, *uigwe* hardly qualify as manuals in terms of providing practical or theoretical architectural knowledge. Although they comprise a certain amount of information on bureaucratic procedures, in the form of records of official communication, they do not contain information on the planning processes or reflections of working practices or structural details.

Architectural Detail Documented in *Doseol*

However, in addition to their textual content, several *uigwe* contain drawings of their respective buildings, or *doseol* 圖說 (Illustrated Descriptions). The importance of the plans in general was stated in the *Lu Ban jing*. Chapter 32 of the first *juan* demands that every carpenter

[...] draw a plan on a sheet of fine paper. Width and depth he subdivides into bays and purlins. There may be three, five, seven, nine, or eleven purlins, according to the wish of the owner. Sometimes all columns reach to the floor, sometimes a number of columns are omitted. As for the beams, transverse cross-beams and longitudinal upper and lower tie-beams may all be used. Sometimes corbel brackets are used. All this has to be indicated accurately on the plan.²⁸

While the Chinese word for plans used in the *Lu Ban jing* is *dipan* 地盤, Francesca Bray in her research gives the character *tu* 圖 as a wider term for technical images, which is common in the Korean context too. In contrast to *hua* 畫, “[...] it was a specialist term denoting only those graphic images or layouts which encoded technical knowledge: *tu* were templates for action.”²⁹ The *doseol* given in *uigwe* should therefore also be investigated from this point of view.

²⁸ Ruitenbeek, *Carpentry and Building* (cit. n. 5), 169.

²⁹ Francesca Bray, “Introduction: The Powers of *tu*,” in Francesca Bray, Vera Dorofeeva-Lichtmann, and Georges Métaillé eds., *Graphics and Text in the Production of Technical Knowledge in China: The Warp and the Weft* (Leiden: Sinica Leidensia, 2010), 1-80 on 2.

The first *doseol* of this kind can be found in the *Uisomyo yeonggeoncheong uigwe* 懿昭廟營建廳儀軌 (Uigwe by the Office for the Construction of the Shrine Uiso-myō), published in 1753. As seen in the Chinese canonical works on architectural knowledge, graphical depictions of buildings and structural elements not only serve as templates for planning officials and craftsmen alike. More importantly, they canonize forms and structures which, from that time onwards, are not to be challenged. The formulation of, and repeated references to, handbooks and manuals in the manner of the *Yingzao fashi* facilitates the continuity of a system and subsequently its canonization. Description thus becomes prescription, i.e. a canon.³⁰

The illustrated descriptions of buildings provided in *uigwe* can be broadly categorized in two ways: depictions of whole building complexes, and depictions of single buildings.

Doseol of building complexes

Some *uigwe* only contain depictions of a whole complex that was to be built in the respective project, or from which only one building was to be built. In contrast to the diagrams in the Chinese manuals, these examples more closely resemble artistic depictions than architectural drawings. These pictures can only be found in the context of the construction of shrines. They provide the names of each building, as well as their locations within the complex.

The buildings are drawn in front view only, providing no further measurements, floor plans, illustrations of the interior or structural details. While Figure 3 shows the oldest depiction found in the databases, Figure 4 shows possibly the latest example, dating from 1790.

Neither the graphic nor architectural styles have changed considerably, which indicates that both are highly canonized within *uigwe* and the actual architecture. However, the depiction of whole complexes stopped in 1790 for no obvious reason, although the building of shrines continued until the end of the dynasty.

Doseol of single buildings

Depictions of the buildings to be constructed or repaired in the course of the project are more frequent, especially from the beginning of the nineteenth century. The two projects on the construction and repair of the Injeongjeon provide examples of the more elaborate form of these diagrams.

³⁰ Winfried Nerdinger, *Die Kunst der Holzkonstruktion: Chinesische Architekturmodelle* (The Art of Woodframe Construction: Chinese Models of Architecture) (Berlin: Jovis, 2009), 42.

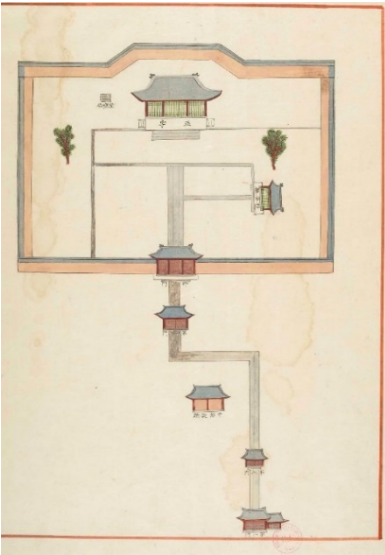


Figure 3. *Doseol* taken from the *Uisomyo yeonggeoncheong uigwe*. (Source: *Uisomyo yeonggeoncheong uigwe* 懿昭廟營建廳儀軌 (Uigwe by the Office of the Construction of the Shrine Uisomyo) (1753), Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

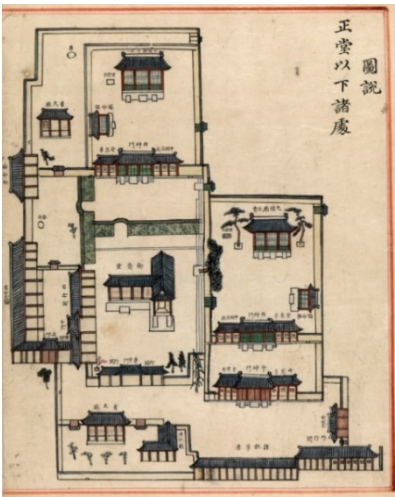


Figure 4. *Doseol* taken from the *Munhuimyo yeonggeoncheong deungnok*. The shrine is the small compound on the right. (Source: *Munhuimyo yeonggeoncheong deungnok*, Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

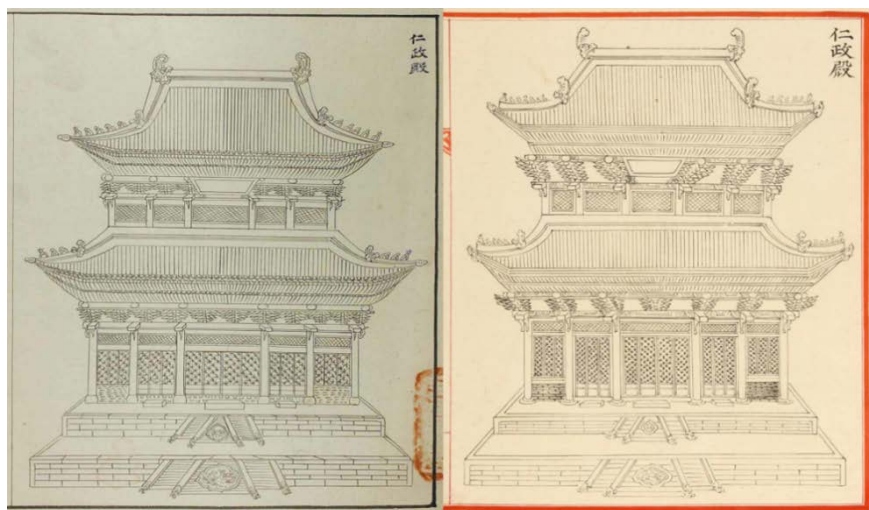


Figure 5. *Doseol* of the Injeongjeon. 1805 on the left side, 1857 on the right side. (Source: *Injeongjeon yeonggeon dogam uigwe* 仁政殿營建都監儀軌 (Uigwe by the Project Office for the Construction of the Injeongjeon) (1805); *Injeongjeon jungsu uigwe* 仁政殿重修儀軌 (Uigwe of the Major Repair of the Injeongjeon) (1857), Comprehensive Digital Archive of Uigwe, Kyujangak Institute for Korean Studies, Seoul National University).

