

The Marine Transportation for Taxation, Ceramic Industry and Circulation in the Goryeo Dynasty

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I. Introduction

It is a common phenomenon that the distribution of pottery takes place by means of waterways, including both rivers and the sea. A large quantity of ceramics has been salvaged along the sea routes of many areas of Korea, and fourteen salvage excavations, including the Sinan shipwreck and several underwater investigations, have been made.

In recent years, tens of thousands of fragments of Goryeo ceramics have been salvaged along the southwest coast of Korea. They provide a new source for Korean ceramic history, while the associated metal and wooden packing slips give information about the various types of ceramics as well as the shipboard life and the distribution of ceramics.¹According to the Cultural Heritage Administration of Korea, Goryeo dynasty antiquities constitute at most fifty percent of the total number of reported artifacts recovered from underwater sites; among them, the quantity of celadon ceramics indicates the flourishing of coastal marine transportation during the Goryeo dynasty.

Approximately half of the known Goryeo pottery kilns, totaling 260 sites, are located in Jeolla-do and Chungcheong-do provinces, and this phenomenon is closely related to the geographical advantage of the locations of the urban centers of Gaegyeong (Gaeseong) and Namgyeong (Seoul). These centers could easily meet intense demands for handicraft products by means of waterways.²

It is assumed that the overall demand for porcelains in the Joseon dynasty was greater than demand for ceramics during the Goryeo dynasty, but the use of land transport had already increased by the late Goryeo dynasty.³ During the Joseon dynasty, the centers of pottery kilns increased in number, and the establishment of royal kilns for the production of court porcelains in Gwangju-gun, Gyeonggi-do province, near Namgyeong (Seoul), in particular, probably affected the decreased reliance upon marine transportation for the ceramics industry, as compared to the Goryeo dynasty.⁴

Distribution along sea routes was critical for ceramic products during the Goryeo dynasty. Locations for pottery kilns were chosen for their access to shipping, for the sake of convenience and sufficiency of distribution. Early celadon ceramic production, beginning in the tenth century, was concentrated in Taeseong in Pyeongan-do province; Baecheon in Hwanghae-do province, and Siheung, Yongin, and Yangju in Gyeonggi-do province around Gaegyeong, but the production areas for ceramics gradually expanded to the western and southern coasts.⁵ This relocation is believed to be the result of the organized distribution system in the Goryeo dynasty, which supported the movement of the kilns and the establishment of new ceramic kilns for the sake of procurement of raw materials and proximity to consumers.

Based on salvaged and excavated Goryeo ceramic finds, this paper will consider the relationship between the marine transportation of ceramics and the Goryeo ceramic kilns, focusing particularly on the relationship with the marine transportation route for taxation. It will also evaluate the use of ceramics through analysis of finds from consumer sites. Through these examinations, this paper will suggest that the regional focus and movement of ceramic

kiln sites shows the changes in celadon production, which are related to the system of marine transportation routes for taxation.

II. Shipwreck areas along marine transportation route for taxation and ceramic transport in relation to kiln sites

1. Acquisition of celadon and repository in the Goryeo dynasty

During the Goryeo dynasty the central governments imposed tribute, a tax in kind, on the local governments including provinces, counties, and prefectures. According to the *History of the Goryeo Dynasty* (*Goryeosa*, 高麗史), the record of the fourth year of King Jeongjong (949) states that “when King Gwangjong ruled the country, he commanded his officials named Wonbo, Sikhoe, Wonyun, and Shingang to establish the quantity of yearly tribute.” It shows that a system of annual tribute was established during King Gwangjong’s reign (949–975).⁶ In order to overcome the contradictions of the Silla dynasty and to establish the central government by unifying the powerful local clans of the late Silla dynasty, the Goryeo dynasty modified the receivable system in the process of local institutions.

The full-scale maintenance started after the unification of the post-three kingdoms in 936. It is understood that in 940, the first Goryeo dynasty king (Taejo 太祖) began to understand the distribution and tax in which the counties and prefectures reorganized the name and designation in order to collect tribute.⁷ According to the record, King Taejo declared,

I exerted myself and repaired a fortress in order to protect my people from the rebellion of thieves. Because of that, all men had to enter the military and women were taken to do forced labor, but most of them escaped to the mountains or appealed to officials about their toils.⁸

It suggested that he could not completely establish the tribute system. King Guangjong (r. 949–975) reinforced and modified the tribute system,⁹ however, and finally King Seongjong (r. 981–997) completed it.¹⁰

While the Goryeo dynasty reorganized the local government system, it had already organized the warehouses (*jochang* 漕倉), along the river or coastal routes from the early Goryeo dynasty. The *jochang* provided storage for goods collected through taxation. Among the twelve designated warehouses was the Deokheungchang in Chungju.¹¹ Through the rule of King Hyeonjong (1009-1031) and that of King Munjong (1046-1083), one more warehouse, Anranchang, was added in Jangyeon, Hwanghae province, and thus finally thirteen warehouses were established in the Goryeo dynasty.¹² The thirteen warehouses were Deokheungchang in Chungju, Chungbuk-do province; Hongwonjang in Wonju, Kangwon-do province; Hayangchang in Asan, Chungnam-do province; Youngpungchang in Seosan, Chungnam-do province; Anheungchang in Buan, Jeollabuk-do province; Jeonseongchang in Gunsan, Jeollabuk-do province; Haereungchang in Naju, Jeollanam-do province; Buyongchang in Yeongguang, Jeollanam-do province; Jangheungchang in Yeongam, Jeollanam-do province; Haeryongchang in Suncheon, Jeollanam-do province; Tongyangchang in Sacheon, Gyeongnam-do province; Seokduchang in Changwon, Gyeongnam-do province; and Anranchang in Jangyeon, Hwanghae-do province. (fig.1)

A local official, called *pangwan* (判官), controlled these warehouses, but he was dispatched from the central government.¹³ Although the warehouses were territorial units of the village, administrative functions were not subjugated to local governments but controlled by the central government.

During the Goryeo dynasty, taxes were paid by two methods, one a tax in kind and the other a tributary payment. A tributary payment was carried by the requisition from local people. In addition, there were two kinds of tribute system; one only carried tribute and the other produced and carried tribute. Because Goryeo society had not fully developed a monetary economy system, its society frequently received rice or grain, cotton and hemp instead of cash, which caused a heavy weight and quantity of taxation. Thus, the Goryeo government preferred to collect taxation by using waterways instead of using land routes.

The marine vessels for taxation kept their grains and clothes in their local warehouses and after loading, they used the waterways to go to the Goryeo capital, Gaegyeong, which had its own central warehouse called *gyeongchang* (京倉). The central government greatly depended on this taxation system to manage its society, and because of that the marine transportation route for taxation was highly valued as one of the important systems in Goryeo dynasty.

First the taxation collected from local areas was transported to the local warehouses. It was supposed to be shipped to the capital, Gaegyeong, by the fourth or fifth month of the following year.¹⁴ In other words, the taxation that was collected in local areas was kept in the local warehouses located nearby rivers or coast areas; later, it was transported through waterways during a designated period. The seasons of rain and hurricanes lasted from the sixth to the eighth lunar month, and much damage could be wrought. Thus, in order to safely deliver the taxes, the vessels had to depart during the lunar third month, in which case they could arrive safely in the capital, Gaegyeong, by the lunar fifth month.

