The formation of the architect-engineer, *perito* and *agrimensore*, and their regulation by the Order of St. Johnin eighteenth-century Malta

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The foundation of Valletta in 1566 catalysed the development of the Maltese landscape. Malta in the early modern period was greatly modified by substantial development. By the eighteenth-century, foreign visitors arriving in Malta's harbour pictured the place as '*surrounded by high rocks, other parts by flat landscape. Everywhere one could see towns and a bit deeper inside there were plenty of country villas, gardens and streets*'.[1]

The early modern landscape was shaped by the architect-engineer, *perito* and *agrimensore*, central figures in its development as planned by the Order of St. John. Their involvement which related to the planning, management and regulation of development is seen at a strategic and micro level. The shaping of this landscape and its re-engineering followed strategies planned mainly by foreign military engineers. At a micro level, the design of a civil or ecclesiastical building was drawn by foreign resident engineers and local architects. Both levels of development were executed by the resident engineers and local *capi maestri*. The management of this landscape was on the other hand the role and task of the Maltese *perito* and *agrimensore*, who dealt with the technical aspects involving surveys, property valuations and the drawing of the measured areas. From the judicial aspect, the *perito*

1 A description of the Grand Harbour by Count Zinzendorf who visited Malta in the late 1760s as quoted in Thomas Freller, *Malta and the Grand Tour*. (Malta: Midsea Books, 2009), 130-131.

was engaged as a technical expert in court cases concerning property litigations.[2] Their contributions are documented in numerous archival records from the early modern period, including notarial acts, court and administrative records, cartographic sources and private notebooks.[3] Sustained development led to the advancement of the professions, which continued to develop particularly during the eighteenth-century.[4]

The aim of this paper is to study the formation of these professions in Malta and to define their roles and tasks through various examples from mid-1650s to the end of the 1700s. Some aspects on this subject were already discussed in earlier publications.[5] Other works mainly focus on

2 The judicial role of architect-engineers and *agrimensori* concerning property litigations will be the subject of a forthcoming paper.

3 An outline of some of the archival sources useful for the study of the Maltese landscape is published in M. Spiteri and N.C. Vella, *Documentary Sources for a Study of the Maltese Landscape*. In '*Storja*' (Malta:*Malta University Historical Society*, 2008), 16-29.

4 The concept of architect-engineer originates in the sixteenth-century under the Order of St. John: Denis De Lucca, *The Maltese 'Perit' in History*. In '*Melita Historica*' 6, 4 (1975), 431-436.

5 In his study, De Lucca (1975) writes about the architect's contribution in the development of Malta from 1722 to 1736 and in 1993 the development of Baroque architecture throughout the period of the Order of St. John. On a more specialised field related to fortress building, Hoppen (1979) and Spiteri (2008) elaborates on these contributions in particular that of the military engineer and the Maltese *capomaestro*. As to the regulation, structure and training of these professions, the subject was first introduced by Gatt in 1972 and was later followed by De Lucca (1975, 1993), Tonna (1993) and Zammit (2009). The foreign influences attained throughout the architectural works are outlined in De Lucca (1999, 2003 and 2004), Mahoney (1983) and Ellul (1989). The latest publication by Zammit (2009) illustrates the minute detailed workings kept in private notebooks of architects and *agrimensori*, as part of his studies on the genealogy of architects from the late 1700s to modern times.; Guzè Gatt, *L-Imgħallem tat-Tnax*. In '*l-orrizont*', (22nd-25th August 1972), 8; D. De Lucca, *Architects working in Malta during the Grandmastership of Manoel De Vilhena*. (University of Malta: unpublished B. Arch Hons. Dissertation, 1975); A. Hoppen, *The Fortification of Malta by the Order of St. John 1530-1798*. (Edinburgh: Scottish Academic Press, 1979), 131; L. Mahoney, *Blondel's influence on Maltese Baroque Church facades*. In '*The Architect*', (April 1983), 15-24; Michael, Ellul, *L-Arkitettura: xhieda ta' identità nazzjonali*. In T. Cortis, ed., *Identità Kulturali ta' Malta* (Malta: DOI, 1989), 93-116; D. De Lucca, *Baroque Architecture in Malta*. In R. Ellul-Micallef and S. Fiorini, eds., *Collected Papers published on the occasion of the Collegium Melitense Quatercentenary Celebrations, 1592-1992 (Malta: University Press*, 1993), 245-281; Jo Tonna, *Architectural and Urbanistic*

architectural development and the architect's contribution, but research on the *agrimensore* and his role in the formation of the rural landscape is still limited. Some publications include short biographies of architect-engineers and *agrimensori*.[6] In the absence of a comprehensive history of these professions, this paper will elaborate on key points central to their formation. The legal regulations mainly concerning the set-up of the professions and their educational background will be discussed in the first part. The discussion will follow with cases of commissions entrusted to these experts and will highlight their roles, workings, skills, collaborations and influences.

The State's legal regulation of architect-engineers and periti-agrimensori and their formation

In 1724 the Order of St. John defines and regularises the practices of *periti* and *agrimensori* as well as those of *mastri muratori* and *capimaestri*. In its codification of regulations concerning development ('*case e fondi*'), the De Vilhena Code describes the '*periti, ed agrimensori*' as those who completed surveys and valuation of urban as well as rural properties and reported on matters of property litigations.[7]

Traditions in Malta: How they were made and unmade. In R. Ellul-Micallef and S. Fiorini, eds., *Collected Papers published on the occasion of the Collegium Melitense Quatercentenary Celebrations, 1592-1992 (Malta: University Press*, 1993), D. De Lucca, *Carapecchia Master of Baroque Architecture in Early Eighteenth Century Malta*. (Malta: Midsea Books, 1999); D. De Lucca, *Mondion: the achievement of a French military engineer working in Malta in the early eighteenth century*. (Malta: Midsea Books, 2003); D. De Lucca, *Architecture in Malta*. In K. Gambin, ed., '*Malta: Roots of a Nation*' (Malta: Midsea Books, 2004); Stephen Spiteri, *The Art of Fortress Building in Hospitaller Malta*. (Malta: BDL, 2008); André Zammit, *Our architects their lives and times: a private archive unveiled from the times of the Order of St John*. (Malta: PEG, 2009).

6 The main biographies are included in Quentin Hughes, *The Building of Malta, 1530-1795*. (London: Alec Tiranti, 1967), 201-223; Leonard Mahoney, *5000 Years of Architecture in Malta*. (Malta: Valletta Publishing, 1996), 307-328 and in Michael Ellul, *Maltese-English Dictionary of Architecture and Building in Malta*. (Malta: Midsea Books, 2009).

7 *Leggi, e Costituzioni Prammaticali*, Codice Manoel de Vilhena 1724, T. 24, § 63,

The *agrimensore* or surveyor was a *misuratore di terreni o campi*.[8] The early modern *agrimensore* originates from the Roman *agrimensor* who practised *agrimensura*, in other words the art of mensuration or land surveying.[9] This association of the *agrimensore* with land and agricultural fields' surveys survives in the Maltese term *qajjvs yr raban* as the surveyor was called in the early modern period.[10] In addition, the *agrimensore* was assigned to accomplish surveys and estimates of civil and military structures. In fact, in *L'Agrimensore Instruito* (1758), Girri writes that '*per Perito Agrimensore s'intende uno, che sia capace di misurare, e stimare qualunque sorte di Terreno, e Fabriche*'.[11] On construction sites, the *perito* and *agrimensore* were also frequently engaged on aspects of quantification and surveying.

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f.120.

8 The term derives from the Latin word *agrimensor* meaning '*qui campos mensurat, et dividit*': Dominici Macri Melitensis, *Hierolexicon, sive Sacrum Dictionarium*. (Venice, 1735), 19; *Compendio del Vocabolario degli Accademici della Crusca*. (Firenze, 1734), 77; *La Coltivazione Italiana, o sia Dizionario D'Agricoltura*, Tomo I. (Venice, 1771), 26; G. B. Falzon, *Dizionario Italiano-Inglese-Maltese*, Tomo II. (Malta, 1882), 33.

9 In Medieval and early modern times, the *agrimensore* was also referred to as *extimator* (Latin *aestimare*; to estimate) and *perticator* (Latin *perticatus*; *perito*, *agrimensore*): D. Gasparini, *'L'arte di misurar et poner in dissegno' campi e paesi. Spunti per una storia dell'agrimensura in età moderna. (Secoli XVI-XIX)*. In G. Cecchetto, ed., '*La Podesteria di Castelfranco nelle mappe e nei disegni dei secoli XV-XVIII*' (Castelfranco Veneto, 1994), 273-289; Rosa Savarino, *Terre di Carta La rappresentazione del territorio netino nel XVIII secolo*. (Siracusa: Morrone Editore, 2011), 30. The act of measuring (*qajjes* or *prendere la misura*) was performed by a measurer (*misuratore*), in Maltese known as *qajjvs*. The etymology of *qajjes* derives from *qies*, to measure: *Queen Anna's New World of Words, or Dictionarie*. (London, 1611), 317; Michaelis Antonii Vassalli, *Ktyb yl Klym Malti, Lexicon*. (Rome, 1796), 398; G.F. Agius de Soldanis, *Damma tal kliem kartaginis fel fom tal Maltin u Ghaucin Italiano-Latino-Maltese Tomo. III*, f.370v, NLM Libr. 143; Guze Aquilina, *Maltese-English Dictionary*. (Malta: Midsea Books, 1987), 1107, 1150.

10 *Qajjys yr raban* or *kajes tal-art*, a surveyor who measured land was also known as *misuratore del terreno* or *perit tar-raban u d-djar*: *Cyclopaedia*, 2v. (London, 1728), 157; Vassalli, *Lexicon*, f.398; Agius de Soldanis, *Damma*, f.370v; G.B. Falzon, *Dizionario Maltese-Italiano-Inglese*. (Malta, 1845), 200, 210; Falzon, *Dizionario*, 33, 541, 476. The Sicilian counterparts were known as *curdiaturi*, which word derives from *corda* (cord) by which the land was measured: Michele Pasqualino, *Vocabolario Siciliano Etimologico*, Tomo II. (Palermo, 1785), 396.

11 Francesco Maria Girri, *L'Agrimensore Instruito*. (Venice, 1758), 1.

The design and construction of buildings and infrastructure was rather the competence of the architect or the engineer.[12] In Malta, the profession of an architect-engineer served three different roles related to the planning, design and direction of constructions. The planning of the early modern landscape, in particular aspects of fortifications and urbanism, was designed by foreign architects, engineers or town planners. These were brought to Malta by the Order for short visits but specifically to advise on and to plan building strategies. Other foreign resident architects and engineers, commissioned by the Knights for longer periods, alongside local architects or *capi maestri* populated baroque cities and towns with high-design buildings of both a civil and an ecclesiastical function. The local architect or *capomaestro* and *mastro muratore*, as the architect was commonly known in historical sources, also drew more simplistic designs for the building of ordinary urban and rural dwellings. The planned development and the detailed designs were implemented on the directions of the foreign resident engineers and local *capi maestri* who served a secondary role as part of their profession of architects and engineers in Malta.[13]Although, the professions of an architect-engineer, *capomaestro* and *perito-agrimensore* are defined to comprise different forms and complexities, these professions are nonetheless documented to have been closely related. Their interrelation was to the extent that some of the tasks pertaining to one were also completed by the other. It was a common practise for the same person to exercise contemporaneously the

12 *New World of Words*, 36; *Cyclopaedia*, 128; Falzon, *Dizionario*, 66; V. Busuttil, *Diziunariu mill Inglis ghall Malti.* (Malta, 1900), 27. By the mid-1500s, military architecture became distinct from civil aspects: A. Hoppen, *Military engineers in Malta, 1530-1798.* In '*Annals of Science*', 38, no. 4 (1981), 413-433.

13 The roles played by foreign and local architects, engineers and *capi maestri* in Malta are explainedin De Lucca, *Baroque Architecture*, 249-50 and in Tonna, *Architectural and Urbanistic Traditions in Malta.*Although the *capomaestro* was the master in charge of a building site entrusted with the progress and the smooth running of the work force, he was also expected to interpret plans and design certain parts of the building. The term architect specified the profession rather than the role. At that time, an architect was not only associated with the field of architecture, but was also associated with other artistic fields like sculpture: G. Privitelli, *The Parish Church of St. Catherine of Alexandria in Żejtun: An Architectural Appraisal.* (University of Malta: unpublished Bachelor of Arts in History of Art, 2013).

profession of architect or *capo maestro* and *perito agrimensore*.[14] The Maltese scenario reflects the situation as existing in early modern Italian states. The same persons exercised these professions in the Duchy of Tuscany, Modena and Reggio, Genoa, the Papal States in particular Bologna, the Republic of Venice and the Kingdom of Naples, with the exception of the Duchy of Milan.[15] The indistinct exercise of these professions was conceded by the Order. The Order considered the close relation of these professions important, especially since the urbanisation, water supply and fortification of the harbour area had to form in a confined spatial parameter. This envisaged that anyone practising these professions had to possess a thorough know-how in both architectural design and civil engineering.[16] Those who practised

14 De Lucca, *The Maltese 'Perit'*, 431 refers to the dual role of a person as both as an architect and engineer. The *agrimensore,* who is not included, is extensively documented to form part of the same concept. Their interrelation survives into the 1800s, as seen in the dictionary of Falzon, *Dizionario* which points out that the *perito* was also referred to as *peritoarchitettoagrimensore* (P.A.A): Erin Serracino-Inglott, *Miklem.* (Malta, 1975), 54.

