



DOCTORAL PROGRAM IN PRESERVATION OF ARCHITECTURAL HERITAGE

Chair:

Prof. Carolina Di Biase

Interventions on the built environment and more generally on buildings of the past, including the recent past, and their management call for fine-tuned knowledge and organization skills in all the related areas, from planning to maintenance. In Italy, even today, these activities are frequently dealt with – by public authorities and private individuals alike – in inappropriate or inadequate ways, considering the present state of know-how, historical and archaeological discoveries, sophisticated surveying and diagnostic techniques, and recent studies on the materials and structures of old buildings. The PhD course sets out to mould operators who will make a significant impact on the project as well on the practices of conserving, maintaining and managing the architectural heritage. Special and separate attention is paid, on one hand, to older and historical buildings and structures, on the other to contemporary architecture, in both cases in constant contact with developments in studies elsewhere in other countries.

Teaching aims

Knowledge is an essential step towards protecting and preserving the built environment, particularly in the case of the “conservation of the architectural heritage”, it is essential to understand complex aspects of its creation, transformation, present conditions, and consider the richness of its meanings and evidences.

In fact a building or a structure cannot be explained by the technical instruments of architecture alone: its documentary dimension lies in its material substance, in the meanings that built heritage has been assuming in time for different societies and that should be evaluated when new condition and significances of buildings and sites are to be defined.

Familiarity with the built environment is necessarily aided by historical research and every other kind of useful contribution as well as, obviously, that by experimental science. As far as knowledge and intervention on the built heritage are concerned, the human sciences and historical disciplines are indissolubly linked with the relevant applied sciences. For there can be no “truthful”, exhaustive diagnosis of old buildings that fails to consider the dimension of time, and the reconstruction of past usages and transformations. Conservation of built environment finds in the interdisciplinary knowledge as well as on people able to solve the questions by means of the contribution of different kind of subjects and studies.



1. The Amphitheatre of Verona in a XIXth century engraving

Coursework

The PhD is intended to offer a broad range of courses which combine theory and practice to stimulate advances in multidisciplinary research.

The basic teaching program is organized with seminars held by Italian and foreign lecturers who introduce the most advanced research methods and results in four major disciplinary fields:

- *Strengthening of historical building* of structures and materials deals with analytical and experimental methods for testing the efficiency of structures, including those at particular risk. It includes study and calibration of non-destructive investigative techniques for structural diagnosis, as well as theoretical and experimental study of appropriate non-invasive techniques, amongst them compliance with safety standards for buildings in seismic areas.
- *The Culture and experiences of heritage preservation* is approached as part of the history of culture getting to contemporary events; as history of the change of the ways of thinking about preservation and its frontiers and change in the expression of different cultural and institutional aspects. Preservation is also considered as history of criteria and types of design and interventions that vary in time, up to the introduction of new intervention techniques, materials and forms between XIXth and XXth Century.
- *Construction history* explores the issues of recognizing buildings as a historic source, interpreting how events unfolded at building sites and how production was organized, and showing how construction techniques of the past evolved thanks to the technical know-how of architects and builders, on one hand, and the methods of archaeological stratigraphy, also in elevation, on the other. In parallel students conduct workshop analyses and learn to interpret their findings.
- *Historical research methodology* addresses its subject on a more general level: the history and geography of documentary sources, the history of institutions which with their activities have changed the landscape and erected and used the buildings; in this respect going beyond the traditional 19th-century perception of history of art, the importance of history of architecture should be reconsidered.



2. Composite beams in Council's Loggia, Verona (XVth century)

Research organization and topics

One of the distinctive features of the PhD course is that it explores issues as yet seldom addressed in the sector of conservation, as a means of developing new contributions to scientific output. Particularly there are analysis of materials of contemporary buildings and their decay, the research of intervention techniques respecting the cultural heritage; the topic could be extended; the topic could be extended, starting from monumental building, to the wider field of common ones; the heating and plumbing systems of historic buildings, "building physics" (already studied in Germany and France) and the consequent documenting of innovative installations in old buildings with the parallel study of old installations in individual buildings and at urban level.