Using the sea route to carry goods received for taxation potentially could cause accidents and shipwrecks during a storm, and Goryeo people were well prepared to limit damages from natural disasters. According to *the History of Goryeo Dynasty (Goryeosa)*, if a cargo vessel departed within the designated date, but the ship sank with losses of lives and goods, tax would not be levied. If, however, the ship sank after departing late, then officials and workers had to pay tax.¹⁵

Along with transportation routes for taxation, the warehouses for storing goods collected as taxation were located in coastal areas or inland areas. Among them, Deokheungchang in Chungju and Heungwonchang in Wonju were representative. Chungju in particular was the pivotal point of the central region in the Goryeo dynasty, because the daughter of Yu Geungdal, who became a third wife of the first Goryeo king, Taejo, came from Chungju, and also the Namhan river penetrated through Gyeongsang-do and Chungcheong-do provinces. Hence, harvested and produced goods for taxation could be transported through this river and the area flourished.

Wonju belonged to Chungbuk-do province at the time when King Seongjong restructured administrative districts of the Goryeo dynasty in 995. But in 1018 (King Hyunjong's ninth year), Wonju had become a larger district that included Yeongwol, Pyeongchang, Dansan, Youngchun, Jucheon, and Hwangryeo, and during King Chungryeol's rule in 1308, Wonju was promoted to be an administrative center. Moreover, because the city was located at the confluence of the Seom and the Namhan rivers, the water system in Wonju was well developed and led to increased production of rice in the nearby Cheolwon plains and Munmak plains.

There is a record of the number of taxation ships assigned to each of the twelve warehouses during King Jeongjong's time, before the thirteen-warehouse system was completed. The record states that Seokdu, Tongyang, Hayang, Youngpung, Jinseong, Buyoung, Haeryong, Haereung, and Anheung had six huge ships called *chomaseon* in each city, and Deokheung and Heungwon had about twenty small ships called *pyeongjeoseon*.¹⁶

The ship called *chomaseon* (哨馬船) is known to have a sharp, narrow bottom, suitable for sailing along the coast, while the vessel called *pyeongjeoseon* (平底船) has a flat bottom, making it suitable for sailing inland waterways.¹⁷

These two kinds of vessels have different capacities. The *pyeongjeoseon* used in the inland waterways could load about 40,000 kg of rice, while the *chomaseon* could load up to 200,000 kg. When all the assigned ships were in operation, the total of six *chomaseon* could transport up to 1,200,000 kg and the total of six *pyeongjeoseon* in Deokheung and Heungwon could carry up to 16,400 kg. Thus the ten coastal warehouses could receive up to 1,200,000 kg of rice and the two inland warehouses could accommodate up to 16,400 kg. Perhaps the ratio of the loadings shifted from the middle to the late Goryeo dynasty, but the quantity was most prolific in the middle Goryeo dynasty, which show that the sea route transportation flourished more than the inland transportation.

2. The areas where ceramic-carrying vessels sank and the routes of marine transportation

This paper will now consider more specifically the areas where vessels transporting ceramics are known to have sunk, the geographic characteristics of those areas, and the neighboring ceramic kilns in the Goryeo dynasty.

The items for tribute were various. These items could be minerals including gold, platinum, copper, silver and hides from cattle, horses, leopards, and bears. They could also include nuts, seafood, handicrafts including papers, tiles, ink, ceramics and pottery, and textiles.¹⁸ Some handicraft production places (*so*, 所) were special administrative districts where peasants lived together to collect minerals or to produce handicrafts, and generally they were in charge of providing and producing goods for taxation. They followed two ways of productions, one by producing the finished products such as ceramics, including celadon, and another by delivering raw materials to Gaegyeong to be made into finished products later.¹⁹ Thus, the marine transportation route could have been an important path for the transportation and distribution of heavy and fragile ceramics.

Most of the sunken vessels investigated to this point were on the marine transportation route for taxation used in the Goryeo dynasty.²⁰ Let us consider a few possibilities here. First, Goryeo people could use the tribute ship for delivering ceramics, because ceramics were goods for taxation. Second, it is possible that they could use the existing marine transportation route to deliver Goryeo celadon not for taxation but as goods for private commerce. Third, they could transport both tribute and private sales, including ceramics, by taking advantage of the marine transportation route. Of course, the general practice during the Goryeo dynasty of paying tax in kind as a form of tribute supports the first supposition, but the actual circumstances of the Goryeo ceramic handicraft industry still are not clear. Hence, the second and third scenarios are also possible.

We need to reconsider fundamental questions about the production system of Goryeo celadon, and we have to observe the characteristics of celadon kiln sites in Gangjin and Buan in order to understand these cases clearly. Generally, in terms of the governmental handicraft, if they did not have artisans to manage raw materials in Gaegyeong, the local artisans had to

produce the finished handcrafts, but if they had enough artisans to control raw materials, these supplies could be delivered to Gaegyeong to produce finished products. For example, hemp cloth or ramie cloth could be prepared and woven in the place of origin, but silk was delivered to Gaegyeong as thread rather than as a finished product, because special artisans worked as dyers and weavers in Gaegyeong.²¹ However, the names and organizations of artisans for ceramics do not appear in the governmental administrative system, and this absence might indicate different characteristics of the governmental handicraft system in Korea as compared to China.

Concerning the transportation of tax vessels, a record in *the History of the Goryeo dynasty (Goryeosa)* states that, in the first month in 1079, King Munjong commanded public and private marine tax transportations to eradicate corruption among oarsmen, because many oarsmen divided pilfered grain among themselves. King Munjong legislated to have the grain repossessed.²² Probably there were many cases of embezzlement of public goods during the Goryeo dynasty.

Recently wooden documents (*mokgan*, 木簡) were discovered in the salvaged ship in Dae Island, Jeongjuk-ri, Taean county, Chungcheongnam-do province. The partial decoding of these checks for baggage distribution has revealed information about the celadon production and distribution system. The wooden documents from Jeongjuk-ri total about thirty-four pieces so far, and they are divided into several types based on their formats and contents.

All wooden documents contained information about the sender of the pottery, but there were marked differences in their configurations. One indicates the shipper (the person's name and local origin), receiver (name and official rank), and shipment quantities, and another indicates only the exact name of the receiver. It is notable that the wooden tablets explained that a specific person would receive the goods. At the same time, they addressed the receivers' names and official titles instead of mentioning direct receivers, which seems to suggest that intermediary receivers might have existed. Future research will provide more

information about the transport purpose and the distribution through marine transportation routes (fig.2).²³

It can be said, however, that these current studies seem to reference the increase in goods for taxation after the middle Goryeo dynasty. In other words, the increase in the amount of tribute during the twelfth century led to escalation of production in the private sector for supplying goods for taxation. In the thirteenth century, contractors appeared who paid the tax for people in advance with their goods. After they gathered tribute from the provinces, they paid tax in advance up to five years; thereafter they extorted a large amount of money from people. This shows that some taxpayers could collect and reserve their goods in order to pay tax.²⁴ That celadon might have been used in such circumstances as goods for taxation is suggested by specific information in the wooden documents in Jeongjuk-ri about local names such as Gangjin and various names and official ranks of receivers, which demonstrate that the supply of celadon might be related to tax payment.

Now let us consider the geographic relationships between the locations of salvaged ceramics vessels and the warehouses for storage of goods collected from taxation (*jochang*). The locales of sunken ships that contained Goryeo celadon were not far from the sites of the eleven warehouses in the west coast of Korea (fig.3).²⁵ According to reported research about ruins of the thirteen warehouses, all except those of Wonju and Chungju were located on the west and south coasts of Korea. Those areas developed as the tax transportation routes, and it is clear that ceramic transportation also happened through these routes. However, it is difficult to identify the origins of artifacts or their departures from certain warehouses on the basis only of the ceramics from some salvaged ships. It is necessary to review carefully the detailed characteristics of the ceramic deposits (data 1).

