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A Methodological Approach for Assessing the Interaction Between Rural Landscapes and Built Structures: A Case Study of Winery Architecture in Tuscany, Italy

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Abstract: This research aims to investigate the dynamics of interaction and interdependence between winery architecture and the rural landscape, with a particular focus on the Tuscany region in Italy. The primary objective is to analyze a selection of wineries deemed iconic and exemplary for the topic, assessing their relationship with the surrounding territory and landscape. To this end, specifically designed analytical frameworks are employed, grounded in experimental methodologies and criteria well-established in the relevant scientific literature. This methodology integrates a wide range of qualitative and quantitative indicators from scientific literature, organizing them within various taxonomic frameworks. Through tailored analytical forms, the research examines how design choices impact the agrarian context, highlighting the pivotal role of winery architecture in strengthening territorial identity and fostering a model of sustainable tourism. This paper introduces an adaptable interpretive method applicable across contexts, suitable for professionals and decision-makers. The findings present a framework for evaluating landscape systems, demonstrating how passive and advanced strategies enhance eco-efficiency and landscape perception, and adding ethical, aesthetic, and functional value. Moreover, the research contributes to rural landscape discourse, highlighting winery architecture's role in balancing sustainability, driving economic development, and preserving rural environments.

Keywords: landscape analysis; structure-environment interaction; landscape analysis sheets; design innovation; rural buildings and territory

Received: 10 December 2024
Revised: 8 January 2025
Accepted: 10 January 2025
Published: 13 January 2025

Citation: Bigiotti, S.; Costantino, C.; Santarsiero, M.L.; Marucci, A. A Methodological Approach for Assessing the Interaction Between Rural Landscapes and Built Structures: A Case Study of Winery Architecture in Tuscany, Italy. *Land* **2025**, *14*, 152. https://doi.org/10.3390/land14010152

1. Introduction

The construction of facilities intended for the management of agricultural estates undeniably produces significant impacts on the rural landscape, altering its perception and shaping its organization in relation to the productive and business-oriented objectives pursued by stakeholders in the sector. Indeed, the current state of the natural environment is intrinsically linked to the transformations brought about by anthropogenic modifications associated with agricultural practices, which contribute to defining numerous landscape aspects through the establishment of layered infrastructural systems [1]. These aspects are further influenced by the widespread or dispersed presence of built elements of varying scales, which serve as functional components of agricultural practices. When these constructions embody a recognizable architectural value, they can contribute to

fostering a desirable sense of identity [2]. In this context, the figurative quality of a rural landscape may be interpreted as the sum of multiple elements attributable to both the natural sphere—intrinsic to the environment itself—and the anthropogenic sphere, encompassing land use and organization as well as the morphological and settlement-related configuration of built structures [3].

Moreover, the Italian legislator, in promulgating Legislative Decree No. 42 of January 22, 2004 (hereinafter referred to as the Cultural Heritage and Landscape Code), explicitly articulated in Article 131 that the concept of landscape is inherently linked to a territory that embodies identity, deriving its character from the interaction of natural and human factors and their interrelations [4]. Building upon these foundational considerations, the primary objective of this research is to evaluate these interactions by proposing an investigative method aimed at exploring the relationship between constructed artifacts and the environment. This approach enables the assessment of design choices based on descriptive and qualitative aspects, focusing the scope of the investigation on the specific case of wineries and their potential integration with the natural environment.

This focus aligns with the growing attention that the sustainable tourism market is increasingly dedicating to experiences related to viticulture and the processing of products within the wine industry.

Drawing from the introductory elements identified in the scientific literature, Section 2 (Background) of this study seeks to systematize contributions deemed highly relevant to the research domain, establishing the foundational corpus upon which the landscape integration evaluation method and the analytical forms are subsequently developed and tested. The method is further elaborated in Section 3 (Materials and Methods), alongside the selection of case studies deemed pertinent for testing the aforementioned analytical forms. The experimentation and results of these analyses are presented and discussed in Section 4 (Results and Discussion), which details the development of the analytical forms addressing the building–environment relationship designed to offer an interpretive tool for this topic. The research conclusions and potential avenues for further investigation are presented in Section 5 (Conclusion).

