
Presentation 4

The Universality and Distinctiveness of East Asian Printing Techniques

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1. Current Status of UNESCO's Cultural Heritage Registration Related to East Asian Printing Techniques

First, What areas are included in East Asia? This article deals with East Asian printing technology so it is necessary to give a thought on the area where printing technology was developed in pre-modern times. Even though there are differences depending on the order of time, countries where printing technology has developed are China and its neighboring countries such as Korea, Japan and Vietnam. Therefore, this article aims to look into characteristics in these countries, grouping them into East Asia category.

Second, what is the scope of printing technology? Printing is the technology for mass copy of texts. Human civilization of copying texts has evolved from oral transmission to transcription, from transcription to printing, from printing to digital copying. It has been only thousand years since printing began to be used in human society in earnest. Social needs drove a development of new technology, and craftsmen who has assimilated its knowledge and skills created new things. In other words, intangible needs and technology produced new tangible things. Diagraming of printing technology is as follows;

Social needs for printing → Craftsman and Technology → Woodblock or Movable - Type → Books

In this article, we will examine why printing technique was needed and what its social background in each area was, focusing on woodblocks and movable-type, two representative methods of printing technology in pre modern times.

Third, in the framework of UNESCO World Heritage, artisans and their techniques are inscribed on UNESCO Representative List of Intangible Cultural Heritage of Humanity, and woodblocks and printed books on UNESCO Memory-of-the-World Programme respectively. Presently East

1 See 'China engraved block printing technique' on UNESCO (heritage.unesco.or.kr/).

2 See 'Wooden movable-type printing of China' on UNESCO site(heritage.unesco.or.kr/)

Asian printing techniques which were inscribed in these two lists are as follows.

First, 'China engraved block printing technique' was inscribed on UNESCO Representative List of Intangible Cultural Heritage of Humanity in 2009. Traditional Chinese woodblock printing technique has been handed down to modern printing workers through apprenticed education by experience and practices from generation to generation. At present, some printing shops such as the Yangzhou Guangling(廣陵) Woodblock Printing Office, the Jinling(金陵) Buddhist Sutra Seal Graving Printing Office and the Dege(德格) Temple Printing Office have maintained their reputations.¹⁾ Next, related to movable-type printing, 'Wooden movable-type printing of China' was inscribed on the List of Intangible Cultural Heritage in Need of Urgent Safeguarding in 2010. Wooden movable-type printing has been being used in Rui'an, Zhejiang Province in China up to date. It has been usually used to print and edit genealogical books. As of 2010, about 60~80 people in 10 families are engaged in this printing work.²⁾ Concerning to woodblock as a outcome of printing techniques, 'Printing woodblocks of the Tripitaka Koreana and miscellaneous Buddhist scriptures', housed in Haeinsa temple in Korea was registered on UNESCO Memory-of-the-World Programme in 2007. And in 2015, 'Confucian Printing Woodblocks' kept in the Korean Studies Institute was also registered on it. 'Woodblocks of Nguyen Dynasty(1802~1945)' housed in State Records and Archives Department of Vietnam was inscribed in 2009.

2. The Woodblock Printing: The Main Trend of East Asian Printing

The printing methods are largely divided into woodblock printing and movable-type printing. And movable-type printing is categorized as wooden movable-type and metal movable-type. Surely, before wooden movable-type, clay movable-type has been firstly attempted in China. It was the metal movable-type that was invented by Gutenberg in the 15th century in Europe. That is why printing reminds us of typography, especially metal movable-type, when we talk about printing. However, it is appropriate only in European cultural context. In the East Asian cultural context, movable-type has never occupied the dominant position. It was exceptively used only in case of need. As mentioned above, the purpose of printing is mass copying of texts. The reason why Gutenberg's metal movable-type received attentions in Europe was that his printing method made it possible to mass produce ancient texts, including Bible, to which only a minority of noblemen and priests were exclusively accessible, and to distribute texts widely to the public. In East Asia, woodblocks have played such a role all the way through. Movable-type was only used to print various sorts of books on a small scale in the short run. Therefore, in the printing history of East Asia, both woodblock printing and movable-type printing should be considered at the same time. The obsession with movable-type printing, in particular, metal movable-type can be biased to the European cultural context.

