

Fortification Inventories in the Early Modern eastern Adriatic as Research Tools (1)

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Abstract

Between the 15th and 17th centuries, the incessant wars in the eastern Adriatic triggered extensive construction of the fortifications, thus making the territory fertile for studying changes in military architecture. This paper focuses on fortifications in the former territories of the Venetian and Dubrovnik Republics, whose importance is also reflected in the multitude of archival records. Among them, a particular serial source has been chosen: the fortification inventories in the State Archives of Zadar, Šibenik, and Dubrovnik. These critical supports for a better understanding of the circulation of knowledge on the military architecture in the region are virtually unstudied. However, they provide quantifiable information on firearms and other necessities, thus suggesting a vivid picture of the functioning of the fortifications. In order to understand the thinking behind these lists, their codification has been traced to a “modern military prototreatise” written in 1410 by Christine de Pizan. Her estimated/ideal fortress budget, with particular emphasis on modern firearms, here serves as a proto-model and provides comparative material for real-time archival inventories of non-ideal fortifications, also permitting speculation of the relation between theory and practice in the *longue durée*.

Keywords: Eastern Adriatic, fortification inventory, firearms, Christine de Pizan.

1. Introduction

The post-fifteenth-century modernisation of warfare and fortification building is evident in architectural practices of construction and designs (Rogers, 1995; Parker, 1988). In the eastern coast of Adriatic, changes in the fortification design and warfare in general, have been detected in relation to the appearance of firearms, which determined the usage of military architecture as a space (Kljajić, 2003). This territory is suitable for studying changes in military architecture because the incessant wars, had caused frequent changes of borders. Therefore, older, and strategically inconvenient fortifications had to be modernized or completely demolished (Kruhek, 1995).

The advanced knowledge of the modern military science in Europe circulated through treatises on warfare and construction (De la Croix, 1963),

which were used as manuals or theoretical works of both the traditional and existing fortifications' models, serving also as polygons for experiments, particularly of the fortification designs (Parker, 1976). Besides the treatises, numerous other sources were spreading the contemporary knowledge on construction. Croatian archives contain archival material such as fortification descriptions and inventories, needed repairs, building accounts, payments, soldiers' lists, etc. As a result, one may argue that the art of warfare and fortification architecture includes a less-studied area of the economy of war, i.e., domestic budget for a fortress. These writings serve as a starting point for further research of both the circulation of knowledge and interrelation of practice and theory of the fortification architecture.

2. Primary sources

During the research in the archives in Zadar, Šibenik, Dubrovnik and Zagreb were collected and analysed border situation reports from the 16th century onwards, fortification descriptions, inventories, restoration prescriptions, soldiers' information, salaries, building accounts, diverse manuscripts on fortification construction, etc. Furthermore, the archives have collections of maps and graphic designs from the 15th to the 19th centuries. Particularly, the Šibenik State Archive (2) contains several designs of the city walls and city's four fortresses throughout the centuries. Even specific maps in the forementioned archives depict simplified designs of the most important fortifications in the eastern Adriatic, allowing their research from the broader spatial perspective. Therefore, different visual sources provide better insight into the circulation of fortification knowledge. Furthermore, documents from the late 18th and the 19th centuries provide reports on the condition of the fortresses and city walls in Šibenik, Knin and Skradin, letters on peace treaties, military matters, number of recruited men, supplies, deployment of military formations in the area, and also a song about Italian prisoners in the St. Nicholas Fortress from 1813 (3).

Although in the Zadar State Archives there is a large fund of the graphic designs, these mostly do not depict the eastern Adriatic fortifications, and those that are, can be dated to the 18th or 19th centuries. However, from the 16th and the 17th centuries date border reports and letters, as well as several fortress inventories. Such example is the 1658 Cash register of workers' payments for Gripe fortress in Split, whose poor condition makes the analysis considerably challenging (4). This document type may not always indicate who was hired for which position, but indicates that there was a practice of maintaining the budgetary issues. Furthermore, the *Miscellanea* fund keeps several unsorted notebooks and statements on fortifications, their construction, repairs inventories etc. An example of a handwritten notebook on the construction of fortresses and their necessities dates from the 18th century. The preliminary analysis suggests that it is a compilation of knowledge on construction that provides fortifications terms and typology, as well as necessities for their modernisation, having even listed timber and tools (5). In the Archives of the Croatian Academy of Sciences and Arts in Zagreb was traced down (Beritić,

1955) a manuscript from the beginning of the 17th century titled *Fortificazione della Citta di Ragusa* (6). It is, as its author Miho Hranjac suggests, a treatise on fortification architecture. Written around 1617 in Italian for the authorities of the Republic of Ragusa, it is one, if not the only example of the written treatise on fortification architecture in the eastern coast of Adriatic. This treatise is a standardized source of both practical and theoretical solutions in fortification building. First, it gives an insight into the authors knowledge on contemporary warfare and required modernization and reconstructions. Second, it is an illustrative and written source of a few ideal fortress' designs that have been planned but not executed in the city of Dubrovnik.

