Memories about the way of making lime. Production and distribution in Malta under the Order of Saint John of Jerusalem

Quaderni di Storia della Costruzione 3

Produrre per Costruire

a cura di Maria Luisa Barelli e Mauro Volpiano
Construction History Group - Politecnico di Torino DAD

Al centro del terzo volume dei Quaderni di Storia della Costruzione, pubblicato dal Construction History Group del Politecnico di Torino, è il tema della produzione edilizia, con particolare riferimento ai luoghi privilegiati nei quali, in età moderna e contemporanea, si sono tramandati – spesso per generazioni – adattati e talvolta innovati saperi e pratiche, capacità tecniche e organizzative, per "fare le cose".
A partire dalla bottega artigiana, dalla corporazione o dal sodalizio professionale, dall'industria come dall'impresa costruttrice, cioè da un'indagine su specifiche realtà produttive, i contributi che qui sono raccolti rivolgono la loro attenzione in più direzioni: puntano a comprendere, entro diversi contesti geografici e culturali, le modalità dell'organizzazione del lavoro e le peculiarità di mestieri e professioni, tecniche e processi; si interrogano sulla lunga durata delle specializzazioni dell'edilizia, così come sul ruolo dell'innovazione tecnologica nell'orientare trasformazioni dei modi consolidati di produrre e quindi di costruire; analizzano, a partire da casi documentati, le relazioni, proficue o talvolta problematiche, che questo mondo – composto da una folla di personaggi – intrattiene non solo con i progettisti, ma anche con gli intermediari e i costruttori; e infine, non ultimo, propongono riflessioni sugli archivi d'impresa e sulle fonti a cui attingere nella ricostruzione di una storia dell'"arte del produrre".

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III. Materiali, prodotti e sistemi costruttivi per l'architettura del Novecento

Memories about the way of making lime. Production and distribution in Malta under the Order of Saint John of Jerusalem

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Introduction

This paper offers new insights into Malta's lime production process and its significance within the broader context of early modern construction practices during the rule of the Order of Saint John in Malta[1]. The research also delves into the role of freshwater in lime processing, mortar mixing, and various construction applications, including plaster production and stone cutting. Moreover, it examines the meticulous regulations imposed by the knights, who opted to lease kilns rather than hire laborers, ensuring efficient management and high-quality output. During the early modern period, the production and distribution of lime in Malta were key aspects of the island's construction process, ruled by the Order of Saint John of Jerusalem. The presence of the Order of Saint John, established in Malta following Emperor Charles V's donation of the Maltese archipelago to the Order in 1530, heavily regulated lime production processes. Due to the scarcity of freshwater on the island, its importance for construction purposes cannot be overstated. Additionally, the Hospitallers supervised each stage of the lime formation process to minimise waste and uphold product standards, reflecting the Order's commitment to excellence. This investigation was conducted through an exploration of historical documents from archival research at the Historical Archive of Masino Castle (Caravino, Turin) and the National Library of Valletta (Malta).

[1] Abbr.: ASCM = Archivio Storico del Castello di Masino; BCAE = Biblioteca Comunale e dell'Accademia Etrusca di Cortona.
On the origin of the Hospitallers, there are various hypotheses. See mainly: Riley Smith 2012; Beltjens 1995, pp. 11-15; Blondy 2002.

[1.]

Fig. 1. De Wit, Frederick, *Insula Malta accuratissime delineata, urbibus et fortalitiis*, Amsterdam, 1689, 54x44.3 cm (courtesy of Stanford Libraries, G6794.I5.1689.W5, David Rumsey Map Center).

Lime production in Hospitaller Malta

In the ambitious project of the Grand Masters to turn Valletta into the capital of the Order, the presence of highly qualified figures was necessary. Among these were military engineers invited to construct imposing fortresses for the city's construction, as well as specialised craftsmen who executed instructions with precision and were familiar with the characteristics of local materials. The flawless functioning of this complex administrative machinery would ensure the Hospital's accreditation as a power on the international political stage, presenting a perfect image of Renaissance taste, akin to the greatest and most important European courts of the time (fig. 1).