Then, the questions are raised in this point. Why was woodblock printing mainly used in East Asia and movable type printing in Europe? Why was not movable-type widely used in East Asia? The other way, why was not woodblock printing developed in Europe? What made it possible to skip the step of woodblock printing and directly jump to the step of movable-type printing in Europe? Of course, before metal movable-type by Gutenberg, in some areas in Europe, woodcut techniques were used but they were rarely used to copy texts.

On these questions, an opinion was suggested early, taking note of the difference between

3 Michael Friedrich, "A position of woodblock printing in copying culture," in *Conservation and Utilization of Woodblocks in the Digital Age* (The Korean Studies Institute, 2019), p. 195.

Chinese characters and Alphabets. Of course, that reason is also important. However, this alone can not explain all the differences. Rosé Chartier has suggested his opinion on the superiority of woodblock printing to movable-type printing in East Asia as follows.

For too long time, the western scholars have judged the printing technology of Asia based on the thought which Gutenberg's printing technique was superior. If they understood much better of books and publication in China, Korea and Japan, they would not have hastily jumped to such a Eurocentric conclusion. Woodblock printing has its own merits. One of them is that woodblock was more convenient than movable-type for printing texts with languages consisting of various writing ways like Japanese or many characters like Chinese. Another merit is that woodblock might be easy to publish manuscripts because it was produced on the basis of calligraphy. Lastly, woodblock is durable, which makes it possible to print thousands of copies of the same books. Furthermore, it is convenient to print the second edition of the same books and also possible to produce customized woodblocks to meet the demands for markets. Considering all these advantages of woodblock printing, it seems to be necessary to reevaluate Gutenberg's printing technique more exactly. It means that undoubtedly, Gutenberg's printing technique has considerably significant meaning in the history of printing but it was not the only available technique to widely spread printed materials³⁾

He stated the three points about woodblock printing, first, the difficulty of writing characters mentioned above, second, the merit of woodblocks in showing off characteristics of calligraphy, third, the merit of woodblock suitable for mass printing. At least he seems to have understood the advantages of woodblock printing well. In order to understand pros and cons of East Asian printing techniques more concretely, it is necessary to examine the characteristics of printing techniques of four countries in East Asia generally.

3. The Characteristics of Printing Techniques of Four East Asian Countries

(1) China

China is a country of woodblock. Before western printing technology was introduced, most of books were printed with woodblocks. Did not they know about typography? If they knew, why they did not use it widely? It is crystal clear that they knew about the movable-type early on. Nevertheless, the typography has not come into general use. Why?

First of all, it is believed that full-fledged woodblock printing began during Sui and Tang Dynasties in China. Even though it will be examined more specifically below, it is guessed that the transcription culture of Mahayana Buddhism played a role as a trigger in the development of woodblock printing. Then, when and how did movable-type printing begin? There is no real objects informing on its beginning left so we cannot but get a sense of it through records.

Shen Kuo(沈括) in Northern Song described in his book, *Mengxi Bitan*(夢溪筆談; Dream Pool Essays), "A monk in charge of transcription invented movable-type with clay". This is the beginning of Chinese movable-type. However, its performance seemed not to be good enough to be widely used. Next, in *Nong Shu*(農書; Agricultural treatise) written by Wang Zen(王禎) in Yuan Dynasty, there is an article on wooden movable-type and its arrangement. In other words, wooden movable-type seems to have been used in Yuan Dynasty. But looking into books left till now, it can be seen that most of books were still published by using woodblock at that time. All mentioned above are evidenced only by records.