15 L. Rombai, *La formazione del cartografo in età moderna: il caso Toscano.* In '*Cartografia e istituzioni in età moderna*', Atti del Convegno 3-8 novembre 1986. (Roma, 1987), 369-414; G. Angelini, *Agrimensura e produzione cartografica nel regno di Napoli in eta' moderna.* In '*Cartografia e istituzioni in età moderna*', Atti del Convegno 3-8 novembre 1986. (Roma, 1987), 122-3; E. Filippi, *L'agrimensura nel Seicento e nel Settecento: cartografi, mappe, periti e perizie.* In P. Brugnoli, ed., '*Misurare la terra', agrimensura e cartografia, catasti e catastici a Verona dall'età romana ai nostri giorni*'. (Verona, 1992), 221-273; A.R. Bambi, *Un caso Bologna? La professione di 'perito' fra norma e prassi.* In A.M. Guccini, ed., '*Memoria disegnata: documenti, lettura, conservazione, utilizzo*'. (Bologna, 2004), 131-155; M.L. Scarin, *Cabrei, Mappe e Periti agrimensori nel Reggiano.* In M. Petrella *et al.*, eds., '*Geo-grafie di un territorio Studi e ricerche per un Dizionario storico dei cartografi in Emilia-Romagna*'. (Bologna, 2006), 75-80; Zammit, *OurArchitects*, 23. In Milan, by mid-seventeenth century the *agrimensore* was already deterred from undertaking complex tasks considered to pertain to the work of an engineer. In the other Italian states, as in Malta, a more distinct practise of these professions starts to appear towards the late eighteenth and nineteenth-centuries. Still the exercise of both professions by the same person persists as attested for instance by the petition of Giorgio Pullicino who in 1830 asked to become '*architect and agrimensore*': M. Ellul, *Giorgio Pullicino (1779-1851) Architect and Painter A Biography.* In Can. J. Azzopardi, ed., '*Giorgio Pullicino (1779-1851) Architect and Painter*'. (Malta, 1989), 46-47.

16 De Lucca, *The Maltese 'Perit'*, 433.

these professions were commonly referred to as *perito* and *maestro*.[17] A *perito* was a skilled person in varying professions. These were experts of particular competences and technical capabilities who were asked to estimate or solve matters of a dubious nature and provide their *perizia*.[18]

The State played an important role in the legal regulation of these professions. The Order ensured that persons employed as *mastri muratori*, *capi maestri*, *periti* and *agrimensori* on various public and private projects possessed proficient qualifications and skills. The Order's control of the *periti* followed Europe's centralisation in the re-organisation or new set-up of colleges and commissions for the professions' regulations, as seen in the Italian states and later in Spain.[19] The organisation of these professions and measures for their approval was regulated as recorded in legal documents identified

17 The master (*maestro*) derived from Latin *magister* was a person skilled in a particular art and titled *perito*: *Compendio del Vocabolario*, 498; Agius de Soldanis, *Damma*, f.434r. In *Leggi, e Costituzioni*, 187, *agrimensori* and *calcolatori* are jointly referred to as *periti*.

18 V. Mortillaro, *Nuovo Dizionario Siciliano-Italiano*. (Palermo, 1853), 640. Various other forms of the term *perito*, like *maestro perito*, *perito agrimensore* and *perito architetto* are recorded in administrative and legal documents as well as in printed sources such as in G.A. Ciantar, *Malta Illustrata*. (Malta, 1780). The *perizia* (*relazione* or report) entailed an assessment, which in the case of the professions understudy included measurements of land, fields and buildings in order to estimate properties, to give advice on technical matters and judgment in cases of litigations: *Compendio del Vocabolario*, 614; *Vocabolario Veneziano e Padovano. (Padova,* 1796), 230; Mortillaro, *Nuovo Dizionario Siciliano-Italiano*, 640; Falzon, *Dizionario*, 538.

19 In Rome, the General Congregation of Agriculture on 19 November 1750 established that persons aspiring to become *agrimensori* were first to be examined by two experts in the profession and in the presence of at least two members of the state: E. Luciani, *Storia degli agrimensori e geometri dalle origini al 1900*. (Cosenza: Ordine provinciale geometri, 1988), 168. Alfredo Faus Prieto, *El Ejercicio Profesional de la Agrimensura en la España del siglo XVIII: Titulacion Academica y Formacion Teorica de los Peritos Agrimensores*. In '*LLULL*' Vol. 18 (1995), 425-440; Giovanni Liva, *Il Collegio degli Ingegnieri e Agrimensori di Milano dal '500 al primo decennio dell'800*. In '*Cartografia e istituzioni in età moderna*', Atti del Convegno 3-8 novembre 1986. (Roma, 1987), 467-487; M. Garafoli, *La figura professionale, la formazione e la professione di geometra in età francese e austriaca*. In P. Brugnoli, ed., '*Misurare la terra', agrimensura e cartografia, catasti e catastici a Verona dall'età romana ai nostri giorni*' (Verona, 1992), 359-379; Bambi, *Un caso Bologna?*, 132.

to date, first by the 1646 ordinance and later in 1724 by the *Codice Vilhena* and the De Rohan Code in 1784.[20] In 1646, the Order decreed that new buildings could only be constructed by *mastri muratori* who were licenced by the *commissarii delle case*. The Order ensured that buildings followed architectural principles, especially since various litigations were occurring among property owners. The regulation of stone masons was also emphasised in both codices which specified that '*nessun in avvenire potrà fare il muratore senza nostra espressa licenza, e senza l'approvazione de' capi maestri, precedente l'esame*'.[21] As in the 1600s, the Order insisted that constructions were '*secondo il buon uso e costume, ed a norma dell'arte*', as otherwise they would be demolished.

At least since 1724, as stipulated in *Codice Vilhena*, the *commissarii delle case* had also to ensure that persons practising as *periti* and *agrimensori* first pass a rigorous examination. This regulation followed practises common to Spanish and Italian states including Sicily, Udine, Milan, Bologna and Veneto.[22] Their colleges together with qualified *periti* examined the petitioners at varying levels from oral exams on elementary arithmetic and geometry to practical exercises. This ensured that the *periti, ed agrimensori* practising in Malta possessed proficient qualifications. The exams were held by the *Officium Commissarium Domorum* (*officio delle case*), whose commissioners had to give advice to the Grand Master about those persons who should be accepted.[23] Those persons found suitably qualified were licensed by the Grandmaster and after being registered by the notary of the *officio delle case* they could exercise the professions.[24] The Order recognised no persons as *periti* if

20 *Ordinazione sopra le case*, 1646: N[ational] L[ibrary] M[alta], Arch. 194, f.240r; *Leggi, e Costituzioni*; *Del Dritto Municipale di Malta*. (Malta, 1784).

21 *Leggi, e Costituzioni*, f. 120r; *Dritto Municipale*, ff.145r-146v.

22 Filippi, *L'agrimensura nel Seicento e nel Settecento*, 228; Bambi, *Un caso Bologna?*, 131-32; Liva, *Il Collegio degli Ingegnieri e Agrimensori di Milano*, 480; Faus Prieto, *El Ejercicio Profesional de la Agrimensura*, 430; Gasparini, *L'arte di misurar*, 274-75; Savarino, *Terre di Carta*, 33-34.

23 For various petitions and commissioner's recommendations that survive for the eighteenth-century see: NLM, Arch. 1188, f. 14v; 1192, f. 258v.

24 In Bologna and Udine the accepted *periti* were registered in a list: Bambi, *Un caso Bologna?*, 131-2; Gasparini, *L'arte di misurar*, 275. For Malta, these records remain to date unknown.

these were not subject to these regulations. In fact, *perizie* of persons not approved by the Order were not valid to the extent that the courts and public notaries were not to accept their work.[25]

During the eighteenth-century, numerous petitions from persons who sought to work as *periti* and *agrimensori* were received by the *officio delle case* for their consideration.[26] As stipulated in the 1724 *Codice*, those practising these professions *siano sempre dodeci solamente, e non più per tutto questo nostro Dominio.* In fact, in most cases petitions were only made once a vacancy occurred due to the demise or retirement of a *perito*. In 1761, three posts became vacant following the deaths of *capomaestro* Francesco Zerafa, *maestro* Giovanni Domenico Cachia and *maestro* Giuseppe Fenech.[27] At least two persons, Antonio Cachia and Andrea Psaila petitioned to become *periti* that year. By 1762, records show that Cachia (from Burmola) and Psaila (Città Pinto) together with Giuseppe Bonnici (Floriana) as *capo maestro*, Felice Vella (Floriana), Nicola Camilleri (Floriana), Antonio Pulicino (Valletta), Giacomo Bianco (Zejtun), Sebastiano Saliba (Asciac), Arcangelo Zamit (Zurrico), Maurizio Schembri (Zebuc), Michele Cassar (Balzan) and Francesco *detto ta laiutante* (Nasciaro) were the twelve *maestri*.[28] Some of the *periti* enlisted in this document are known to have been active during the early eighteenth-century, while the others were newly elected in the mid-1700s. Although, these *periti* came from different localities in Malta, no *periti* are registered to be working in Gozo at the time.[29] Nonetheless, it is known that Gozo was allowed to have two *periti*.[30] This transpires from a 1778 petition in which Ludovico Portelli asked to replace *maestro perito* Ludovico

25 The nullity of *perizie* made by non-recognised *periti* was also the case in other Europan states like Milan and Rome: Liva, *Il Collegio degli Ingegnieri e Agrimensori di Milano*, 473; Luciani, *Storia degli agrimensori*, 168.

26 For the 1600s, only one petition that about the election of Barbara as *capo maestro* in 1681 was traced to date: NLM, Arch. 1185, ff. 36r-436v.

27 NLM, Arch. 1190, ff. 156r-157v; Giovanni Bonello, *The Cachia Dynasty of Architects*. In '*The Sunday Times*', (10 December 1995), 57.

28 NLM, Libr.10, f.444.

29 The 1762 list suggests that the twelve *periti* worked in the immediate vicinity of their places of origin, covering the main towns and cities in Malta.

30 Gatt, *L-Imgħallem tat-Tnax*, 22nd August 1972, 8.

Valletta one of the two *periti* in Gozo.[31] In 1762, Valletta was surely practising his profession considering that by 1778 he was in his eighty years of age. This clearly shows that the 1762 document omits the two *periti* from Gozo and that at least by the second half of the eighteenth-century two other *periti* were approved besides the twelve *maestri periti* working in Malta.

Amongst these petitions, there were others who petitioned to be elected as *capi* of various offices (Tables 1 and 4). The *capo maestro*, a master mason in charge of builders was a *perito* often specialised in architecture.[32]

Capi Maestri dell'Opere et fortificationi	? - 1646	1646 - 1681	1681 - 1715	1715 – 1758	1758 - 1779	1779 - 1813
	Nardo?	Clemente Muscat	Giovanni[33] Barbara	Francesco Zerafa	Giuseppe Bonnici	Antonio Cachia

Table 1: The Maltese *periti* who occupied the post of *capo maestro dell'Opere et fortificationi* during the last century and a half of the Order of St. John.

31 NLM, Arch. 1193, ff.52r-53v.

32 D. De Lucca, *Mdina A History of its Urban Space and Architecture.* (Malta: Said International, 1995), 137. The *capomaestro*'s knowledge in architecture is documented in several cases, such as during the building of the Żejtun Parish Church: Privitelli, *The Parish Church of St. Catherine*, 140-142. In her study, Privitelli re-evaluates the extent of architect Gafà's contribution to our architectural collective memory and recognises the involvement of *capimaestri* Alessandro Pulis, Giuseppe Bonnici, Giacomo Bianco and the Cachia family in the architectural history of this church concluding that the church does not rest on 'the name of one single architect'.

33 As documented, by 1715 Barbara was already replaced by Zerafa: NLM, Arch. 6552, f. 23v; De Lucca, *Architects working in Malta*, 252.

These *periti* were to execute, direct and supervise works of various offices and foundations including the *officio dell'opere et fortificationi, officio delle case, segrezia magistrale, fondazione Cottonera, fondazione della Monte della Redenzione* and *fondazione Manoel.*[34] In 1757, Giuseppe Bonnici petitioned to become *capo maestro della segrezia magistrale* and *delle case*, and a year later as *capo maestro dell'opere et fortificationi, fondazione Cottonera* and *fondazione del Monte della Redenzione*. Other similar petitions in the eighteenth-century are those of Antonio Cachia, the first in 1761 to replace his father Giovanni Domenico Cachia as *capo maestro della fondazione Manoel*[35] and the second, some years later, to be elected as *capo mastro dell'opere et fortificationi, fondazione Cottonera* and *fondazione del Monte della Redenzione* following the death of Bonnici in 1779. It was common for these *periti* to occupy more than one post within the different offices.

The *officio delle case*, in examining persons who aspired to become *periti* and *agrimensori*, sought requisites considered essential for the best practise of these professions.[36] These not only included competencies in theoretical principles and practice mainly in arithmetic and geometry, but also specific skills in the art of building, land measuring, land division and valuation. The architect, according to Romano Fortunato Carapecchia's *Compendio Architettonico* was to be fully conversant in both civil and military architecture.[37] In fact, the *capo maestro dell'opere* being the most proficient in these skills, was asked by the *officio delle case* to sit on an evaluation board and examine the petitioners.[38] The petitioner was asked various questions *in riguardo all'arte di misurare, quanto intorno le regole di geometria* and had also to indicate that he possessed a good understanding of the

34 NLM, Arch. 6397 f.99v; 1186, ff. 362r-362v; 1189, f. 347r; 1190, ff. 357r; 147r-147v; 1193, f.164r; De Lucca, *Architects working in Malta*, 254; G. Bonello, *Art in Malta: Discoveries and Recoveries*. (Valletta: Patrimonju Publishing, 1999), 173.

35 It was a common practice, at least since 1636, that posts within the Order were inherited from father to son: NLM, Arch. 6552, f. 23v.

36 NLM, Arch. 1190, f. 147v; 1192, f. 458v; 1193, f. 53r.

37 De Lucca, *Architects working in Malta*, 199-200; NLM, Libr. 81, ff. 1r-2v as transcribed in De Lucca, *Carapecchia*, 231-243.