Experimental and workshop activities about famous buildings (Arena di Verona – S. Andrea a Mantova) or less known (Rocca di Spilamberto, Modena) are carried out in the Laboratories that collaborates with PhD Doctoral program: The DiAP Lab of Analysis and Diagnostic Evaluation Building; in DIS L.P.M. (Laboratory material tests), the CNR G. Bozza, the Department of Chemistry and other university centres. Innovative studies are being conducted in this sector, thanks to new research tools: the particular subjects of interest are historic mortars, old concrete, new mortars for masonry restoring. The objective is to find out how they were produced in the past, something little is yet known about, and current possibilities for re-introducing their use, or to research suitable and compatible materials and techniques of interventions.

Other more usual subjects of research and specialized teaching are the economic aspects of conservation, legislation to cultural heritage, landscape conservation, history and conservation of historic gardens, museology and museography.

The PhD program fosters contacts with government institutions – starting from the Ministry for Cultural Heritage, in its central and regional offices – and with organizations operating across the country in the sector of preservation. Within this framework several bodies have financed scholarships. Graduates of the PhD program have often found employment at progressively higher levels in public sector conservation institutions as well as in professional practice and in the business world, in specific specialized fields.



3. The Rangoni fortress. Courtyard section with the indication of transformation phases; in red the noble level of the "vago palazzo" (phase 5: 1641-1660) built restoring the previous disposition of the rocca (phases 1-5)

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STRUCTURAL RESTORING OF THE CATHEDRAL OF SAN LORENZO MARTIRE IN VOGHERA BETWEEN EIGHTEENth AND TWENTIEth CENTURIES

History, comparisons, verifications

Stefano Bagliani

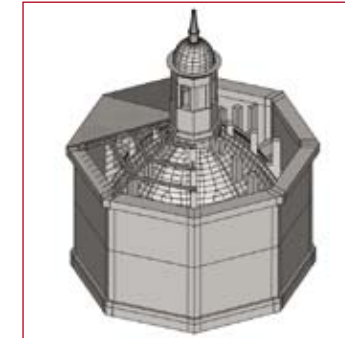
The purpose of the research of this thesis is a study of the consolidation work that, for the purposes of structural rehabilitation of architectural heritage, uses techniques and technologies in disuse since the advent of reinforced concrete, steel and new materials. The re-enactment of the old methods of consolidation is possible and acquires interest thanks to the protocols of the now available structural analysis, which allows the interpretation and validation of what was previously achieved only through the use of empirical knowledge. These interventions involve techniques and technologies compatible with the materials and type of ancient buildings, that proved what the years their effectiveness and durability. Such results have not always been obtained by static strengthening interventions considered "innovative" - such as those cited - that over time didn't satisfy as effectiveness, validity, compatibility and reversibility. The research starts by studying the methods of consolidation indicated by historical tradition, therefore we discuss the most common systems of consolidation in the literature, to show what interventions is the object of our interest. By analyzing the problems we can understand the solutions

recommended by many architects, as well as understand what the state of the art was in the period under consideration. Since the core of this work is a critical analysis of these interventions, it was considered essential to see how some of them were handled, like for the Cathedral of San Lorenzo Martire in Voghera, interesting for the little that is known about its history and for the possibility of using the analysis of the past and unrestricted access to the building. In order to give an effective reading of the factory and its layers, then photograph the state of the building as it has come to our days, it was necessary to analyze first the archival sources in order to reconstruct the building and run geometrical surveys necessary to know the structural elements considered important for research. Much of the technical documentation necessary to reconstruct the history of "structural" building, was split among several files, such as the Parish of San Lorenzo, which still has extensive documentation of the vestry on the XVII-XX and the Historical Archives of the City of Voghera. The work on archival sources allowed the reconstruction of all the interventions of consolidation that had been developed from the eighteenth to the