4 Chen Hong Chen, "A Review of Early Chinese Metal Movable-Type Printed Copy", in *The Creation and Science of Metal Movable-Type Printing Culture in East Asia 1*", (Academy of Korean Studies press, 2017), p. 230.

5 Tian Yeh, "Movable-type printing technology and Genealogy book Printing", in *Cultural History of Asian Woodblocks - Perception and Comparison* (The Korean Studies Institute, 2018), p. 214.

6 Ibid, re-cited, p. 215.n

7 Ibid, p.216.

The China's oldest copy printed with metal movable-type was published in Wuxi(無錫) during Hongzhi(弘治, 1488-1505) reign of Ming Dynasty. This copy was produced under the control of Hua sui(華綏) and printed by private institute called Huitongguan(會通館⁴⁾, not by a government office. Examining the remaining copies printed with metal movable-type in this period, it can be seen that the printing quality was lower than those of contemporary metal movable-type copies in Joseon Dynasty. Since metal movable-type of Joseon was exclusively produced by central government offices such as Jujaso or Gyoseoguan and know-how of printing has been accumulated for a long time since Goryeo Dynasty, the quality of printing technology in Joseon was much higher than that of contemporary metal movable-type by the private sector in China. The metal movable-type copies printed in Huitongguan operated by Hua family in Wuxi shows the difficulties faced in initial stage of metal movable-type printing. Besides, other metal movable-type copies printed in Lanxiangtang(蘭雪堂) of Hua family and Seoksan Anssiguan still remain.

Gujin Tushu Jicheng(古今圖書集成) printed with bronze movable-type and Wuyingdian(武英殿) Ch-chen(聚珍) edition printed by wooden movable-type in Qing Dynasty still remain.⁵⁾ However, these books account for a very small amount of total printed books.

Why did movable-type printing eventually fail to replace woodblock printing in China? Tsien Tsuen-hsuein(錢存訓), an authority on the history of Chinese printing, stated as follows: "The invention of movable-type aimed to lessen the burden of woodblock printing. The attempts to use movable-type have been made several times intermittently in the development process of printing in China. It was a natural tendency to try to use movable-type printing in order to make printing work more economical and efficient. Unfortunately, the printing results using movable-type, in China, has never been satisfactory enough."⁶⁾ He said that, at the start, movable-type printing was invented to lessen the burden of woodblock printing as supplementary means but it could not meet the expectations and eventually disappeared.

Professor Tian Yeh suggested more concrete reasons for this. According to him, first, Chinese letters as an ideogram needed 200,000 types to print books. Second, it is required to typeset and disassemble repeatably to print larger volume of books at a time. Third, movable-type printing costed more than woodblock printing. Fourth, movable-type printing was not able to emphasize the accuracy and beauty of handwriting. Fifth, Chinese metal movable-type was different in size depending on the shapes of characters, which made it to fail to standardize. What's more, typeset was less aesthetic than woodblock. Sixth, the production of movable-type needed high skilled craftsmen but it is not easy to secure such craftsmen. These are the reasons why typography could not take the leading position in China.⁷⁾

As mentioned above, wooden movable-type printing technique of China was registered on the List of Intangible Cultural Heritage in Need of Urgent Safeguarding in 2010. This tells us that wooden movable-type printing technique is still in use. Why is it still used and what is the current situation? How has wooden movable-type been used? Is this universal or special in China?

The wooden movable-type printing of China is one of the oldest printing techniques in the world. This has been maintained in Rui'an, Zhejiang Province and still used for compiling genealogical books. Men carved letters into blocks of wood, and selected and typeset letters for printing books. Women were responsible for cutting paper and binding books. All the year round, printing craftsmen traveled many ancestral shrines in the neighboring areas, carrying wooden movable-type with printing tools and equipments, and produced genealogical books. Wooden movable-type printing techniques have been transmitted for generations in the

8 Ibid, pp.216-217.

9 Nguyen Thuan cung, Pham Van Thuan, Nguyen, and Khao Tan, "The Woodblock Collection of Khe Hoi(溪洄) temple viewing from the context of Buddhist printing culture in the 19th century", in Sharing experiences of woodblock preservation in Asia(The Korean Studies Institute, 2017) p.157.