1.1. The Design Opportunity of Wineries and the Need for Landscape Integration

In contemporary times, there is a growing emphasis on exploring effective approaches for integrating built structures into the landscape and on redefining the morphological characteristics of rural buildings. This shift aligns with a gradual departure from traditional "functionalist" design principles [5], which historically prioritized pragmatic, business-oriented requirements for structures associated with agricultural practices. Today's discourse increasingly embraces broader critical reflections, wherein formal, typological, and settlement qualities of architecture are seen as opportunities for enhancement and, in some cases, rehabilitation of entire territorial contexts identified as "landscapes" [6].

This paradigm shift is driving a rethinking of rural architecture, advocating for new connections between architecture and landscape, particularly in rural areas recognized for their high conservation value [7]. The urgency to safeguard the identity and integrity of rural landscapes has been clearly articulated in the European Landscape Convention. It advocates sustainable development founded on a balance between social, economic, and environmental needs [8]. At the same time, an evolving sensitivity within the agricultural sector is propelling a shift in design focus—from purely pragmatic practices to experimental approaches aimed at ensuring morphological harmony and enhancing the experiential qualities of the environment. This transition is also fueled by an evolving economic market increasingly tied to wellness practices and sustainable tourism [9].

These economic domains emphasize market demands attentive to the integrity of the natural environment and the overall quality of the landscape. Consumers aspire to products that reflect the natural characteristics of their origins while preserving the environmental context [10]. Within this framework, sustainable tourism has been defined as activities that avoid overburdening local resources or altering the lifestyles of host communities while distributing economic benefits equitably and ensuring the protection of environmental resources [11]. Within these trends, the issue of architectural integration in rural contexts takes on a pivotal role, particularly concerning wineries. While the integration of rural buildings and their morphological aspects is a broader phenomenon, wineries have uniquely evolved into interdisciplinary experiments in landscape integration, incorporating technical and conceptual innovations from fields beyond industrial engineering [12]. The vineyard itself contributes to a refined organization of the natural environment through its characteristic rows, and the winery building has attained equal importance in harmonizing with and enriching the landscape. Wineries now serve as venues for welcoming visitors and showcasing products, combining functionality with storytelling through innovative spatial designs influenced by communication theory, sequential narrative, and experiential space-time dimensions [13].

This contemporary design response seeks to balance aesthetic appeal and ecological protection, imbuing wineries with identity, symbolic, and cultural values. A holistic approach emerges, striving to achieve a new equilibrium between landscape and architecture, function and aesthetics, sustainability and morphological transformation. This phenomenon caters to consumer expectations for environmentally respectful models that are well integrated into their territorial context. The European Landscape Convention's principles of "landscape management" emphasize guiding and harmonizing transformations arising from social, economic, and environmental developments in pursuit of sustainability. These principles resonate strongly with the design of wineries, which increasingly reflect the economic opportunities of wine tourism as a key driver of the sector. This trend has led major producers to invest in architectural quality and consumer services, promoting an attractive image for the wine industry grounded in experiential value and deep connections to the local landscape [14].

Wine tourism now influences building development and landscape transformation, driving the proliferation of hospitality services and spaces for wine tasting. These spaces often transcend functionality, becoming cultural landmarks, sometimes designed by renowned architects, artists, or designers. The evolution of agricultural and productive practices signals a renewed balance between tradition and modernity. By integrating aesthetic and functional considerations, the design of wineries responds to the growing market demand tied to the promotion of wine tourism [15]. Moreover, the economic impact of architectural quality is well-established, underscoring that beauty has tangible, economic, and constructive value [16].

1.2. Quality and Technological Choices: Morphology and Construction Techniques

The theme of architectural quality in a building is a typically extensive notion, often addressed—both normatively and conceptually—through variable definitions. As Forte has observed, the appreciability of architecture refers to a concept encompassing both intrinsic qualities (technical, physical, functional, etc.) and extrinsic qualities (perceptive, symbolic, subjective, etc.) pertaining to the placement of the building within its urban and territorial context [17]. While extrinsic aspects prompt reflection on the relationship that the building may establish with its contextual environment, intrinsic qualities of appreciability draw attention to the physical constitution of the architecture and the technologies employed.