Over time, the Order had established a very important system, where the construction process was perfectly defined, as it was in all Italian or foreign states[2]. A well-organised administration was therefore essential to avoid unnecessary waste of time and money. The

[2] Vanesio 2018.

[2.]

Fig. 2. St Angelo Castle, Birgu, Malta (courtesy of Prof. Emanuel Buttigieg, 2022).

knights were constantly pressed by the Turkish threat, so the quiet moments between one siege and another had to be maximised. Funding came from the coffers of the Common Treasury, i.e., from the "responsiones" or responsions coming from the commanderies scattered across the international territory[3]. Since the expenses for fortresses were substantial, often exceeding what could be guaranteed, donations from individual patrons were sought (as in the case of Fort Ricasoli and the fortified curtain of Galdiana) or additional taxation, as in the case of the 17th century Cottonera bastioned line. The presence of fresh water, scarce on an island like Malta, was essential for the construction process and therefore highly valued. The construction of fortifications[4], crucial for the Order of St John as defender of the Christendom, also known as "Antemurale Christianitatis"[5], required a lot of water, as did its maintenance: it was preferable to build near sources, integrating the source within the walls to ensure continuous reserves during long sieges (fig. 2). Furthermore, the supply of water was a mandatory requirement for the habitability of the fort in case of attack. The same regulations of the "Ordinationi sopra le Case" or Statutes above the Houses[6] mandated that every private residence must have a cistern for water collection, under penalty of a fine of 50 *scudi*. From the documents, in fact, there were 26 cisterns, each of 10 square meters, built in June 1568 in Valletta at the behest of Grand Master Jean de la Valette. A complex and efficient system of channels had to ensure the arrival of water at the construction site. Water supply was also indispensable in civil buildings, as it was needed to ensure proper carbonation of finishes: both mortars and plasters required water during the preparatory phase and even after application. Equipping Valletta with a comprehensive water system was crucial not only for supplying the knights in their palaces or Auberges[7], and for powering foun-

[3] Burgassi, Said-Zammit, Vanesio (eds), forthcoming.
[4] Thake 2011.
[5] Brogini 2006.
[6] Mifsud 2020.
[7] Burgassi, Vanesio 2017.

[3.]

Fig. 3. The Wignacourt Aqueduct in St. Joseph High Road, Santa Venera, Malta (courtesy of Matthew Axiak, 2017. Prof. Emanuel Buttigieg, 2022).

tains and water features but also for prolonging resistance during sieges, as emphasised by Francesco de Marchi in his treatise. Although the aqueduct[8] in Malta was constructed in 1610 by the Bolognese engineer Bontadino de Bontadini under the Grand Master Fra' Alof de Wignacourt, the project had been previously promoted by the Aragonese Grand Master Fra' Martin Garzez[9] in 1596. Water was especially needed for processes such as slaking lime, making the mortar mix, plaster production, finishes, and stuccos, as well as for the processing of slabs and stone blocks, as described by Vincenzo Scamozzi in his *Universal Architecture*[10]. Here, the architect indicates the necessity of a channel that directly flows into the tanks used for slaking lime, in order to dispense water at a lower temperature and facilitate the hydration process more quickly (fig. 3). The water for this operation had to be fresh and not from the sea, as emphasised by Baldassarre Lanci, an architect who worked on the projects of the new city. Once he left the island on May 3, 1562, Lanci mentioned in a memorial transcribed by Francesco Laparelli[11], the Tuscan architect who designed Valletta: «If you slake the lime and then mix it with fresh water, not seawater, which is quite an enemy to the construction»[12].

In the same memoir, Lanci described the procedure for obtaining good lime, with the right quantities of water and sand:

[8] Menchetti 2001.
[9] Fra' Martin Garzez (b. 1526 – d. 1601) was originally from the Langue of Aragon and succeeded Fra' Hugues Loubenx de Verdalle. He served as Grand Master from 1595 to 1601.
[10] Scamozzi 1997. See D'Amelio 2002, p. 143.
[11] See Burgassi 2022a; Vella Bonavita 2011.
[12] Sisi 1991, pp. 176-181.