10 Trần Bân Cung ·Trần Ti Ming, "Special Value of Woodblock Heritage in Vietnam", in Cultural History of Asian Woodblock - Perception and Comparison (The Korean Studies Institute, 2018), p. 147.

11 Ibid, p.148.

12 Ibid, p.148.

13 Ibid, p.149.

14 Nguyen Thuan Cuang and Nguyen Ding Hung, "A case study on Woodblock of Càn An Temple: Printing culture and Buddhist Knowledge Network in the Northern Vietnam in the 18th and 19th centuries", in Cultural History of Asian Woodblock - Perception and Comparison (The Korean Studies Institute, 2018), p. 49.

family but the income is not enough to manage livelihood whereas the printing work requires precise and hard trainings. Furthermore, as computer printing techniques has widely spread and publication of genealogical books has been reducing, the number of artisans holding this technique has been also drastically decreasing.⁸⁾ At present there are only 10 or so who bear this technique completely. This is why it was listed on Need of Urgent Safeguarding.

Through above facts, it can be found out that typography was used by private trader in certain provinces to publish certain books such as genealogical books in China.

(2) Vietnam

In China, woodblock printing began in at least the 6th and the 7th century. And the technology was disseminated along with Buddhist scriptures to the Korean Peninsula and Japan before the end of the 8th century. In Vietnam, it is recorded that Buddhist scriptures were printed in the end of the 13th century but there is no books printed at that time left now. Therefore, What can be definitely said is that it was in the 15th century that printing was used in Vietnam.⁹⁾ Let's have a brief look at the history.

According to Thiề Uyể tậ anh(禪苑集英) in Chinese, containing the achievements of Zen School and Zen Masters from the end of the 6th century to the 13th century, woodblock engraving was not widely disseminated but carried out only in temples in Lý Trần Dynasty.¹⁰⁾ Then, during Hồ dynasty(1400~1407), printing technology has considerably developed and Hồ Quý Ly(胡季犛) launched to print banknotes. The intricate patterns such as water plants, waves, clouds, turtles, giraffes, phoenixes, etc were also printed.¹¹⁾ In the 15th century, woodblock printing has developed into community business. It can be evidenced by the fact that Lương Như Hộc, dispatched to China as an envoy, came back with the printing technique learned during staying in China and taught it to residents in Hồng Lự village and Liể Chàng village.¹²⁾ Since then, these villages have become Vietnam's first centers of professional printing.

It was in Nguyen Dynasty (1802~1945) that woodblock carving and printing industry was most developed. Not only government agencies but also private businesses established printeries to print and publish books with woodblocks. Large-volumed books such as history books and encyclopedias supervised by state were printed and have been handed down up to now.¹³⁾ The woodblocks to print these books were listed on UNESCO Memory-of-the-World Programme. Books published at that time were so various, ranging from Buddhist scriptures to history books, collection of poems, medical books, educational materials, geographical books, law books and woodcut drawings and so forth.

Particularly in Vietnam, many woodblocks are accommodated in temples. In northern Vietnam, whatever sects including Trú Lâ(竹林), Lâ Tế(臨濟), Tà Đөг(曹洞), Tịh đhộ(淨土) are, monastic life in temples is commonly based on the spirit of Mahayana Buddhism. Therefore, the main scriptures of Mahayana Buddhism such as Diamond Sutra(金剛經), Prajnaparamita(般若經), Lotus Sutra(蓮華經), Avatamsaka Sutra(華嚴經), Amitabha Sutra(阿彌陀經) are highly respected.