38 NLM, Arch. 1193, f. 53r-53v.

law regarding *delle case e fondi* as stipulated in Codice Vilhena and Rohan. A case in point is that of Ludovico Portelli who in 1778 was rigorously interviewed by the *capo maestro dell'opere* and *secondo ingegniero* Giuseppe Bonnici. Any person who lacked proficiency was not accepted, as happened to Pasquale Sammut in 1784 who was told that he could not *esercitare per ora l'impiego di perito agrimensore, avendo bisogno di maggior teorica.*[39]

In electing *periti*, the *officio delle case* also considered testimonials in favour of the petitioner.[40] In 1794, Francesco Sammut who petitioned to become *perito agrimensore, ed estimatore di beni urbani* presented also a testimonial from the *capo maestro dell'opere* Antonio Cachia. It was attested that Sammut accomplished various works following the designs of the same *capo maestro*, in particular as *soprastante* during works at Fort Tigné. The *capo maestro* also highlighted the proficient practice of Sammut *nell'arte di fabricare, nell'aritmetica, nella geometria e nelle stime di fabriche e misure di terreni.*[41] A similar testimonial was written in 1761 by the Governor of Fort Manoel for Antonio Cachia when the latter petitioned to become *capo maestro* of *Fondazione Manoel.*

The Order also received petitions at times when no vacant post existed amongst the twelve *periti.* Several persons asked to become a *perito estraordinario* or a *sopranumerario* and be accepted above the number of *periti* usually elected. In the course of the eighteenth-century, four such petitions: that of Giuseppe Bonnici (1750), Ludovico Portelli (1777), Michele Cachia (1784) and Francesco Sammut (1794) are known to have been made to the Order.[42] The Order considered these petitions and evaluated the petitioners in the same manner as discussed above. Those persons who possessed the required capabilities were

39 NLM, Arch. 1194, f. 282v.

40 NLM, Arch. 1190, f. 147v; 1197, f. 337r. The practise of getting a testimonial s signed by an established expert who certifies the apprenticeship of the petitioner was common also in Europe such as in Sicily and Venice: Garafoli, *La figura professionale*, 374-5; Savarino, *Terre di Carta*, 31.

41 In 1792, the Maltese engineer Antonio Cachia supervised works at Fort Tigné following designs of the Order's chief engineer Stefano de Tousard: S.C. Spiteri, *Fortress of the Knights*. (Malta: BDL, 2001), 319.

42 NLM, Arch. 1189, f. 229r; 1193, f. 55r; 1195, f. 40r; 1197, ff. 336r-336v.

recognised as *periti sopranumerari or estraordinari*, as were Bonnici, Portelli and Cachia. Still, these had to petition again once a vacancy amongst the twelve *periti* occurred in order to be nominated as *periti ordinarii* or *numerarii.* The *periti sopranumerari* were not permitted to carry out *perizie* or *relazioni*. In fact, on various instances it is recorded that the *periti sopranumerari* objected to these restrictions as did Antonio Cachia in 1761 who expressed in his petition that although he was elected *capo maestro della Fondazione Manoel*, he was not yet approved as *perito numerario*. Further, Cachia stressed that due to this situation he experienced *gravissimo pregiudizio*, as did also Giuseppe Bonnici in 1756 who could not *misurare, e stimare, come per dividere qualunque spezie de beni* unless there was a vacancy amongst the twelve *periti*.[43] Although not elected by the Order, other persons were nonetheless practising certain tasks of these professions by assisting the twelve *maestri*. This suggests that not all *periti* mentioned in archival documents were those recognised by the Order to do *perizie*.

In their formative years, the Maltese *periti* ensured that they achieved an adequate level of knowledge and skills so as to be able to practise these professions as *maestri*. In fact, Francesco Zerafa, Sebastiano Saliba, Antonio Cachia and Ludovico Portelli were involved in these professions from a young age until they attained enough experience *per poter esercitare tall'arte in qualità di maestro agrimensore*.[44] Their learning, based on individual initiatives, involved self-teaching and years of apprenticeship during which they focused on the theoretical principles of arithmetic and geometry, but mainly on field practise. In early modern society, apprenticeship occurred within *botteghe* (workshops) established widely by various *maestri* who exchanged their expertise with the younger generation.[45] This transfer

43 NLM, Arch. 1189, f. 76r; 1190, f. 157r.

44 NLM, Arch. 1186, f. 362r; 1188, f. 23r; 1190, f. 147v; 1193, f. 55r.

45 These petitions record various instances of persons aspiring to become *periti* who worked alongside established experts. In his biography on T. Dingli, Calleja writes that children showing the least sign of interest in architecture were immediately assigned to a *bottega* of a known artist: G. Calleja, *Tommaso Dingli, architetto ed ingegnere*. In '*L'Arte Periodico Patrio-Bimensile III*', no. 66 (1865), 5-6. E.F. Montanaro, *The Building of a New Church dedicated to Saint Julian 1682*. In '*Melita Historica*' 11, 1(1992), 35-58; De Lucca, *Architects working in Malta*, 254; Savarino, *Terre di Carta*, 32.

of knowledge was a typical model in European states and prevailed throughout this period. In most cases, an apprenticeship was served in a familial setting which ensured the inheritance of knowledge from one generation to the next and thus maintained their social status.[46] This familial connection occurred between father and son, uncle and nephew like the Cachia and Pulis families, and also by architects who married the daughters of other architects, such as Clemente Zahra and Andrea Lia who married the daughters of *maestro* Giovanni Bonavia.[47] In the late 1700s, Pasquale and Francesco Sammut, Saverio Xerri and Michele Cachia were all related. The occurrence of apprenticeship in family *botteghe* is recorded in at least three instances: Lorenzo Gafà who in 1655 at the age of 16 was still an apprentice together with his brother Melchiore at their father's *bottega di scalpellini*, Tommaso Dingli who was first trained by his father as a sculptor, and Antonio Cachia who in his 1761 petition states that he assisted his father *capo maestro* of *Fondazione Manoel* for sixteen years.[48] The young enthusiasts were assigned to already established *maestri periti* such as Tommaso Dingli who in the early seventeenth-century is known to have learned under Giovanni Attard and also probably with Vittorio Cassar.[49] During the mid-1600s, the resident engineers Francesco Buonamici and Mederico

46 Andrew P. Vella, *Storja ta' Malta*. (Malta: Klabb Kotba Maltin, 1979), 42; Tonna, *Architectural and Urbanistic Traditions in Malta*, 587; Angelini, *Agrimensura e produzione cartografica*, 121; Rombai, *La Formazione del Cartografo*, 372-3; Liva, *Il Collegio degli Ingegnieri e Agrimensori di Milano*, 473; Jo Tonna, *L-Arkitettura f'Malta*. Kullana Kulturali. (Malta: PIN, 2004), 19.

47 C.G. Bonavia, *Portrait of an Architect: Giovanni Bonavia (1671-1730)*. In '*The Sunday Times*', (7 September 1986), 23; Zammit, *Our Architects*, 19; Privitelli, *The Parish Church of St. Catherine*, 143.

48 An interesting manuscript about the lives of some popular Maltese artists, architectsand *capimaestri*was compiled by a Capuchin Friar, Dott. Bartolomeo Mifsud (1707-1781), better known as Padre Pelagio. In 1825, the document was copied and annotated by Count Saverio Marchese: *Uomini Illustri di Malta*, NLM, Libr.1123. Dominic Cutajar, *Architect Lorenzo Gafà (1693-1703)*. In '*The Sunday Times, Architecture Supplement*',(2 August 1981), XIV-XV; Mario Buhagiar and Stanley Fiorini, *Mdina: The Cathedral City of Malta*, Vol. I. (Valletta: Central Bank of Malta), 223; Mahoney, *5000 Years of Architecture in Malta*, 150.

49 Mahoney, *Blondel's influence*, 15; *L.* Mahoney, *17th Century Architecture*. In '*Maltese Baroque, Proceedings of a Seminar on 'The Baroque Route in Malta'* 3 June 1989 (Malta-Strasbourg), 15–9; Konrad Thake, *Baroque Churches in Malta*. (Malta: Arcadia, 1995), 2, 8; Buhagiar, *Mdina*, 221; Tonna, *L-Arkitettura*,150-1.

Blondel trained Maltese architects like Lorenzo Gafà, Giovanni Barbara and Francesco Sammut. According to Ciantar, other Maltese architects trained under Gafà who had his architectural school.[50]

As seen above, most of the Maltese *periti* came from amongst the stone masons and sculptors who later attained knowledge in the professions of architect-engineers and *agrimensori*.[51] Although they were more acquainted with the building industry to the extent that in some cases they lacked a sound knowledge of theory, still the expertise of Maltese stone masons in the local building industry was considered essential by the Knights.[52] In the course of the eighteenth-century, five *periti*: Sebastiano Saliba (1736), Saviano Scerri (1779), Michele Cachia (1784), Pasquale Sammut (1784) and Francesco Sammut (1794) who petitioned to become *periti agrimensori* were previously licensed and had worked for a number of years as *mastri muratori*.[53] The practical preparation of the *perito* included experience in various works, for nstance construction of major and smaller buildings as well as surveys of rural land estates.[54] In fact, during their apprenticeship these *aiutanti* worked together with *famosi ingegnieri* and *capimaestri* as did Matteo Bonavia who assisted the *capo mastro dell'opere* and *secondo ingegniero* Giuseppe Bonnici and Francesco Sammut who assisted *capo mastro dell'opere* Antonio Cachia on various works including Fort Tigné.

The emphasis placed on the practical aspect of the professions sometimes undermined the fulfilment of a sound knowledge in the theoretical principles of arithmetic, geometry and architecture. These deficiencies were countered for by the individual's interest in self-learning who acquired various manuals and treatises on military as well as civil architecture and *agrimensura* as basis for his formation and advancement of the profession.[55] These books, written by well-

50 Ciantar, *Malta Illustrata*, 545-6.

51 Gatt, *L-Imgħallem tat-Tnax*, 22 August 1972, 8.

52 De Lucca, *The Maltese 'Perit'*, 432; Spiteri, *The Art of Fortress Building*, xiii.

53 NLM, Arch. 1188, f. 23r; 1193, f. 195r; 1194, f. 282r; 1195, f. 41r; 1197, f. 336r.

54 NLM, Arch. 1186, f. 362r; 1192, f. 458r; 1197, f. 337r. Several *agrimensori* assisted engineers on various fortification projects: Spiteri, *The Art of Fortress Building*, 171.

55 Savarino, *Terre di Carta*, 32-3; Tonna, *Architectural and Urbanistic Traditions in*

known mathematicians, architects, engineers or *agrimensori* included Vitruvius' *Dieci Libri di Architettura* (Venice, 1556), Leon Alberti's *L'Architettura* (Florence, 1559), Bartoli's *Del Modo di Misurare* (Venice, 1564), Carapecchia's *Compendio Architettonico* (Rome, 1690), Clairaut's *Elemens de Geometrie* (France, 1741), G.A. Alberti's *Istruzioni Pratiche per l'Ingegnero Civile, o sia Perito Agrimensore, e Perito d'Acque* (Bologna, 1748)[56], Perini's *Geometria Pratica* (Verona, 1750) and Pomodoro's *Geometria Pratica* (Rome, 1772). In fact, throughout early modern times these books were so widely in circulation in Europe and Malta that the most acclaimed books ended in the hands of numerous persons including knights, architects and *capi maestri* who interested themselves in these subjects. Such was the case of Francesco Sammut who possessed two French text books: one called *Le Neuve architecture* and the other *Fortificatione e prospecti*.[57] Experience, manuals, treatises, instruments and also patrons were all essential elements for the practise of the professions. A less 'academic' instruction of the illiterate stone mason came through the possession of pattern-books like '*Il Vignola Illustrato*' (1770), but mainly through the reading of high-design buildings which increasingly became to offer 'a pattern-book of stone'. The architectural details and motifs of these buildings were copied to incorporate in the ordinary design.[58] The traditions of apprenticeship and building styles facilitated this inheritance.

The educational input of the Order of St. John with respect to the formation of these professions was indirect. Just as in Europe, the Knights never established a local school for the formation of architect-

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Malta, 579. Various editions of these books are today found at the National Library of Malta. The Library collection increased especially after the Order's Chapter General decided that books originating from the wills of the Knights be given to the Order for an establishment of a library: M. Ellul, *In search of Girolamo Cassar: an unpublished manuscripts at the State Archives of Lucca*. In '*Melita Historica*'14, no. 1 (2004), 29-51; Hoppen, *Military Engineers in Malta*, 430.

56 An 1804 edition of the book which belonged to one of the Maltese *periti* survives in a private archive: A. Zammit, *Antonio Cachia's estate*. In '*The Sunday Times*', (25 February 1996), 37.

57 Mahoney, *Blondel's influence*, 18, fn.5 referring to N[ational] A[rchives] M[alta] at Mdina M.C.C.A.O., Vol.306, ff.110-9.

58 Tonna, *Architectural and Urbanistic Traditions in Malta*, 581-2.

engineers nor for the*periti-agrimensori*.[59] Indeed, many on their own initiative sought to learn the basics of arithmetic and geometry which at the time were taught as part of mathematics in private schools, the Jesuit College and after 1768 at the university.[60] In the mid-seventeenth-century, the Order recognised mathematics, which discipline at the time included algebra, arithmetic, Euclidian and military geometry, as an important part of the educational input. In 1637, during his brief visit to Malta, the renowned Jesuit Athanasius Kircher was assigned to teach mathematics. The Jesuit involvement in the instruction of mathematics continued until 1768 through its Italian and French mathematicians.[61] An insight into the lectures given at the *Collegium Melitense* by the Jesuits Jacobus Masò and Angelo Aguillera survives in two manuscripts entitled *Problemi Geometrici Cavati ... dal trattato della Geometria Militare dettato in Malta dal P. Giacomo Masò della Compagnia di Gesù Professore di Maltematica* and *Trattato dell'Aritmetica Prattica.* The significance of mathematics for the advancement of the social necessities was deemed crucial in the case of Grand Master Pinto de Fonseca who assigned the mathematician Giuseppe Zahra to work on the Order's scientific projects which related to hydrology, fortifications, navigation and the silk industry.[62] The establishment of a specific

59 De Lucca, *Architects working in Malta*, 17.

60 The teaching of mathematics at an elementary level was taught in schools run by the *Università*, the Church and other private schools. The discipline was also taught at the Jesuit College since its set-up in 1592: Vella, *Storja ta' Malta*, 39-43; S. Fiorini, *The development of mathematical education in Malta to 1798: A case study of cross-cultural influences*. In V. Mallia-Milanes and S. Fiorini, eds., '*Malta: a case study in international cross-currents. Proceedings of the First International Colloquium on the History of the Central Mediterranean*, 13-17 December 1989' (Malta: Malta University Press, 1989), 111-145.