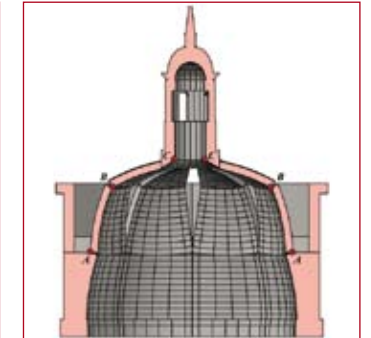
twentieth century, with particular attention to those that affected the dome of the Duomo. The relief, however, has allowed not only to describe geometrically the factory, but to discover what action among those prescribed in the documents found were actually made and how they were put to work, and to investigate failures and distortions that have continued to affect walls of the cathedral. Because the analysis revealed that the instability has progressed over time, the effectiveness of interventions in the eighteenth century was uncertain and led to a path of analysis and verification of the static behavior in order to understand the functioning of structures of the dome and one of the principals in the supplies. Starting from the survey data it was possible to develop a solid model of the structures used to calculate the vertical actions and to perform audits of stability and strength, of which the first limit is an analysis that is based on the theories of pre-elastic Coulomb allowing you to find the value and direction of thrust of the dome and the possible mechanism of collapse. The second test is based on the latest theories of elastic continua developed by Navier and Cauchy and allows us to understand the state of tension at the interface of the segments of the dome.



1. Cathedral of San Lorenzo Martire in Voghera



2. The solid model of dome



2. Structural collapse of dome

The third test was carried out using a program of structural analysis - in line with the latest information also normative - using the finite element method. Despite the different assumptions underlying the three tests, the results obtained were coincident, allowing verification of the static trial of historic structures and to understand why certain safeguards were put in place, it was possible to analyze the reasons for their imperfect operation and reveal the reasons for the progress of the damages. The checks were used to quantify what had been observed already in the eighteenth century and interpreted on the basis of empirical knowledge at the beginning of the twentieth century. This work is not meant to give design ideas, but rather to offer a complete reading of the material document and its historical layers, construction and

structural. This is the kind of work that started from the study of archival sources on the analysis and built on the states of distress, to test the condition of the structures to understand the effectiveness of the safeguards put in place in previous centuries. Returning to the initial theme, that a critical analysis of actions that use technologies now considered obsolete, our work lead toward understanding how a careful reading of the stratification of the building by means consolidated (source analysis, survey, study materials and degradation) is the prerequisite to give certainty and credibility to the verification phase of the historic structures and the "consolidation traditional" covered architectural treatises and technical manuals.

PRO INSTAURANDO AMPHITHEATRO

Historical practices of restoration and conservation of Verona Arena

Marco Cofani

The thesis traces the history of the practices of restoration and conservation of Verona Arena, from the Renaissance to the Unity of Italy. The celebrity of the building, in fact, has not yet been supported by a large background of studies, whose cornerstones remain the Scipione Maffei and Bartolomeo Giuliani's treatises, written respectively in 1728 and 1823. The contribution of the thesis fits in continuity with these texts, trying to clarify the steps still unknown or little depth – even with regard to the limited but useful recent contributions – and to increase the framework of the historical sources for the study, the use and the restoration of the building and its role in the urban context: these issues are, in fact, still too limited to the area of Verona, when in fact there are more long-term contributions.

The works of restoration concerning the Arena from XVI century to today – earlier reconstructed in detail for the last hundred fifty years by another doctoral thesis – have often defined its current consistency in a brand new way, from the *cavea* and the underlying vaults to the stairs, from the floors to the drainage system. The arguments in the first two chapters, i.e. for the period between XV and XVIII century, is derived from published studies and, particularly, from

the reading of the archival documents of the time, now carefully collected and analyzed. These essays and testimonials come from very different and chronologically distant sources – even within the contemporary literature – so the information derived from them has been gathered and continuously compared with the material status of the building, in an extremely fruitful and useful way: it has allowed, in some cases, to achieve a better understanding of the events and, in others, to implement new questions not emerged so far or poorly considered.

The same criteria were applied to the following period, the XIX century, investigating on the events occurred after the fall of the Venetian Republic and the first institutional reforms imposed by the French Reign and then by the Hapsburgs. In this case, however, to the considerations on the large existing bibliography – in relation to historical and institutional context – it has been added a wealth of new information about the maintenance of the Verona Amphitheatre, as a result of the extensive archival research at the State Archive of Verona. The several hundreds of unknown documents found – poorly explored by scholars because of the extension of the archival funds and their