In the specific case of winery design, the architectural quality of the building seems to resonate with aspects related to its integration with the landscape, as well as the spatial, physical, and technological organization of the winery itself. Together, these intrinsic and extrinsic elements contribute to the overall valuation of the building. Notably, technological and constructive aspects aimed at ensuring the sustainability of the construction appear to be increasingly prioritized, even at the regulatory level. These issues, far from trivial, have been extensively discussed by both national and European legislators. For instance, as early as December 2008, the European Council, in adopting the "Conclusions on Architecture: The Contribution of Culture to Sustainable Development" (2008/C319/05), recognized architecture as a discipline rooted in innovation and technology [18]. This recognition is partly reflected in the more recent Legislative Decree No. 36 of 31 March 2023, whose Article 57 mandates the inclusion of technical specifications and contractual clauses compliant with Minimum Environmental Criteria in the design and tender documentation for public procurement. This obliges Italian public administrations to adopt environmental requirements that identify the potentially optimal project solution [19], reinforcing what had been previously established by Article 34 of Legislative Decree 50/2016 regarding energy and environmental sustainability criteria [20]. Such developments underscore how technological considerations (and associated environmental protection ambitions) have increasingly been treated as positively qualifying factors in architectural works.

Based on preliminary European discussions on the concept of architectural quality [18,21–24], regulations and procedures governing construction activities have been adapted to pursue the appreciability of buildings. This evaluation includes assessing construction processes and the implementation of eco-efficient technologies, with technologically advanced solutions aimed at ensuring building–environment sustainability identified as qualitative indicators. Particular attention has been given to analytical processes related to the life cycle of buildings [25,26], which are especially relevant not only for residential, large-scale, and design sectors but also for rural constructions tied to sustainable tourism and environmental wellness sectors. These sectors demand energy-intensive services for visitors, thus emphasizing the need for advanced energy management solutions [27].

The common denominator of these trends leads to a qualitative assessment of buildings that intrinsically involves technological choices made during the design phase, especially when such choices represent deliberate and coherent architectural integration processes [28]. In this sense, the qualitative evaluation of the relationship between a structure and its environment—specifically in the case of wineries—must also consider the analysis of technological solutions employed during the design phase, particularly from an eco-compatibility perspective. There is a renewed focus on this issue among producers, stemming from the strong relationship between wine production and the soil from which raw materials are cultivated—a correlation that fosters growing interest in innovative solutions [29]. The production of wine, in fact, generates significant environmental impacts, including energy demands for buildings and production activities, soil management and protection, sourcing from renewable energy, efficient water use, and waste management [30].

The interplay between function, natural context, and construction has always influenced the final architectural form of wineries. The production function—particularly aspects tied to the technological process of winemaking—plays a pivotal role in determining the characteristics of the building. Ensuring optimal internal microclimatic conditions is crucial for achieving high-quality products, requiring architectural forms and technological solutions tailored to meet these demands. Specifically, protection from sunlight and maintaining specific temperature ranges during various production phases are critical for

preserving product quality. For example, storage environments ideally require temperatures between 7 °C and 15 °C, while bottle conservation benefits from temperatures between 8 °C and 10 °C [31]. The use of terrain as a passive technique for ensuring high thermal stability has played a fundamental role since antiquity, sometimes influencing the final architectural form of the structures [32]. Thus, the terrain serves a dual purpose as both a natural technical element and an integral component of the landscape.

A bioclimatic approach is crucial for optimizing energy consumption by adapting building designs to local environmental conditions [33]. Key bioclimatic techniques include the optimal orientation of buildings relative to the sun, the use of materials that provide adequate thermal and acoustic insulation, the design of natural ventilation systems, and sunlight control through aperture orientation and appropriate shading devices [34]. Solar gains, thermal mass, and insulation are vital for reducing heating demands, while passive cooling techniques such as solar shading and cross-ventilation address rising temperatures [35]. In recent years, Nature-Based Solutions (NBS) have become valuable strategies for improving building energy efficiency and achieving optimal internal microclimatic conditions [36]. Through processes like transpiration, photosynthesis, and shading, vegetation helps regulate the thermal environment, reducing the energy required for heating and cooling [37].