A Chinese official of the Northern Song court, called Xu Jing (徐兢), documented his visit to the Goryeo dynasty in 1123 in his book, *Illustrated Accounts of Goryeo* (宣和奉使高麗圖經). The route he followed on his visit was almost identical to that of the marine tax transportation

route used during the Goryeo dynasty (fig.4).²⁶ Because the Khitan people occupied the northern route, the Northern Song people had to use the long southern route for this visit instead of the shorter and more direct northern route. The Chinese envoys began their journey from Henan province on the fourteenth day of the third lunar month in 1123, passed through Zhejiang, and arrived in Hyeopgyesan, now called Soheuksan island, on the second day of the sixth month. Then they continued by way of Bigeum island, Goseom island, Gogunsan island, Anmyeon island, Daebu island, Youngjong island, Seokmo island, and Yeseong harbor. They departed from Soheuksan island on the second day of the sixth month and arrived in Yeseong harbor on the twelfth day, taking eleven days and staying one or two days in each harbor, where they were greeted by local officials.²⁷ Although the Chinese imperial envoy ship performed well, Goryeo ships might have been more suitable for the coastal navigation. The Chinese imperial ship seemed to require more time in the Korean sea route. Thus, it is assumed that the Goryeo marine transportation ship took less time from the warehouse in the south area to the capital, Gaegyeong. It is also possible that the ship traveled by way of another warehouse before reaching the capital, and its time of arrival seemed to be more flexible.

The marine transportation route was the most appropriate route for moving a large amount of material at one time. In addition, Goryeo celadon was much heavier and more fragile than other items. For these reasons, most celadon probably was transported using the marine route for taxation. Hence, the waterfront development of the ceramic industry would have been inevitable.²⁸ Although there are no documents about how Goryeo people shipped celadon, the evidence discussed previously shows that other goods for taxation were collected in the production areas and transported to the warehouse, from which the goods were loaded during a certain period and delivered to Gaegyeong. In other words, the location of warehouses would have been a constant relationship with the surrounding areas of the Goryeo ceramic industry. In the early Goryeo dynasty, the locations of the kilns of celadon and white porcelain in Gaegyeong as the central celadon industry gradually expanded to the southwest coastal areas.

This phenomenon would be closely correlated with the tribute system, national control, and the issues within the production and transportation of the celadon industry.

It was difficult to examine this issue carefully, however, and this paper would like to encourage other researchers to pursue the topic further. During the early Goryeo period, the celadon kilns that were distributed in the areas of Gyeonggi-do, Huanghae-do, and Pyeongan-do provinces were built with bricks, but after the middle Goryeo period, the brick-made kilns were replaced by clay-built earthen kilns, distribution of which spread to the southwest waterfront areas. Thus, there are two kinds of views about the chronology of Goryeo kiln sites: one holds that the brick-made kiln sites in the central region of the Goryeo dynasty opened earlier than the clay-built kilns in the southwest.²⁹ Another is that the two different kinds of kilns reached the southern region simultaneously and developed there.³⁰ Consideration of the process of the tribute system and the marine transportation route for taxation, which shows the implementation of procedures for governing the provinces, would be able to reveal a clearer understanding of the validity of these different opinions.

III. Goryeo ceramics salvaged from the sea³¹

1. Jeungdo in Sinan (fig.5)

The remains were excavated and salvaged offshore of Bangchuk-ri, Jeungdo-myeon, Sinan-gun, Jeollanam-do, in August 1975 by a fisherman who accidentally caught six remains including a celadon vase in his net. Primary research began on 16 October 1976, and a total of eleven excavations and investigations of the so-called "Sinan shipwreck" were conducted over nine years. The excavated remains consisted mainly of 22,000 pieces of ceramics and other artifacts, coins weighing about 28 tons, 1,017 pieces of valuable timber, and 445 fragments of the ship's hull. Among the ceramics, the majority of the products came from a specific kiln, and some kinds of porcelain were also included. A total of 729 metal products were excavated, including ritual utensils, candlesticks, bronze mirrors, and cooking vessels. In addition, stone

products such as inkstones, grindstones, and millstones and wood products including crates for pottery and lacquer vessels containing 364 small product tickets were excavated.

Moreover, a buried wooden ship 20 meters in length and 6.9 meters in width was excavated. In the interior of the hull, ceramics were stored neatly in wooden boxes that measured about 70 x 70 x 50 cm and were secured with ten or twenty cords, which suggested that the products on the ship were trade goods. The sunken vessel was a Chinese ship, and the date of the wreck is estimated from 1331 to 1350, based on the forms of pottery, marks on the coinage, and the records of lacquer wares. These remains are now in the National Museum of Korea and Gwangju National Museum.

2. Eodu-ri Wando (fig.6)

Goryeo celadons totaling 30,645 pieces were salvaged together with the wooden ship from the seabed off Eodu-ri, Wangdo-gun, Jeollanam-do province, from 1983 to 1984. Among them, the vast majority of ceramics were undecorated celadon except for fifteen celadon bottles, some pieces of celadon decorated with metal, and some bottles with long necks carved with lotus patterns.

The celadon bowls in particular used clay that had been more thoroughly processed compared to other types of celadon. Although some bowls bear dark brown or greenish brown glaze, most bowls are of higher quality than average.

3. Bian Island in Gunsan (fig.7)³²

Several hundred pieces of Goryeo kingfisher-colored celadon (*bisaek cheongja*, 翡色靑瓷) were salvaged from the sea bottom near Bian island, Okdo-myeon, Gunsan-si, Jeollabuk-do province. Fishermen reported that they accidentally found celadon vessels while fishing. The underwater research team of the Cultural Heritage Administration of Korea, Makpo Marine

Relics Exhibition, conducted urgent excavations. Because the pieces of celadon had remained in the sea over many years, they were covered by sedimentary layers, but they were revealed by the faster flowing erosion of the ocean floor because of the construction of the Saemanguem sea wall. It is assumed that the celadon vessels were produced in the kiln site of Yucheon-ri in Buan based on form, firing, decoration and quality, and that they had been intended to be livered through Julpo harbor to Gaegyeong as goods for use in governmental offices.

4. Sipyidongpa Island in Gunsan (fig.8)

The underwater survey conducted near Sipyidongpa island, Okdo-myeon, Gunsan city, Jeollabuk-do province (35° 59' 491" N, 126° 13' 843" E) salvaged 14 hull fragments, 8100 pieces of pottery, a stone crossbar from an anchor, an anchor cable, cast iron pots, and bronze spoons. Straws, reeds, and poles for transportation and loads of ceramics were excavated as well, and they suggest the methods and materials for loading ceramic. The bow of the Sipyidongpa island ship was facing east to west and was buried at a tilt of 15 degrees to the left. With regard to the structure of the ship, flat boards were spread in the bottom, and the underside of the ship was of a flat form, called *mangokjongtongjae* (彎曲宗通材), which designates the use of timber to connect the floors and shell in wooden ship structure. Most of the remains were celadon vessels; bowls and dishes were most common. The finds also included everyday vessels such as bottles and pots.

5. Wonsan island in Boryeong (fig.9)

One thousand pieces of celadon of the middle Goryeo dynasty were collected about three hundred meters off the northcoast of Wonsando-ri, Ohchon-myeon, Boryeong-gun, Chungchngnam-do province. They were good quality ceramics, including incised celadon

(*eumgak cheongja*, 陰刻青瓷) and inlaid celadon (*sanggam cheongja*, 象嵌青瓷). These ceramics were excavated as a large amount of debris not as intact products, but they show the thirteenth century's finest quality celadon. In addition, some bowls have a small incised circle inside the footring, demonstrating that the bowls were produced in the Gangjin area. These bowls were decorated in incised, inlaid, and relief patterns, and most pieces showed scars of having been positioned for firing on silica stone spurs, a practice reserved for high quality pieces.