lack of inventory – contribute to form a brand new chapter regarding not only the events about the Arena and the protagonists of its restoration – remember, among others, engineers Luigi Trezza, Giuseppe Barbieri, Enrico Storari and architects Francesco Ronzani, Bartolomeo Giuliani – but also the history of techniques and materials used for the care and maintenance of the historical buildings, especially the mortars. The documentation on the works executed have an exceptional precision in language, with data still easily understandable, particularly for the mortar joints between the steps of the *cavea*. Therefore, new possibilities are now opened for the knowledge of historic mortars, whose composition is often subject to many hypothesis about the quality and the quantity of the materials, where many variables are indeterminate. The importance of the characters involved, who come not only from Verona – i.e., scientists Anton Maria Lorgna, Giovanni Scopoli and architects Luigi Trezza, Rodolfo Vantini, Giuseppe Valadier – and the particular historical moment, in which the modern chemistry was born and set in mortar and building materials a significant scope, highlight the diffusion of knowledge through personal exchanges and the technical



1. The *cavea* of the Amphitheatre



1. A. B. Desgodetz, *Profil de l'Amphitheatre de Verone, 1682*



1. The facade of the amphitheatre, in a XIXth century image

and scientific literature, starting from the *Encyclopedie*. There are also links between experimental and theoretical research and its practical applications. Through the physical-chemical-mineralogical analyses on the survived mortar traces and their reproduction in laboratory, as detailed described in the archival documents, a brand new research itinerary has started on their realization procedures that ensured the strength and duration, and more generally on "bitumen", "mastics" and "mortars" between XVIII and XIX century. The appendix also contains information about the use of the Amphitheatre in the modern era, showing the development of methods and institutions that govern its management, also in relation to the changing of the urban and social context.

The Arena, in fact, is especially known today as a great building for shows and drama representations (a topic that has been deliberately omitted in the thesis but already outlined by several recent publications); however, from the XVI to the XIX century, it also held the role of commercial and craft hub, hosting many shops, homes, stores and taverns in its outdoor arcades, thus taking advantage of the privileged position of the building overlooking the public space of the Bra. All information relating to the modern and contemporary restorations of the building, with a fair degree of certainty and precision related to the different sectors of the building, have been finally collected and plotted on the current plans of the Arena. The establishment of a series of georeferencing adapters of the data of

reconstructions, alterations, works of maintenance and the traces of use, provided by the historical research, offers a basic overview of the building and is an easy tool to quickly find information about the story of restorations and to lead or manage any future work or investigation in the Amphitheatre.

SPILAMBERTO AND OTHER PALACES: THE RESIDENCES OF THE RANGONI MARQUISES BETWEEN THE 17th AND 19th CENTURY

Paolo Corradini

The thesis is focused on the transformation of the fortress in Spilamberto, a fortified residence which in the 17th century became the palace of the Rangoni marquises. Starting from an interdisciplinary research which evidenced the fundamental construction and modification passages, and after a first PhD thesis which explored the period between the origins and the start of the 1600's, the research moves to interrelate the construction events of the building with the relations of the Rangoni marquises with the Spilamberto community, and especially with the Estense rule and the Court transferred to Modena from Ferrara in 1598. From this event, the stories of the fortress are linked with the general political events of the new state, the role which the aristocratic family covers both in the city-capital and in the country, and in the broader area of relations between Italian and European states; also, they are compared to other examples of noble residential buildings, in particular to family country homes – without forgetting the influences of the city palaces – and main commission models, especially Estense. From the 17th century, the history of the building has been followed until today, when its acquisition by the commune of Spilamberto in 2005 foresees a public use.

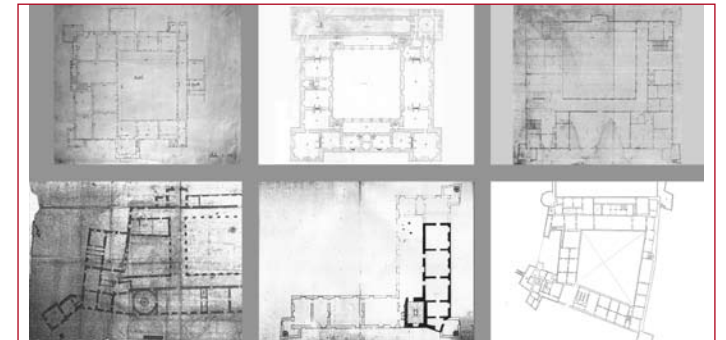
The methodological work maintains at the centre the comparison with the building, which preserves an extraordinary documentary potential in its material consistence; archeology of architecture, supported by direct and laboratory surveys, is linked to bibliographic research and to acquisitions emerged in a thorough examination of documentary resources, where the private Rangoni archive - inaccessible until 2009 - had an important role. The research started from the election of Modena as capital of the Duchy, focusing on the passage which sees the Rangoni, *primi inter pares* of the antique feudal aristocracy, forced to carve themselves a place at the Estense court. This is the scenario for the conversion of the fortress into "vago palazzo", stronghold of the management of the possessions in the territory and representative home for the Rangoni aspirations in the ducal court. The research on the new figures at the top of the Spilamberto family tree, Guido IV in particular, revealed a new political and cultural prospective, which substituted ancient military ambitions with interests for the administration of estates and court life, in a careful balance between the Estense and Farnese ducats. The study on the building, specifying the entity of the transformations,