[4.] 

Fig. 4. Limestone quarry on the island, Malta (courtesy of Limestoneheritage.com).

The lime will not be bad when it is wet, as is customary in other countries, where they have the habit of igniting it because they spray water on it, which only serves to turn it into powder [...] in this case, the ancient law must be introduced, which did not allow lime to be put into operation unless it had been well soaked for two years[13].

To obtain sand for the production of lime, Lanci emphasised that the only possible source was from quarries, as river sand was too far away to be used. Therefore, he suggested using that «which the sea throws in some coves»[14], recommending taking the sand that had been exposed to rain for many days so that it had removed as much salt as possible. In this regard, Laparelli, in his report dated May 26, 1567, echoed this same concept, emphasising to seek sand near Marsamuscetto, taking it «whole [...] and not in powder»[15], and being careful to choose the one that was more moist, not dry, to not compromise the quality of the constructions.

On making lime

A document dated 1725[16], preserved at the Historical Archive of Masino, meticulously describes the lime production process in Malta[17]. The report is unsigned, but it can be hypothesised that it was drafted by an anonymous secretary following the instructions of the Piedmontese engineer residing in the Order, Francesco Marandono. Since 1720, architect Marandono had been on the island for the construction of the Corderia in the direct vicinity of Fort Ricasoli, a work dated 1670 designed by another renowned Piedmontese engineer, Antonio Maurizio Valperga. The document is divided into three parts, describing how to work with lime, how to preserve it, how to distribute it, and also how to distribute *pozzolana*, that is a porous variety of volcanic tuff or ash used in making hydraulic cement.

[13] BCAE, ms. 724, fol. 33v.
[14] *Ibidem*.
[15] Sisi 1991, pp. 427-429.
[16] ASCM, m. 126, fasc. 2507, 1, 30, fols. 1r-4r. We express gratitude to Dr. Laura Tos for her assistance in archival research and to Irene Maniscalco for transcribing the document in its entirety.
[17] See Burgassi 2022a.

[5.]

Fig. 5. Auberge of Castille, Valletta, Malta (picture by the author, 2022).

In the first part of the document, lime is described as a «paste made from calcinated or burnt stones, which crumble and liquefy through the water thrown on these stones while they are hot»[18]. Regarding the lime formation process and its characteristics, our anonymous technician emphasises that the best quality lime is obtained from stones that are more tenacious but, at the same time, sufficiently porous. The document highlights the fundamental role of stone quality in the success of lime: the quarried stone should not be too hard to avoid too much effort for the "guastatori" or destroyers in extracting it, but neither too soft because it would require the consumption of precious wood on the island to burn and solidify it further. This result is achieved with stones found in the San Giuliano area, namely the coastal area, most suitable for greater resistance and easier transportation, given their proximity to the sea (fig. 4). Archive documents indicate that the main quarries in Malta were located in San Giuliano and Santa Venera. Stones extracted from San Giuliano were likely used for the convenience of transport by boats. Santa Venera is located in the centre of the island, and stones from its quarries were used because the blocks found were large, free from any imperfections that could undermine the strength of the slabs subjected to significant cutting efforts. Stones were transported by "carovane" or cartloads from the port area from

[18] *Ibidem*.

[6.]

Fig. 6. Ribbed cross vault, Church of St Anne, St Angelo, Birgu (picture by the author, 2022).

where galleys arrived from the port of Messina and elsewhere[19]. In Eighteenth-century accounts register, the designated cost for transportation was 12 grains per load of stones. The accounts registers indicated how many "balate di pietre" or loads of stones needed to be transported. The globigerina, or Maltese limestone, had always been used in the Hospitallers' palaces since their settlement on the island, thanks to its abundant availability and ease of processing[20] (fig. 5). It was cut, polished, and carved into architectural elements that met the most demanding requirements for size, shape, and finishing details (fig. 6). Globigerina, in fact, allowed the imposition of geometric shapes on the material, and any desired form could be realised[21]. The joints between different elements could be seamlessly fitted by filing the faces until they matched perfectly to the extent that not even a thread could be inserted between them[22]. However, it presented some durability and weather resistance issues, including humidity (figs. 7-8). Regarding the organisation of the construction process for lime production, the Order had established kilns and necessary tools for lime manipulation at the "Calcara", that is the place where lime was cooked since the construction of the Order's new city. Since the Common Treasury spent a considerable sum on its production, it had decided to lease the kilns rather than pay the day's work to laborers, as they «not working for themselves would