The need to construct large interior spaces with ideal microclimatic conditions has led to architectural solutions that often diverge, in form and technology, from those typically observed in traditional Mediterranean architecture, where many wineries are located. From this perspective, landscape integration is often achieved through mimicry with the surrounding context, sometimes employing underground or semi-underground solutions, given the lack of typological and constructional similarities in traditional architecture. Alternatively, integration is pursued through material research. This observation underscores how the relationship between a building and its environment is strongly influenced by the form, slope, and dimensions of the surrounding context. Depending on these natural characteristics, wineries may be designed as above-ground, semi-underground, or underground structures [31]. Consequently, the layout and spatial distribution are adapted to the terrain, with fermentation, maturation, and aging functions situated deep within the building, while guest facilities are placed at the surface. In this context, a synergy is often observed between modern materials such as steel, glass, or wood and traditional materials like terracotta and brick or solutions that echo traditional materials chromatically, such as colored concrete or plaster [38].

1.3. The Italian Wine Industry

The main goal of the research is to analyze and understand the symbiosis between wine architecture and the rural landscape that could be created [39]. Specifically, the aim is to analyze the relationship between the typology of wineries and the surrounding landscape, how the natural landscape influences the buildings, and how architects integrate the constructions within the context. It is undeniable that wine production involves both the form of the architecture, designed to accommodate the production processes, and the landscape, even at an infrastructural level, as it becomes subject to changes related to the spatial organization of the vineyards [40]. To better understand the design criteria of contemporary wineries, a synthetic description of the evolution of the industrial sector in recent decades is provided. Subsequently, the role wine and food can play when combined with local branding for local communities is analyzed as a tool for sustainable development [41]. Finally, 10 case studies of Tuscan wineries are examined to identify the most recurring typologies among contemporary architectural significant examples. Furthermore, three of these case studies are analyzed in depth to understand better the current

state of building and landscape design in vineyards and offer insights and design strategies for improving wine architecture and landscape.

The context under examination is located in a geographical area where the regional legislator has also given particular attention to the issue of integration between built environments and rural landscapes. As already noted by De Montis [42], the landscape plan approved by Tuscany is relevant, as it provides "some explicit information on the rural built-up landscape." This further confirms the thematic relevance. The Italian wine industry has always been characterized by being fragmented into many small producers across different regions, whose production tends to be highly heterogeneous over time (vintages) and space (regions and specific geographical areas within them); consequently, Italian wine is closely linked to the concept of terroir [43]. This French term, introduced in the late Middle Ages, encompasses both the reference to the taste of the wine derived from the variety of grape species and the reference to the geographical place of production: physical and chemical characteristics of the soil, natural and geographical conditions, orientation, climate, but also social and cultural characteristics of growers and consumers. Therefore, in contexts where production is less industrialized and relies on traditional techniques, as in Italy, the terroir (natural factors) assumes prominence in determining the properties of wine compared with human intervention techniques during the fermentation and aging processes.

This traditional production that characterizes the Italian territory has also led, at a legislative level, to official recognition of the quality of products primarily linked to the product's origin rather than the production process methods. In 1963, Italian law formalized the traditional conception of quality based on the bond wine terroir [44], employing initially two classes: DOC (Denominazione di Origine Controllata) and DOCG (Denominazione di Origine Controllata e Garantita). The second group collects denominations of higher-quality wines. The EU has also introduced regulation on quality schemes for agricultural food products, aiming to protect the designations of specific products to promote their unique characteristics linked to geographical origin and traditional expertise. This classification has been harmonized at the Italian legislative level, with the differences indicated in Figure 1.