focused on outcomes and objectives. Interesting analogies are identified with the ducal *delizie* built in order to extend their presence in Modenese territory in the first half of the century. An essential key to understanding is in the culture of Guido IV, and in particular in the connection of architecture with theatre and scenography, which reached positive outcomes in Emilia. Between the 17th and 18th century, the family events bring the Estense state to the centre of the Rangoni interests. In a period in which Modena is returning the hub of the State, a close examination concerned the city residence, where, such as other aristocratic palaces, formal models and uses that arrived at the Court were experimented, before quickly expanding to the country. Focusing the Rocca in Spilamberto, the topic becomes the reading, with the help of precious inventories from the end of the 1700's, of the ways in which the building has been adapted to the elegant "villeggiatura" requirements in 18th century, which gave often ospitality to the Estense court; among the subjects, the identification of small adjustments, new decorative systems and furniture which adapted the consolidated building; the redefinition of the garden; the synergies that are



1. Rangoni residences in Spilamberto: the Rocca and, background, Villa Ida (1913)

created with the community. The reasons of the decline until today of the residence is studied starting from the end of *ancien régime*. If the land registry searches evidence the family efforts to preserve the patrimony connected to agricultural production in Spilamberto, an extensive research beyond traditional feudal references shows a wider network of freehold property, where the presence of new lodges and cottages evidences the arrival of new and more comfortable living models. In the poor interventions noticed in the fortress, symptoms can be found of what, in the second half of the 19th century, became a no longer recoverable gap with new use needs: while not far away Villa Ida is built, the antique palace is condemned to years of abandonment and to the inadequate location as



2. Noble floors of feudal aristocracy's palaces in the dukedom of Este and references between the end of 16th and 17th century

headquarters of an agricultural company. At the end of a research path built weaving sources and deepening the matters around topics which emerged from investigations, the thesis contributes to reinsert the events of the building in the history of the territory, community and owning family. Identifying signs and traces in its permanencies, it indicates limits and potentiality of a future project of preservation and reuse, which can coexist the safeguarding of the historic richness that the Rocca still today encloses in its forms and material consistence. Moreover, the careful research on the building becomes a solid comparator around the wide system of feudal residencies in Modena territory, extending to broader areas of the Po, whose study has often been hindered due to few archival sources; also

the methodological approach could be successfully proposed for offering new contributions of knowledge, necessary for future preservation interventions.

THE TRADE OF “LEGNOME DA OPERA” IN THE ADIGE RIVER VALLEY BETWEEN THE 12th AND 17th CENTURIES

Assortments and uses in relation to the diffusion of composite beams

Silvia Dandria

The technology of composite beams, or ‘*travi armate*’, allowed the possibility to cover large rooms and lodges by the construction of double-framework wooden floors with load-bearing beams which were larger in size and more resistant than simple wooden beams. The beam was assembled by using pieces of wood cut with a jagged profile, much like teeth, and securing them vertically with internal nails in order to avoid sliding. The use of elements with smaller sections and various lengths allowed them to exploit the full length of the trunk saving a significant amount of material.

Setting up a composite beam required carpenters with great ability in order to make perfect joints and also a keen understanding about use of optimal width/height ratio. The studied structures were built in three or four pieces: *catena*, a tie beam set in the lower side and resistant to pull, two *puntoni*, subject to compression, and the possible central *tassello*.