Aside from their depicting the same building, a number of important observations can be made of the similarities of the diagrams. The general outer style of the building was not changed by the 1857 repair measures. The foundation, the two-story construction, the *gan* measurements, and the elaborate roof structure all stayed the same. This observation is confirmed by the chapters that list the building's measurements, which is almost an exact copy of the respective chapter in the *uigwe* published in 1805. In addition, not only were the architectural features of the building kept unchanged, the artistic manner in which the buildings were depicted was also subject to processes of canonization. This canonization of architecture, together with all the areas it encompasses, becomes apparent in the diachronic comparison of different *uigwe*. One of the last construction *uigwe* to provide a diagram of the building worked on is the *Junghwajeon yeonggeon dogam uigwe* 中和殿營建都監儀軌 (Uigwe by the Project Office for the Construction of the Throne Hall Junghwajeon), published in 1907, just before the very end of the dynasty.

Built as the main throne hall at the beginning of the twentieth century within the Gyeong'un'gung 慶運宮 Palace, the building and its depiction closely resemble the Injeongjeon throne hall.³¹ Both *uigwe* contain only a front view of the building,

³¹ The original Junghwajeon was destroyed by a fire in 1904, only two years after its completion. In 1906, it was rebuilt as the one-story hall that exists today and was designated National Treasure

showing no floor plans, structural details, or machinery and tools. At a time when Western architectural and construction-related knowledge and technology, as well as Western-style architecture itself, were already existent in Korea, either through heavy Japanese influx or companies and specialists from other foreign countries, the absence of these influences on official buildings stands as proof of the dominance of canonization in royal/imperial architecture.



Figure 6. Doseol from the *Junghwajeon yeonggeon dogam uigwe*. (Source: *Junghwajeon yeonggeon dogam uigwe*, Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

That the discussion and the consequent depiction of structural characteristics and single components of architecture was of no importance in the canonized context of official construction becomes even more evident in the rudimentary style of architectural diagrams provided by a number of other *uigwe*. They do not stand apart from

#819 in 1985. Interestingly, the reconstruction of the Junghwajeon commenced before the original *uigwe* was published, but no *uigwe* on that reconstruction project exists.

the construction of buildings of royal importance, such as the Injeongjeon, but instead were built within the same context in which an *uigwe* was published on this particular project.

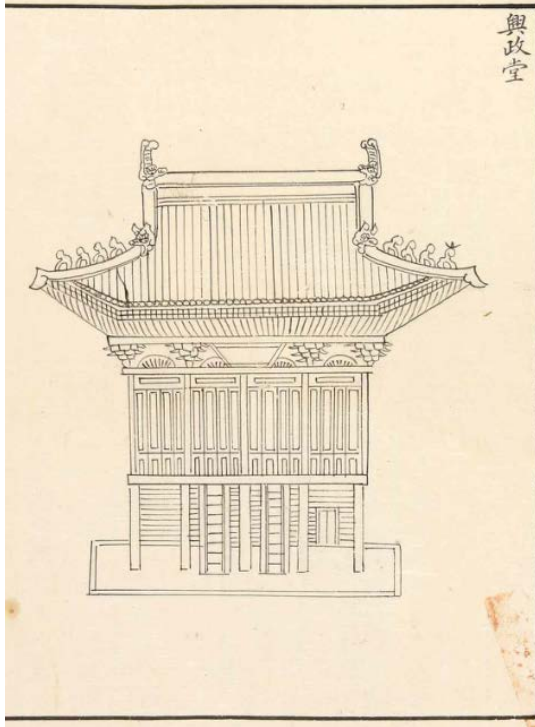


Figure 7. *Doseol* of the Heungjeongdang 興政堂 hall of the Gyeonghuigung Palace. (Source: *Seogweol yeonggeon dogam uigwe* 西闕營建都監儀軌 (Uigwe by the Project Office for the Construction of the Gyeonghuigung Palace) (1832), Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

The example given in Figure 7 shows even fewer details than those above. Produced in the same timeframe as the slightly more elaborate diagrams of the Injeongjeon, it provides fewer details, is not to scale, and seems generally out of proportion. The example indicates that diagrams were neither produced for representative or modelling purposes to share with decision-makers, i.e. the king and the superintendents, nor for practical usage in the form of manuals, such as Bray and others presented for the Chinese context. They were complemented by little written text that could clarify and further elaborate on their usefulness and application.

Furthermore, information on machines, carts, wagons, or tools that were used or thought to be useful for the actual work is almost entirely absent. *Uigwe* certainly do

not contain working methods either, meaning that practical knowledge must have been located among the great number of specialized craftsmen. Lastly, the main material was wood. Wooden buildings had a centuries-old tradition, whereas stone and bricks were of lesser importance, in contrast to China for example. This can also be seen by the fact that *mokjang* 木匠 (woodworkers) in general were the most numerous in the lists of craftsmen. As long as wooden buildings of a similar kind were constructed, there was no major deviation from the given canon.

As Winfried Nerdinger and others have indicated in their works on Chinese architecture, canonization is common in East Asian architecture and within its distinct regional aspects. In these ritualized contexts, a great number of buildings of a similar kind could be planned, using existing buildings as a template, and calculating the number of pillars, beams, and diverse elements of often elaborate roof construction according to actual need. Many standardized parts were produced distinct from individual projects. What is nowadays called modularization and pre-production was, to a certain extent, already vital in pre-modern East Asia. However, the practice of modularization and pre-production did not mean that the work of individual craftsmen was less important or elaborate. Highly sophisticated roof construction, with its pillars, consoles, bracket systems, and abundance of structural ornaments and paintings, stands as proof of the extent of specialization and expertise.³² In this context, the significance of graphic depictions becomes even greater than those of written ones.

Overall, the success of construction did not seem to depend on either practical knowledge or extensive theoretical discussions in *uigwe*, or on discussions of construction at all. The information given in *uigwe* neatly fits the pattern of canonization in construction.

The Exception: The Hwaseong Fortress Construction Project

Only the *Hwaseong seongyeok uigwe* 華城城役儀軌 (Uigwe on the Construction of Hwaseong fortress) for the first and supposedly only time provides a great amount of detailed information from architectural elements of wood and stone to tools and machines, as well as theoretical discussions of modes and practices that could have been used as templates by craftsmen. These technical details are largely based on the “Seongseol” 城說 (On Fortresses), written by Jeong Yakyong (1762-1836) on the orders of King Jeongjo in 1789, prior to the construction project and in the year he passed the *munghwa* 文科 (higher civil service examination). Jeong Yakyong’s writ-

³² Nerdinger, *Die Kunst der Holzkonstruktion* (cit. n. 30).

ings were in turn based on the Chinese *Qiqi tushuo* 奇器圖說 (Illustrated Descriptions of Wonderful Machines) written by the Jesuit Johann Schreck (1576-1630),³³ which introduced early modern Western tools and machinery, as well as fundamental knowledge on mathematics and mechanics, to China. While it remains unclear how the book reached Korea, it served Jeong Yak-yong as a template to develop his own work. He refers to it himself, stating:

[...] Your majesty urgently requested [me] to look for the systems of *ongseong* 甕城 [barbicans], *poru* 砲樓 [protruding/flanking towers], *hyeonan* 懸眼 [battlements], *nuyo* 漏槽 [embrasures], and all descriptions of [how to] lift heavy weights, you handed down the *Neijiang tushuo* 內藏圖書, integrated into one *gwon*, which exactly is the *Qiqi tushuo*. [...] ³⁴

Your servant cautiously examined the methods of lifting heavy weights which are printed in the *Neijiang qiqi tushuo* [...]. ³⁵

The innovative and exceptional character of the Hwaseong project and the respective *uigwe* can be deduced from the history of fortress construction during the late Joseon Dynasty. During the seventeenth century, the construction of fortresses was partly adapted in response to the modern warfare Koreans were confronted with during invasions.³⁶ Towers for canons, reinforced battlements and other minor adjustments were among these adaptations. Overall, there were few amendments, and neither the general system of fortress building nor the Korean focus on *sanseong* 山城 (mountain fortresses) over *eupseong* 邑城 (city fortresses), changed, despite having proven useless during the wars.³⁷ Together with demands to strengthen the fortifications of the capital, calls for stone walls to replace earthen walls and for further measures to strengthen the defensive power of fortresses were made by the military from the early years of King Yeongjo's reign.³⁸ Several different, albeit not necessarily new, methods of construction were applied. These methods partly resulted

³³ Johann Schreck, a German Jesuit missionary, is often referred to as Terrenz in the scholarly literature.