[19] Burgassi 2022b.
[20] Antista 2022.
[21] Nobile, Scibilia 2016.
[22] Marconi 2011.

[7.]

Fig. 7. Globigerina limestone, Castellan House, Fort of St Angelo, Birgu, Malta (picture by the author, 2022).

Fig. 8. Durability and weather resistance issues of the Globigerina limestone in a block of stone, Malta (picture by the author, 2022).

[8.]

lack either zeal or fidelity»[23]. The so-called "partitarij" or contractors, according to the document, paid 600 tarì per year for the rent of the kilns and necessary tools. They were obliged to provide all the lime needed for the Order of St John construction process at a regulated price, equal to 9 tarì per salma of slaked lime, while to the rest of the population, it was sold at the price of one scudo per salma of slaked lime, or even 13 tarì if of good quality:

> The *partitarij* or contractors who now pay 600 per year in Conservatory are also obliged to provide for the service of the Religion all the quantity of lime needed for its works [...] for the work, at the price of nine tarì per salma of slaked lime, with the option for said partitarij to sell the lime to the public at the price of one scudo per salma even slaked, indeed, they sell it for 13 and 177 tarì when it is of good quality[24].

The lime formation is described in all its phases, following Vitruvian instructions, as already shown by Rusconi in his treatise with clear illustrations[25]. The location of the kilns is then described, where there was a gallery where stone blocks were gradually wetted, reducing them to "flour" in about 8 hours (fig. 9):

> Once the stone is sufficiently burned, it is left in the kilns for three days to perfect the calcination. Near the kilns, there are specially made loggias, under which the calcinated stones are arranged one above the other, water is then gradually poured over them until these stones crumble by themselves and turn into flour, and this happens within 7 or 8 hours, after which the lime can be distributed to those who want it[26].

The anonymous writer specifies in detail the difference in price according to the weight of the lime because the exothermic reaction of lime slaking produces a volume increase up to two and a half times, leading to a considerable variation in cost:

> in a salma of virgin lime, its volume increases orderly up to two and a half salmas, so when the Commissioner issues a receipt to the partitarij, for example, for 50 salmas of virgin lime, the Common Treasury, which pays for 125 salmas of slaked lime at the aforementioned price of nine tarì according to the agreement[27].

The document also provides valuable information to warn «persons of the habit familiar in building matters»[28], i.e., knights of St John who were solid knowledge of construction processes, from receiving unburnt stones from the "calcinari" due to «negligence or malice»[29]. The document emphasises the need to be very cautious not to be deceived by lime sellers:

[23] ASCM, m. 126, fasc. 2507, 1, 30, fol.1r.
[24] *Ibidem*.
[25] Rusconi 1590.
[26] ASCM, m. 126, fasc. 2507, 1, 30, fol.1v.
[27] *Ibidem*.

SETTIMO. 101

IL Secondo Capitolo c'insegna à macerar la calce; la quale oltre l'esser attuffata, & mollificata nell'acqua, vuole che con vna cazzuola, ò zappetta, ch'altri la chiamino, sia bene rimescolata, & che il segno della sua bontà sia questo, che essa calce sia come cera appiccaticcia, & non si spicchi così facilmente dalla zappetta: questo particolarmente, si come diligentemente ci viene auuertito da Vitruuio, così minutissimamente l'habbiamo ancora nella nostra seguente figura.