6. Yami island in Gunsan (fig.10)

The survey was conducted from 2005 to 2006 offshore from Yamido-ri, Okdo-myeon, Gunsan-si, Jeollabuk-do province. As a result of the emergency survey and excavation, 780 ceramics were salvaged; they were scattered or buried at a depth of seven meters, and more than forty pieces of celadon bowls were neatly stacked. The excavated celadon bowls were of low open forms and had very thin walls, making them light in weight, and their coarse, dark brown clay bodies were covered by glaze, although the glaze on some ceramics had delaminated because the glaze was poorly melted, and they were oxidized, which suggests that these ceramics were produced in the kilns of the southwest and made for local demand, not for the Gaegyeong (Gaeseong) or Namgyeong (Seoul) market. Moreover, various goods such as hard pottery and earthenware steamers were salvaged.

7. Dae island in Taeon (fig.11)

A large quantity of Goryeo celadon vessels was found during underwater excavations from 2007 to 2008 offshore from Jeongjuk-ri, Geunheung-myeon, Taeon-gun, Chungcheongnam-do province. The excavation area was notorious for its fast tides, which had

caused the wreck of many vessels and led to attempted excavations of canals.³³ In this area, a total of 23,462 pieces of celadon was salvaged.

Based on the excavated evidence, the loading method was the same as that of the wreck off Sipiyidonpa island, which was to pack the ceramics with straw as a cushioning material, wooden wedges as supports, and cords to secure the bundles. In addition, one artifact, a melon-shaped ewer, was buffered by a stack of straw, demonstrating that different ceramics were packed in different ways for safe delivery. Although the celadon vessels have various forms, patterns, and glaze colors, and also show some differences in the firing process, the foot forms and the kiln tools seem to indicate that the ceramics were produced in the same period. The condition of the glaze is very good and is of high quality, and the forms of the ceramics are varied and include melon-shaped ewers, pots, bowls, dishes, jars, bowl stands, and incense burners.

Designs are also varied and include parrot motifs, peony and vinescroll motifs, underglaze-iron painted patterns, petal patterns, lotus patterns, and fish motifs, but no inlaid celadon was found. Most vessels were fired on soft sand supports. Their shapes are close to the second type of the 10-II level in Yongyun-ri, Gangjin, which suggests that these ceramics would seem to have been produced from the late twelfth century throughout the thirteenth century. It is assumed that they had been produced in Gangjin and were en route to Gaegyeong for use by the royal family members and aristocrats.

8. Ma island in Taeon (fig.12)

The most recent survey, made in May and July 2008 as an emergency investigation and underwater exploration, resulted in recovery of 515 ceramics. Ma island in Geunheung-myeon, Taeon-gun, Chungcheongnam-do province is situated about three hundred meters from the west coast and is geographically adjacent to Dae island in Jeongjuk-ri. The island lies along the main water passage from Gyeongsan-do and Jeolla-do to Gaegyeong, but the strong tidal

current caused frequent marine accidents. The collected artifacts were various ceramics such as bowls, dishes, and cups, and even though they were of the same shapes, their decoration and firing methods were slightly different and showed variation in quality. When the remains were viewed with regard to their firing techniques and design motifs, they were determined to have been made in Buan or Gangjin from the late twelfth century to the early thirteenth century. The remains had been exposed on the mud flat because of the change of the near underwater topography, and three groups of ceramics were excavated in the four sites near Ma island.

9. Doripo, Muan (fig.13)

Three excavations took place in the offshore area of Doripo, Songseok-ri, Haejae-myeon, Muan county, Jeollanam-do province, and salvaged 638 pieces of Goryeo celadon. Inlaid celadon was the most typical form and showed late fourteenth century styles. The production site of the ceramics is estimated near a village named Mishan, the location of Sadang-ri kiln number 10, Daegu-myeon, Gangjin. Various patterns were represented, including cloud, phoenix, chrysanthemum, peony, lotus, and willow. These ceramics provide important data about characteristics of ceramics of the late Goryeo dynasty, and they have become valuable evidence for research about the transitional change of ceramic patterns. In other words, these remains show the circumstances of the stylistic changes in ceramics from the Goryeo dynasty to the Joseon dynasty, and especially they suggest how the Goryeo celadon transitioned to Joseon Buncheong ware (*buncheong sagi*, 粉青沙器).

IV. Production areas of ceramic shipments and the organization of the goods

1. The production areas of salvaged ceramics and their characteristics

As we have considered in the previous section, if the tribute of ceramics was under the standard acquisition system during the middle Goryeo dynasty—meaning that it was managed under the control of the country and used the same marine transportation route as that used for taxation—then the forms and fabrication techniques of Goryeo ceramics should share common characteristics.

During the Goryeo dynasty, the kiln centers within the current administrative districts of Jeolla-do and Chungcheong-do provinces, including Gangjin, Buan, Haenam, Boryeong, and Seosan, were located along the shortest route by means of marine transportation route. In fact, this conjecture was already confirmed through the aspects of celadon production and design from the celadon kiln sites and consumer sites discussed in the previous section.³⁴

The consumers of Goryeo ceramics did not distinguish the origins of production as they used ceramics from both Gangjin and Buan. Consumers probably followed preferences related to quality and styles of celadon rather than to origins. In other words, the Goryeo handicraft production industry that was controlled under the government tribute system instead of the free trade would seem to belong to the local governmental handicraft organizations, which suggest that the production, transportation, and marketing in those areas might have been managed under the central governmental system like those of Gangjin and Buan. These lower local administrative organs are called *so* in Korean.

In addition, research indicates a relationship between the Gangjin kilns and the Buan kilns during the Goryeo dynasty as correlated private kilns³⁵ though study of the inscription on the inkstone probably dated to 1241, with inlaid peony decoration and celadon glazes, in the Leeum Samsung Museum of Art (fig.14).³⁶ Although textiles and other products of those areas were the main components of tribute, these items were partial components of the local governmental tribute and some goods such as gold, silver, and iron were produced not only in the typical lower local administrative organs but also in many other places. Whenever new production regions were added, moreover, not all those locations could belong to the local administrative organs.³⁷ Thus it might be difficult to say with certainty that the celadon kilns in

Buan operated as private kilns during the Goryeo period.³⁸ The inscription on the inkstone would seem to suggest instead that its technology and style might be adapted from those of the Gangjin kilns. This inkstone may have been produced as a gift in gratitude for a governmental office in Gangjin.³⁹

Most of the kilns that provided goods for Gaegyeong were located in Gangjin and Buan, whereas the ceramic products of Jinsan-ri, Haenam, that appear in the Wando shipwreck might have been intended for delivery to markets in the surrounding areas to meet local demands. The ceramics excavated from sites along the route of marine transportation for taxation, including Bian island, Wonsan island, Dae island in Jeongjuk-ri, Ma island in Jeongjuk-ri, and Doripo, seemed to be products of Gangjin or Buan. Although those ceramics encompass varied shapes, quality, and period, they share essentially the same styles in terms of types of productions. Therefore, it is necessary to take both Gangjin and Buan into consideration and to examine the possibility of their complementary relationship for the purpose of meeting demand, and of their coexisting for a certain amount of time under the system of the taxation and tribute. By virtue of sharing the same marine transportation route for taxation, moreover, those two locations could have maintained a much closer relationship in terms of technology and molding.

It is highly possible that celadon bowls bearing incised marks such as small circles on the base might have been used as a kind of marker for indicating the integration of the marine transportation route for taxation, the central storage for collected goods from taxation (*gyeongchang*), and the distribution. The marked celadon vessels are excavated mainly from kilns number, 8, 10, 23, 27, and 38 in Sadang-ri, Gangjin, and for the most part they are good quality ceramics with silica supports. Other kinds of ceramics are also of high quality, although their places of production are unclear. Those ceramics have been found in the sites of government-related organizations such as Gwancheng-ri in Ganghwa and Hyeemwonji in Paju and noted Buddhist temples including Bulguksa (佛國寺) and Silsangsa (實相寺).⁴⁰ Hence, it might be possible that the central storage for collecting goods for taxation collected celadon

and then distributed it for the purpose of adjusting the supply and demand for celadon. The markers signed in advance before distributing would seem to have been used for the convenience of the process of production.