61 Specific funds for the teaching of mathematics by a Jesuit priest were left by Grand Master Lascaris: *Trattados del Priore Caravita*, NLM, Arch. 1680, f. 154; S. Fiorini, *The Collegium Melitense and the Universitas Studiorum to 1798*. In R.G. Sultana, ed., '*Yesterday's Schools Readings in Maltese Educational History*' (Malta: PEG, 2001), 31-58. D. De Lucca, *Jesuits and Fortifications* (Leiden and Boston, 2012), 235-304.

62 In his early years, Giuseppe Zahra studied in Malta under the Jesuits and later taught mathematics to the Knights. Raffaele Grillo, *Giuseppe Zahra, maltese, professore nell'Università di Catania*. In '*Melita Historica*' 7, no. 3 (1978), 234-6; Fiorini, *The development of mathematical education*, 137.

school focusing on design, painting, sculpture and architecture was only opened later under the British in 1802.[63]

In the absence of an advanced academic training, architects enhanced their education abroad by joining foreign academies and develop new ideas.[64] The main European academies were the *Accademia di Belle Arti e del Disegno* in Florence, the *Accademia di San Luca* in Rome and later the Royal Academies of Fine Arts in Madrid and Valencia.[65] During the 1600s, the *Accademia di SanLuca* focused on major arts integrating architecture, painting and sculpture as their main subjects.[66] Their teachings included the principles of civil and military architecture, human anatomy, geometry, the orders of architecture and perspective drawing. Still, the lectures at the academy were limited, since students were expected to spend most of their time at the artist's *bottega*. A number of Maltese *periti* are known to have studied abroad mostly at the Roman academy.

In the 1600s, both Lorenzo Gafà and Giovanni Barbara were at this academy and probably met with Carapecchia.[67] Other *periti* are known to have frequented the academy of *San Luca*, like Carlo Gimach, Pietro Paulo Troisi, Giovanni Borg and Giuseppe Azzopardi.[68] It was during the late 1700s and 1800s that these academies advanced to incorporate formal training of architects and *agrimensori*.[69] The latter approach was experienced in Rome by Giorgio Pullicino from 1794 to 1800. Besides Rome, others like Michele Cachia also visited Naples in 1787.[70] Some promising youths like Pullicino were also financed by the

63 Ellul, *Giorgio Pullicino*, 33.

64 Ellul, *L-Arkitettura*, 108; Tonna, *Architectural and Urbanistic Traditions in Malta*, 579.

65 Ellul, *Giorgio Pullicino*, 7; Charles C. Noel, *In the House of Reform: The Bourbon Court of Eighteenth-century Spain*. In Gabriel Paquette, ed., '*Enlightened Reform in Southern Europe and Its Atlantic Colonies, c.1750-1830*' (England: Ashgate Publishing, 2009), 162.

66 De Lucca, *Carapecchia*, 9-11.

67 Hughes, *The Building of Malta*, 97, 102; De Lucca, *Baroque Architecture*, 247.

68 Stafano Zerafa, *Discorso sulla storia artistica di Malta*. (Valletta: 1850), 29-30; De Lucca, *Architects working in Malta*, 248; M. Ellul, *Carlo Gimach (1651-1730) - Architect and Poet*. In '*Proceedings of History Week 1986*', 1992, 15-38; Thake, *Baroque Churches*, 62.

69 Rombai, *La Formazione del Cartografo*, 372.

70 NLM, Arch. 1195, f. 249r.

Order to enhance their knowledge in fine arts and architecture.[71] The formal instructions given by the academies had by the late eighteenth-century replaced individual efforts in self-teaching and unending years of apprenticeship in the artists' *botteghe*. The experience gained at these academies is evidenced in buildings like the Seminary in Floriana (1751), the Customs House (1774) and the Bibliotheca in Valletta (1786).[72] As will be discussed further below, other occasions for an exchange of concepts occurred locally between foreign and local architect-engineers who worked together on various projects. The Knights' origins from Europe's high society eased an inflow and transfer of the best knowledge, since the Order afforded to employ the best architects and engineers.[73] These exchanges provided platforms for concept-sharing and the introduction of new ideas, techniques and practices of varying complexities which promulgated development of the professions.

The advancement of the professions through varying cases of commissions

The early modern architect-engineer, *perito* and *agrimensore* played an important role in the development of the Maltese landscape. The landscape was subject to continuous development and modification as planned by the Order in its control of the harbour region and later the rural and coastal areas. In the 1630s, with the completion of Valletta, the Order began to intensify its fortification of the harbour region by enclosing the approaches to Valletta and the naval facilities in Vittoriosa.[74] Since then, the harbour was further improved and extended to accommodate commercial facilities, while the coastal areas were being fortified and the rural properties organised. This change and improvement in land use brought by a socio-economic growth led to further stability, prosperity and an increase in population.[75] The

71 De Lucca, *Architects working in Malta*, 254; Ellul, *Giorgio Pullicino*, 4, 15.

72 Hughes, *The Building of Malta*, 186-7; De Lucca, *Baroque Architecture*, 249.

73 Roger de Giorgio, *A City by an Order*. (Malta: Progress Press, 1986), 13.

74 Spiteri, *The Art of Fortress Building*, 51-2, 57.

75 B.W. Blouet, *The changing landscape of Malta during the rule of the Order of*

progressive urbanisation of Malta required the expropriation of rural lands for new urban centres and an increase in agricultural lands so as to sustain the growing population. By the early 1700s, the urge for a strong Baroque culture encouraged the construction of refined artistic and architectural compositions which symbolised elevated social statuses as exhibited in cities, churches, palaces, fountains, gateways and arches. The prominence of Baroque architecture pursued into the second half of the century under Grand Masters Pinto, Ximenes and de Rohan.[76]

The development and management of properties including fortifications, houses, palaces, churches, landed property, gardens, water systems, road infrastructure and harbour improvement was commissioned by the Order of St. John, the *Università*, the Church, noble families and individuals. The Order's properties were administered by different institutions and foundations including the *officio dell'opere et fortificationi*, *delle strade* and *delle fontane*, the *segrezia magistrale*, and *fondazione Paola, Lascaris*, *Cottonera*, *Manoel* and *Monte della Redenzione*. As part of their administrative duties, these institutions and foundations commissioned *capimaestri* and *periti* (Table 2) to carry out constructions, transfers and rents, inventories and management as well as condition and assessments of properties. As was the practise in early modern Europe, the role of the Maltese *capo maestro* and *perito* involved several tasks. These included designs, buildings, surveys, measurements, valuations and estimates resulting in the compilation of *perizie*, working sketches and surveys.[77] The *perito* had to ensure that the commissions entrusted were completed not only as instructed, but also in line with the principles and legal parameters of the profession. In the sections below, the paper will discuss examples of commissions

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St. John of Jerusalem, 1530-1798. (University of Hull: unpublished Ph.D Thesis, 1963); V. Mallia-Milanes, *Introduction to Hospitaller Malta*. In V. Mallia-Milanes, ed., '*Hospitaller Malta 1530-1798*' (Malta: Mireva Publications, 1993), 1-42.

76 Mahoney, *5000 Years of Architecture in Malta*, 178; De Lucca, *Architecture in Malta*, 193-210.

77 G. Angelini, *Il disegno del territorio in età moderna*. In '*Il disegno del territorio. Istituzioni e cartografia in Basilicata. 1500-1800*' (Bari: Laterza, 1988), 1-9; Filippi, *L'agrimensura nel Seicento e nel Settecento*, 231-2; Gasparini, *L'arte di misurar*, 273-4; Savarino, *Terre di Carta*, 31.

assigned to the *perito* by the Order and its foundations, the *Università* and other private commissioners.

Planning and construction projects

The *officio dell'opere et fortificationi* undertook numerous constructions of fortifications, civil and ecclesiastical buildings as well as infrastructural works. The design of this development was assigned to the engineer as the most renowned expert. The resident engineer or *architetto militare, e civile* was to *disponere, e giudare tutto q*[uel]*'lo all'architettura appartiene* as demanded by the Order.[78]

During the 1600s and the 1700s, the Order elected several French and Italian resident military engineers to work for an extended period in Malta. Their duties concerned not only the implementation of fortification and urban planning designed by visiting engineers, but also to control and develop civil aspects including designs, engineering and the construction of new buildings. These engineers were namely Francesco Buonamici (1635-59), Mederico Blondel (1659-98), Fortunato Romano Carapecchia (1706-38), Charles François de Mondion (1715-33), Francesco Marandon (1734-62) and Stephen de Tousard (1793?-1798).[79] The resident engineer was distinguished from other European engineers who visited Malta on specific and brief assignments mainly to design fortifications and aspects of urbanism. The French military engineers introduced a new sense of professionalism in the field of military engineering and architecture.[80] The resident engineers were always foreigners, with the exception of Vittorio Cassar (1590-1607) and Giuseppe Bonnici (1775-1779). The latter was

78 NLM, Arch. 6397, f. 98r.

79 A list of the visiting and resident European military engineers and architects who worked in Malta under the Order of St. John was compiled by Spiteri, *The Art of Fortress Building*, 102-103.

80 *ibid.*, xii, 94. The resident engineer was mainly responsible for maintenance works and to supervise constructions. Besides the resident, the Order also elected second engineers, like François Bachelieu. Their position was of lesser importance that although the Order had no resident engineers, these remained in a secondary position: Hoppen, *Military Engineers in Malta*, 420, 427.

recognised by the Knights as a *secondo ingegniere* in 1775.[81] Several designs were drawn by these engineers for the Order of St. John and for other private commissioners. These included numerous churches by Buonamici and Blondel, the Perellos warehouses underneath the St. Barbara Bastion in Valletta by Carapecchia, the planning of Mdina and Floriana by Mondion and the Customs House at Lascaris Wharf, Valletta by Giuseppe Bonnici.[82] The principal concepts of Maltese Baroque architecture were influenced by the ideas of foreign engineers practising in Malta. Their designs served as grounds for formative collaboration between foreign and Maltese *periti*. In the seventeenth-century, Maltese architects like Francesco Sammut, Lorenzo Gafà and Giovanni Barbara learned and worked alongside Buonamici and Blondel.[83] In 1662, Blondel and Sammut were involved in the building of the Carmelite Church in Mdina and after Sammut's death in 1668 his role was taken over by Gafà. Another opportunity for collaboration occurred in 1664. In this year, Gafà agreed to supervise works at St. Paul's Church in Rabat on the designs of Buonamici and following later contributions by Blondel.[84] Similar collaborations pursued into the eighteenth-century. In 1713, Barbara built the portico of the Church of St. Catherine of Italy in Valletta on the designs of Carapecchia.[85] Experiences of high baroque architecture was attained by Francesco Zerafa following acquaintances with Carapecchia and Mondion, both his superiors.[86] The designs of foreign architects, mainly of those coming from Rome and France influenced local *periti* who soon

81 NLM, Arch. 657 f. 118-120; 1193, f. 3r; 6430 f. 73r.

82 Hughes, *The Building of Malta*, 186; Mahoney, *5000 Years of Architecture in Malta*, 179; De Lucca, *Carapecchia*, 151.

83 Mahoney, *5000 Years of Architecture in Malta*, 169; Mahoney, *Blondel's influence*, 18; NLM, Libr. 1123, f. 84; De Lucca, *Architecture in Malta*, 198.

84 In 1646, Buonamici was commissioned to rebuild the Wignacourt College and some years later to design an extension to St. Paul's Church in Rabat. The contribution of this architect is attested in payment records issued from 1646 to 1650. A 1701 copy of Buonamici's plan of the college survives in the *Cabreo della Ven. Grotta di S. Paolo*: D. De Lucca and K. Thake, *The Genesis of Maltese Baroque Architecture: Francesco Buonamici*. (Malta University Print, 1994), 11-12.

85 De Lucca, *Carapecchia*, 127-128. The difficulties encountered during the building of the new portico to the existing church are recorded in a *relazione* by Giovanni Barbara: Tonna, *L'Arkitettura*, 163 fn.69 referring to NLM, Arch. 2137.

86 De Lucca, *Architects working in Malta*, 259-260; De Lucca, *Mondion*, 29.

grafted the new style to their own architectural sophistications. By the late 1600s, Gafà started to design his own Baroque Churches like St. Nicholas Church, Siggiewi in 1675. The local designs followed new ideas induced by Maltese architects from their studies abroad and the experiences acquired during constructions in Valletta and elsewhere.[87]

In planning development, completing constructions and their maintenance the engineer worked alongside the *commissario dell'opere*, the *capo maestro*, other administrative staff of the *officio dell'opere* and the Ordinary Commissioner of Fortifications (Table 3).[88] Other *maestri periti* were also engaged on specific projects of the *officio dell'opere et fortificationi*.

Once a project was approved by the Order, the engineer had to ensure that the final designs were completed according to the conventions of military and architectural practice.[89] The engineer was also to examine, advice and finalise in line with satisfactory *prospettive e simetrie* any proposed projects including also works put forward by other *periti*. In drawing reports and plans of new structures as well as in tracing out these plans on site, the engineer was frequently assisted

87 Ellul, *L-Arkitettura*, 108; De Luca, *The Maltese 'Perit'*, 433; Tonna, *Architectural and Urbanistic Traditions in Malta*, 581-2.