¹⁴⁾ Mahayana Buddhism put an emphasis on initiation or blessing, recitation, commentaries and transcriptions of these scriptures, which means to widely spread the words of Buddha to the general public. For this purpose, woodblock printing was used as a significant tool. These woodblocks were manufactured mainly during the 18th and the 19th centuries.

The representative temple can be mentioned is Càn An temple that keeps a large number of woodblocks. Besides, Vinh Nghiem Temple collection, Bodasa temple collection, Dhdamsa temple collection consist of many woodblocks, too. Other than these collections, it is believed that there are many other small and medium-volumed woodblock collections housed in

15 Ibid, p. 87.

16 Ibid, pp. 80-86.

17 Tomohiko Sumiyoshi, "The Woodblock and its editions in the medieval Japan", in Conservation and Utilization of Woodblocks in the Digital Age (The Korean Studies Institute, 2019), p. 7.

18 Eight monks who traveled to Tang Dynasty of China in the early days of the Heian and studied the Buddhism.

19 Ibid, p.7.

20 Ibid, p.8.

21 Temples dedicated to the ancestors of noble families.

22 Ibid., pp.8-9.

temples all over the country yet rarely known to researchers.¹⁵ In Vietnam, Buddhist temples have functioned as the center of woodblock engraving. Centering the temples, Buddhist knowledge was collected and circulated, and a Buddhist network between local communities and sects was established.¹⁶

After the 15th century, printing technique began to be used in earnest. Most of the remaining woodblocks were produced in the 18th and the 19th centuries. In fact, it has not been heard yet whether movable-type printing was used in Vietnam or not and, if used, what roles it played. Probably, it seems to print books entirely by using woodblock in Vietnam.

(3) Japan

As mentioned briefly above, the woodblock printing in China was provoked by the spirit of Mahayana Buddhism which sublimated mass production of Buddhist scriptures to sacred religious acts, turning to teachings of Buddha. Hyakkumantou Dharani Sutra in the period of Nara(710CE-794CE) inherited and embodied cultural phenomenon of copying the symbol of Chinese Buddhism. However, its technology could not yet reach to the level of unrestricted printing of various texts regardless of the length. Actually, publication in Japan has been stalled for over 200 years after the period of Nara and finally stopped altogether.¹⁷ The publication in Tang Dynasty in the 9th century was conducted centering around Shu(蜀) area. In the period of Heian(794CE-1185CE) in Japan, the eight Japanese(入唐八家) who were pioneers of new Buddhism¹⁸ imported Buddhist books from this area.¹⁹ Upon that opportunity, the concept of printing to copy books began to spring up in Japan. After the establishment of Song Dynasty, Emperor Taizong issued the royal order to engrave and publish Tripitaka for the first time in East Asia. This scripture, called Kaibao Tripitaka(開寶藏), was conveyed to Goryeo, Khitan, Japan and so forth.

This scripture was introduced into Japan by monk Chōnen(僞然) who had a royal audience with Emperor Taizong in Kaifeng(開封) in 986. It was recorded that woodblock-printed copies were produced among nobles in Heian period including Fujiwara no Michinaga who sponsored Chōnen from this time on. This can be read as the influence of imported woodblock-printed copies from Song Dynasty. Buddhist ceremonies held for public or private purposes among nobles were great opportunities to use such Buddhist scriptures printed with woodblocks. In the list of Kugeniki((公家日記, a journal of noble family) or prayers, the titles of Lotus Sutra(妙法蓮華經), Innumerable Meanings Sutra(無量義經), Amitābha Sutra(阿彌陀經) printed by woodblocks are found. These printed copies were substituted for the charitable deeds of manually transcribing Buddhist scriptures. While transcription focused on improving the quality of books and decorating them, woodblock printing has been developed by giving an emphasis on the number of books.²⁰ It was intended to secure a number of Buddhist scriptures through mass copying texts and to accumulate their charitable deeds by enshrining them in many temples.