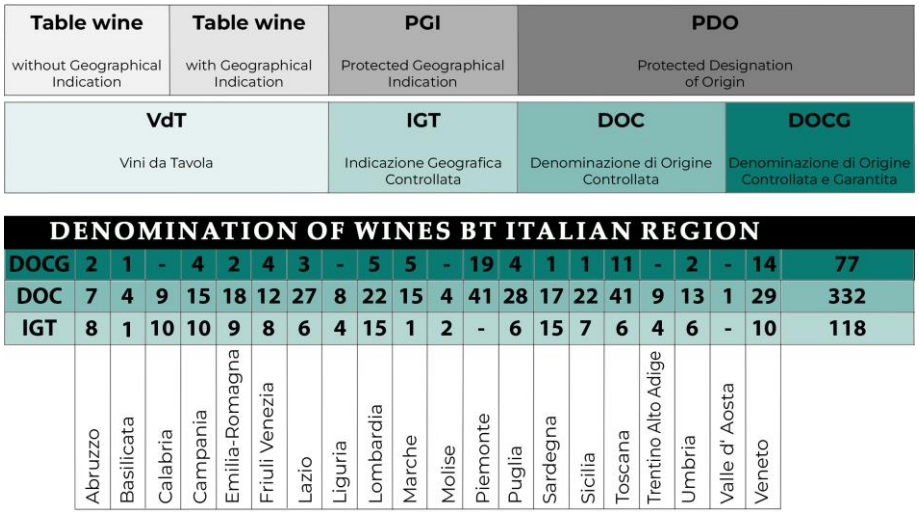


Figure 1. Differences between the classification of wines at the Italian and European levels. Number of protected wines by type and by Italian region—© Authors, 2024.

This vertical classification system has contributed to fragmenting the Italian wine industry into numerous small producers with a strong territorial identity [45]. In certain regions, due to globalization, this division has led to suffering from the large quantities of

wine imported by foreign competitors. In contrast, in other cases, it led to importing different grape varieties, globalizing the production, and, in some way, canceling the ancient idea of terroir [46]. In this way, in some regions, the landscape has become suitable for very productive crops, eliminating weak vine varieties. These choices have favored large producers, who, despite the many acres of land available, have taken advantage of the high quality of the wine mixing of different terroirs and imposing a unique and recognizable label on the final product. From a wide variety of grapes, the market has been reduced to a few big names, well-marketed, which have become global brands, including Prosecco, Chianti, Barolo, Aglianico, and others, which have cannibalized other vines, standardizing the productive landscape and heavy infrastructure of the territory to allow faster transfers toward larger wineries. Consequently, in these areas, wineries now revolve around these few industrial centers, and so too does the rural landscape of wine, which, usually developed in harmony with the territory, now has to confront itself with production halls. Alongside, another interesting phenomenon has developed: replacing the traditional criterion of winemaking linked to the region by complex production where Italian wines are cut with foreign ones—the so-called "Super Tuscans".

From the 1990s to the present day, the wine sector has undergone significant changes: the production of wine has shifted its focus from quantity to quality. In Italy, a long-standing leader in this industrial sector, from the 1970s, when annual production reached a record value of 72 million hectoliters, yearly output has steadily declined; currently, production stands at approximately 42.5 million hectoliters. Conversely, wine exports have been consistently increasing and reached a value of over 6.5 billion euros in 2020 [47]. With this shift in the industrial paradigm, the communication of product quality through recognizable brands and wine guides has become crucial for producers to ensure that their products are distinguishable worldwide despite strong competition and increasing geographical distances. In recent times, Italy has experienced significant growth in nature tourism, which accounted for 32.10% of total destinations reached in 2019 [48]. This form of travel is particularly popular among young people, with over 75% of Generation X and Y individuals embracing it. They are drawn to the genuine appeal of natural surroundings and seek immersive experiences related to food, wine, and landscapes. The literature has largely explored the relationship between young generations and tourism [49,50]. In particular, concerning rural regions, nature-oriented tourism and establishing a recognizable brand beyond regional borders become two interconnected, indispensable tools for developing sustainable tourism [51].

Furthermore, nature-oriented tourism in rural areas stimulates new socioeconomic opportunities related to other sustainable activities encompassing leisure, gastronomy, biodiversity conservation, hospitality, wellness, and sports [52]. In this perspective, wineries play a pivotal role in enhancing the appeal of agricultural production areas, relying on the picturesque beauty of the scenery, the cultural heritage of this traditional production, and the authentic identity bound to the places it is located. This experience often breeds success; in other cases, it developed just a series of "land use" phenomena, with increasing appropriation by fashion vines of a larger part of the territory and more areas along urban edges [53]. Tuscany has interpreted better than other regions the opportunity of lifestyle wines: exploiting a landscape already known abroad, it has for the first time performed a marketing area, promoting worldwide a limited number of wines, well produced and marketed: the idea is that the customer purchases through the wine also a "part" of the Tuscan terroir. Yet the Tuscan landscape seems not only to have been affected by this situation: the pattern of the historic vines has also supported the impact of big producers, but, compared with sufficient production of grapes and an increase in the prices of the finished product, has created niche markets for potential virtuous experiences from the local point of view. This substantial situation of balance between large

producers and small farmers has initiated a reshaping of the territory that today provides a great quality of products and a large supply.