Up to this point, this paper has considered the locations of salvaged shipwrecks, their association with the marine transportation route for taxation, and the kiln sites in the vicinity. Then, what might be the actual characteristics of the salvaged ceramics? Based on the goods salvaged from a given vessel, these ceramics were produced not only from kilns of the same region but from different production regions. Now, let us consider the configuration of their shipments through some information such as quantity and weight from a few examples.

2. Ceramic compositions and characteristics

Among potteries salvaged from the seabed, the ruins of some regions such as Wan island, Sipyidongpa island, Bian island, Yami island, and Doripo quantitatively expressed the situations of excavated ceramics. Although detailed decoration, foot styles, and firing supports were not confirmed, the composition and distribution of artifacts can be identified to some extent.

The remains of Sipyidongpa island in Gunsan total 8,734 pieces, including 622 published artifacts. Among them, a total of 8,118 pieces in addition to the published ones is celadon (fig.15). The quality and glaze material suggest that these artifacts were produced in the kilns of Sindeok-ri, Haenam. The forms are varied, among which small dishes are 67% (5,540 pieces), big bowls (*daejeop*, 大蝶 or *bal*, 鉢) are 23% (1,865 pieces), small bowls (*wan*, 碗) are 3.6% (297 pieces), and plates are 1.8% (151 pieces). Although the rate and the trend of the products are not clear because excavations have been continued until now, the portion of small dishes that seem to be produced during the late eleventh century to twelfth century is the highest among the shapes of excavated ceramics, which is unusual (fig.16).

At Wando 30,645 pieces of celadon were excavated. The composition of the shipwreck holdings in Wando shows the same characteristics as kilns that produced the typical celadon of the middle Goryeo dynasty such as those of kiln number 10, layer II of Yongyun-ri, Gangjin, and the seventh section in Yucheon-ri. In kiln number 10, level II, small bowls (*wan*) constituted 11.4% and were less numerous big bowls (*bal*) or dishes. In the seventh section in Yucheon-ri, the percentage of small bowls is 4.5%, which shows similar circumstances compared to Yongyun-ri. Hence, the Wando remains would seem to have been made during the period when big bowls and dishes were popular. To be precise, the area of Jinsan-ri, Haenam, is presumed to be the most similar production region.

In addition, most remains excavated from Bian island, Gunsan, are celadon. Through the sixth investigation, 3,117 pieces were collected.⁴¹ The surveyed ruins numbered 2,934 pieces in addition to the 243 reported ones. The statistical figures for aspects such as shapes, techniques, and patterns are not shown separately, but this excavation in particular provides a full list of relics and artifacts including names, techniques, and shapes. Based on these formative characteristics, the 2,934 pieces are as follows.⁴²

The various celadon shapes in Bian island included big bowls, plates, cups, lids, and small bowls (fig.17), of which the major forms are big bowls (41%, 1,207 pieces), plates (40.05%, 1,175 pieces), cups (10.5%, 308 pieces), and lids (7.4%, 217 pieces), but the proportion of small bowls is less than that of Sipyidongpa island at 0.51% (15 pieces).

Among whole ceramics in Bian island, sixty percent of celadon vessels were decorated in some manner, with incised pattern (47%, 1,378 pieces), relief pattern (13%, 390 pieces), or inlaid pattern (0.2%, 7 pieces), while celadon vessels without decoration were about 40% (fig.18). However, underglaze-iron-painted and white painted decoration did not appear in this excavation. The most popular forms were big bowls, and the most common patterns were lotus flower pattern (46%), followed by peony and vinescroll patterns. Thus, the models and pattern techniques showed a constant functional relation.⁴³

In addition, excavators in Bian island have estimated the production region through scientific analysis of components. The silica content of the clay is not identical, but relatively similar to that of Yucheon-ri and Jinseo-ri, and the glaze composition is almost similar to that of Yucheon-ri and Jinseo-ri, which suggested that these excavated ceramics from Bian island seem to belong to the groups of Yucheon-ri and Jinseo-ri.⁴⁴ For this reason, after comparing the properties of sherds from Yucheon-ri, including the proportion of various shapes, patterns, and firing supports, this excavation addressed the similarity of the kilns in the seventh section, Yucheon-ri. As a result, the close match between the production region and the products recovered from the consumption region was verified.

This paper proposed, therefore, that the salvaged goods were produced in similar kiln sites. Some reported remains in the vicinity of Munyeo-do, Gunsan, however, showed that they were produced in completely different production regions because of the low quality celadon. Most shipped celadon was of high quality in the Goryeo dynasty. Thus the additional data about the configuration of celadon in the shipload needs consideration. In other words, an ocean-going ship (*wonhang*, 远航) such as the Sinan wreck would seem to have carried ceramics collected from various regions in compliance with orders, but most ships moved along the near shore or offshore and completed their voyages within one month. Thus we need to explore the question of whether it was really necessary for those vessels to anchor at different warehouses in order to collect different ceramics. The central storage facility for goods collected from taxation (*gyeongchang*) could have had separate warehouses (*jochang*), and it could have regulated receiving and releasing the collected tributes.

V. Conclusion

This essay considered the relationship between ceramic remains excavated from the seabed, the problem of the storage for goods collected for taxation, and the marine transportation route for taxation in the context of an overview of excavated Goryeo dynasty kilns, their contents, and the locations of the wrecks.

Based on current research, roughly half of the local administrative handicraft organs in the Goryeo dynasty congregated in Jeolla-do and Chungcheong-do provinces because of their geographical advantages, through which these two areas enjoyed a well-developed marine transportation system that easily carry large numbers of handicraft goods to Gaegyeong. The reality that ceramics are heavy and fragile compared to other goods might be one of the important factors in the emphasis on the marine transportation route for taxation (*journo*, 漕運路) in the Goryeo dynasty.

The marine transportation route for taxation would be most appropriate for transporting a large amount of material at one time. Ceramics like other tribute goods seemed to be produced at local kilns, then collected in local warehouses. Finally, they might be shipped during the prescribed time and delivered to Gaegyeong and surrounding areas. It is highly possible that the locations of the storages for goods collected through taxation (*jochang*) were closely related to local celadon kiln sites. In other words, local storage might impact the establishment and the rise and fall of kiln sites in a relationship of supply and demand.

As a result, ceramics kilns developed around Gaegyeong during the early Goryeo dynasty, but then they were gradually expanded to the southwest coastal areas. This phenomenon is closely related to the establishment of the national tax system, the subsequent national controls, and the production and transportation of celadon.

In other words, kiln sites around Gaegyeong could not produce enough supplies once the government began receiving ceramics as tribute in the early Goryeo dynasty, and the number of kiln sites began to increase. In addition, after the establishment of a national governance system and the completion of the tax system from the end of the tenth century to the early eleventh century, kiln sites that were adjacent to the marine transportation route for taxation along the southwest coast could begin to be more activate. The consistently large kiln sites in Haenam, Goheung, Gangjin, Yeonggwang, Buan, and Boryeong that were situated in close association with the marine transportation routes address the correlation between kiln sites

and marine transportation routes. Moreover, in terms of the structure of ceramic kilns, the relationship between national handicraft production and distribution and the development of clay-built kilns (*tochukyo*, 土築窯) in the southwest regions needs to be reconsidered. Although the detailed production models were different, Gangjin and Buan at this time would have been managed under the same marine transportation system and would have produced ceramics simultaneously or in complementary fashion. Established earlier and larger in scope than Buan, the Ganjin area would have affected the surrounding areas both technically and formatively, and among them, the kilns of Buan such as Yucheon-ri were among the local kilns that were managed under central governmental control.