In this way, in the 11th century, full-fledged publication using woodblocks was realized in Japan under the influences of Song Dynasty. This woodblock technique has been accumulated in Kofukuji temple(興福寺), an ujidera(氏寺)²¹ dedicated to the Fujiwara family who led the Heian aristocracy. Among copies that have the clear publication year, the oldest copy is Discourse on the Perfection of Consciousness-only(成唯識論) published by Kofukuji(興福寺) temple in 1088. It was called Kasugapan(春日版). In this time, the aims of publication already moved away from reproducing talismans to delivering Buddhist scriptures and creed, and enjoying the content of texts.²² Regarding to Japanese printing, the origin and role of movable-type printing technique should be noted. Several opinions were suggested on the origin of Japanese movable-type printing. Among them, the most possible arguments are two as follows; one is that Gutenberg's

23 Izumi Munemura,
“Tokugawa Ieyasu and
Tsurugapan printed with
Bronze movable-type”, in
The Creation and Science
of Metal Movable-Type
Printing Culture in East
Asia 1 (Academy of Korean
Studies Press, 2017), p.
249.

24 Tomohiko Sumiyoshi,
Ibid (The Korean Studies
Institute, 2019), pp. 33-34.

25 Tomohiko Sumiyoshi,
“History of Japanese
Woodblock Printing”, in
Woodblock Printing in East
Asia (The Korean Studies
Institute, 2008), pp. 592-
593.

26 Tomohiko Sumiyoshi,
Ibid (The Korean Studies
Institute, 2019) p. 35.

printing technique was introduced into Japan by European missionaries and the other is that Joseon's typography was introduced when Toyotomi Hideyoshi invaded Joseon.

It was in 1590 that metal movable-type was first introduced into Japan. In 1582, Padore Visitador Alessandro Balignano of Jesuit, who was engaged in missionary work around Kyushu, planned and implemented to send Tensho embassy to Europe. They arrived in Rome and had an audience with the Pope in 1585 and returned to Japan in 1590. A Japanese boy called Constantino Dorado, who took part in this embassy, returned home with western movable-type printing technique in 1590. In 1588 before returning to Japan, he printed a book titled the Speech of Martinho Hara in Latin in Goa, India. This book is the first edition printed with western style movable-type by Japanese

In 1591, the following year after returning to Japan, they published books by using western-style metal movable-type printing technique in Kazusa, Kyushu. These are called Kirishitan editions. However, in 1612, as Tokugawa Ieyasu prohibited Christianity and expelled Christian facilities from Japan, western-style movable-type printing eventually came to an end. About 100 kinds of books were published for 20 years, but only 30 kinds have been handed down up to now.²³⁾ If Kirishitan printing technique had been continuously developed, the development of printing in East Asia would have greatly changed.

Around the similar time, metal movable-type was also introduced from Joseon. In 1592 and 1597, Joseon's movable-type edition was introduced and craftsmen with the technique crossed into Japan, which opened the era of ancient movable-type for about following 50 years. Its influences reached to the royal court of Emperor Go-Yōzei, who ordered to make the Keichō edict edition(慶長勅版), and the new ruler Tokugawa Ieyasu, who published Fushimi edition and Suruga edition. During their reigns, the classics such as The Four books, Nihon Shoki, The Seven Books, Qunshu Zhiyao(群書治要) were also published with movable-type. It had influences on a newly emerging intellectual class of doctors, Buddhist temples of Nichiren order and wealthy merchants in capital city and at last realized movable-type printing of Keicho era(1596~1615).²⁴⁾ The advent of ancient movable-type had a great influence on the history of publishing in Japan given that it facilitated publishing books in both royal court and private sector, comparing that the publication of books was almost monopolized by temples up to the period of Muromachi(1336-1573).²⁵⁾ However, the publication of ancient movable-type edition fell into a decline after Kan'ei period(1624~1644) because it could neither reflect various composition of Japanese characters nor cope with quantitative and temporal enlargement of publishing business. The era of ancient movable-type ended with unprecedented outcomes such as the appearance of publishing bookstores and expansion of readers. After that, the mainstream of printing returned to woodblock printing.²⁶⁾