In the Dubrovnik State Archives *Fabbriche* and *Guardie ed armamento* funds provide fortifications' descriptions, inventories, lists of soldiers and their payments, documents on the construction processes, lists of material and weapons, etc. These documents vary from the 16th to the 18th century. Moreover, a written form of a particular inventory list from the 18th century distinguished itself as a more visually comprehensible source. The mentioned example was traced down in the *Guardie ed armamento* fund (7), entitled "Defence plans and observations on fortifications". Dated in 1785 and written half in French and half in Italian, it is a table summary of counted soldiers, cannons, gunpowder pounds, cannonballs, etc. around Dubrovnik's city walls, towers, and fortresses. The data given by this table is also a source for fortification terminology (Papeš, 2019) and typology from the end of the 18th century. Sources found in the other funds were mostly written in the form of minor paragraphs, either if these were building accounts, or accounting books of salaries. The latter, especially from the linguistic point of view, is even a source of information about the people who worked in the different areas of fortifications at the time, providing their name variants, exact salaries that perhaps corresponded with the importance of the working position, as well as other information that may serve for broader scientific approach. From the same archival series is also the text "Annotazioni fatte intorno alla Città" (8), which is a list of short descriptions for the improvement of mostly smaller fortifications. Some improvements indicate where to raise or crash a wall, best positions for *canoniere*, doors and staircases, etc. There are also instructions

| | Canons à servir | Canonniers | Soldats | Livres de poudre a Canon | Boulets et Gargous des a Mitraille | écouvillons Lanterne refouloir Boute-feu | Leviers | hommes et fusils | poudre à fusil ? |
|--------------------------------|-----------------|------------|---------|--------------------------|------------------------------------|--|---------|------------------|------------------|
| La Mincetta | 9 | 18 | 100 | 6548 | 900 | 11 | 38 | 118 | |
| St Giacomo | 4 | 8 | 74 | 1300 | 400 | 5 | 18 | 82 | |
| La Spianato del Rivelino | 4 | 8 | 80 | 2400 | 400 | 5 | 18 | 88 | |
| La Porta delle Ploce | 3 | 6 | 38 | 650 | 300 | 4 | 14 | 44 | |
| Il Castello del Rivelino | 6 | 12 | 34 | 4866 | 600 | 7 | 26 | 66 | |
| Della Beccaria fin a Pescheria | 3 | 6 | 150 | 600 | 300 | 4 | 14 | 156 | |
| Di Pescheria fin al Baluardo | 2 | 4 | 30 | 300 | 200 | 3 | 9 | 34 | |
| Il Baluardo del Palazzo | 3 | 6 | 50 | 950 | 300 | 4 | 14 | 56 | |
| La Punta | | | 18 | | | | | 18 | |
| Il Molo | 12 | 24 | 212 | 7564 | 1200 | 14 | 50 | 236 | |
| S. Salvatore | 3 | 6 | 20 | 1933 | 300 | 4 | 14 | 26 | |
| S. Stefano | 5 | 10 | 16 | 2599 | 500 | 6 | 22 | 26 | |
| La Margherita e S. Pietro | 4 | 8 | 224 | 1800 | 400 | 5 | 18 | 232 | |
| Il Bocare | 6 | 12 | 44 | 2466 | 600 | 7 | 26 | 56 | |
| La Porta delle Pile | 2 | 4 | 22 | 700 | 200 | 3 | 9 | 26 | |
| Il Bastione e cortine Pile | 5 | 10 | 100 | 2450 | 500 | 6 | 22 | 170 | |
| S. Lorenzo | 10 | 20 | 30 | 7749 | 1000 | 12 | 42 | 50 | |
| L'Anzimuro | 3 | 6 | 100 | 600 | 300 | 4 | 14 | 106 | |
| Totale | 84 | 168 | 1362 | 45075 | 8400 | 104 | 368 | 1530(?) | 31200 |

Fig. 1- Transcription and spreadsheet by Karla Papeš according to HR-DAD-47/HR-DAD-9, Guardie ed armamento, 84, Piani di difesa e osservazioni sulle fortificazioni 1785, fol. 14, 9v.

regarding the weaponry, titled “Piano per servire al miglioramento dell’Artiglieria e contribuire alla sicurezza della Città” (9).