³⁴ *Yeoyudang jeonseo* 與猶堂全書, *munjip*, *gwon* 10, "Seongseol": "[...] 御批隆重, 亟求甕城砲樓懸眼漏槽之制及起重諸說, 仍降內藏圖書, 集成一卷, 即奇器圖說也[...]."

³⁵ *Yeoyudang jeonseo*, *munjip*, *gwon* 10, "Gijung doseol" 起重圖說: "[...] 臣謹按內降奇器圖說所載起重之法 [...]."

³⁶ For a short but comprehensive description of how this was not successfully conducted between the Japanese and Manchu invasions in the early seventeenth century, see James B. Palais, *Confucian Statecraft and Korean Institutions: Yu Hyŏngwŏn and the Late Chosŏn Dynasty* (Seattle: University of Washington Press, 2014).

³⁷ Roh Young-koo [No Yeonggu] 盧永九, "Joseon hugi seongje byeonhwa-wa Hwaseong-ui seonggwaksajeok uimi 조선후기 城制 변화와 華城의 城郭史의 의미 (Late Joseon Dynasty Changes in Fortress Systems and the Importance of Hwaseong for the History of Fortifications)," *Jindan hakbo* 進단학보 88 (1999), 294f.

³⁸ *Ibid.*, 297f.

from the experience of invasions, but were also taken from Chinese sources, for example the *Wubeizhi* 武備志 (On Military Preparedness), which contains rather broad instructions for building fortresses with a reasonable defense capability.³⁹ Jeong Yakyong was certainly aware of these developments, frequently referring to the *Wubeizhi* in his own writings, particularly in the “Seongseol.” The Hwaseong project and the respective *uigwe* might therefore be regarded as the peak of this development.⁴⁰

What Jeong Yakyong did not take into consideration for his research were any of the construction *uigwe* which were existent in the capital and in different storehouses throughout the country. While the king explicitly provided him with the Chinese *Qiqi tushuo*, not a single *uigwe* or other Korean source is mentioned, which additionally indicates that they were not highly regarded as building manuals or sources of architectural knowledge of fortress construction by either Jeong Yakyong or the king. In fact, no other *uigwe* on the construction of large stone buildings, such as city walls, gates, and towers, is known, despite the extent of fortress construction after the invasions. This renders the *Hwaseong seongyeok uigwe* as one of a kind within the genre.

In the introduction to his treatise “Seongseol,” Jeong Yakyong refers to previous discussions on the hard work and high costs of the project, which seem to have put much stress on the king. While at the time of the treatise, little more than the initial setup of the floor plan and suitable measurements had been discussed, he offers his opinions on the construction of fortresses in eight distinct categories: *bunsu* 分數 (measurements), *jaeryo* 材料 (materials), *hocham* 壕塹 (trenches), *chukgi* 築基 (laying the foundations), *beolseok* 伐石 (cutting stone), *chido* 治道 (managing streets), *jogeo* 造車 (construction of carts), and *seongje* 城制 (methods to build fortresses). Subsequent to these, five essays give more detailed information on specific topics according to the king’s demands: “Ongseong doseol” 甕城圖說 (Illustrated Description of Barbicans), “Poru doseol” 砲樓圖說 (Illustrated Description of Flanking Towers), “Hyeonan doseol” 懸眼圖說 (Illustrated Descriptions of Battlements), “Nujo doseol” 漏槽圖說 (Illustrated Descriptions of Embrasures), and finally

³⁹ However, the *Wubeizhi* is far from being a work specializing in the construction techniques of fortresses. Only a very small part of its *juan* 110 deals with this topic by citing or paraphrasing older Chinese sources. The *Wubeizhi* most likely was brought to Joseon in 1737, given a *Sillok* entry: *Yeongjo sillok* 英祖實錄 (Veritable Records of King Yeongjo), the 20th day of the 10th lunar month, 14th year of King Yeongjo 英祖 (1738), 2nd entry. It was known already in 1712 to Kim Chang’eop 金昌業 (1658-1721), judging from an entry in the *Nogaje yeonhaeng ilgi* 老稼齋燕行日記 (Diary of an Embassy to Beijing by Nogaje), *gwon* 4. I was not able to find earlier quotes that mention the *Wubeizhi*.

⁴⁰ For an elaboration of these developments that eventually would culminate in the construction of Hwaseong fortress, please see Roh, “Joseon hugi seongje byeonhwa-wa.” However, I would like to remark that I do not estimate the developments in late Joseon Dynasty fortress construction as a targeted evolution in a discursive manner in the same way Roh implies.

“Gijung doseol” 起重圖說 (Illustrated Description of [a Machine for] Lifting Heavy Weights). Despite the essay titles, however, only the last one provides illustrations.⁴¹ These illustrations come together with textual descriptions of the sketched parts, as well as the whole hoist.

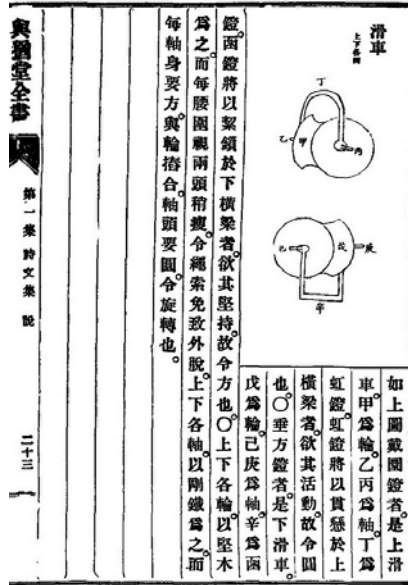


Figure 8. *Doseol* of pulleys from the “Gijung doseol.” (Source: *Yeoyudang jeonseol, munjip*, gwon 10, “Gijung doseol”).

Figure 8 illustrates how Jeong Yakyong combined illustrations and explanatory text for every component of the hoist. He begins each of his paragraphs with the phrase “as in the diagram above,”⁴² followed by a short definition of the component, in this case the *hwalcha* 滑車 (pulley block), which is divided into an upper and lower part, according to the commentary. The text continues:

[...] *Dae* 戴 [support], *won* 圓 [pulley/spool], and *deung* 鐙 [stirrup] are the upper pulley block. The character *gap* 甲 signifies the wheel-like [part], the characters

⁴¹ I refer to the “Seongseol” edition of the *Yeoyudang jeonseol* 與猶堂全書 provided online by the Institute for the Translation of Korean Classics. Regarding Jeong Yakyong’s remark, it seems possible that he included illustrations within his original petition, which were not recorded in the *Yeoyudang jeonseol*.