SEguita il Terzo Capitolo: & con esso ci dà Vitruuio la regola del fabbricare i volti in questo modo. E prima che siano dispostigli Afferi, ò trauicelli diritti, distanti più di due piedi l'vno dall'altro, & quando saranno così ordinati in forma rotonda, che si congiungano alle trani, & siano conficcati con chiodi di ferro. Poi vi si leghino delle canne greche pistе, come ricercara la forma del volto con reste di Sparto Spagnuolo, che nella nostra figura è segnato con la lettera H. & sopra la curuatura vi sia indotta materia di calce, & d'arena mescolata per difenderla da quello, che potesse cadere dal tauolato. Se non vi sarà copia di canne greche si piglierà di quelle de' paludi sottili, & se ne faranno matasse, & legheranfi, si che tra due legamenti non vi sia distanza più che di due piedi: & esse matasse legate (come s'è detto) a' trauicelli haueranno conficcati le loro spatelle di legno per maggior vnione, & fermezza, il che tutto ci si mostra diligentissimamente espresso nella seguente figura.

Architett. del Rusconi. Cc Quest' [9.]

Fig. 9. Giovanni Antonio Rusconi, *Della Architettura di Gio. Antonio Rusconi, con centosessanta figure dissegnate dal medesimo, secondo i precetti di Vitruvio, e con chiarezza, e brevità dichiarate libri dieci*, Venezia: Giovanni & Giovanni Paolo De Ferrari, 1590, f. 101 (courtesy of Architectura CESR).

When measuring for private persons, lime is placed in the measure as it is placed on the shovel, and usually unburnt stones are found together, which also damage the buyer, but no remedy has been provided for this by the public, and the partitarij sell stones and lime together as they are found; indeed, often they even put ashes in it[30].

The procedure was well-described to avoid poor-quality end products, ensuring that the assigned knights were informed about the correct process and could verify its quality themselves. A series of detailed precautions were then listed to distinguish well-processed lime from poorly processed lime.

The regulations established by the Order for lime production involved the withdrawal of virgin lime from the kiln in capacious containers equivalent to four "tomini" in capacity, that is approximately 68.75 liters, all standardised, to avoid any issues with quantities. The maximum quantity that could be purchased at once was 10 salme, equivalent to 40 barrels of 4 tomini each. The lime was slaked only in dedicated tanks built at the Calcara, measuring 26 palms in length and 14 in width, for an area of approximately 22 square meters. The document highlights that for slaking 500 kg of lime, 1,700 liters of water were needed, yielding one cubic meter of lime putty. Furthermore, the mortar mix itself required water equal to 15-20% of its volume, a percentage that rose to 80% for the preparation of limewater. Once the lime was slaked in the tanks, four "calcinari" or limewater makers were tasked with mixing the paste

[28] *Ibidem*, fol. 2r.
[29] *Ibidem*.
[30] *Ibidem*. fol. 2r.

[10.]

Fig. 10. Fort of St Angelo, Birgu, Malta (courtesy of Prof. Emanuel Buttigieg, 2022).

with long wooden shovels for about an hour until it became liquid, completing the exothermic reaction:

> Then the said lime is pushed by throwing water over it discreetly, after which four men armed with long-handled rakes move it, dress and redress it for at least one hour, until the stones have melted and the lime has become like milk, which, by opening a purposely made hole in said tank, passes all the milk[31].

Once a milk was obtained, it passed through a hole to a lower-height tank by gravity. The passage was regulated by two grates made of copper or iron, the first with moderately fine meshes, the second very tight, serving as a filter to allow only small stones to pass:

> and is deposited in other large tanks, or perhaps lower ones made especially in lower storehouses, with the precaution, however, that in front of said hole, there are two small grates, one of which, the first, made of iron or copper thread, is so tight that it does not allow larger stones to pass together with the other[32].

The blocks remaining in the first tank, still partially intact, were adequately rehydrated and soaked sufficiently with the same procedure. Otherwise, the blocks of unhydrated lime could be deducted from the total sum of 10 salme, consequently subtracting the price and thus avoiding potential deception against the Order. According to the regulations, the obtained lime had to flow into pits with dimensions of 30 palms in length, 16 in width, and 10 palms in depth, capable of collecting a maximum volume of 80 salme of «net lime

[31] *Ibidem*.
[32] *Ibidem*.