In sixteen short paragraphs are described basic elements for the artillery’s improvement and the soldiers’ contribution to better security. Furthermore, weaponry inventory “Nota del numero e calibro dei Cannoni, che si trovano intorno alle fortificazioni della Città” (10) is also included in this series. It is a precise list of artillery, mostly cannons and other types of firearms in Dubrovnik’s towers, fortresses, and other buildings.

3. Comparison with the “modern military prototreatise”

The introduced less-studied area of the economy of war, i.e., domestic budget for a fortress was the subject of the French author Christine de Pizan’s “modern military prototreatise” *Le livre de faiz d’armes et de chevalerie* (Richards, 2022). This manuscript written around 1410 distinguishes itself as a theoretical work on warfare and military architecture not only for the gender of its author, but also because of the budgetary treatment. Christine de Pizan’s written works have been a subject of numerous theses (Richards, 2017;

Caraffi, 2003), and had a substantial diffusion (Richards, 2022; Gray, 2019; Watson, 2018). However, her prototreatise was not used as a comparative tool for the military practices in the eastern Adriatic. Up to now, no comparative research of fortification architecture's theoretical principles and practices of construction have not been made in the area. This research may provide new understanding of early modern European warfare because, as the prototreatise is the nearest standardised source of practice, it is being compared with practical solutions of the later centuries.

On the other hand, as the abovementioned sources and the investigated area of the Eastern

Adriatic seem rather distant in time and space with Christine's text, it may be difficult to underline the possible connections of such diverse material. Nevertheless, this essay argues that Christine's prototreatise may be the first and only attempt of the standardisation of the theory of warfare's budgetary issues, thus being crucial for understanding of the analysed archival documents.

Christine de Pizan was the first to write about the importance of firearms and the inadequateness of the fortifications at the time, according to the scholarship (Richards, 2022; Watson, 2018; De la Croix, 1963). In result, main chapters for this research were those written by the author herself and those composed with the help of anonymous

| FORTRESS STOCK DURING WAR AND/OR SIEGE | | |
|--|---------------------|-----|
| men-at-arms | 200 | 600 |
| servants (2 per each) | 400 | |
| timespan | 6 months | |
| food (per one person) | | |
| salt | 1 measure | |
| spices (ginger, cumin, other) | 50 pounds | |
| saffron | 2 pounds | |
| mustard seed | 2 measures | |
| mill | 1 | |
| large oxen (salted and alive) | 100 | |
| bacon | 100 or 120 flitches | |
| sheep | 8 score | |
| poultry | supply* | |
| eels | 1000 | |
| herring | 25 barrels | |
| hake | many | |
| salted butter | a cask | |
| almonds | 11 pounds | |
| rice | 10 or 12 pounds | |
| oatmeal | 10 or 12 pounds | |
| kitchen (if it is winter) | | |
| large logs | 200 cartloads | |
| coal | 60 loads | |
| or esterels/small bundles of wood | thousands | |
| large earthen pots | 240 / 20 dozen | |
| cauldrons | 6 | |
| pans (large-medium-small) | 24 / 2 dozen | |
| wooden spoons | 48 / 4 dozen | |
| wooden bowls | 2000 | |
| trenchers | as many | |
| goblets | as many | |
| cups | as many | |
| bellows | 20 or 30 | |

Fig. 2- Fortress stock during war and/or siege (spreadsheet by Karla Papeš)

wise knights, experts in military techniques, who wished to remain unknown (De Pizan, 1999).

4. The ideal fortress inventory?

The twenty-third chapter of the first part and fifteen chapters of the second part of the book (11) include information on modern weaponry and warfare, and the inventory lists of necessities to survive the siege in case of attack or defence. Through the usage of spreadsheets, it was possible to harvest and organise the data, making the given necessities more visually comprehensible.