88 The Order maintained direct control at all levels of the building process: Spiteri, *The Art of Fortress Building*, xiii. The structure of the *officiodell'opere et fortificationi* as formed bythe eighteenth-century is recorded in primary sources which describe its main posts and their respective roles: NLM, Arch. 6397, ff. 98r-100v; 1012, ff. 187r-88v and 212, ff. 385r-387r. The main posts shown in bold in Table 3 are based on these sources. Sources for the other employments include: the Order's Statutes NLM, Arch. 294 *Sacrum Capitulum Generale 1603*, ff. 89r-89v, 295 *Sacrum Capitulum Generale 1612*, f.85v, 296 *Sacrum Capitulum Generale 1631* and Arch1680, f.151-6, 458-60, 649-52. The persons who held the posts of Commissioners of Works and *prodomi* from 1500 to 1780 are registered in Arch6430, *Cariche in Convento*. Hoppen, *The Fortification of Malta*, 131, De Lucca, *Architects working in Malta*, 14 and Spiteri, *The Art of Fortress Building*, 94-106 quote Arch. 1012 and 6397 to explain the administration of this office concerning military aspects.

89 Before starting any projects the commissioner of works had to obtain the Treasury's authorisation. These instructions were issued twice by the Treasury, in 1697: NLM, Arch. 647, f. 29r and in 1773: Arch. 634, ff. 242r-44v, 258r. In military planning, the engineer presented his designs which included plans and profile drawings to the Congregation of War for their examination. The advice of the Ordinary Commissioner of Fortifications was also sought. The commissioner had to be involved in case of modifications to the original drawings.

by the *capo maestro* and *agrimensori*. In 1714, the Order instructed the engineer, *capo maestro* Giovanni Barbara and *maestro* Giovanni Zammit to *tracciare il disegno* related to maritime works starting *dalle marine di marsascirocco*.[90] In 1760s, *capo maestro* Giuseppe Bonnici traced several plans and took measurements for the design (*delineare disegni*) of new fortifications.[91] Works were to follow the engineer's direction and guidance. The engineer's instructions on works to be carried out and on-site planning were part of his daily tasks as for instance occurred in 1715 when the visiting military engineer René Jacob de Tigné together with the secondary engineer François Bachelieu and *capi maestri* visited a site at *l-Ahrax* in Mellieħa to constructa new coastal battery. To this end, they requested workers including *periatori* (trench-cutters) and *picconieri* (pick-men) to cut stones.[92] The constant direction by the engineer ensured that any difficulties encountered by the *maestri periti* were addressed immediately and therefore permitted an expedite completion of works.

The *capo maestro* had to see that the instructions issued by the engineer and commissioner of works were being followed. Considering the limitations of pre-1700s cartography, proposed works were often displayed to *periti* and *mastri muratori* through models to convey instructions.[93] A model was built by Francesco Sammut in 1662 during the construction of the Carmelite Church in Mdina.[94] Another model of the Qrendi parish church was built by Lorenzo Gafà as recorded in Bishop Cocco Palmieri's 1708 visitation report.[95] Later, written communication became more frequent. In the mid-1700s, numerous letters and notebooks including working drawings and measurements were exchanged for instance between the resident engineer Marandon and *capo maestro* Ludovico Valletta during the building of Fort

90 NLM, Arch. 6552, f. 27r.

91 Spiteri, *The Art of Fortress Building*, 141; NLM, Arch. 1012, f. 180v.

92 NLM, Arch. 6552, f. 23v.

93 Scale models probably of different sections were used by architects to convey instructions to stone masons. These models served as essential instruction tools for the illiterate workers who were unable to read architectural drawings and written instructions: Cutajar, *Architect Lorenzo Gafà*, XV; Spiteri, *The Art of Fortress Building*, 148-9.

94 NLM, Libr. 1123, f. 84; De Lucca, *Mdina*, 64.

95 Cutajar, *Architect Lorenzo Gafà*, XV.

Chambrai.[96] In order to ensure that site works proceeded as intended, the engineer together with the *capo maestro* also inspected works on several occasions. However, since the engineer was unable to carry out a daily visit, the day-to-day organisation of works was left to the *capo maestro* with whom the engineer was in regular communication. During the re-planning of Mdina (1722-36), numerous site visits were done by the resident engineer Mondion and his *capo maestro* Francesco Zerafa.[97] On large-scale projects, the supervision of specific work areas was also entrusted to other *periti*. The re-building of parts of the Mdina fortifications, the construction of Baroque civil and ecclesiastical buildings, the re-planning of the main gate area and the square in front of the Mdina Cathedral were closely supervised by Maltese *periti*, namely Petruzzo Debono, Simone Mifsud, Alonzo Tagliana, Giuseppe Vella, Salvo Borg and Fortunato Callus.[98]

Apart from his own tasks, the *capo maestro* kept a close watch on the engineer's duties. This was crucial since the *capo maestro* had to organise and supervise the *maestri* and other workers in the course of works. In fact, the *capo m[aest]'ro* was *il p[ri]:mo M[aest]'ro, e degl'altri che all'opera sono impiegati*, in other words the superintendent of buildings.[99] Since the post of *capo maestro dell'opere* required an advanced know-how, any *perito* considered by the Order must have worked on numerous projects of certain complexities and had to be the most experienced amongst the Maltese *periti* and *capi maestri*.[100] As already discussed above, the *capo maestro dell'opere* examined those persons who petitioned to become *maestri periti*. This ensured that the *periti* worked to the satisfaction and expertise required by the Order. The superiority of the *capo maestro dell'opere* is further emphasised in a court record which specified that a *perizia* from *capo maestro* Barbara *dell'opere et fortificationi* was considered by the *officio delle case*

96 Spiteri, *The Art of Fortress Building*, 141-2.

97 De Lucca, *Mdina*, 93.

98 *ibid.*

99 NLM, Arch. 6397, f. 99v.

100 These complexities were indicated by Ciantar in his description of an outstanding and massive skewed arch built by the '*insigne architetto e capo-mastro Giovanni Barbara*'. The arch is found at the Provence Bastion on the Marsamxett side in Floriana: Ciantar, *Malta Illustrata*, 77-8.

superior to another report done by the its own *capo maestro*.[101] In fact, Barbara is referred by the court as *l'antesignano di tutti li m*[aest]*'ri muratori*.

The *capi maestri dell'opere* from 1646 to 1714 were elected by the Grand Master on nominations made by the *commissarii dell'opere* and those of fortification as well as by the preceding *capo maestro*. In 1646 on suggestions of these commissioners the Order elected Clemente Muscat as *prothomagistrum operum Religionis*, since he was the most experienced *perito* to replace the previous *capo maestro*. As stated in this recommendation the expertise of Muscat included various works of *stime, misure, et in altri affari concernenti alle fabriche, e servitio della Religione*.[102] A similar situation occured in 1714 when Giovanni Barbara petitioned the Grand Master to assign *maestro* Francesco Zerafa as *coadiutore* to assist him in his old age and eventually occupy his post as *capo maestro dell'opere et fortificationi*.[103] The varied experiences held by Zerafa included works with the *opere et fortificationi*, *fondazione Cotonera*, *Veneranda Assemblea*, *Veneranda Albergia di Francia*, *Università* and the *Monasterio di Santa Caterina*. The highest expertise required for such post is emphasised by the *Congregatione Bellica* in a petition which concludes that Zerafa was to accompany Barbara on every *opere, per più perfezionarsi nell'arte, e rendersi capace di servire cotesta nostra Sacra Religione*.[104]

The efficiency in completing these projects was considered essential to the Order. The relation between the engineer, *capo maestro* and the commissioners was of great importance for the organisation of construction works.[105] At least by 1583, the Knights elected *duos fratres probos homines structurae, seu fabricate* or commissioners of works (*commissarii dell'opere*) whose responsibility was to manage

101 NAM, ODD Reg. Supp. & Sent., Vol. 1, 1700-59, no pag.

102 NLM, Arch. 471, f. 270.

103 NLM, Arch. 1186, f. 362r; 6552, f. 23v.

104 NLM, Arch. 1186, f. 353v; Vincent Borg, ed., *Il-Knisja Parrokjali ta' Hal Lija: storja, arkitettura, pittura*. (Malta, 1982), 84 fn. 39.

105 NLM, Arch471, f.270; 1020 f.626; The engineer, commissioner and *capo mastro* had to work together and remain '*fra loro cosi uniti, e ligati, anzi cosi strettam:te concatenati, che l'uno all'altro reciprteam:te aiuto a pro' della Relig:ne et i due ultimi del p:mo disgiunti vengun ad esser manchevoli, et alla Relig:ne*': Arch. 6397, f. 100v.

and oversee all the works undertaken by the *officio dell'opere et fortificationi*.[106] The Treasury assigned the commissioners of works and the ordinary commissioner to draw up work contracts which were then notarised. In this, the commissioners were assisted by the engineer and *capo maestro dell'opere*. The commissioner of works and the *capo maestro* were to procure all the necessary resources, including materials, tools and labourers.[107] The materials and equipment procured were to be certified to be of good quality.[108] The procurement of materials required works' estimates and costings of construction materials undertaken by *agrimensori*, as was also the practise in Sicily.[109] The new constructions were certified by the engineer. Any buildings found inadequately constructed were to be modified according to the engineer's instructions. If no solution was possible the building had to be re-constructed. In 1764-66 *capo maestro* Bonnici who supervised works carried out at the monastery of St. Ursola in Valletta was in charge of signing payments once works were satisfactorily completed.[110]

Along his public duties, the *capo maestro dell'opere et fortificationi* and other Maltese *periti* were involved in independent works.[111] These commissions involved the building and re-embellishment of several ecclesiastical and civil buildings as well as infrastructural works. To

106 *Privilegi della Sacra Religione di San Giovanni Gerosolimitano*, 1718, 116. The *Privilegi* is one of several printed copies of the *Sacrum Capitulum Generale 1631* (NLM, Arch. 296).

107 The commissioner of works had to procure the necessary tools and machinery, including bridges and lifting devices, as well as a workforce including skilled craftsmen, apprentices and slaves to work on various projects: Spiteri, *The Art of Fortress Building*, 93, 109, 448-450.

108 NLM, Arch. 6552, f. 21r. In 1714, the resident engineer Bachelieu was instructed to report on the quality of the tools at the Order's stores. The *capi maestri* sustained that the tools provided were not of good quality. The engineer was on the whole of a different opinion, although he stated that to work Maltese shallow soils one requires metals with longer handles like '*zappe, e zapponi*' (hoes and mattocks). The latter were found of good quality but more tools were to be procured. The '*mazze di ferro*' (iron maces) were found to be very small, like the '*baconi*' (pick-axe) that heavier ones were needed. Still, the ones at the stores were still useable for excavation of tunnels and countermines due to their short handles.

109 Savarino, *Terre di Carta*, 31.

110 George Aquilina, *Is-Sorijiet Gerosolimitani, Il-Knisja u l-Monasteru ta' Sant'Ursola, Valletta*. (Malta: PEG, 2004), 99, 112-3 fn. 123.

111 NLM, Arch. 1020, ff. 626r-27v.

this end, the architect was entrusted to draw a number of designs.[112] As recorded in notarial deeds, Maltese *periti* like Francesco Zerafa, Andrea Belli, Antonio Galdes and Petruzzo Debono designed private and public buildings ranging from *casette* and *case* to palaces.[113] Some of these deeds included terms which regulated construction and obliged the person in charge to follow a set of conditions. In 1724, *capo maestro* Zerafa was entrusted by the Grand Priory of Catalonia to design Palazzo Cabrera which was located in St. Lucia's Street, Valletta. The deed signed for the new building, specified that the construction, in particular the façade was to be built as designed by the architect. On some occasions, minor elements of the building's design were left to the discretion of the *capomaestro*.[114] Once the building was completed, two *periti* were to inspect the site for any serious structural defects. In these cases, the architect was responsible to amend or rebuilt at his own expenses. Typical Baroque buildings are illustrated in the *Cabreo della Fondazione Manoel*.[115] The cabreo includes several plans of palaces and townhouses in Valletta, *casette* along the Vittoriosa and Cospicua waterfront and plans of a number of windmills located in the

112 The identity of the architect who drew the design is largely unrecorded as stated by Mahoney in 1983. The architect's identification is a challenging field of research as concluded by De Lucca in 1993. In most cases, documentary sources are unclear if a project was designed or built by a particular architect: Tonna, *Architectural and Urbanistic Traditions in Malta*, 580. Mahoney, *Blondel's influence*, 17; De Lucca, *Baroque Architecture*, 263. Our research which mainly focused on the Archives of the Order of Malta together with secondary sources show that the names of architects and *capimaestri* can be traced in the records of the Order's Treasury, Church and private account registers, as well as in work contracts recorded in notarial deeds. The significance of historical records is exemplified in a recent study which re-addresses the architectural history of the Żejtun Parish Church. The *LibridellaFabrica* from the Żejtun Parish Archives evidence the contributions of the *capimaestri* involved in the construction of the church over the years: Privitelli, *The Parish Church of St. Catherine*, 140-1.

113 De Lucca, *Architects working in Malta*, 255-61; De Lucca, *Baroque Architecture*, 268-9; N[otarial] A[rchives] V[alletta] Ms.565/5, f.6; De Lucca, *Mdina*, 81-2.

114 *ibid.*, 81-2.

115 De Lucca, *Architects working in Malta*, 194, 255; K. Thake, *The Cabreo of the 'Fondazione Manoel'*. In '*Treasures of Malta*' Vol.III, no. 1 (1996), 47-52; D. De Lucca, *The Contribution of François de Mondion in the Architectural Development of 18th Century Malta*. In '*Proceedings of History Week*', (1981), 75-80; NLM, *Cabreo Fondazione Manoel* 1734 Treas. B Vol. I, 310 and Vol. II, 311.