This framework, considered highly relevant due to the aforementioned characteristics, undeniably identifies a foundation on which to develop some reflections of landscape interest. The qualitative aspects of those wineries and areas of territory that have been most influenced by an economic and social context distinctly oriented toward promoting wine tourism policies will be used as case studies for experimentation.

Before engaging in a broader discussion of the background elements that delineate the investigative domain of this study, it is essential to underscore that the multifaceted nature of the aspects addressed thus far stems from the inherently complex and multidisciplinary character of the subject matter. Issues related to landscape integration, particularly when situated within the broader rural context, can manifest across a diverse array of dimensions, encompassing morphological, typological, and technological considerations, as well as economic, managerial, and production-related aspects of a structure—just to name a few. These facets, in no instance, can be overlooked in the scope of a holistic discourse such as the one this study aims to present.

This approach is offered with the awareness that such a comprehensive introduction might pose challenges in framing the central theme under investigation. However, it is deemed imperative to immediately identify the pivotal topics that define the boundaries of the investigative horizon—thus establishing the hypotheses and thesis that the experimental inquiry seeks to pursue.

2. Background

The convergence of the various aspects discussed in the introduction has led contemporary practices to elevate production facilities to the status of "iconic" artifacts [54], embodying values of innovation while fostering a heightened focus on environmental sustainability [55] and landscape integration [56]. This shift reflects layered considerations extensively documented in the scientific literature, which provide a framework for isolating a broad range of references. These references enable the delineation of a specific investigative domain related to winery design, distinct from the broader research lines concerning rural buildings and the relationship between constructed forms and the territory. This section describes the methodological process employed to systematize and select relevant references from the scientific literature, thereby offering an initial, albeit partial, state-of-the-art overview of the subject of winery design. It is important to emphasize from the outset that the reconnaissance provided here does not aim to deliver a comprehensive and exhaustive review of the scientific literature. Instead, it seeks to address a complex, multifaceted, and multidisciplinary topic by discretizing it within a possible ordered framework of references and sources. Based on these sources, the study identified evaluative criteria pertinent to the investigation's thematic focus. Partially replicating the investigative method previously adopted by De Montis [57] and sharing the general inquiries posed by other authors regarding the integration of constructed artifacts and rural landscapes [58–60], this section aims to systematize the conceptual issues discernible from the scientific literature (see Table 1). Its purpose is to classify methods, approaches, data, and indicators widely recognized and validated by the scientific community for the selected theme. The ultimate goal is to identify qualitative and quantitative criteria of analysis within a unified analytical framework, isolating widely accepted indicators and approaches to inform the design of an interpretative method grounded in established literature. This method will be further elaborated in Section 3 of this work.

Table 1. Preliminary survey on the state of the art regarding the relationship between wineries and the landscape: Themes and descriptions—© Authors, 2024.

Themes	Description
Focus	Specific conceptual issues pertaining to one or more dimensions of interest identified as the basis for selection.
Approach	Approach used for the analysis of the morpho-type of constructions, the relationship between built structures and landscape, the assessment and verification of sustainability in the construction sector, and the influence of building design on the wine tourism industry.
Method	Investigation methodology and logical-descriptive pathways aimed at identifying systems for evaluation, analysis, and criteria selection.
Data	Sources, description, and identification of data used for the application of the general approach methodology.
Indicator	Measurement of qualitative, quantitative, or mixed order.

The topic of wineries has been approached from various perspectives due to the influence that the wine industry has exerted over time on architectural and morpho-typological research. This refers to both a theoretical and practical connection that becomes objectively evident in geographic areas where the economy is largely based on oenological and wine tourism activities and their derivatives.

To isolate a cluster of specific elements closely connected to the issues outlined in the introduction of this study and at the beginning of this section—namely, the relationship between buildings, landscapes, and environmental impact—a focused search was conducted. This research utilized the Scopus database with the following keywords: "wineries", "vineyard", "wine cellar", "tourism", "architecture", "landscape", "rural landscape", "landscape planning", and "building-landscape integration". Simultaneously, a cross-verification was performed on the Web of Science database using the same keywords. The research outputs obtained were then filtered based on the specific objectives of the study, defining a taxonomy of common characterization criteria, as detailed in Table 1. This process aimed to delimit the research domain within a specific framework of outputs, partially applying the evaluation criteria originally formulated by De Montis for analyzing the building-landscape relationship in Sardinia [57]. It is important to note that this analysis does not aspire to present a comprehensive and exhaustive state-of-the-art review but is instead limited to constructing a qualitative/quantitative analysis method tailored to the specific topic of this research.