(4) Korea

In the 1960's, “Mugujeonggwang daedarani Sutra” was discovered in the process of restoration of Seokgatap Pagoda at Bulguksa Temple. But it is impossible to determine the exact date and place to be published due to no record on the publication information. Nevertheless, there is no doubt that it was published in the middle of the 8th century. However, it seems to be in the 10th century when full scale publication of books by woodblock began in Korea. At this time, in China, after chaotic period of Five Dynasties and Ten Kingdoms was tidied up, Song Dynasty was established and professed ‘Principles of virtuous administration’, governing by scholars with benevolence and erudition, excluding military officers. As a result, active book publication has been conducted and its achievements were delivered to Goryeo. This situation in Song Dynasty seems to have influenced on actively publishing books in Goryeo as well.

In Goryeo and Joseon, books have been published by using both woodblocks and movable-type. Distinctively from other countries, in Korea, woodblock printing and movable-type printing continued to be developed at the same time. This is obvious difference from other countries where movable-type was used as a supplementary tool in certain areas at certain times only. I would like to call this 'Dual structure of printing technique on the Korean Peninsula'. How was this characteristic formed? Why did Goryeo and Joseon continued to improve and develop typography?

As mentioned in the beginning, technology is the product of need. Gutenberg's metal movable-type was evaluated as the best invention in Europe because it widely opened the era of mass copy of texts. In East Asia, however, woodblock was already playing the same role to Gutenberg's. As many as needed, any number of books could be published using woodblocks. Even so, the biggest weakness of woodblock printing was that it could print only one kind of text with a single set of woodblocks. Consequently, lots of cost and labor were put into the production of woodblocks. It was unavoidable labours to engrave the content of text one by one on the wooden board. If large volume of books are needed, such laborious work is acceptable but in case that only small number of books are needed, the concern deepens. The cost performance should be weighed. Furthermore, if many kinds of books in small quantities are needed, the concern deepens more because the cost performance of woodblock production is too low. In this case, there is no choice but to find alternatives to woodblocks. The alternative was the movable-type which could be typeset and disassembled repeatedly. That was a natural result in the development of printing techniques as needed.

The necessities of both diversified small-quantity production and mass production, that is the main reason to form the dual structure of printing technology in Joseon. Differently from China and Japan, the role of private sector in production and distribution of books was very weak in Joseon. After the 18th century, the production and distribution of Banggakbon(坊刻本, novels published for attaining commercial benefit) grew up as a business in private sector but it accounted for an insignificant part of the total volume of publishing. The selection and production of books depended entirely on the central government. But woodblock production for printing necessary books one by one could not be handled by government finance alone. It was too much burden to central government. Therefore, central government printed the needed books in small quantity using metal movable-type and distributed them to local governments. Then the local governments were allowed to engrave the woodblocks of the books needed to be distributed in large quantities among those books and reprint them. In that case, a book had both a woodblock edition and a movable-type edition at the same time. This was the basic publication system in the period of Joseon.

Here, one thing has to be mentioned. Chinese character itself is hard to get on with movable-type. The movable-type printing can function properly only if over 100,000 types at least should be manufactured with thousands of Chinese characters. Hangeul(Korean) was created in Joseon, but the intellectuals of Joseon has yet used Chinese characters entirely. Despite of that, Joseon indulged into production of metal movable-type and published books in Chinese characters using movable-type. After creation of Hangeul, the production of Unhaebon(the explanation book on principles and ways to use Hangeul) was conducted, according to which movable-type for Hangeul was produced along with.