Maltese architects, *capimaestri, periti* and *agrimensori* commissioned on various works * petitions, ** 1762 list, ( ) – date of election as *perito-agrimensore or capo maestro*	
1650-1700	Nardo?, Clemente Muscat, Giovanni Barbara* (1681), Tommaso Dingli, Lorenzo Gafà, Francesco Sammut, Salvatore Borg, Michele Agius, Giuseppe Azzopardo, Francesco Bonnici, Domenico Tonna, Vincenzo Casanova, Carlo Gimach, Giuseppe Bonavia, Alesandro Pulis
1700-1750	Giovanni Barbara*, Francesco Zerafa* (1715), Lorenzo Gafà, Salvatore Borg, Giovanni Bonavia, Giovanni Domenico Cachia*, Andrea Belli, Sebastiano Saliba*/** (1736), Antonio Pullicino, Maruzzo Schembri*/**, Simone Mifsud, Giovanni Zammit, Clemente Zahra, Pietro Mallia*, Filippo Pace*, Giuseppe Fenech, Alonzo Tagliana, Giuseppe Vella, Fortunato Callus, Michele Micallef, Ferdinando Valletta, Alberto Galdes, Michelangelo Chercop, Salvo Micallef, Alesandro Pulis, Giovanni Micallef, Giovanni Maria Vella, Giovanni Paolo Debono, Pietrozzo Debono, Fra Giuseppe Grech, Antonio Azzopardi, Andrea Lia, Giacomo Bianco, Pietro Paolo Troisi, Giovanni Borg, Giovanni Azzopardi, Domenico Farrugia, Francesco Aquilina, Roccus Farrugia, Ludovico Valletta*, Horatii Borg, Giovanni Maria Galea, Salvatore Buhagiar, Giovanni Dominci Galea, Dominici D'Anna, Mariutti Grech, Antonio Pace, Justus Piscopo, Gio Maria Mamo, Laurenz Psaila, Andrea Farrugia, Tommaso Pulis, Paolo Falzon, Paola Portelli, Natalis Grech, Prattio Vella, Candeloro Magro, Salvo Galea, Giuseppe Grixti, Giuseppe Bonavia
1750-1798	Giuseppe Bonnici*/** (1754), Andrea Belli, Sebastiano Saliba*/**, Antonio Pullicino*/**, Maurizio Schembri*/**, Giovanni Domenico Cachia*, Antonio Cachia*/** (1761), Saverio Xerri* (1779), Matteo Bonavia* (1777), Francesco Sammut*, Giuseppe Camilleri, Michele Cachia* (1785), Giacomo Bianco**, Arcangelo Zammit**, Andrea Psaila*/** (1761), Michele Cassar*/**, Nicola Camilleri**, Felice Vella**, Francesco (detto ta laiutante)**, Giovanni Maria Cachia, Ludovico Portelli* (1778), Antonio Psaila, Antonio Galdes*, Ludovico Valletta*, Paolo Cachia, Paolo Saliba, Pietro Xerri, Pasquale Sammut, Salvatore Cachia

Table 2: Some Maltese architects, *capimaestri, periti* and *agrimensori* commissioned on various constructions, surveys and *perizie* as recorded in several archival sources.

rural areas. The drawings of Casa Correa in Valletta and Casa Leone in St. Venera designed by Mondion are included in this *cabreo*.[116] (See Plate 1) These plans record and describe in detail the different floors and frontal elevations of each building, which are rendered in different shades of watercolours.

116 De Lucca, *Mdina*, 14, 34.

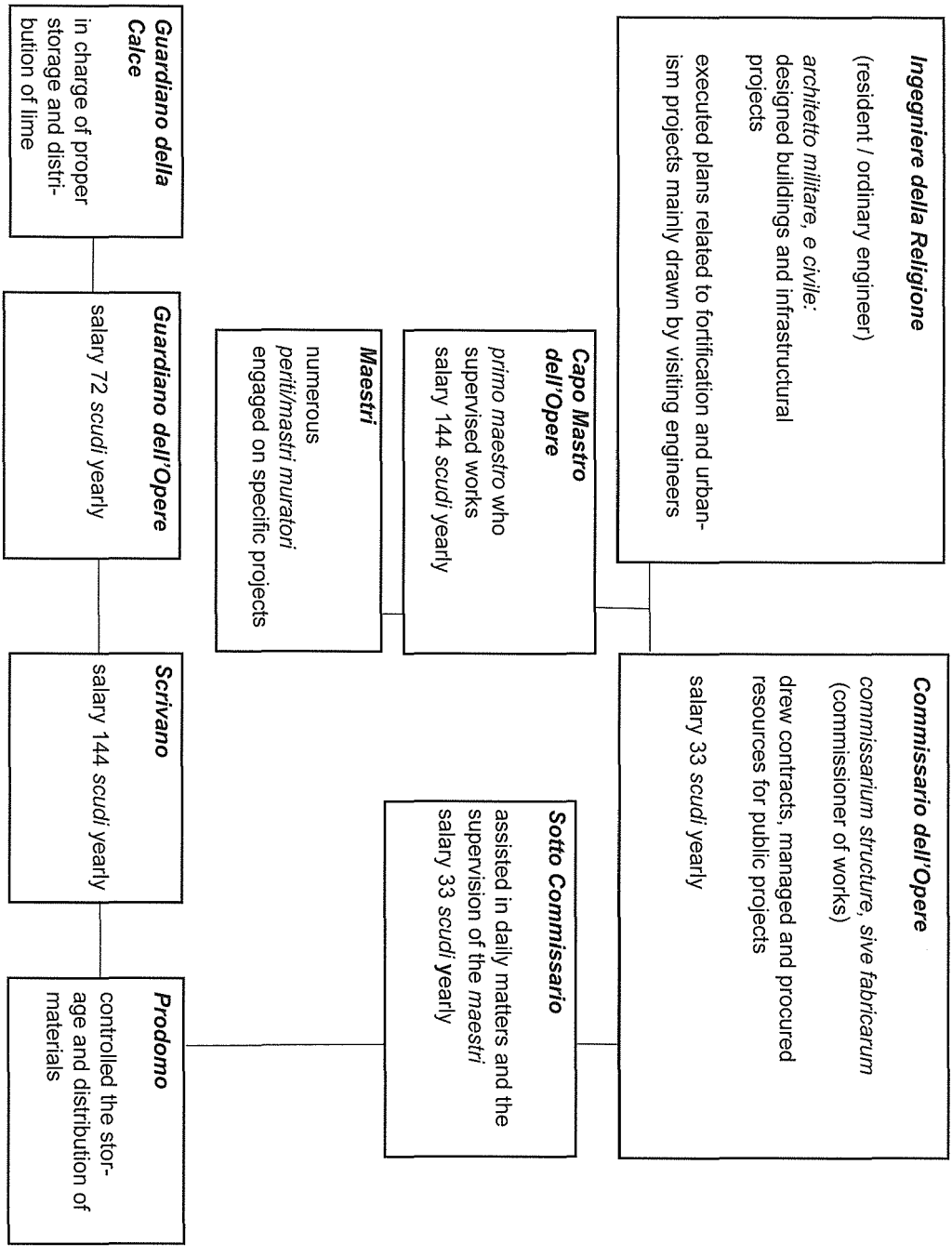

Table 3: The structure of the *officio dell' opere et fortificationi.*

The *capo maestro dell'opere* was also entrusted with works on road infrastructure.[117] In 1770, the streets in Valletta were re-surfaced with lava flagstones known as *vasoli* imported from Naples. The works were undertaken by *capo maestro* Bonnici on the instructions of the Order's engineer Balì François René Jacob de Tigné.[118] During these works, the Maltese *maestri* were trained how to work the imported stone by experts from Naples who were in Malta specifically for this purpose. This collaboration ensured to further establish a working plan mainly for the levelling of water channels, to locate new fountains, public and private cesspits as well as water canals and to lessen road steepness. In 1776, the Order assigned the planning and maintenance of roads to a specific commissioner. The *commissario delle strade* was to inspect regularly the state of the roads and request repairs whenever deemed necessary so as to avoid the degradation of roads.[119] In his duties, the commissioner sought the technical assistance of the engineer with whom he finalised aspects of road engineering.[120] In 1778, the Treasury instructed the commissioner to pave with flagstones part of Old Bakery Street (between St. Augustine's Church and the Auberge of France) and *Strada detta della Falconeria* in Valletta. These works were planned by the engineer and *capo maestro* Bonnici subsequent to a visit of both sites. An estimate of these works was reported by the *commissario delle strade* to the Treasury. The report included, for instance, details on the type of flagstones to be used. The *perito* indicated also the levels for the new street, giving particular attention to ascertain that the street was lower at its centre in order to facilitate the collection of water within a central canal.

As to matters of hydrology, the Knights entrusted the *sopraintendente delle fontane* with the planning, construction and maintenance of fountains, cisterns, wells and water channels.[121]

117 NLM, Arch. 634, f. 193r.

118 In the original source, the engineer's name is written as Fra Renato Tigni. Tigni is better known as the Balì François René Jacob de Tigné, the engineer who was employed by the Order during 1762-88: Spiteri, *The Art of Fortress Building*, 103.

119 NLM, Arch. 657, f. 118r; Arch. 634, f. 333r.

120 NLM, Arch. 657, ff. 118r-120v.

121 The superintendent of fountains was also referred to as *commissario delle fontane*. NLM, Arch. 657, ff. 118r-119v; 1680, f. 155r.

From 1707 to 1737, this position was occupied by Carapecchia who recommended a set of rules concerning the collection of rain water in public and private cisterns and measures for the upkeep of the water reservoirs.[122] Carapecchia also suggested the construction of large reservoirs, from which water could flow into the public fountains through a network of channels. During these works, the technical assistance of the engineer was usually sought by the commissioner. This expertise was also needed in order to identify the best materials for these constructions.[123] As shown in a 1778 report, the commissioner along with the *secondo ingegniere* Bonnici inspected the site at St. Ursula Monastery in Valletta. The team took the necessary measurements to estimate the different costings of a new water canal in *piombo* or *catuse sigillate*. In maintenance works, a *maestro fontaniero* assisted the commissioner.[124] In 1723 this position was occupied by Michelangelo Chercop who played an important role in implementing the proposals put forward by Carapecchia.

Property transfer, management and condition assessments

Besides his duties on construction sites, the *capo maestro dell'opere* also worked as an *agrimensore* and was frequently instructed by the commissioner of works and the resident engineer to carry out a number of property surveys related to the transfer of ownership and renting aspects.[125] The new acquisitions were due to land expropriation

122 NLM, Libr.195, ff.19-21. This document is transcribed by De Lucca, *Carapecchia*, 278-9; NLM, Arch. 6430, f. 169r; E. Said, *Subterranean Valletta*. (Malta: Fondazzjoni Patrimonju Malti, 2012), 69; Spiteri, *The Art of Fortress Building*, 297-8.

123 NLM, Arch. 657, f. 118r; Aquilina, *Is-Sorijiet Gerosolimitani*, 92.

124 NLM, Arch. 1680, f.155r; Said, *Subterranean Valletta*, 58-60; NLM, Libr. 95, f. 3r.

125 These surveys became so more frequent that by the mid-1700s the *capo maestro dell'opere* was constantly occupied with these works due to various major projects taking place at the time. Bonnici was assigned to '*fare d'agrimensore à delineare disegni, o piante, ed à prestare quasi una continua assistenza alle fortificationi tanto di Citta, chi delle marine*': NLM, Arch. 1020, ff. 626r-27v. The major projects undertaken by Pinto continued in his last years as can be seen from the infrastructural works done in 1768 at the Marsa harbour. These works as accounted by Barbaro

for the building of new fortifications, the buying of properties by the *segrezia magistrale* and the Order's foundations, as well as properties acquired through inheritance (*spogli*). Several surveys undertaken by Giovanni Barbara, Francesco Zerafa, Giuseppe Bonnici and Antonio Cachia survive in a number of records pertaining to the Order. In these works, the Maltese *periti* were working alongside the resident engineers who had also measured areas occupied for military reasons.[126] Their *relazioni* included various details, descriptions, measurements and estimates of sites, structures and features.[127] Some reports, especially those from the eighteenth-century also included drawings of the properties surveyed.

In 1715-16, lands at *l-Aħrax* in Mellieħa were expropriated for the building of new batteries and redoubts.[128] These properties formed part of an estate known as *l'Hahrasc* and were owned by the *Università* of Mdina. The lands' value was estimated in 1752 by Zerafa for matters of compensation. Zerafa's report only provided the value of each portion of land. A more detailed report related to land expropriation for the St. Julian's and Spinola entrenchments was compiled by Bonnici in 1767.[129] Bonnici's report describes these lands which overlooked St. Julian's Bay and identifies the owners of the surrounding properties. Other details, including access routes like a *pubblica strada* or *vicolo* were also noted. In particular, the land quality: whether of *buona, mediocre* or *mala qualità* so as to give an appropriate valuation. The *relazione* measured the surface area of these lands and their estimated value. In cases of disagreement on the compensations due, more detailed reports

included dredging of inlets and marshlands, road works and the constructions of new quays under Jesuits Hill: Carl'Antonio Barbaro, *Degli avanzi d'alcuni antichissimi edifizi, scoperti in Malta l'anno 1768*. (Malta, 1794), 2-3.

126 A 1711 petition mentions the '*mesure di terre occupate fatte dal fu Com: Blondell*': NLM, Arch. 6552, f. 17v.

127 NLM, Arch. 6552, ff. 21r-21v.

128 A number of coastal defences were built in 1715-6 on designs which evolved by the French in the late 1600s: Spiteri, *The Art of Fortress Building*, 77, 357. The fortifications at *ta'l-Ahrax* were known by their place-names, *batteria à torno della punta dell'ahrasc*, *vandomo tal cortin* and *wiet musa alias ta suata* for the batteries; and *Hosiliem alias tar Ramla*, *Crivelli alias tal Armier*, *tal Ghrap* and *Wiet musa alias tal bir* for the redoubts. NLM, Arch. 1033, ff. 119r-120v.