Often a tie beam had a slight inflection upwards in the middle and also finishing elements, called ‘shoulders’, which were set above the rafters to level the top of the beam.

This technology spread over a large area in northern Italy between the 14th and 16th

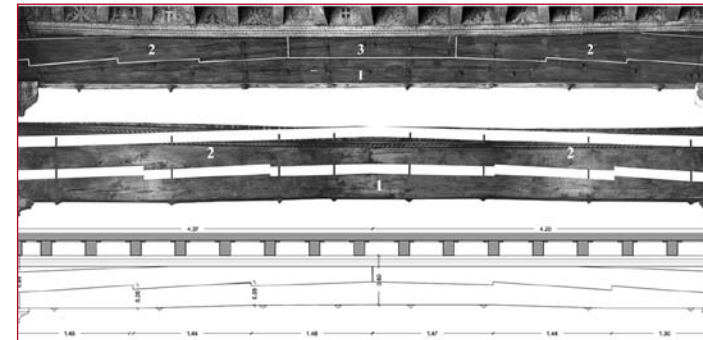
centuries. There are a lot of examples in buildings (palaces, castles, loggias) along the Adige’s path; in Trento, Verona, Mantua and Ferrara, but also in Emilia and Lombardy.

In spite of the fact that they are quite common, these kinds of structures haven’t been studied in depth and this study aims to understand their technical features, the way they were built and the dimensions of the wooden pieces used. Research was done for the area of Trento and Verona because in this area it was possible to compare material analyses of several structures (cataloging, geometrical surveys and dendrochronological studies) and the interpretation of historical documents about the trade and construction use of coniferous wood along the course of the Adige from the South Tyrolean mountains to the cities of the valley (Verona was the main centre), as well as the use of wooden assortments in the workplace of various buildings.

The contracts for the purchase of consignments of lumber show the timber business stimulated interests and financial capital across the entire region and the important figures of this trade soon became the founders of important noble families. Starting from the second half of the 14th century the statutes

of veronese *radaroli* (tradesmen and transporters of timber) contained a series of regulations describing all assortments of beams, semi-finished and sawn elements for sale; having correlated the textual analysis of the vocabulary and specific dimensions used in this document with the information derived from the reading of detailed lists of duties imposed along the river route, it has been possible to reconstruct an overall picture of the wooden building elements that were present on the market. Documents from the 15th to the 19th centuries show a sustained continuity of production methods and building techniques. Adding some specific uses, described by documents related to the construction of historic buildings, it was possible to compile a glossary of technical terms about carpentry from this geographical area.

Using this overview and looking at the measurements found of composite beams, it seems that these structures were built with pieces of timber of medium to large dimensions and therefore the use of these beams originates not only from the need to save material but moreover from the desire to overcome the structural characteristics of simple beams through a refined and efficient assembly system; a desire also



1. Schemes of beam in three and four pieces

focused on aesthetic and spatial effect of the rooms. Oddly enough, the way this knowledge of construction was spread remains unknown. There is some relation to the route of the Adige River but not only because it spreads to other regions; in this way the sources related to the skilled carpenters, the *marangoni*, do not give full answers.

Examining the cases of composite beams recorded in the Trentino-Veneto area, it is possible to find *piane armate* (composite beams in these cities, ‘*piana*’ is a long, square beams) in buildings dating from the 13th and 14th century such as castles, government and residential palaces and towers of considerable importance (span: 9-11m); between the 15th and 16th centuries the same beams were employed covering wide halls on the main floor of buildings, long porticos and

huge public loggias in the centre of the city (there were also some examples of re-use in the roof structures). Their use was continued until the early decades of the 17th century in palladian villas spread throughout the territory of Verona. Together with the cataloguing of these floors (by photographic and geometrical survey) a series of dendro-chronological studies were prepared which were able to date some of the most significant structures and to identify the kind of wood used. The data that emerged shows that these techniques are of medieval origin, as it’s possible to trace the first cases back to the end of the 12th century. Considering the historic origins is easier to understand the large diffusion of composite beams in the following centuries that reached Provence through the Po valley (as some French studies show).