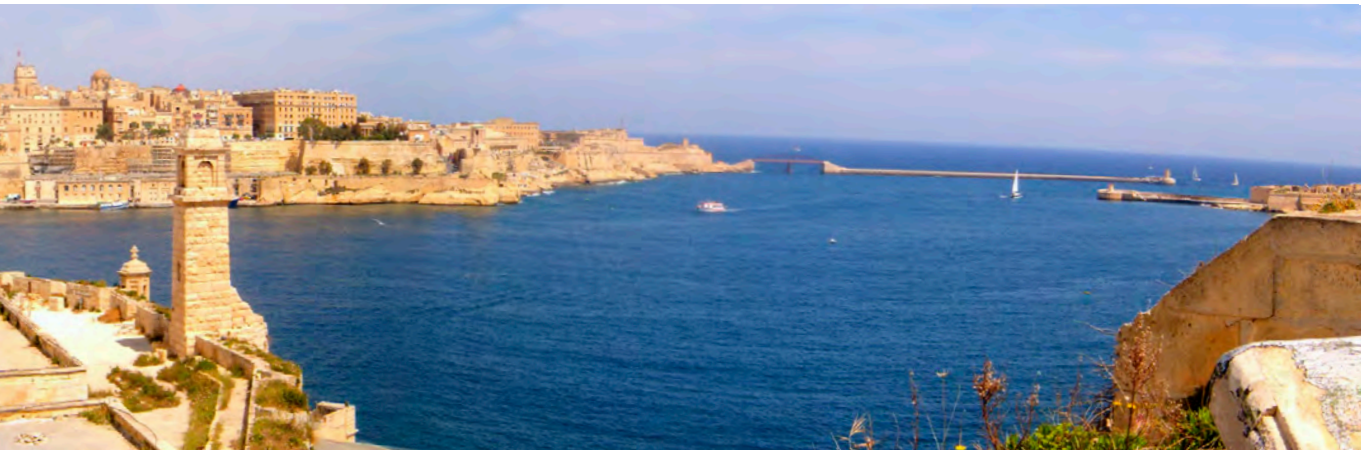
Fig. 11. View of the fortifications of St Angelo, Birgu, and the peninsula of Sciberras, Valletta, Malta (courtesy of Prof. Emanuel Buttigieg, 2022).

without stones»[33]. Lime was measured in "salme", from "salma", a capacity unit approximately equal to 275 liters, or 16 "tomoli", referred to as "tomini" in Malta. Alongside the deposits were channels with openings closed by plugs made with blocks of wax. This way, the limewater settled, heavy material fell to the base, separating from excess water, which then floated on the surface at a height of a span. Subsequently, as the lime settled, the excess water flowed outward once wax plugs at the sides of the pits were removed, where it was then collected for disposal. Only the channel in use remained open. The lime was then allowed to dry, with all excess water still draining away.
For the Order's safety, the "partirarij" or contractors left a kind of signed receipt indicating the net total of delivered lime and were then remunerated by the Common Treasury according to the terms defined in their contracts.

The distribution of lime

The document describes how, originally, it was common to consume lime in large quantities, often using "taini", a kind of mixture of lime powder with small amounts of light or dark sand and water, used to bind stones together and plaster walls. Since the results achieved in construction without such a mixed paste were equally suitable, it was decided not to use this mixture anymore unless a perfect mixture was achieved from the start, that is, made with ¾ dark soil and ¼ light soil. Black soil was obtained in the Maltese countryside, while light, a white soil, was obtained from stone extraction, sieved to obtain a fine powder. A specialised commissioner was responsible for the weekly supply of lime to the construction process based on the engineer's calculations, and once the quantity was known, the lime guardian was ordered to deliver everything as per the regulations: since only the commissioner had the key to the pits where the lime rested at the Calcara, the guardian «must return it to the said commissioner's house every evening and come to pick it up every morning»[34]. Transportation was carried out with «carts, or boats, or boys on their backs depending on the places»[35] using

[33] *Ibidem*.
[34] *Ibidem*, fol. 3r.
[35] *Ibidem*.