In conclusion, the ceramics salvaged along the marine transportation route, namely the ceramics excavated from a certain point in the distribution process, had departed from the production regions, yet they had not arrived at the final destination for consumers. In other words, it is impossible to identify completely the precise details of production and consumptions within the ceramic industry through the salvaged Goryeo ceramics. In order to access information encoded in the ceramics salvaged from shipwrecks, further research is required about correlations among production regions, consumption places, and the characteristics of the distribution process in the Goryeo ceramic industry. These studies will provide more information about the ceramic productions and their actual usage in the Goryeo dynasty.

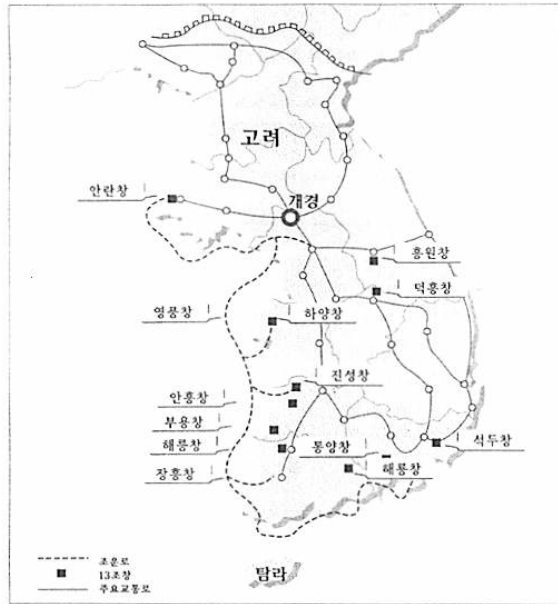


Fig.1. Thirteen storages for goods collected from taxation and the marine transportation route for taxation in the Goryeo dynasty

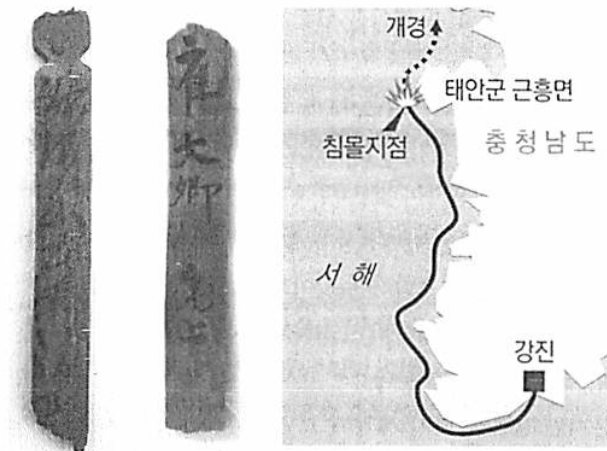


Fig.2. Salvaged wooden documents (*mokgan*) from Dae Island, Jeongjuk-ri, Taean



Fig. 3. The marine transportation route for taxation and locations of salvaged Goryeo ceramics

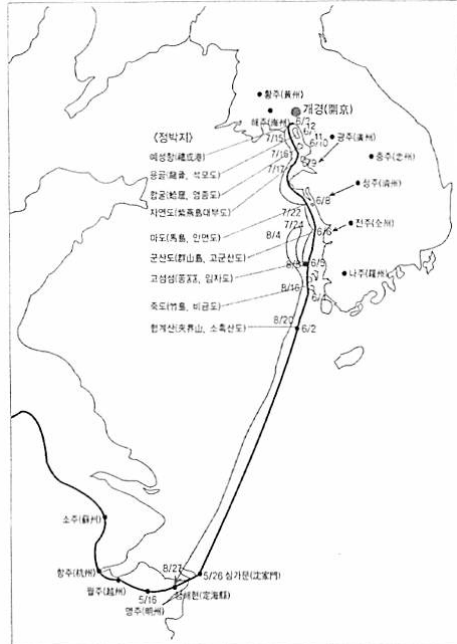


Fig. 4. Route of the Chinese ship according to the *Goryeodokyeong*



Fig. 5. The marine route and ceramics of the Sinan Ship



Fig. 6. Salvaged celadon from Eodu-ri, Wan-do island



Fig. 7. Salvaged ceramics in Bian island, Gunsan

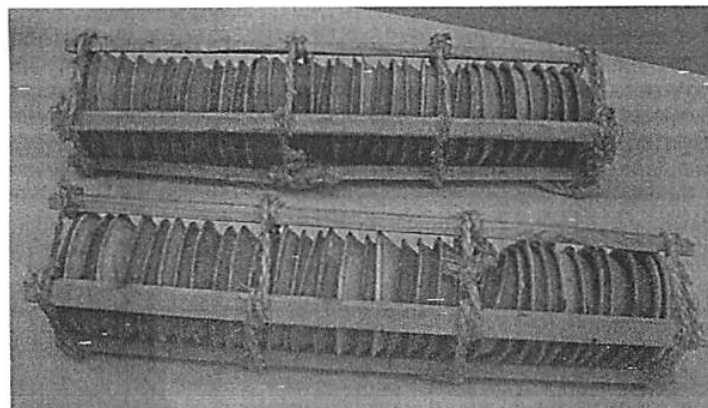


Fig. 8. Loading circumstances of salvaged ceramics in Sipyidongpa island (restored artifacts in the National Oceanic and Relics Exhibition)