2. Composite beams in Bishop's Palace, Verona (15th century)

GAS LIGHT SYSTEMS IN THE XIXth CENTURY ORIGIN AND DEVELOPMENT OF URBAN NETWORKS IN THE LOMBARD-VENETIAN KINGDOM

Angelo Landi

The studies on the European town in the XIXth century, or the “town in the industrial age”, have always ascribed some infrastructural networks to a secondary role as regards as the problems concerning the urban transformations. In this connection a great need to investigate and to record every facet of the urban context is being felt nowadays. In the light of recent research also the gas lighting networks can be rightfully ascribed to this sphere. However what is still lacking is the link between the urban and the architectural dimensions in order to determine exactly all the installations and enlargements of the lighting networks, which were carried out in the urban streets and buildings during the XIXth century.

An analysis has also been made on the technical, legal and economic difficulties that contractors and public institutions had to overcome for the installation of gas networks. This research concerns the Lombard-Venetian Kingdom, a region where the development of the gas networks in the chief towns occurred just in the XIXth century; in addition this has also allowed to take into account all the relations, common purposes and contrasts which involved citizens, public administrators and firms, even beyond the borders of the “Habsburg monarchy”.

However the gas lighting network was only a fragment of the government’s manifold interests: the construction of the Ferdinanda’s railway between Milan and Venice, the policy on taxes, the regulations for companies and monopolies, the development of industrialization in the Lombard-Venetian Kingdom.

So, after due consideration it is possible to realize how the period of the Habsburg Monarchy has corresponded, more or less, to the chronological phases of the first development of the gas industry. In this context the technological delay of the gas industry is generally attributed by literature to the negligence and political obstructionism of the Habsburg Government towards the liberal class; nowadays in the light of the latest research this delay can be considered as a consequence of the decisions which were taken by local bureaucrats and officials.

At present the archive documents allow to make a comparison with the Habsburg context thus offering a new way to consider Aldini’s and Count Porro Lambertenghi’s practical applications; nowadays they are seen in their true light, free from any false “political” interpretation.

In addition in the Lombard Venetian Kingdom the study of

the debates – only apparently theoretical – which were published in reviews and pamphlets, have revealed several systems of building the first gas plants; the publication of these empirical trials anticipated the following technical manuals and specialized reviews by some decades.

Amoretti’s, Carloti’s, Vismara’s studies on the thermolamp, still unpublished, show a very detailed picture of the gas lighting history in Italy, which is still relegated to some isolated experiences nowadays. The analysis of the technical and scientific matters, concerning also the European sphere, shows how the transmission of the “technical knowledge” was not so easy as the transport of goods and gas apparatus. The comparison of the cases which have been dealt with has allowed to point out the geography of the gas networks development throughout the kingdom: in the first four decades of the XIXth century the gas networks extended to the main towns along the Ferdinanda’s railway between Venice and Milan. Afterwards, twenty years later, the networks started to stretch as far as secondary towns – Brescia, Bergamo, Cremona, Mantova, Pavia, Lodi, etc. The analysis of the events which



1. Original plan of the gaslight network in Cremona, 1861 (detail)



2. S. Andrea Basilica, Mantua. A circular pipe, which supplied 250 small gas burners, is still preserved at the base of the tambour



3. Drawing of some gas lamps to be installed inside the “Caffè Gnocchi” in Milan. Ing. Onorato Rapallo, August 31, 1845

occurred in single towns has allowed to explain otherwise the failure as well as the success of the public gas utilities which paradoxically started with the aim to supply private buildings, shops and houses: the profits coming from the street lighting were in fact only just enough to amortize the costs of the gas-plants.

Italian towns have been fully methanized for about thirty years and this has caused the abandonment of ancient gas plants which today are bound to be demolished. Therefore it is urgently needed to safeguard the surviving structures of lighting gas networks which are now situated on the fringes of the historical town centres. Also the smaller parts of the gas networks, which were the first to be eliminated, must be consequently preserved. In

this sense the examples of the S. Andrea Basilica in Mantua and the I. R. Palazzo di Corte in Milano give evidence of the value of the material traces still preserved in these buildings.