These so-called budgetary lists are implemented to two narrative scenes. One is the defence or fortress stock during war and/or siege and the other is the attack. The first case addresses an exact number of

subjects involved in the narrative scene - 200 men-at-arms plus 2 servants per each of those men-at-arms in a time span of 6 months, which is followed by lists of diverse utilities, such as food, dishes, other kitchen necessities and defence provisions. The second narrative scene contains longer and more precise lists, while also bringing the “ideal narrated case” of a large stronghold situated near the water and difficult to capture. The following chapters indicate precise lists of weaponry and other material, as well as equipment needed for its conquest, providing not only the insight into the war planning but also information on the various types of weapons around 1410, along with the amount of gunpowder and animals needed for weapons’ transport, an exact number of stone ammunition and their firing capacities. These lists also contain lists of people, such as the number of workmen with their precise tasks (De Pizan, 1999; Caxton, 1932). The question of weaponry was precisely brought in both scenarios, making it the most important segment of these chapters. To the food stock was given more space in the case of defence, however soldiers and their precise duties were not described at all. Therefore, these lists provide straight data and an insight into the knowledge and experience of Christine’s advisors, plus the possible common practice in the economy of warfare. The latter corresponds to the analysed sources found in the archives around the eastern coast of Adriatic.

6. Conclusions

At the beginning of this archival research, a great number of documents was found containing the descriptions of fortifications and giving the exact numbers of contained or acquired necessities. Furthermore, precise lists of soldiers and their personal information have been found in hundreds of pages throughout the archives in the eastern coast of Adriatic. This was obviously a common practice in the economy of war.

However, treatises on fortification architecture do not provide such precise data, therefore the question still remains if the knowledge contained in the aforementioned archival documents can also be observed through the prism of theoretical principles. Christine de Pizan managed to elaborate on these budgetary issues by giving the example of the ideal cases of defence and attack with detailed inscriptions of all necessities. One may comprehend how crucial was the measured redistribution of money in the times of war.

| FORTRESS ATTACK – EQUIPMENT: ideal narrated case | | | |
|--|-------------------------|---------------|----------------------|
| Materials | | | |
| Cannon powder | In the prepared product | 30 000 pounds | 15 000 out of 30 000 |
| sacks of charcoal from willow wood | | 3000 | |
| sacks of charcoal from oak trees | | 2000 | |
| Large braziers with 3 feet and a handle for gun fire | | 20 | |
| bellows | | 20 | |
| Reinforced cart for the transport of each cannon | | | |
| Carts for carrying the powder and other necessities | | 25 | |
| Horses for each cart | | 3 = 75 | |
| Wooden tampons for the cannons | | 300-500 | |
| Machines required to transport and arm the assault equipment | | | |
| Machine to carry stones from boats, loads them into cart, unloads them where necessary | | 1 | |
| Ironclad mechanical devices to take wood for the machines and mantelets from the boats | | 3 | |
| Large reinforced ironclad sledges to take the rods of the machines from the boat | | 2 | |

Fig. 3- Fortress attack, equipment: ideal narrated case (spreadsheet by Karla Papeš)

Further investigation of archival sources and fortification treatises may shed the light on this complicated matter, which heavily relates with the architectural practices.

Notes

- (1) This paper is part of a project that has received funding from the European Union's Horizon 2020 Research and Innovation Programme (GA n. 865863 ERC-AdriArchCult).
- (2) HR-DAŠI-192 KARTOGRAFSKA ZBIRKA, 1561. - 1985; HR-DAŠI-244 Grafička zbirka 1630. - 1841.
- (3) HR-DAŠI-197 Zbirka arhivalija (Miscelanea) 1400. - 1900.
- (4) HR-DAZD-16 A.1.2.4. Općina Komuna Split 5. Camera fiscalis Spalati, 1500-1602., Blagajničke knjige (raznovrsne) kutija 347, svezak 401, Izvanredni providur Gian Francesco Avrio (1658.) Financijski poslovi 1658., p. 1-66., Prilog 14 a-c., Libro di cassa dei pagamenti fatti ai

lavoratori di costruzioni nei pubblici lazzaretti di Spalato, e del Forte detto Grippi nell'anno 1658.

- (5) HR-DAZD-377 MISCELLANEA, 24. 3. Rukopisna bilježnica o gradnji tvrđava i njihovih potreština 18. stoljeće.
- (6) Arhiv HAZU I. d-130. *Fortificatione della Citta di Ragusa*
- (7) HR-DAD-47/HR-DAD-9, Guardie ed armamento, 84, Piani di difesa e osservazioni sulle fortificazioni 1785, 9v.
- (8) HR-DAD-47/HR-DAD-9, Guardie ed armamento, 84, Piani di difesa e osservazioni sulle fortificazioni 1785, 3v.
- (9) HR-DAD-47/HR-DAD-9, Guardie ed armamento, 84, Piani di difesa e osservazioni sulle fortificazioni 1785, 12v-14r.
- (10) HR-DAD-47/HR-DAD-9, Guardie ed armamento, 84, Inventario dell'artiglieria e robe appartenenti all'armamento dell'anno 1785, 1r-3r.
- (11) Second book's chapters 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, and 34.

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