⁴² Ibid., “如上圖 [...].”

eul 乙 and *byeong* 丙 signify the axis, the character *jeong* 丁 signifies the stirrup [that resembles] the character *hong* 虹. [...]⁴³

The systematic introduction of components and parts, as well as the use of abstract terms instead of crude translations that could be ambiguous, indicates not only that Jeong Yakyong borrowed this system of referencing from the *Qiqi tushuo* but also that he, for the first time, reconnected text and illustrations directly in this particular context. As a result, his treatise resembled the genre of the handbook or manual, as introduced by the Jesuits to China in, for example, the form of the *Qiqi tushuo*. It also indicates that, as with the Jesuits' work in China, Jeong Yakyong's treatise introduced something new and innovative to Korea that can now be understood as the form of *tu* characterized by Francesca Bray. This awareness can be found in Jeong Yakyong's other writings, including the "Giyeron" 技藝論 (On Skills and Crafts).⁴⁴

This short treatise begins by pointing out that Heaven had created human beings with the ability to use tools to cope with life's challenges, in contrast to beasts, which are equipped with everything necessary by nature. Without mentioning any specific tools and machines, except carts, Jeong Yakyong refers to craftsmen in Korea who once obtained their knowledge from ancient China but, regrettably and shamefully, never developed it further. Instead, they adhered to the knowledge of old, falsely cherishing this as something immutable.⁴⁵ In this context, the "Seongseol" seems to be a continuation of the rather broad content of the "Giyeron," now delving into the detailed development of tools and architectural knowledge based on foreign sources. Nonetheless, Jeong Yakyong, in a seemingly conservative-scholarly manner, refers to ancient times as the basis of his work, thereby equipping his argument with the authority of tradition, not revolution:

Now, I take the forgotten ideas of the ancients, and consult [them] for a new system where I manufacture a small frame for the purpose of lifting heavy weights which shall be put into use for the construction of the Hwaseong fortress.⁴⁶

Many of the suggestions made by Jeong Yakyong were taken into account during the construction of the Hwaseong fortress. However, his name was never mentioned in the *uigwe*, which indicates that he did not take part in the construction process itself. The reasons for this are not yet entirely understood. He held several mid-ranking posts in, among others, the Gyujeongguk 奎章閣 (Royal Library), the Saganwon

⁴³ Ibid., "[...] 戴圓鐙者。是上滑車。甲爲輪。乙丙爲軸。丁爲虹鐙 [...]。"

⁴⁴ While it is not yet clear when this text was originally written, the content more resembles the historical circumstances from before the submission of the "Seongseol" in terms of its broad and comparably unspecific character.

⁴⁵ *Yeoyudang jeonseo, munjip, gwon* 11, *ron* 論 (Discussions), "Giyeron."

⁴⁶ *Yeoyudang jeonseo, munjip, gwon* 10, "Gijung doseol": "[...] 今取古人遺意，參以新制，製爲起重小架，俾用于城華之役 [...]。"

司諫院 (Office of the Censor-General), and the Hongmungwan 弘文館 (Office of the Special Counsellors), all of which provided him with direct access to the king, with whom he maintained a close friendship. He also seems to have been well connected to officials who are mentioned in the *uigwe*, particularly to Chae Jegong 蔡濟恭 (1720-1799), who was one of the leading figures in the realization of the king's plans.⁴⁷ Jeong Yakyong's connections may at least have led to the integration of his out-of-the-box proposals into the construction project.⁴⁸

In fact, the king ordered Chae Jegong to include Chinese methods as well as "the theories of a former minister" into his work.⁴⁹ According to Kim Junhyuk, the quote is a reference to Yu Hyeongwon 柳馨遠 (1622-1673), whom the king praised highly and who had already made suggestions on fortress construction as well as the relocation of Suwon, which are documented in his *Bangye surok* 礮溪隨錄 (A Miscellaneous Account of the Man from Bangye).⁵⁰ In the chapter entitled "Seongji" 城池 (City Walls and Moats), Yu Hyeongwon deals with certain aspects of fortress construction against the backdrop of the Japanese invasions. Jeong Yakyong was certainly familiar with the *Bangye surok*, or what was available to him, which was limited due to the unfortunate history of its publication.⁵¹ He refers to it in his writings, and quotes from Yu Hyeongwon's chapter "Seongji" in his own "Seongseol."

The eight main points of the "Seongseol" were replicated almost entirely in the *uigwe*, under the title "Eoje seonghwa juryak" 御製城華籌略 (Strategic Plan for the

⁴⁷ For a detailed account on the role of Chae Jegong, please refer to: Kim Junhyuk (Kim Junhyeok), "Beonam Chae Jegong-ui Hwaseong sindosi giban joseong-gwa Hwaseong chukseong" 변암 채제공의 화성신도시 기반조성과 화성 축성 (The Foundation of New City Infrastructure of Hwaseong and Its Citadel by Chae Jegong under the Pseudonym of Beonam), *Jung'ang saron* 중앙사론 (Journal of Chung-Ang Historical Studies) 38 (2013), 97-123.

⁴⁸ It has to be mentioned that *Hwaseong seongyeok uigwe* was only published in 1801 after the death of King Jeongjo and after the severe persecution of Catholics, which also had a huge impact on Jeong Yakyong's life and reputation as well as the *namin* 南人 (southerners) faction in general. The lack of his name in the *uigwe*, therefore, might also be connected to this context. However, the exact reasons can only be speculation.

⁴⁹ *Hongjae jeonso* 弘齋全書 (The Comprehensive Writings of Hongjae), *gwon* 44, *bi* 3, 13th entry: "[...] 故相之論 [...]."

⁵⁰ Kim Junhyuk, "Beonam Chae Jegong-ui," 113. I agree with Kim's interpretation of the phrase, even though the immediate context of the text and the related entry in the *SJW* do not provide solid evidence, and Yu never was able to pursue a career as a scholar official. However, King Jeongjo directly referred to the explicit content of the relocation and fortification of Suwon according to a later entry in the *Sillok*: *Jeongjo sillok* 正祖實錄 (Veritable Records of King Jeongjo), the 8th day of the 12th lunar month, 17th year of King Jeongjo (1793), 1st entry. For a detailed account of the relocation of Suwon, also in comparison to its modern location, see: Jeong Dae-Young 정대영 and Choi Jong-Hyun 최중현, "Yu Hyeongwon-ui Suwonbu eupchi ijeonji-e gwanhan yeon'gu 유형원의 수원부 읍치 이진지에 관한 연구 (A Study on the Relocation Site of Eup-settlement in Suwon-bu Suggested by Hyeong-won Yu)," *Han'guk dosi seolgye hakhoeji* 한국 도시설계 학회지 (Journal of the Urban Design Institute of Korea Urban Design) 10:4 (2009), 185-202.

⁵¹ Palais, *Confucian Statecraft and Korean Institutions* (cit. n. 36), 8f.