Hangeul is an phonetic system that combines consonants and vowels to write sounds like western alphabet. It was already pointed out before that Western alphabet was a factor to accelerate typography development. Total number of alphabet including upper and lower

cases and special letters are 100 characters or so. Hangeul has only 24 characters in total. In that point, if Hangeul instead of Chinese characters was mainly used, it could have been easier to produce movable-type and publish books. Although alphabet and Hangeul have the similar principle to separate sounds by each phoneme, the way of writing is totally different. Alphabet is written in consonants and vowels side by side but Hangeul is mostly structured with consonants and vowels up and down, but not always and sometimes written side by side, to make a syllable. As a result, due to the writing method of Hangeul, the number of movable-type to be produced increases. Hangeul has also become tough to be produced in movable-type.

4. Conclusion: The Power to Create Printing Techniques in East Asia

What is the power to create the East Asian printing techniques? First of all, the power of basic techniques having been accumulated for a long time can be mentioned. A single new technique is never made out of nothing. It is created by the combination of techniques piled up layer by layer. New needs and creative ideas drive the emergence of new technologies.

In Europe, the geographical axis of civilization has continuously moved on from orient region to the Aegean Sea, from the Aegean Sea to the Mediterranean, from the Mediterranean to Western Europe, from Western Europe to Britannia Island and from Britannia Island to USA across the Atlantic Ocean. Now, the United States of America on the Atlantic Ocean is losing the light. On the other hand, the geographical center of East Asian civilization was always fixed. That is the Chinese continent centering two rivers, the Yellow River and the Jiang River, where various ethnic groups, cultures and religions gathered to form a melting pot. This melting pot was the birthplace of East Asian civilization. When the furnace boiled up, East Asian civilization flourished but when the furnace cooled down and lost its function, East Asia fell into chaos.

Chinese character was used in East Asia in common. It is a unique writing system that integrates sound, meaning and shape. The early systems of character in human history started with similar ideas but gradually, they have been developed respectively in different directions. They have evolved from the shape-centered system to the sound-centered system. As Chinese character system needed more and more letters, it also evolved to sound-centered system but the Chinese never gave up the shape of characters and found out the new solution, maintaining their past traditions. East Asia could share their ideas each other through the common literacy life.

Traditions can not only be a nourishment for new and creative ideas but also become a hindrance to innovation. In East Asia, beautiful traditions to engrave letters on stones and metals or to write on bamboos and fabrics have been developed. Bamboos and fabrics was changed into paper, which led to creating a new genre of art, calligraphy. Transcription for copying texts satisfied the demand for books. But another stimulus was required once again to go beyond this tradition of transcription and step forward to printing. This stimulus was offered by Buddhism, especially unique philosophical system of Mahayana Buddhism. Mahayana Buddhism puts emphasis on faith. In a certain way, it can be seen that Buddhism has changed from asceticism to religion through Mahayana Buddhism. From the viewpoint of the current concept, it can be said that Buddhism sublimated into religion is Mahayana Buddhism. It emphasizes to believe the words of Buddha written in Buddhist scriptures. So, it said to widely

spread Buddha's words through reciting and carrying the scriptures.

In Confucianism, as character was sacred one created and handed over by saints, it belonged to a privileged class and was able to be interpreted only by them. Such sanctity and symbolism of character would have been an obstacle to mass copying of texts even though the society expanded as the population has grown, and accordingly the social demands for books has also increased. In this situation, it was the philosophical system of Mahayana Buddhism to get rid of the obstacle. In Mahayana Buddhism, the sanctity of character already disappeared because in East Asia, Mahayana Buddhist scriptures were introduced with being already translated into various languages. Mahayana Buddhism emphasized to spread the words of Buddha. Then how to widely spread the words of Buddha? The transcription one by one has the limit for it. In China, there was an established tradition of engraving characters on stone, metal and wood. So, it didn't take much time to replicate the Buddhist scriptures using this technology. The following development process is never away from what we already knew.

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