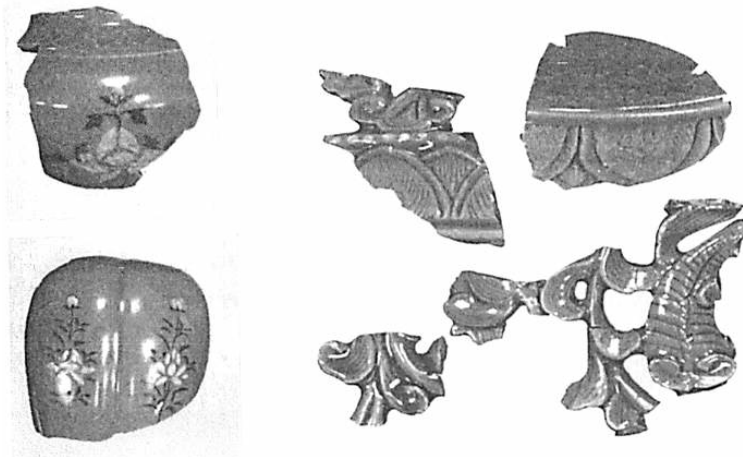


Fig. 9. Salvaged ceramics from Wonsan island, Boryeong



Fig. 10. Salvaged celadon bowls from Yami island, Gunsan



Fig. 11. Salvaged celadon from Dae island, Jeongjuk-ri, Taean

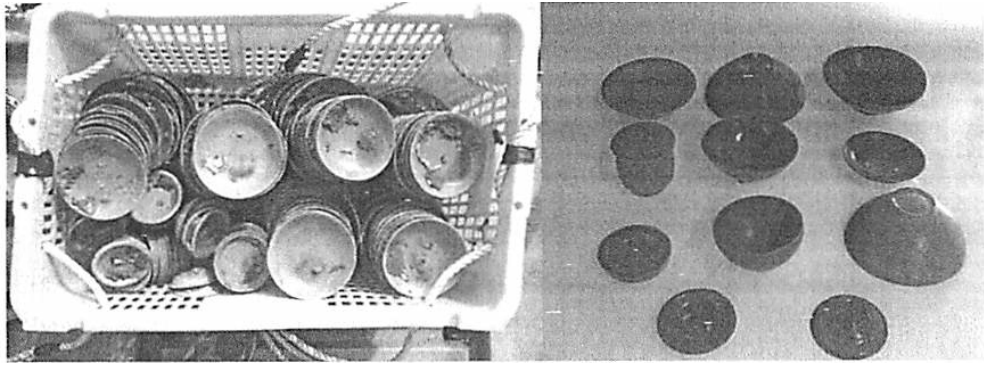


Fig. 12. Salvaged celadon from Ma island, Taean



Fig. 13. Salvaged inlaid celadon from Doripo, Muan

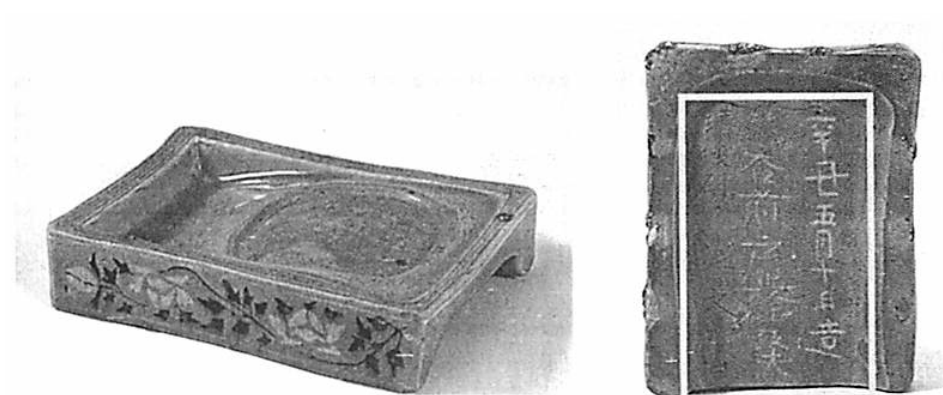


Fig. 14. Inlaid celadon inkstone with peony pattern. Height 2.9 cm, length 13.4 cm, width 10.2 cm. Leeum, Samsung Museum of Art, Seoul



Fig.15. Assemblage of salvaged celadon from Sipyidongpa Island, Gunsan

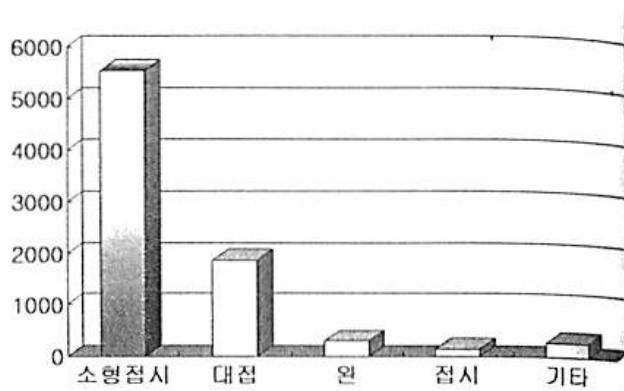


Fig. 16. Percentages of vessel shapes in salvaged celadon from Sipyidongpa island, Gunsan (left to right: small dishes, big bowls [daejeop or ba], small bowls [wan], dishes, and other)



Fig. 17. Salvaged celadon from Bian island, Gunsan

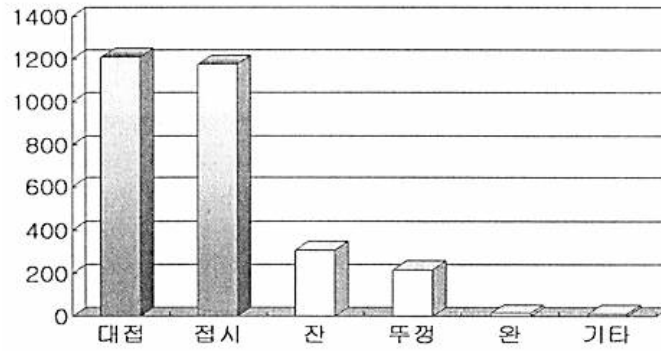


Fig. 18. Percentages of vessel shapes in salvaged celadon from Bian island (Left to right: big bowls [*daejeop* or *bal*], dishes, cups, lids, small bowls [*wan*], and other)

Area	No	Excavated Locations	Presence	Quantity
Yanggwang-do (Gyeonggi, Chungcheng)	1	The Adjacent Sea in Dangjin-gun, Chungchengnam-do		
	2	The Adjacent Sea in Dangjin-gun, Chungchengnam-do		
	3	The Adjacent Sea in Seosan-gun, Chungchengnam-do		
	4	The Adjacent Sea in Anmyeon Island, Taeangun, Chungchengnam-do		
	5	The Seabed in Taeانبando, Chungchengnam-do	o	
	6	The Adjacent Sea in Boryeong-gun, Chungchengnam-do		
	7	Wonsan Island, Boryeong-si, Chungchengnam-do	o	1,500
	8	The Adjacent Sea in Seocheon-gun, Chungchengnam-do		
	9	Dae Island, Jeongjuk-ri, Taeangun, Chungchengnam-do	o	23,462
	10	Ma Island, Taeangun, Chungchengnam-do	o	513
Jella-do	11	The Adjacent Sea in Yeondo-ri, Miseong-eup, Okgu-run, Jellabuk-do		
	12	The Adjacent Sea in Okdo-myeon, Gunsansi, Jellabuk-do (except Munyeo Island)		
	13	The Adjacent Sea in Bian Island, Okdo-myeon, Gunsansi, Jellabuk-do	o	3,117
	14	The Seabed in Sipyidongpa Island, Okdo-myeon, Gunsansi, Jellabuk-do	o	8,118
	15	The Seabed in Yami Island, Okdo-myeon, Gunsansi, Jellabuk-do	o	780
	16	The Adjacent Sea in Nakueol Island, Yeonggwang-gun, Jellanam-do		
	17	The Adjacent Sea in Doripo, Haeje-myeon, Muan-gun, Jellanam-do		
	18	The Seabed in Doripo, Haeje-myeon, Muan-gun, Jellanam-do	o	638
	19	The Adjacent Sea in Dali Island, Chungmudong, Mokpo-si, Jellanam-do	o	
	20	The Adjacent Sea in Amtae Island, Sinangun, Jellanam-do		
	21	The Adjacent Sea in Hwawonbando, Sanyimyeon, Haenam-gun, Jellanam-do		
	22	The Adjacent Sea in Yaksan Island, Gogun-myeon, Wando-gun, Jellanam-do		
	23	The Seabed in Eodu-ri, Gogun-myeon, Wando-gun, Jellanam-do	o	30,645

Data 1. Locations of excavations of Goryeo ceramics from underwater sites and their quantities

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⁸ Goryeosa (The History of the Goryeo Dynasty), vol. 2.

⁹ In 949, a local tribute system was established and investigations of farms and population were carried out.

¹⁰ Lee Jeongheui, *Goryeo sidae sejeeui yeongu* (Studies of Tax System during the Goryeo Dynasty) pp. 38–39. In 983, local administrative organization system and population investigation began.

¹¹ *Goryeosa* (The History of the Goryeo Dynasty), vol. 79.

¹² *Ibid.*, vol. 82.

¹³ *Ibid.*, vol. 79.

¹⁴ *Ibid.*, vol.79.

¹⁵ *Ibid.*, vol.79.

¹⁶ *Ibid.*, vol.79.

¹⁷ In fact the salvaged ship offshore from Haenam, Jeollanam-do province, shows the lower flat floor; because of that, the evaluation about the structure and capacity of the vessel will be discussed later.

¹⁸ *Goryeosa* (The History of the Goryeo Dynasty), vol. 78.

¹⁹ The raw materials such as silver and gold were delivered to Gaegyeong and then refined.

²⁰ *Gukrip haeyang yumul jeonsigwan, Dojagil badakgil* (The Korean Celadon Route and Sea Route), p. 48.

²¹ Lee, Jeongheui. *Goryeo sidae sejeeui yeongu* (Studies of Tax System during the Goryeo Dynasty), pp. 78–79.