SOME CONTRIBUTIONS FROM THE ECONOMICS DISCIPLINES TO THE PRESERVATION OF ARCHITECTURAL HERITAGE

Francesca Schellino

Economics may be considered as a part of culture. Culture regarded as the completely whole of the life expressions of a people, a social group, an individual, seems to have to comprehend also the economics, with its theoretical acquisitions, its principles, concepts and methods, as also the systems of economic functioning set in action inside the same peoples, groups, and between individuals. Culture as a continuing process of meaning-making inside individuals' consciences to establish correlations between oneself and the world outside them, culture as a dynamic process of meaning-making and contestation of it inside social groups, seems to have to comprehend the economic dimension. Certainly this was not the concept of culture implied by Alexis de Tocqueville when he wrote about *literature industry* in 1840, neither that of Adorno and Horkheimer when they wrote about *culture industry*. Nevertheless a holistic concept of culture does not help its analysis. Among the complex and complete expressions of peoples, groups and individuals life, it is possible to separate specifically cultural expressions, to which are attributed distinctive characteristics compared to other expressions; characteristics as much variable as the historical and social contexts are, and,

in the final analysis, as much variable as the individual consciences (in which the characteristic are identified) are. In such a sense they have been individualized, as *cultural expressions* in a *restricted* meaning, those referable to the category, however very extensive and changeably composed, of expressions with a symbolic, signifying content, and in which the symbolic, signifying content is considered a priority over other contents. Symbolic contents which are intentional or unintentional into the recognitions that it is made of them, beyond the voluntariness of their same symbolic content, referring to complex polysemous expressions becoming manifest into the interpretations plurality. Values are recognised as fundamental and distinctive components of culture; they constitute its basis and its comprehension, they give a structure to the selectivity inherent to it, they lead the choosing. Values may be described as central to the exertion of critical judgement, into their specific condition to present themselves as fundamental and result of judgement faculty together. And it seems not to be possible to separate the concept of value from that of *preference*: into specific circumstances, processes of selection between

values are nearly unavoidable; the value which induce a choice is inevitably preferred to the detriment of another one or other values. Particularly the attribution of value towards an object is the completion of a critical judgement and the base to action. Economic values, with their specific connotation seem to play an increasingly fundamental role delivering judgements, shaping the reasons to action, also into the field of preservation of architectural heritage. Thus it seemed interesting to investigate the proper language of economics which with its concepts, theories, tools and methods, contribute to shape the practice context of the preservation of architectural heritage. The attempt to find a way from the inside of the field of the preservation of the architectural heritage to *deal with* and not just to *resist* to the power and influence of the economic considerations and of the same thinking way of the it, has constituted the principal motivation for this research. Research which tried to develop a critical vision about the economic contributions and analysis related to the built heritage, examining especially their theoretical basis, the implications and limits to their application. *Cultural Economics* is a branch of economics disciplines which deals with cultural themes in

a restricted meaning; it is a field of study of international ambit to which economists who deal with all the cultural sector components make reference to. The themes which distinguish the economic approach to culture seemed of particular interest if related to considering the architectural heritage characteristics as public or mixed goods and, particularly, as *merit goods*. It seemed appropriate to set at the analysis basis of the architectural cultural heritage conceptualization into the cultural economics contest, an in-depth study about the cultural heritage juridical meaning inside the Italian legislation. To specify the heritage concept characteristics seemed useful to make it possible to articulate a confrontation as much fruitful as possible with the meanings in which the same term is used in the economic ambit. The juridical notion of cultural heritage from the Italian Constitutional discipline linked to the theoretics expressed by Massimo Severo Giannini and related to the Commissione Franceschini acquisitions, have constituted the elaboration focus. The regulation in force expressed by the *Codice dei beni culturali e del paesaggio* may be read in the light of the juridical gianninian theoretics.

The conceptualization of cultural heritage as cultural capital seems to constitute an useful confrontation ambit in which the preservation decisions about the cultural heritage may be expressed on a cultural and specifically economic plane together. With the due cautions and the related subtle distinctions which were tried to be defined into the research, it seems possible to affirm that methods and valuation techniques which the economics disciplines offer, may be useful to obtain information about the realization context of preservation projects, information which their utilization may vary inside the different application ambits. It seems a crucial element to clear formulate the questions which are intended to be submitted to valuation, also paying particular attention when choosing and articulating specific techniques. As when dealing with all the techniques, the utilization of economic techniques has to be informed about the theoretical assumptions on which they are based and which made their application *not neutral*; it has to be aware of their application limits with the ability to consciously interpret the information which their utilization outcomes may give.