Construction of Hwaseong Fortress Made by the King), authored by King Jeongjo. The text particularly emphasizes the discussion on how to build certain parts of the fortress, and why. As Jeong Yakyong repeatedly indicated, the most important material was heavy stone for high walls and towers, and as these were not used regularly in Korea, new practices and machines were required. He highlighted why certain materials were preferred above others:

Secondly, regarding the materials, I will now explain the discussion of having brick walls, earthen walls and so forth. As a matter of fact, Koreans are not skilled to burn bricks. Furthermore, because it is complicated to manage the fuel, the solidity of bricks is incalculable. [...] Hence, it would be better to use stone.⁵²

After analyzing the current situation, he concludes that nothing would be better suited to the construction of the fortress than stone. In the case of bricks, Koreans did not have the ability to produce them; in the case of earthen walls, the way they were traditionally built was prone to failure. In the case of stone, however, the modes of production and transportation needed to be explained and improved:

Fifth, regarding the cutting of stone, no matter of which particular mountain the stone comes from, when they are already cut, one should order a stonemason to roughly work on them at his own place to reduce their weight, so that they are easy to carry and transport. [One should also order him] to divide the stones according to their size into a number of grades. There is a system to the cutting. The big ones each fit in one cart, of the next ones two fit in one cart, of the small ones three or four [fit in one cart]. Every transport of one cart supplies [stone] for the use of one po of the wall. [...] ⁵³

Moreover, or perhaps consequently, *doseol* now gave detailed information on new machines suited to moving heavy stones, which are even more elaborate in the *Hwaseong seongyeok uigwe* than in the “Seongseol.” The famous hoist *geojunggi* 舉重器 and the crane *nongno* 轆轤 did not have any Korean precedents, and a number of carts that resemble the cart *yuhyeonggeo* 游衡車 suggested by Jeong Yakyong in his “Seongseol” are depicted in great detail. Furthermore, descriptions of their components, manual of their construction and usage, as well as theoretical discussions of their advantages and potential are given in the text directly following the

⁵² *Yeoyudang jeonseo, munjip, gwon* 10, “Seongseol”: “[...] 二曰材料者。今議有甃城土城等說，然東人不嫻燒甃，且難辦薪，甃固非計，[...] 莫如仍用石材 [...]。”

⁵³ *Yeoyudang jeonseo, munjip, gwon* 10, “Gijung doseol”: “[...] 五曰伐石者。石材無論某山，既伐，宜令石工，即其本地，草草攻治，以減其重，便於載輸。又其石體之大小，分爲數等，斷截有制。大者一顆一車，其次兩顆一車，小者三顆或四顆，每輸一車，令供城一步之用 [...]。”

doseol. This holds true for the different modes of transportation. Selections of suitable carts and sleds are given in the *uigwe*, together with explanations of how and why one should use them. This also follows the established pattern.

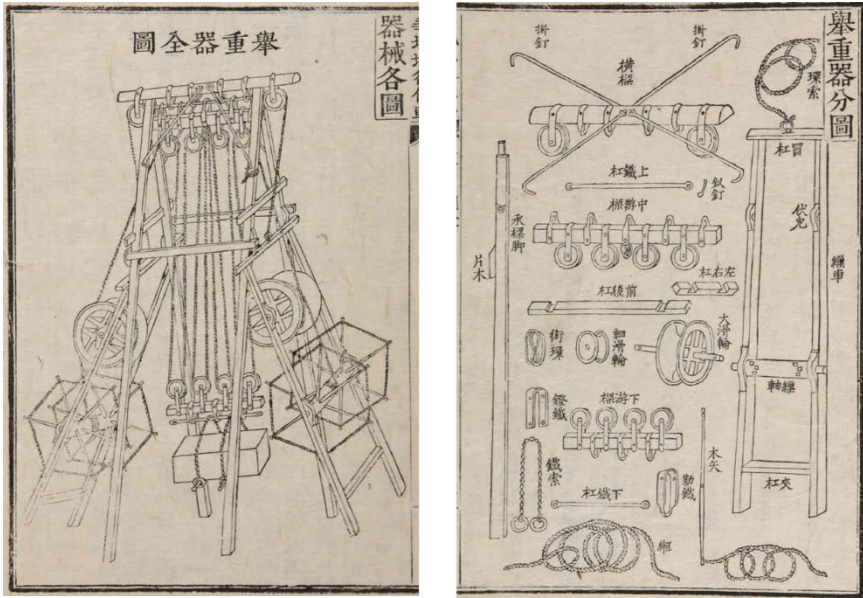


Figure 9. *Doseol* of the pulley *geojunggi* from the *Hwaseong seongyeok uigwe*. (Source: *Hwaseong seongyeok uigwe*, book 1, 166f., Comprehensive Digital Archive of *Uigwe*, Kyujanggak Institute for Korean Studies, Seoul National University).

Figure 9 shows the two pages dedicated to the illustrated descriptions of the *geojunggi*. Following the same pattern that Jeong Yakyong introduced to Korea in his “Gijung *doseol*,” all elements of the hoist are named and referred to in the following three pages of written explanation. The same applies to the *nongno* as well as the different carts, two of which are given in Figure 10. However, the detail of the different technical equipment goes far beyond its precursors in the “Gijung *doseol*.” Since Jeong Yakyong was not part of the construction of the fortress, it remains unclear how this further development of his initial ideas took place.

The king has bestowed the hoist *geojunggi*. Regarding its system, the horizontal beam *hoengnyang* is set up at the top to fix the main body, in the middle and lower part there are the movement beams. On the left and right there are reels.

They are used in common with the horizontal beams. (Commentary: its length is seven *cheok*, its thickness is seven *chon*, its breadth is six *chon*). [...] ⁵⁴

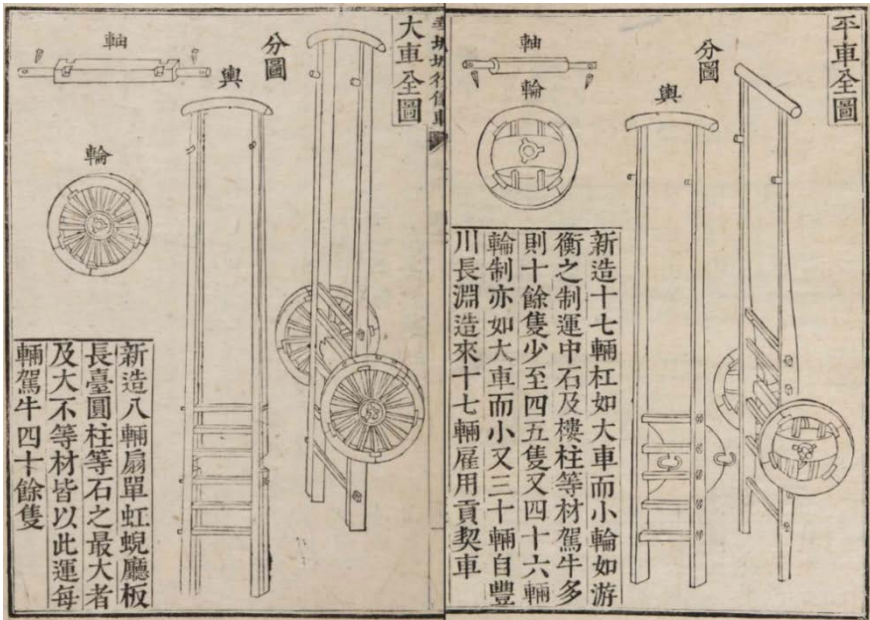


Figure 10. Doseol of two carts from the *Hwaseong seongyeok uigwe*. (Source: *Hwaseong seongyeok uigwe*, book 1, 174f., Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

The explanation then goes on to describe all the elements, their functions and the theoretical capabilities of the machine, as well as their advantages compared to traditional working techniques, particularly the efficiency in lifting heavy weights and the potential to economize manual labor.

Figure 10 provides two examples of carts that were mentioned in the *uigwe*. The eight newly constructed *daego* 大車 on the left were supposed to be used for the transportation of specific heavy stones, for example the base stones of the fortress gates, called *seondanseok* 扇單石. This stone again can be found in another *doseol* which provides diagrams of different structural elements.⁵⁵ The 17 newly constructed *pyeonggeo* 平車 on the right were intended to carry fewer heavy materials, as indicated by their name. In addition to these *pyeonggeo*, a number of carts seem

⁵⁴ *Hwaseong seongyeok uigwe*, book 1, 168: “內下舉重器一部，其制，上設橫樑爲定體，中下有游樑，左右有纜車，并爲其用而橫樑（長七尺厚七寸闊六寸）[...]”