From the partial reading of this selected segment of literature, a growing interest by the scientific community emerges regarding the multiple applications associated with the theme of tourism development related to wine, not limited to Italy. Consider, for instance, the analyses conducted by Merino Bobillo on the strong connection between contemporary architectural projects for Spanish wineries and their related tourism industries [61]. Similarly, the correlation between sustainability and wine tourism has further fueled scientific research, attesting to the fertility of this topic [62].

The analytical framework highlights the importance of how a winery, situated within a specific territory, shapes the landscape through the establishment of vineyards [63]. Alongside research that predominantly explores the relationship between constructed artifacts and the environmental landscape, it is also essential to mention investigations into the building typology of wineries and their architectural quality [64]. Additionally, studies addressing the connection between architectural choices and energy efficiency, aimed

at minimizing environmental impacts during wine production and promoting the sustainable use of resources in production processes, are particularly noteworthy [65–67].

Another dimension that complements these aspects pertains to the economic development generated by the presence of certain wineries and companies within a territory. The scientific literature dedicated to examining economic aspects and development opportunities associated with the wine production chain is extensive [68]. Equally significant are studies on the communication aspects of wine tourism merchandising [69]. These findings further underscore the relevance of the wine sector for the scientific community and the holistic characterization that certain artifacts impart across multiple levels.

Based on the aforementioned considerations, an initial taxonomic organization of the examined literary components was undertaken. The analyzed texts were categorized into four macro-categories (MG-01, MG-02, MG-03, MG-04), highlighting the characterization of each author's arguments in relation to the hypotheses driving this research. This systematization is outlined in Table 2 below.

Table 2. Macro-groups of investigation identified for the preliminary survey based on the examined scientific literature. © Authors, 2024.

Macro-Group	Focus	Type of Characterization	Refs.
MG-01	Analyses related to the characterization of the architectural artifact, including its interaction with the context.	Spatial and distributional organization. Vernacular architecture. Design of outdoor and auxiliary spaces.	[56,60,61,64,70]
MG-02	Analysis of the Characterization of Rural Landscapes.	Perception of the landscape and the direct influence of environmental aspects on the wine tourism sector. Perceptual and aesthetic aspects related to the landscape context. Cultural landscape.	[63,71–74]
MG-03	Analyses related to the characterization of the rural landscape.	Design strategies for the eco-efficiency of the built artifact. Architectural aspects and environmental impacts. Materials and technologies employed. Active and passive strategies for energy consumption reduction.	[55,66,67,75,76]
MG-04	Aspects related to the characterization of wine tourism development linked to the presence of the winery.	Sustainable territorial development models. Rural heritage and local development. Economic sustainability of the supply chain and production.	[62,65,68,69,77]

It is important to clarify that the reflective process employed for the integration and classification of the literary elements analyzed within each macro-group (as well as for the evaluation of their potential interrelations) comprises an initial survey of the proposed literature. This is followed by a direct taxonomic organization based on the recurrence of tactics identified therein, including the indicators, methods, approaches, and focal points underlying each reference.

The first macro-group (MG-01), as outlined in Table 3, represents the most relevant category for the purposes of this research, as it is based on literature specifically focused on describing the architecture of the building and its relationship with the landscape. It should be noted that in this case, contributions related to the cadastral characterization of

the building—accessible through available national databases [78]—have been omitted. Instead, the investigation has been limited to literature addressing the specific topic of wineries and the associated design strategies and techniques. This approach intentionally excludes quantitative analyses based on dimensional parameters, prioritizing elements that characterize the integration between morpho-type and the surrounding landscape context.

Table 3. Classification and characterization of literary elements analyzed for the macro-group related to aspects of architectural quality—© Authors, 2024.