²² *Goryeosa* (The History of the Goryeo Dynasty), vol. 79.

²³ Im Kyeongheui, “Taeon Cheongjaunbanseon chulto goryeo mokgan (The Excavated Goryeo Wooden Tablets from Celadon Carriers in Taeon Area)”: 177–183; Im Kyeongheui and Choi Yeonsik, “Taeon cheongjaunbanseon chulto goryeo mokganeui hyeonhwanggwa naeyong (The Status and Contents of the Excavated Goryeo Wooden Tablets from Celadon Carriers in Taeon Area)”: 23–35.

²⁴ Lee Jeongheui, *Goryeo sidae sejeeui yeongu* (Studies of Tax System during the Goryeo Dynasty), pp. 205–206.

²⁵ Han Jeonghun, “Goryeosidae 13 jochanggwa jubyeon gyotongro yeongu (Studies of Thirteen Storages for the Collected Goods from Taxation and Their Surrounding Transportation System in the Goryeo Dynasty)”153–190.

²⁶ Jo Dongwon, Kim Daesik, Lee Kyungrok, Lee Sangguk, and Hong Gipyo. *Jungguk songnara sasineui nune bichin goryeopungkyeong-goryeodokyeong* (Goryeo Scenery Through the Eyes of the Song Dynasty's Official, Seo Geong).

²⁷ *Ibid.*, pp. 401–463.

²⁸ The term *imhaedoja sugongeopdanji* (waterfront development of the ceramics industry) is coined by the author.

²⁹ Lee Jongmin, “Hanguk chogichengjaeui hyeongseonggwa jeonpa (The Formation and Propagation of the Early Korean Celadon Based on Brick-made Kilns and Earthen Kilns)”: 51–75; Jang Namwon, *Goryeojunggi chengja yeongu* (Studies of Celadon in the Middle Goryeo Period), pp. 107–138.

³⁰ Lee Heuigwan, “Goryeochengjayeoksasangeui Gangjinyowabuanyo (Celadon of Gangjin Kilns and Buan Kilns in the Goryeo Dynasty),” pp. 61–80.

³¹ These excavation results are based on the reports and documents from Cultural Heritage Administration. *Munhwajae gwanriguk, Wando haejeoyumul* (Undersea Relics in Wan Island); *Gukrip haeyang yumul jeonsigwan, Badaro boneun wuriyeoksa* (The Korean History Through Undersea Relics); *Gukrip haeyang yumul jeonsigwan, Muan doripo haejeo yujeok* (Undersea Ruins in Doripo, Muan); Kim Yeongwon, *Hanghaeya pyoryueui yeoksa* (The History of Sailing and Drifting in Korea); *Gukrip haeyang yumul jeonsigwan, Dojakil badakil* (The Korean Celadon Route and Sea Route); *Gukrip haeyang yumul jeonsigwan Jeollabukdo, Gunsan biando haejeoyumul* (Undersea Relics in Bian Island, Gunsan); *Ilbon gukrip yeoksa minsok bakmulgwan, Dongasia jungse haedo* (The Sea Route in East Asia); *Gukrip haeyang yumul jeonsigwan, Gunsan sipyidongpado haejeo yujeok* (Undersea Ruins in Sipyidongpa Island, Gunsan); *Gukrip haeyang yumul jeonsigwan, Boryeong wonsando sujung balgul bogu* (Underwater Excavation Report in Wansan Island, Boryeong); *Gukrip haeyang yumul jeonsigwan, Gunsan yamido sujung balgul bogoseo* (Underwater Excavation Report in Yami Island, Gunsan); *Gukrip haeyang yumul jeonsigwan, Goryeo chengja bomulseon* (Goryeo Celadon Treasure Ship).

³² *Gukrip haeyang yumul jeonsigwan, Jeollabukdo, Gunsan biando haejeoyumul* (Undersea Relics in Bian Island, Gunsan).

³³ *Goryeosa* (The History of the Goryeo Dynasty), vol. 16.

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- ³⁴ Jang Namwon, "Gangjinyuhyeonggeui gongyu hyeonsangeul tonghae bon 11-12 segi chengjaeui senggyeok (The Characteristics of Goryeo Celadon Through the Sharing Style of Gangjin Area's Celadon)": 77–100.
- ³⁵ Lee Heuigwan, "Goryeochengjayeoksasangeui Gangjinyowabuanyo (Celadon of Gangjin Kilns and Buan Kilns in the Goryeo Dynasty)," pp. 61–80.
- ³⁶ There are three lines and twenty-four characters inside the foot of the inkstone, which contained information about date, purpose, and receiver.
- ³⁷ Seo Seongho, *Goryeojeongi sugongeop yeongu* (The Handcrafts Industry of the Middle Goryeo Period); Park Jongjin, *Goryeosigi jaejeongnyeonggwa josejedo* (Financial Management and Tax System in the Goryeo Dynasty).
- ³⁸ Guilheui, "Buan yuchenri goryeodoja yeongu (Studies of Goryeo Celadon in Yucheon-ri, Buan)": 93–96. Kiln sites of Yucheon-ri would seem to belong not to the governmental organs but to local administrative organs.
- ³⁹ This paper does not deal with the operation characteristics of kilns, but the author will consider the topic in the future.
- ⁴⁰ Choi Seonil, "Cheongja gupbadake saegyeojin pyojieui silchewa euimi-gangjinyoji chultopumeul jungsimeuro (The Substance and Meaning From the Marks of the Carved Celadon-Based on the Excavated Celadon in the Gangjin Kiln Sites)," pp. 110–117; Han Seonguk, "Goryeoeumgak munyang chengjaeui yeongu (Studies of Goryeo Celadon's Intaglio)," pp. 133–161.
- ⁴¹ Gukriphaeyangyumuljeonsigwan jellabukdo, *Gunsan biando haejeo yujeok* (Undersea Ruins in Bian Island, Gunsan).
- ⁴² The author recomposed data from the paper of Park Ahyeon, a graduate student in art history at the Ehwa Womans University, which dealt with information about the characteristic analysis and statistics for 2,934 pieces of celadon.
- ⁴³ Wongwangdaehakgyobakmulgwan mahanbakjemunhwayeonguso, *Buan yucheonri 7gwanggu chengjayojigun balguljosabogoseo* (The Excavation Report of Seven Celadon Kilns in Yucheng-ri, Buan).
- ⁴⁴ Munhwajae gwanriguk, *Wando haejeoyumul* (Undersea Relics in Wan Island); Gukrip haeyang yumul jeonsigwan, *Badaro boneun wuriyeoksa* (Korean History Through Undersea Relics); Gukrip haeyang yumul jeonsigwan, *Muan doripo haejeo yujeok* [Undersea Ruins in Doripo, Muan]; Kim Yeongwon,

Hanghaeya pyoryueui yeoksa (The History of Sailing and Drifting in Korea); Gukrip haeyang yumul jeonsigwan, Dojakil badakil (The Korean Celadon Route and Sea Route); Gukrip haeyang yumul jeonsigwan Jeollabukdo, Gunsan biando haejeoyumul (Undersea Ruins in Bian Island, Gunsan); Ilbon gukrip yeoksa minsok bakmulgwan, Dongasia jungse haedo (The Sea Route in East Asia); Gukrip haeyang yumul jeonsigwan, Gunsan sipyidongpado haejeo yujeok (Undersea Ruins in Sipyidongpa Island, Gunsan); Gukrip haeyang yumul jeonsigwan, Boryeong wonsando sujung balgul bogu (Underwater Excavation Report in Wansan Island, Boryeong); Gukrip haeyang yumul jeonsigwan, Gunsan yamido sujung balgul bogoseo (Undersea Excavation Report in Yami Island, Gunsan); Gukrip haeyang yumul jeonsigwan, Goryeo chengja bomulseon (Goryeo Celadon Treasure Ship).