129 Ibid., ff.169v-170r.

were prepared and the property was usually surveyed by different *periti*. In 1736, Zerafa surveyed a garden close to St. Helen Curtain in Cospicua which was held by Signori Scarpelli.[130] The compensation due as estimated by Zerafa was not in agreement with another report done by *maestro* Clemente Zahra. The reports list the structures and other features found within the property and describe in detail their type and layout. In addition, the dimensions, areas and volumes were measured and their respective values given.

Similar details were included in reports concerning valuations of buildings. In areas occupied by new fortifications, an extensive survey of the surrounding properties was carried out by the Order's *perito*. Those buildings which obstructed the line of defence were demolished. In 1757, Zerafa surveyed a *casamento* at Ras et Tafal in Gozo owned by Francesco Busuttil.[131] These structures were to be demolished and the site was to be cleared from soil and other material. The *casamento* was located to the northwest of Fort Chambray on the road leading to Rabat. The report describes in great detail the layout of the house, the entrance which was *coperta a modo di loggia*. The house had a courtyard paved with flagstones in which a citrus tree and a cistern were found. The courtyard was surrounded by a number of rooms including a kitchen and a stable. From the courtyard, a staircase led to an upper floor in front of which there was a chapel and through a covered *loggia*, led to three adjoining rooms in which the bedroom and *gabinetto* were found. The *relazione* enlists the wood, metal and glass panes of which the doors and windows were made, as well as other wood used in the rest of the building.

With the growing population in the harbour settlements, regulated development led to an increase in surveys to delineate new areas, to partition or modify houses and to evaluate properties for renting

130 Ibid., ff. 25r-31v.

131 Ibid., ff.140-1. During the construction of Fort Chambray, Balì de Chambraii took up residence in this house. The engineer Marandon was offered to stay at the same house, but he refused since at a ground floor room allocated to a certain Francesco Busuttil gunpowder was stored close to a bakery: K. Buhagiar and J. Cassar, *Fort Chambray: the Genesis and Realisation of a Project in Eighteenth Century Malta*. In '*Melita Historica*' 13, no. 4 (2003), 347-364.

purposes.[132] The fortifications were by the eighteenth-century viewed by the society as public spaces to be later occupied by gardens and houses.[133] A number of petitions to occupy such areas were made to the Congregation of War.[134] In 1780-81, for instance the Commissioner of Fortifications Bali de Tigné together with *capo maestro dell'opere* Antonio Cachia visited public sites located along the fortifications at the Capuchin Friars Convent in Floriana and within the ditch of St. Elena Bastion at Cospicua.[135] To this end, surveys were carried out to assess potential impacts upon the defensive lines and to divide these spaces into separate allotments to be developed into fields and gardens. Plans, such as those drawn by Antonio Cachia, illustrated the fortification lines in red and showed other features including roads, ditches, stairs, buildings and the coast. The perimeter of the proposed enclosure was delineated in a dotted line and indicated by letters.

Besides the Order's surveys, the Maltese *periti* were on various occasions privately commissioned to survey and estimate structures, gardens and water features in urban areas.[136] (See Plate 2) In the 1780s, Michele Cachia, Matteo Bonavia and Francesco Sammut amongst

132 Zammit, *Our Architects*, 72. In 1718, Mondion planned the extension of Bormla. A plan of the town layout was drawn and is reproduced in De Lucca, *Mondion*, 8-9. Later, in 1722-25, Mondion also set out and built the new suburb of Floriana: De Lucca, *Mondion*, 13-4, 22.

133 The encroachment onto fortifications was common especially during the eighteenth-century. In 1780s, public spaces on the Marsamxett side of Floriana were being built. Furthermore, the dense population led to parts of the fortifications to be occupied by habitations. Blouet, *The changing landscape of Malta*, 190; De Lucca, *Architects working in Malta*, 114; Spiteri, *The Art of Fortress Building*, xvi, 472-4.

134 Several requests to develop areas close to the fortifications were sent to the *Congregazione di Guerra e Fortificazioni* for their evaluation: Spiteri, *The Art of Fortress Building*, 88-9. The Commissioner of Fortifications ensured that the use of these military spaces were not of a threat to the fortifications. The proposed enclosures were also not to obstruct any public access including roads and stairs. In most cases, such petitions were approved on conditions that in case of emergency non-military structures were to be removed without compensation.

135 NLM, Arch. 1022, ff. 71r-76v, 543r-45v.

136 André Zammit Private Archives, Notebooks of *Michele Cachia Agrime*[nsor]*:e Libro Primo*, 1788 and Francesco Sammut, 1782; Zammit, *Our Architects*; A. Zammit, *Valletta and Michele Cachia* (1760-1839). In J. Grima, ed., '*60th Anniversary of the Malta Historical Society: A Commemoration*' (Malta: Malta Historical Society, 2010), 407-432.

other *periti* collaborated on a number of surveys and evaluations. As recorded in their working notes, these *periti* carried out the usual observations which characterised the property and its surroundings, and in most cases they also drew a sketch plan on site. These plans identify in detail the different spaces which characterised the varying house types. These spaces were usually noted by letters and their use explained along the margins of the plan. The plan illustrated various features like arches, *loggias*, doorways, windows, colonnaded pathways, stairs, spiral staircases (*scala lumaca*), wells, stone stoves (*fuklar*) as well as the thickness of the walls. Some of these plans were also drawn to scale. In some cases, estimates of properties involved more than one *perito* with different expertise. In 1762, a house with its garden in Casal Lia became the property of the Order after the death of Fra Filippo Antonio, Barone di Wellen.[137] The Treasury instructed the commissioner of works to evaluate this property. The site was inspected by the commissioner together with three *periti* who were entrusted with the survey of different parts of the property. The house was inspected by *capo maestro* Bonnici, whilst *maestro* Maruzzo Schembri gave an estimate of the different trees found in the garden.[138] The materials used in the property mainly wood, glass and metal fittings were left in the hands of Salvo Saliba.

By the 1600s, the Order recognised property acquisition as an important contribution to infrastructural and economic improvement. As recorded in a decree entitled *sopra le feudi di Malta*, the Order's Council instructed in 1643 the establishment of foundations.[139] Grand Masters Antoine de Paule, Jean Lascaris de Castellar, Nicolas Cottoner and Antonio Manoel de Vilhena all set up their own foundations.[140]

137 NLM, Arch. 634, ff. 87r, 93r-94v.

138 In this document, Maruzzo Schembri is referred to as *giardinaro*, indicating that he was mainly involved in *perizie* of rural properties. Schembri is also listed amongst the recognised twelve *periti* recorded in the 1762 list referred above: NLM, Libr.10, f.444.

139 NLM, Arch. 257, ff. 60r, 152r. Blouet, *The changing landscape of Malta*, 71-72. By the end of the 1500s, the Order had already annexed a number of fiefs including *Buleben*, *Bieb ir-rua*, *Qlejja* and *Marsa* to its estates: John Montalto, *The Nobles of Malta 1530-1800*. (Malta: Midsea Books, 1979), 26.

140 The set-up of these foundations is accounted for in: *Cabreo dè Beni Spettanti alla Fondazione Lascaris* NLM, Treas. B 301 Vol. I (1784), 301a Vol. II (1779), 302 Vol.

The income generated permitted capital investment in various projects including the provisions of galleys (*Fondazione Paula* and *Fondazione Lascaris*), and the building of warehouses, windmills and fortifications (*Fondazione Cottonera* and *Fondazione Manoel*).[141] The reorganisation of existing institutions required a reassessment of their possessions. An extensive survey to locate the Order's fiefs, upon which no rent was collected since 1530, was initiated by the *segrezia* with the intent to start developing these untapped assets.[142] These surveys were carried out by experts whose tasks were to define land boundaries and to note land use, quality and yields so as to determine land value and the rent due.[143] These possessions were described and drawn in the *Cabreo del Magistero* which was finalised in 1653.[144] The valuation of newly acquired properties was carried out by different *periti* engaged separately by the buyer and the seller. In 1652, the *capo maestro dell'opere* Clemente Muscat was instructed to inspect and measure a site in Cospicua obtained by the *segrezia magistrale*.[145]

The organisation of land estates also involved the division and delineation of rural properties. The engineering and geomorphological changes of this landscape involved several planners and *periti*. In 1627, the *Università* of Mdina petitioned the Order to be granted public spaces in Mellieħa, in order to improve these lands and turn them into cultivation.[146] This request was looked into by a commission appointed by Grand Master De Paule. As reported in a *relazione*, various *clausure* were identified by their names and described in relation to their contiguous properties and topographic features. Other details including the area of the land and the existing walls were also noted. The new acquisitions were delineated and enclosed with *mura di pietra secca*

III (1784); *Cabreo Universale de Beni Stabili, tanto Urbani che Rustici spettanti alla Fondazione Cottonera* NLM, Treas.B 300 (1737); *Cabreo o sia descrizzione della Fondazione Manoel* NLM, Treas. B 310 (1734), 311 (1736).

141 Blouet, *The changing landscape of Malta*, 72; de Giorgio, *A City by an Order*, 199.

142 Ibid., 72.

143 *Cabreo del Magistero* NLM, Treas. B 291, f.1v.

144 *Cabreo del Magistero* NLM, Treas.B 289 Vol. I (1653), f. 1r, 23r.

145 NLM, Arch. 1185, f. 53r.

146 NLM, Arch. 462, ff. 99r-v. The acquired property became to form part of the land estates known as il-*Qammieħ* and l-*Aħrax* which occupied the northernmost headlands of Malta overlooking Għadira Bay and Ċirkewwa in Mellieħa.

per separarli dagli altri publici.[147] These lands and others acquired by the *Università* in later years were resurveyed in the eighteenth century. Their descriptions and drawings were integrated in the *Cabreo Università della Città Notabile* (1750).

In the 1700s, the *cabrei* became an essential tool serving as legal records of owned properties and means for a more effective land management. The surveys of urban and rural possessions alongside descriptive information formed the main constituent of these *cabrei.* Other information, at least in some *cabrei*, referred to notarial deeds of lands bought and rented by the institutions. The compilation of *cabrei* was entrusted to commissioners who visited sites regularly together with *periti agrimensori.* These experts were called upon to draw plans and provide detailed descriptions of the properties surveyed.[148] The numerous compilations of *cabrei* throughout the eighteenth-century indicate an intense surveying activity. The foundations had their own *periti agrimensori* as listed in Table 4. Although not a common practise, the plans drawn by the *perito agrimensore* were sometimes signed especially in the late 1700s. (See Plate 3) The properties owned by *Fondazione Lascaris*, as recorded in its *cabreo* of 1784, were surveyed and drawn *coll'assistenza e perizia delli sopra detti Capo Maestro Antonio Cachia rispettivamente e m[aest]r'o Andrea Psailia che misuravano li beni descritti, e fecero le corrispondenti relazioni colle annesse piante, e coll'intervento personale in tutti i sudetti atti, accessi, misure, e ricognizioni.*[149] These surveys involved a team of *periti*, as recorded in the c*abrei* of *Lascaris* which plans were done by Antonio Cachia as the foundation's *capo maestro*, *maestro* Andrea Psaila and *maestro* Ludovico Portelli for the estates in Gozo.

As emphasised in the *Cabrei della Fondazione Manoel* and those of *Lascaris*, the necessary measurements were completed in line with geometric principles. This entailed the division of an area in basic shapes mainly rectangles and triangles by triangulation and the setting of offset baselines, which are basic elements in surveying. These baselines,

147 NLM, Arch. 462, ff. 99r.

148 Theresa Zammit Lupi, *The Cabreo of Fra Mario Bichi.* In '*Treasures of Malta*' Vol. VIII, no. 2 (2002), 59-63.

149 The drawings in this cabreo include the signature of *maestro* Andrea Psaila and in some also that of *maestro* Ludovico Portelli.

represented by dotted lines on the plan served to measure walls and other features. The internal elements of the property including rubble walls, farmsteads, field rooms, pathways, water channels, reservoirs, cisterns and sometimes trees were noted by the *perito* and illustrated in line with drawing conventions. (See Plate 4) As discussed above, knowledge in geometry was an essential skill in land surveying. Other property characteristics were observed by the *perito*. The land quality and its use were considered in determining the rent value of the property. Its value was further assessed with the examination of the contiguous landscape, namely access routes like public roads, alleys and field pathways and topographic elements including valleys and springs. The institutions' or landowners' names of the surrounding properties were also noted. The survey was either plotted directly on site or otherwise sketched in notebooks including also a list of measurements taken on the spot. The drawings were then copied in the *cabrei* and decorated with cartographic elements including a scale bar and a north point. The plans within the first *cabrei* of the eighteenth-century (1705-1731) were rendered in black ink but some included outlines in different watercolours.[150] A higher standard in cartographic records was set by the *Cabreo Manoel* compiled in 1734 under the direction of the French engineer Mondion. This *cabreo* highlights the significant contribution of French military engineers who in the eighteenth-century introduced a refined mode of draughtsmanship based on standard scaled plans and colour-coding conventions.[151] The landed estates presented in this *cabreo* are more sophisticated with boundaries traced in fine colour schemes and the internal spaces in watercolour washes. The standard set in *Cabreo Manoel* influenced local *periti* like Zerafa who throughout the compilation of this *cabreo* was surely assisting Mondion as his *capo maestro*. Other *cabrei*, like *Cabreo Monte della Redenzione* (1735)

150 These plans are found in *Cabreo Veneranda Grotta di S. Paolo* (1705) NLM, Treas.B 305 and in the various volumes of *Cabreo del Assemblea de Cappellani Conventuali* and *Cabreo Assemblea Fiernalda* NLM, Treas.B 292-299.