⁵⁵ *Hwaseong seongyeok uigwe*, book 1, 150.

to have been provided by other regions. Intriguingly, the text also refers to the *yuhyeonggeo* 游衡車, the cart introduced by Jeong Yakyong in his “Seongseol” but hardly mentioned in the *uigwe* or used in the construction project. This reference might also be an indication of either Jeong Yakyong’s involvement in the project or the appreciation of his texts by the officials in charge.

In addition to tools and machines, the technique for burning bricks is also introduced in the *uigwe*, which again indicates that the critique Jeong Yakyong formulated regarding Koreans’ technical knowledge of bricks was taken seriously.

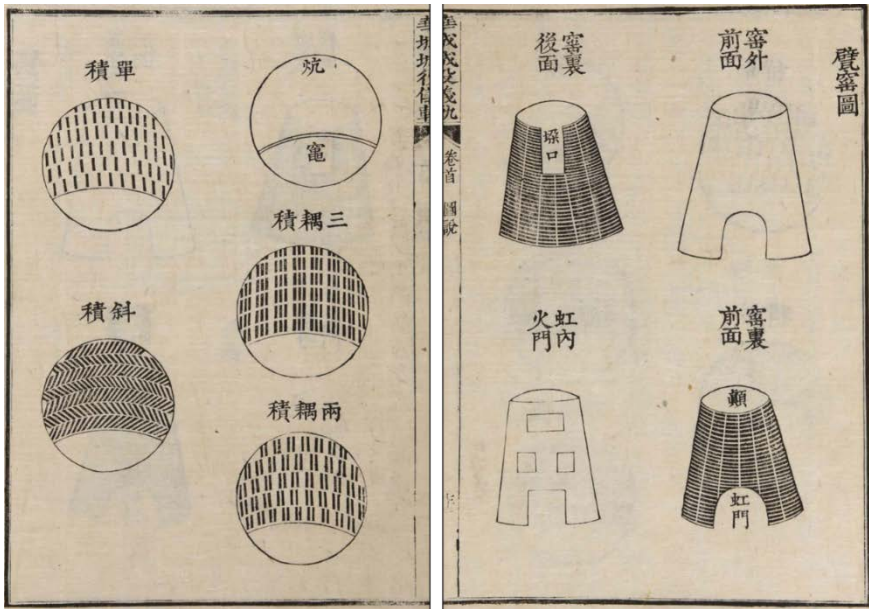


Figure 11. *Doseol* of the *byeonnyo* 甃窰 (kilm to burn bricks). (Source: *Hwaseong seongyeok uigwe*, book 1, 161f., Comprehensive Digital Archive of *Uigwe*, Kyujanggak Institute for Korean Studies, Seoul National University).

Figure 11 shows two pages dedicated to the techniques of correctly burning bricks for construction. While the page on the right gives the general shape of a kiln, explained in the subsequent text as the shape of a big bell (*daejong* 大鐘),⁵⁶ the page on the left informs the reader of the mode of stapling the bricks in the inner layer of the kiln. This description in turn can be directly attributed to the comments made earlier by Jeong Yakyong on the skills of Korean craftsmen in burning bricks for this kind of construction.

⁵⁶ *Hwaseong seongyeok uigwe*, book 1, 163: “To burn bricks, one firstly has to build a kiln shaped like a great bell. [...]” (“甃甃，必先築窰，狀如大鐘 [...]”).

Furthermore, diagrams of the diverse buildings, and structural elements in particular, are provided, complemented by written explanations. They contain extensive discussions on why structures such as the outer fortress walls, the adjacent trenches, and the battlements should be built in a certain way. While many of the depictions of buildings resemble those already known from earlier *uigwe*, the cross-sections of a number of buildings were new to Korea.⁵⁷ Figure 12 provides an example for this new style of *doseol*.

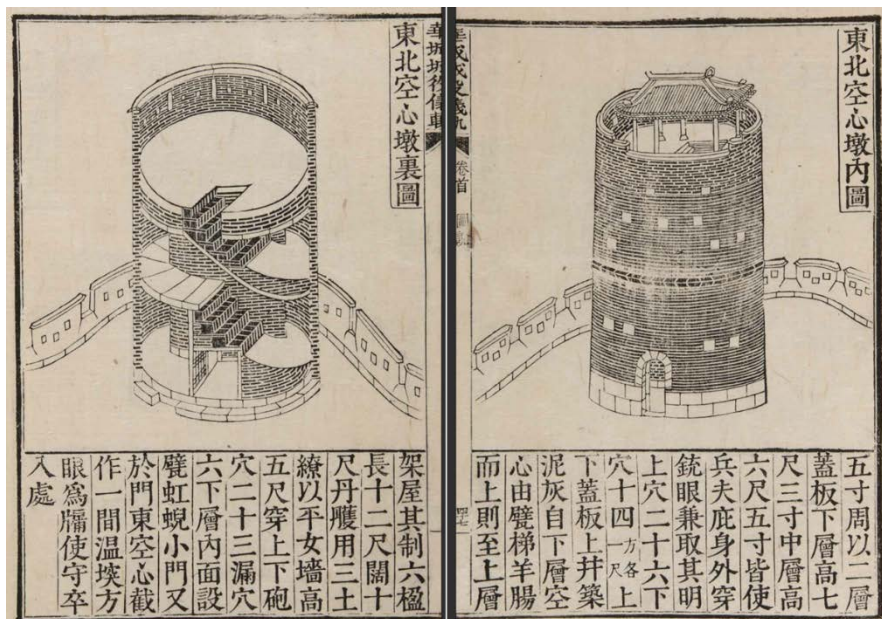


Figure 12. *Doseol* of the cross-section (left) and inner external view (right) of the North-eastern Tower. (Source: *Hwaseong seongyeok uigwe*, book 1, 111 (right), 112 (left), Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

Another group of *doseol* depicts a broad range of structural elements of the fortress, as well as of several buildings of the *haenggung* 行宮 (temporal palace), that were neither new to the Korean context of palace-building nor to the craftsmen of this particular time. There was no special need to introduce many of these elements,

⁵⁷ Cho Doo W., "Die koreanische Festungsstadt Suwon. Geschichte – Denkmalpflege – Dokumentation *Hwaseong seongyeok uigwe* – nationale und internationale Beziehungen" (The Korean Fortress City Suwon. History – Monument Preservation – Documentation *Hwaseong seongyeok uigwe* – National and International Relations) (Inaugural-Dissertation, Otto-Friedrich-Universität Bamberg, 2011).

particularly the wooden structures of the chapter and bracket system of the centuries-old canonical roof construction. Furthermore, they indicate the intention to turn the *Hwaseong seongyeok uigwe* into something more than a mere documentation of the project following traditional lines, i.e. a comprehensive manual or white book that includes every detail of the construction, not simply elements new to Korea. Figure 13 provides examples of these structural elements.