[11.]

barrels containing the lime. The barrels were duly numbered, with a specification of which pit the stone had been extracted from. The appointed lime guardian had to report weekly to the Order's commissioner on how much lime had been sent and subsequently draw up a monthly report with the exact number of barrels sent and the precise quantities of lime remaining in the pits at the Calcara.
In the last part of the document analysed so far, there is mention of the distribution of "pozzolana", a dark, brown, or black volcanic sand in powder form, usually mixed with lime to waterproof a well or a cistern and widely used in fortifications. As fortified curtains required well-anchored foundation plans, and the Maltese terrain was predominantly rocky, the pozzolana could be particularly suitable for this purpose. Since fortresses were built near cliffs for strategic reasons, the soil found there was more clay-based and did not provide good support for the weight on the foundations, causing settlements. In his speech *De varij modi di fondare una fortezza* (1566), Laparelli explained how to make a foundation platform using "pozzolana":

> because the same material is not found everywhere, therefore make it with pozzolana and with quarry sand or with river sand, and whether one or the other, do not mix it with earth [fol. 34r] because the earth is naturally antagonistic to lime[36].

If there was a need to use pozzolana in fortification works (fig. 10), the commissioner had to request a certain quantity on behalf of the "Congregazione della Guerra" or War Congregation from the Commissioner of the Warehouse of the Common Treasury ("Comun Tesoro"), specifying, in a receipt, the number of "salme" to be transported. In this case, as with lime, each weight corresponded to a significant difference in the account; for this reason, measurement was fundamental here as well. The pozzolana was transported by boats where needed in the fortification site: it was deposited in a safe and closed place. Also, for "pozzolana", as for lime, the procedure was strict, and the Order's Commissioner had to guard the key jealously, entrusting it only to safe figures. Only once ensured that he had secure individuals in front of him could he open «the said place to take the said pozzolana and bring it to the place of consumption»[37].

[36] BCAE, ms. 724, fols. 33v-34r.
[37] *Ibidem*.

Conclusions

The meticulous regulation of lime production and distribution in Malta under the patronage of the Order of Saint John of Jerusalem played a key role in shaping the island's construction landscape during the early modern period. Through an exhaustive examination of archival materials, this paper has unraveled the intricate process of lime production, underscoring its indispensable role in various construction projects, from fortifications to palaces. The stringent regulations enforced by the Order ensured the effective management of lime production, meticulously overseeing every aspect from quarrying to slaking and distribution, thus minimising wastage and upholding stringent quality standards. Furthermore, the integration of freshwater sources into lime production underscored the strategic significance of water supply for construction endeavors across Malta. Beyond lime, the island's construction industry relied on a diverse array of materials, including the locally abundant globigerina limestone, prized for its workability and aesthetic appeal, and pozzolana, a volcanic sand employed for waterproofing, and fortification works[38]. In addition to lime and other construction materials, the availability of freshwater sources was crucial for the construction of fortresses in Malta. The strategic importance of water supply cannot be overstated, as it not only facilitated the production of lime but also sustained the habitability and resilience of these military structures. The construction and maintenance of fortifications required substantial quantities of water, both for the preparation of building materials and for the daily needs of soldiers stationed within the forts. Moreover, the presence of freshwater sources within or near fortress sites was essential for withstanding prolonged sieges, ensuring a reliable water supply even during times of conflict. Thus, alongside lime production, the careful management of water resources played a crucial role in shaping the island's defensive architecture and bolstering its strategic position in the Mediterranean region. By delving into the nuanced nuances of lime production and its symbiotic relationship with other construction materials, this study underlines the multifaceted complexities of architectural innovation during the Knights Hospitaller rule of Malta, underscoring its enduring legacy in the island's rich architectural heritage (fig. 11).

[38] Pedley, Hughes, Clarke, Galea 2002.

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