151 The high standard of French cartography is also attested by the plans of the fortifications projects at the National Library of Malta, which contrast markedly with the more crudely-executed designs of the earlier Italian engineers: Spiteri, *The Art of Fortress Building*, xii, 67, 145-6. Thake, *The Cabreo of the 'Fondazione Manoel'*, 49.

drawn by Zerafa[152] and *Cabreo Cottoner* (1737) followed the same technique, although not to an equal standard reached by Mondion. For later plans, the *cabrei* like the volumes of the *Cabreo Lascaris* (1779, 1784) and other plans in various registers of the Order's archives attest that the drawing techniques established in the 1730s became a common practice.

Further to the drawing of the large estates, these *periti* were also entrusted to carry out other minor *perizie* of these landed properties. (See Plate 5) These included valuations to determine the rent due on lands leased, the costings of improvements and condition assessments of damaged properties. In 1703, Giovanni Francesco Bonvicino asked to rent parts of due *clausure* called *il Maielli*.[153] These lands were part of the fief of *Budach* which belonged to the *Fondazione Lascaris*. A *relazione* and a plan of the property done by *capo maestro* Barbara survives in the Treasury's registers. The report notes that this portion of land was sterile and of bad quality, and that it was more suitable for vines rather than for cultivation. The lands were measured and described in detail. The plan, which shows the rubble walls that delineated these fields, includes the lengths in *canne* of the site boundaries and the fields' surface area. To the side of the plan, the paper shows traces of workings done by the *periti* to calculate the area of the fields surveyed. The site was inspected by Barbara together with other experts (*persone perite*), including other *periti* and *gabelotti* who were acquainted in valuating properties and annual yields of such terrains. The advice of others, was also sought by the *perito* of the Inquisition Giacomo Bianco.[154] Bianco together with Giuseppe Mifsud, an expert farmer, visited the landed properties of *Ghajnil-Kbira* and *l-Ghars* beneath *Buskett* gardens to assess damages and estimate expenses incurred by a recent storm. The same practise continues into the late 1700s. This is noted in numerous reports which often included scaled plans as those signed by Matteo

152 At the bottom of the title page of the *Cabreo della Ven:da Monte della Redenzione* NLM, Treas.B 309, Francesco Zerafa signs as the *capo maestro dell'opere*. Further, it is known that Zerafa was the *capo maestro* of this foundation (Table 4).

153 NLM, Arch. 647, ff. 205Ar-205Dv.

154 Frans Ciappara, *The Landed Property of the Inquisition in Malta in the Late XVIII Century*. In 'Melita Historica' 7, no. 6 (1976), 43-60.

Bonavia, the *perito agrimensore* of the *Veneranda Assemblea.*[155] The *perizia* was included in notarial deeds of lands given in emphyteusis. Several copies of these deeds are included in the *Tomo del Cabreo della Veneranda Assemblea de Cappellani Conventuali.* The plans of the notarial deeds followed the established drawing practice, with less artistic configurations. The *perito* had also to ascertain that he followed the geometric principles in *misurare dette terre, che nel delienare la cennata pianta.*[156]

In managing their estates, the institutions contractually obliged the lessee to improve lands rented and to prevent their deterioration. Improvements were frequent as occurred from 1707 to 1717 in the land estates of *il Cammech* and *il Barrani* owned by the *Università* of Mdina. Along these years, various *periti* were engaged to calculate the costings of these improvements.[157] The lands were inspected by the *periti*, who had *misurato tuttle le muraglie, catene, et altri beneficati in detti due territorii fatti ... e quelli secondo la nostra pratica, e scienza in tal mestiere l'habbiamo stimati, e stimano valere ....*[158] The new constructions and repairs of rubble walls, structures, animal pens and mangers were measured. Their lengths and heights determined costings estimated per *canna.* In addition, the number of working days, stone transportation and travel distances were calculated. Similar practices were common in cases of compensations and expenses for the repairs of damages caused by natural disasters. In 1794, the *Veneranda Assemblea* entrusted Matteo Bonavia to assess damages caused by rains at *tal Hadiera* or *tal Pantan* inside the Mellieħa Harbour (Għadira).[159] These surveys serve as indirect sources outlining different land uses by noting the type and in some cases the number of trees, agricultural produce, passage ways and structures within the fields.[160]

155 NLM, Treas.B 294, f.103r.

156 NLM, Treas.B 294, f.40r.

157 The *periti* involved in these *perizie* included: Fortunati Callus, Horatii Borg, Joannis Maria Galea, Salvatoris Buhagiar, Joannis Dominici Galea, Dominici D'Anna from Casal Attard, Mariutii Grech from Casal Zebbug: NLM, Università 24 and 25, ff.26r, 154r-154v, 562r-562v, 614r-614v, 588v-590r, 10r-11v.

158 NLM, Università 24, ff.588v-590r.

159 NLM, Treas.B 294, ff. 103r-103v.

160 Ciappara, *The Landed Property*, 51.

In the eighteenth-century, changing politics modelled by despotic regimes redefined society and economy in Europe. This reformation called for extensive land surveys in their endeavour to re-think economic contributions. This wealth symbolised the absolutist power in Baroque artistic monumentality and induced cultural transformations throughout the century. In its development of the landscape, Malta follows as a microcosm of the European regimes. The modified landscape was here shaped by foreign architects and engineers together with the contribution of local *capi maestri*, *periti* and *agrimensori*. The changes brought by this century led to the re-organisation and set-up of the State's administration empowered to regulate these professions and encouraged technical advancements. Although the state offered little education, it sought satisfactory qualifications for the development that formed eighteenth-century Europe. In Malta, the formation of the landscape created platforms for concept-sharing resulting in the advancement of these professions. These professions evolved in three levels of proficiency: the apprentice, the *perito-agrimensor e ordinario* and the *capo maestro*, and a higher expertise held by prominent architects and engineers. This formed the eighteenth-century architect-engineer and *perito-agrimensore* working in Malta, whose roles were interrelated and controlled by the Order of St. John.

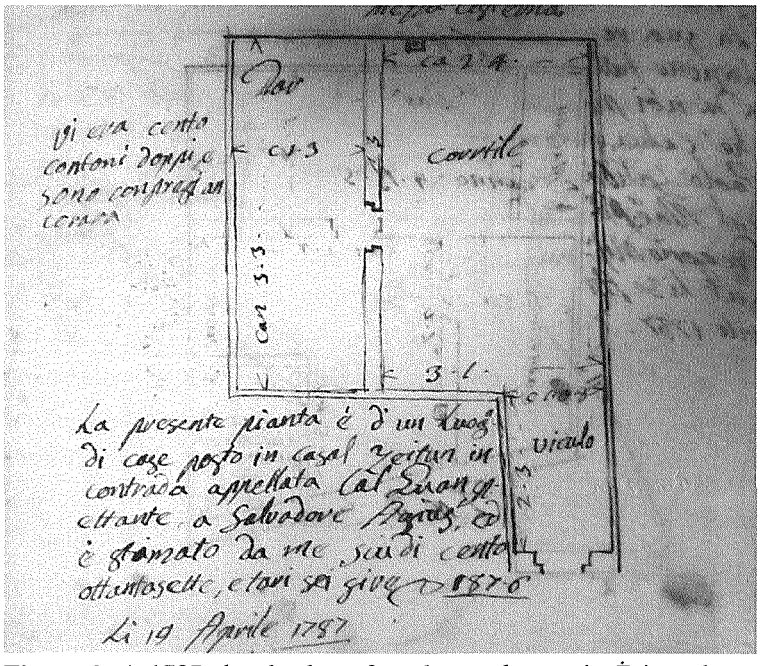

Figure 2: A 1787 sketch plan of *un luogo di case* in Żejtun drawn by *perito* Michele Cachia (Courtesy of: Perit André Zammit private archives).

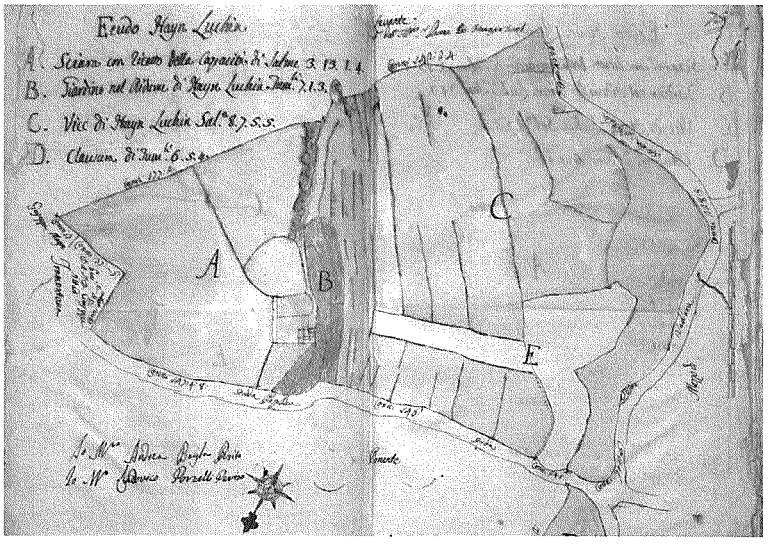

Figure 3: A plan of *feudo Hayn Luchin* in Marsalforn, Gozo drawn by *periti* Andrea Psaila and Ludovico Portelli from Cabreo Lascaris (Courtesy of: National Library of Malta).

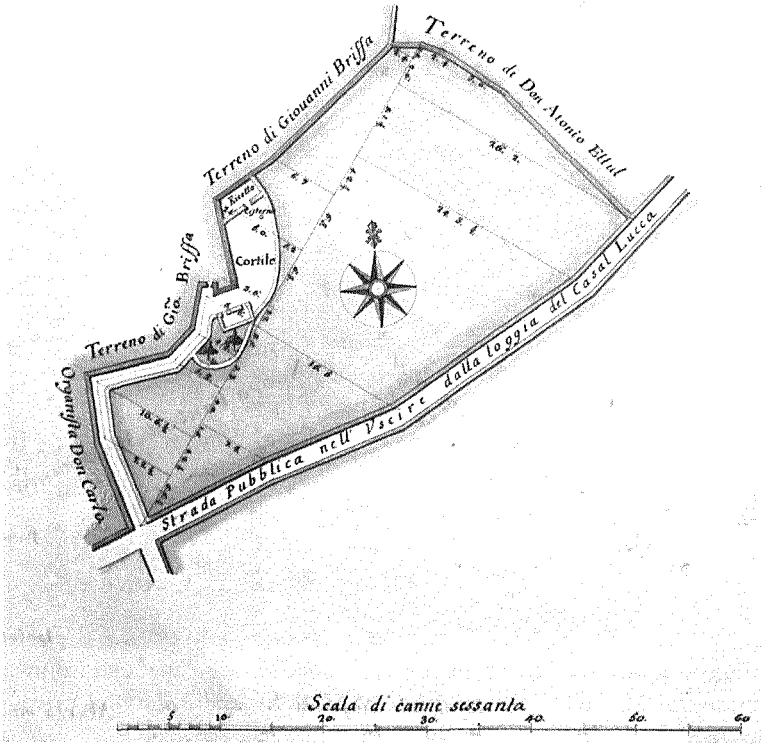

Figure 4: A plan in Cabreo Manoel of a field known as 'ta landar' in Ħal Luqa surveyed in 1735 (Courtesy of: National Library of Malta).

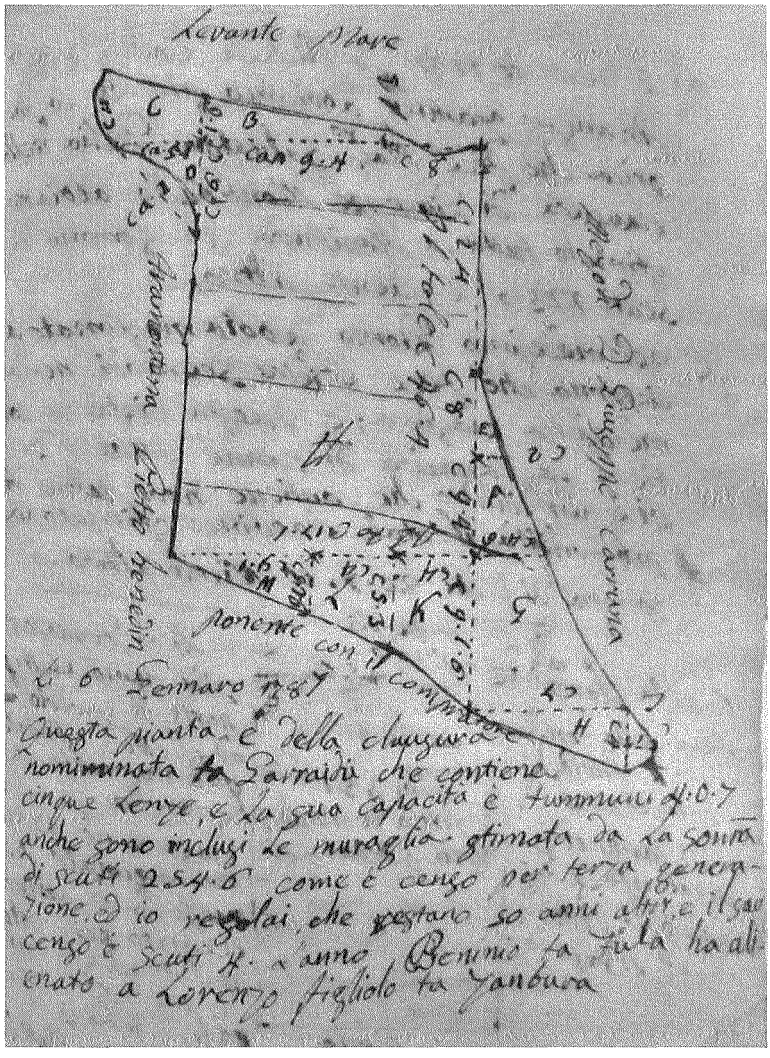

Figure 5: A sketch plan of a *clausura* called 'ta Garraidu' surveyed in 1787 from the notebooks of *perito* Michele Cachia (Courtesy of: Perit André Zammit private archives).