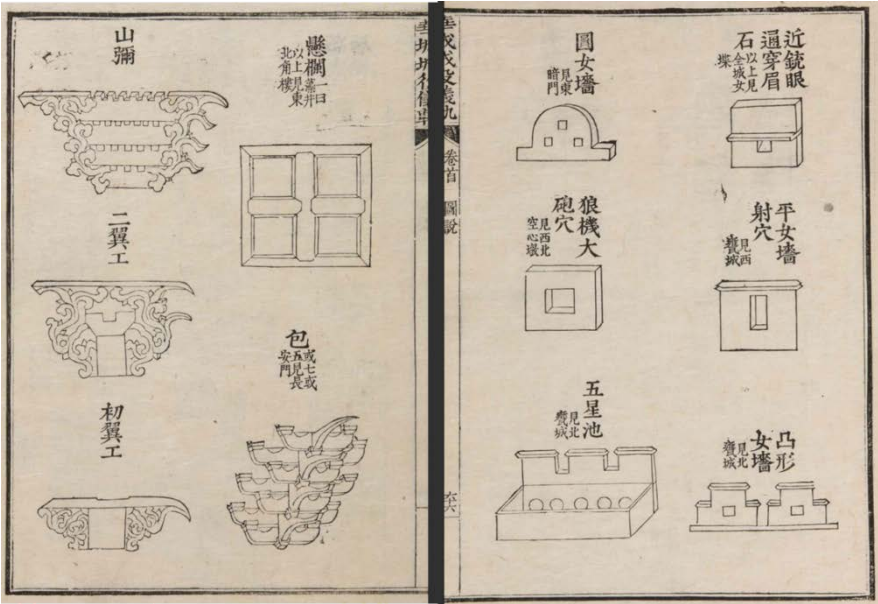


Figure 13. *Doseol* of examples of the bracket system (left) and different stone elements (right). (Source: *Hwaseong seongyeok uigwe*, book 1, 149 (right), 156 (left), Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

The elements on the left all belong to the bracket system of the roof construction of the wooden buildings, except for the *hyeollan* 懸欄, which is one element of the coffering. The elements on the right all belong to the fortress wall and reflect different styles of battlements and embrasures. Neither were new to the Korean context. The roof construction in particular followed the canonical forms already systematically explained in the *Yingzao fashi*. Figure 14 gives an example of the depiction of the same bracket system from this twelfth-century publication, regarded as one of the most important architectural manuals in Chinese history.

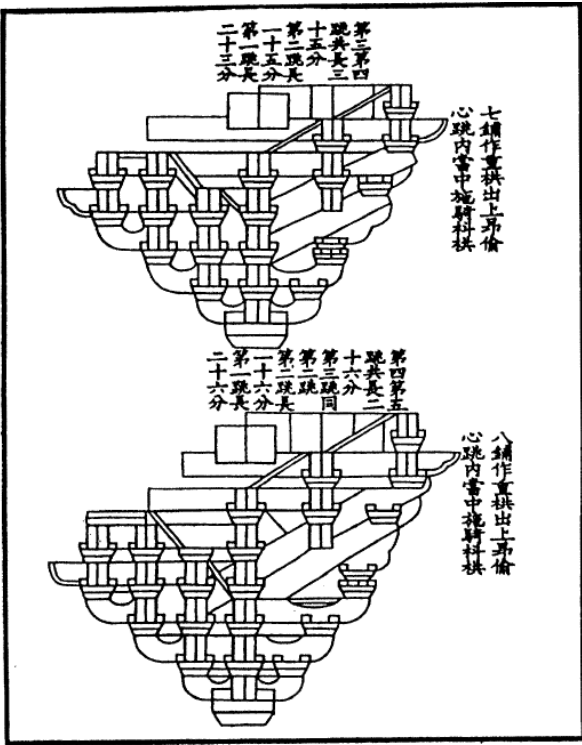


Figure 14. Diagram of a completely assembled bracket system. (*Yingzao fashi*, Source: Feng Jiren, “The Song-Dynasty Imperial ‘Yingzao Fashi’ (Building Standards, 1103) and Chinese Architectural Literature: Historical Tradition, Cultural Connotations, and Architectural Conceptualization” (Ph.D. diss., Brown University, 2006)).

The production of such large numbers of diverse elements might have been expedited by the pre-production suggested above, or have been the result of the large number of craftsmen who were engaged in the project. However, the construction of the stone walls themselves, and the different constructive forms of the stone elements in terms of their function, were heavily influenced by the Chinese examples evaluated by Jeong Yakyong, as well as by the reflection of Koreans based on their experience of traditional fortress construction.

Consequently, many of the constructive stone elements were new to Korea and had to be introduced graphically and in writing, not least to be valuable for future projects of the same kind.⁵⁸ Their detailed documentation can be understood within the framework given by Renn and Valleriani, in the sense that the construction of

⁵⁸ Ibid., 26.

massive stone structures of this kind was anything but canonized in Korea. The method of meticulously providing *doseol* in the form of depictions of the whole compound itself was not entirely new, however, as shown in Figure 4. However, the large scale and level of detail of the Hwaseong construction project were new, in terms of geographical features, patterns of human cultivation, inner and outer settlement, and even the simple form of scenography, with hills and mountains creating a close foreground and a distant background (see Figure 15).

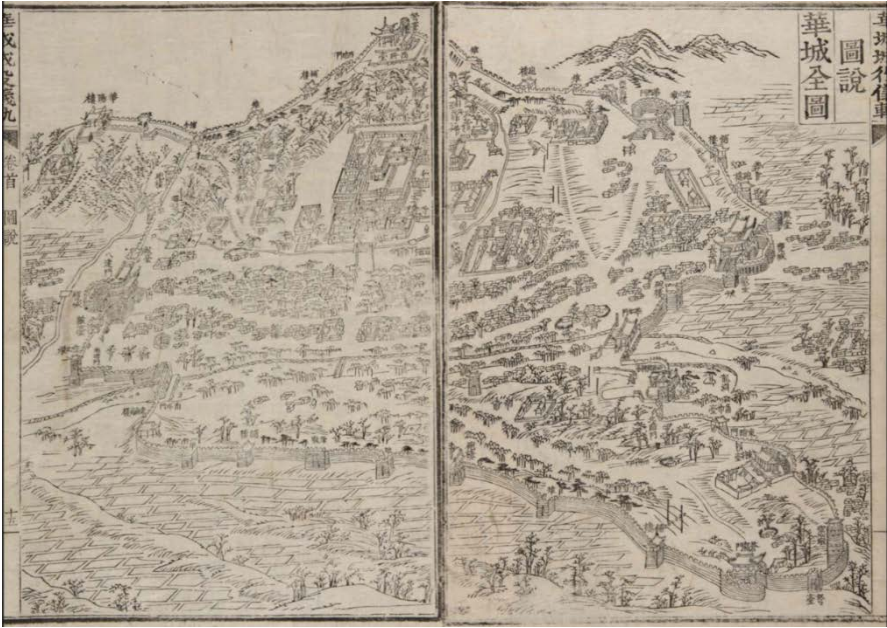


Figure 15. *Doseol* of the Hwaseong city complex. (Source: *Hwaseong seongyeok uigwe*, book 1, 46f., Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

Furthermore, for the first and only time in Korean architectural history, one finds a combination of, first, a general overview of the Hwaseong complex; second, single buildings in their context of location and function; third, single elements of these buildings; fourth, machines and tools for construction; and finally, written descriptions that supplement the graphical presentations. In this way, it combined theoretical and practical knowledge in accordance with the framework outlined above. However, this particular *uigwe* in its uniqueness shows that the genre itself, with its canonical structure and content, was very well suited for the documentation of ritual events, the context within which it was originally established. Conversely, it seemed rather ill-suited to the demands of a manual for construction projects, whether for

the purposes of their planning or for practical execution on site, unlike its Chinese predecessors.

Conclusions: Some Preliminary Thoughts on the Sustainability of Innovation

The *Hwaseong seongyeok uigwe* and the “Seongseol” can certainly be called a Korean textual innovation, and were themselves based on architectural innovation supported by the influx of foreign knowledge. Although it would be an exaggeration to call Jeong Yakyong an architect, in his function as a transmitter or supplier of foreign knowledge he played a role similar to the European architects described by Renn and Valleriani. Detached from practical work, he digested Chinese sources as well as historical experiences, and formulated plans for the construction of the fortress, taking this new theoretical information into account, while taking into account the canonical forms of construction. New types of *doseol* integrating theoretical discussions on practical issues into the canonized genre of *uigwe*, which were unprecedented in this context, significantly changed the character of the sub-genre of construction *uigwe* in the direction of the Chinese, and possibly even European, predecessors.

However, an examination of subsequent development reveals that this innovation was not to be equaled, and did not necessarily lead to sustainable progress in this context. Further examination of the construction *uigwe* that were published after the ground-breaking *Hwaseong seongyeok uigwe* shows that the new format was a singular occurrence. The *Injeongjeon yeonggeon dogam uigwe*, published only four years later, in 1805, as well as all other *uigwe* until the end of the dynasty, again resemble older publications in their canonical form, both structurally and textually. As mentioned in Figure 5, the buildings are only depicted in front view and out of proportion, and in some instances in merely childlike sketches. They are not situated within any local context. All the structural details provided for the Hwaseong fortress and for discussions on either theoretical or practical knowledge are missing, although the Injeongjeon is the main throne hall and as such no less important. Only the newly introduced crane, *nongno* can be found in some of the subsequent construction projects during the early nineteenth century, indicating that it must have proven useful, unlike the *geojunggi* and the different types of carts that disappear from official publications. Figure 16 reveals that the crane in this case carries a wooden beam, though it carried a stone in the *Hwaseong seongyeok uigwe*. If theoretical knowledge is understood as reflection on experience and adaptation to new contexts, then this simple example is the only one found after the Hwaseong construction project.

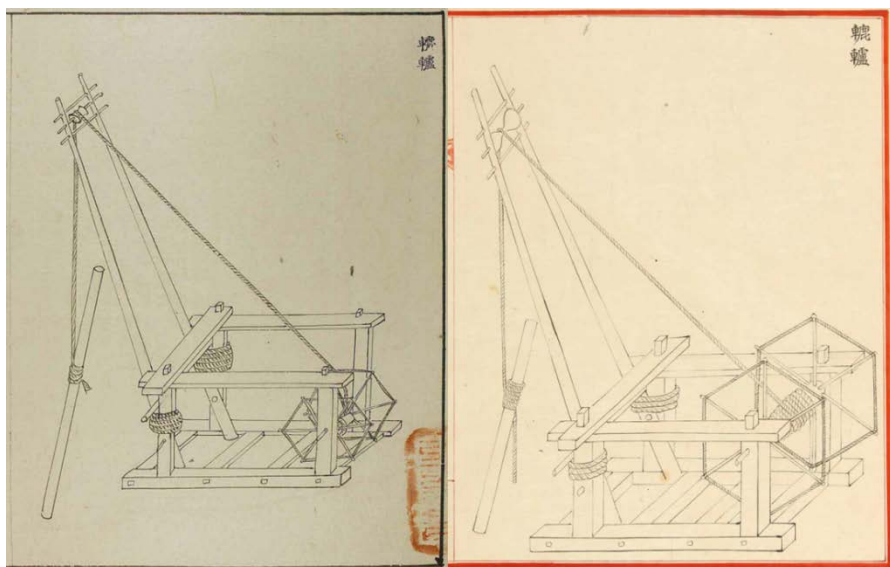


Figure 16. Two depictions of the crane *nongno*. (Source: *Injeongjeon yeonggeon dogam uigwe*; *Injeongjeon chungsu uigwe* 仁政殿重修儀軌 (Uigwe of the Major Repair of the Injeongjeon) (1857), Comprehensive Digital Archive of Uigwe, Kyujanggak Institute for Korean Studies, Seoul National University).

However, apart from this, the *Hwaseong seongyeok uigwe* led neither to a sustainable transformation or innovation of the genre into a comprehensive manual suited for construction processes nor to the publication of further manuals of a similar kind. None of the three fields identified by Renn and Valleriani underwent considerable change, either in the available materials or social structure, and least of all the epistemic system. The canonical structure and content, as well as the canonical modes of construction, i.e. the forces of conservative tradition, seem to have proven too strong and stationary either to adapt to the demands of construction or to the Chinese templates of construction manuals.

The exceptionality and singularity of this *uigwe* must be attributed to the political circumstances of King Jeongjo's reign, and are deeply interconnected with aspects of his legitimization by means of redeeming the name of his father and making efforts to strengthen the king's power in general by establishing the so-called *tangpyeong* 蕩平 politics.⁵⁹ The construction of the fortress, together with the restructuring of certain parts of the military, the bureaucracy, and the administrative

⁵⁹ The relocation of the tomb of Crown Prince Jangheon (1735-1762), which was conducted in 1789, is documented in three *uigwe*: *Jangheon seja yeonguwon cheonbong dogam uigwe* 莊獻世子永祐園遷奉都監儀軌 (Uigwe by the Project Office for the Presentation of the Relocation of the

regions just south of the capital, all seem to be geared towards these final political goals of the king.⁶⁰ To this end, all possible measures were made available, and one finds this most clearly reflected in the construction of the Hwaseong fortress, the publication of the respective *uigwe*, and the corresponding provision and amalgamation of the necessary knowledge available at that time, be it foreign or local. After the death of King Jeongjo, the restoration of the conservative political factions and the banishment of Jeong Yakyong and other progressive scholar-officials turned back the clock and confounded many of the efforts and developments of the eighteenth century.

The history of architectural knowledge in Korea as well as the sub-genre of construction *uigwe* should therefore be read within the larger context of a general history of architectural knowledge framed by Renn, Valleriani, and others. Conversely, the local conditions of the late Joseon Dynasty, as outlined above, can support and enhance an understanding of the subtle interplay of the diverse factors within this framework. In this regard, the specific combination of Jeong Yakyong, King Jeongjo, and the Hwaseong construction project at this particular point in time must be recognized as the reason for this exceptionally innovative and singular case. One might call this an early modern instance in a pre-modern context.

Tomb Yeonguwon of Crown Prince Jangheon); *Jangheon seja hyeollyungwon wonso dogam uigwe* 莊獻世子顯隆園園所都監儀軌 (Uigwe by the Project Office for the Gravesite Hyeollyungwon of Crown Prince Jangheon); *Jangheon seja hyeollyungwon cheonwon uigwe* 莊獻世子顯隆園遷園儀軌 (Uigwe by the Project Office for the Relocation of the Tomb Hyeollyungwon of Crown Prince Jangheon). For a short historical sketch please refer to Han, *Joseon wangjo uigwe* (cit. n. 17), 402-406.

⁶⁰ Even though I do not agree with all of the conclusions, for further detail please refer to Kim Sung-Yun, "Tangpyeong and Hwaseong: The Theory and Practice of Jeongjo's Politics and Hwaseong," *Korea Journal* 41:1 (2001), 137-165.

Abstract

The importance of construction for the Joseon state is reflected not least by the abundance of buildings which are today designated as cultural as well as world heritage sites. However, this importance is belied by the scarcity of sources concerning their construction. In contrast to the Chinese case, manuals that explain and pass on the modes and templates for the construction of specific buildings are missing. The only comprehensive sources that deal with a selected number of these construction projects seem to be the *uigwe* 儀軌 (Ritual Regulations). A meaningful approach to the seemingly contradictory Korean context was provided with the development of a framework of a general history of architectural knowledge by Jürgen Renn and Matteo Valleriani. They examined the importance of architectural knowledge in terms of practical and theoretical knowledge with respect to its written documentation. This general framework offers explanations for certain developments in Korean history within the context of the development of architectural knowledge and the carrying out of construction projects as documented in *uigwe*. This article analyzes the content of representative *uigwe* on construction projects against the backdrop of this historical framework. It shows how the genre was rather ill-suited for the purpose of a manual for construction projects and the way in which the Hwaseong fortress construction project can be regarded as an exception to this. It further explains how the development of architectural knowledge in Korea in general as well as the exceptionality of the Hwaseong project can be understood and located within a world-historical framework.

Keywords: architectural knowledge, *Hwaseong seongyeok uigwe*, late Joseon Dynasty, “Seongseol,” Jeong Yakyong, knowledge transfer