MG-01				
Ref.	**Approach**	**Method**	**Data**	**Indicator**
[60]	Evaluative analysis of the aspects of integration of the winery structure into the landscape context.	Comparative analysis based on morphological and environmental aspects.	Local climatic conditions and soil characteristics.	Mixed qualitative/quantitative indicators: aesthetic and visual impact of the structure on the landscape, area covered by vineyards, size of the structures.
[64]	Architectural analysis of the artifacts and the integration of oenological structures into the landscape.	Comparative analysis conducted based on literature related to the critical interpretation of typical architectural and landscape aspects.	Architectural documentation, research on the wine tourism sector, and reports on the environmental impact of constructions.	Mixed qualitative/quantitative indicators: morphological aspects and environmental sustainability measures.
[56]	Analysis of the relationship between architectural forms and the vineyard landscape.	Comparative analysis based on the morphological study of the artifact and its methods of integration into the landscape.	Photographic documentation and layout plans, critical reviews, and textual analyses.	Qualitative measurement based on the harmony between architecture and landscape and the use of sustainable materials.
[61]	Morphological analysis concerning integration with the landscape and the impact on wine tourism and ecology.	Morphological analysis of the artifact and the methods of its integration into the landscape.	Typical characteristics of materials, along with information on landscape integration and tourism impact, derived from the scientific literature.	Mixed indicators: qualitative for evaluating aesthetics and landscape integration, quantitative for measuring the reduction of environmental impact.
[70]	Historical and landscape analysis of terraced vineyards as evidence of vernacular architecture and cultural heritage.	Analysis of the historical landscape through a combination of historical sources, interviews with local experts, and field surveys to collect data on architectural and natural elements.	The data derive from a combination of primary historical sources, including texts, interviews with local experts, and field surveys.	Qualitative measurements through the analysis of elements such as dry-stone walls, staircases, and drainage systems to understand their influence on water management and soil conservation.

The second macro-group (MG-02) encompasses research outputs related to the landscape and territorial aspects of the topic. These findings highlight a specific focus on the dynamics influencing the visual, perceptive, historical, and naturalistic characterization of the territory. This is analyzed not only in relation to the cultivated areas but also due to the presence of particularly iconic structures and wine tourism flows. The texts in this

category are oriented toward evaluating the visual and aesthetic qualities of the landscape and the perception local communities may have of this subject. This systematization is summarized in Table 4 below.

Table 4. Classification and characterization of literary elements analyzed for the macro-group related to aspects of landscape quality—© Authors, 2024.

MG-02				
Ref.	**Approach**	**Method**	**Data**	**Indicator**
[71]	Analysis of the historical structures of vineyards and traditional winegrowing landscapes.	Comparative analysis based on archival research and direct administration of interviews.	Data derived from cadastral maps, aerial photographs, historical land use information, and interviews with operators.	Quantitative indicators: identified in historiographical and dimensional data. Qualitative indicators derived from the interpretation of interviews.
[72]	Evolutionary analysis of wine landscapes.	Comparative analysis based on archival sources and established literature.	Historical information, territorial, and geographical data.	Qualitative and quantitative indicators identified, also based on scientific literature.
[73]	Stratigraphic and evolutionary analysis of wine landscapes.	Historical information, territorial, and geographical data.	Data derived from scientific literature based on archaeological, paleobotanical, and historical sources.	Qualitative measurement through the analysis of archaeological remains and cultural characteristics.
[74]	Interpretation of data derived from the analysis of agricultural courtyard redevelopment projects.	Analysis of agricultural courtyard spaces, investigating the interactions between architectural spaces and cultivated areas through metric surveys and photographic documentation.	Surveys of wineries with detailed studies on a sample; geospatial data on vineyards and agricultural properties, digital cadastral maps, and orthophotos.	Qualitative indicators: perceptual aspects. Quantitative indicators: geomorphology of the territory, characterization of construction materials.

The focus on the environment and landscape translates into a particular sensitivity exhibited by the designers of these structures, even at the technological level. The third macro-group (MG-03) is thus oriented toward providing a synthesis of the assessments made regarding the possibilities and experiences explored by various authors in relation to technological innovation and the promotion of environmental sustainability values implemented in winery buildings. Particular attention is given to the evaluation and control of the vertical and horizontal partitions of the constructions. The aforementioned taxonomic arrangement is presented in Table 5 below.

Table 5. Classification and characterization of the literary elements analyzed for the macro-group related to aspects of the sustainability of the built artifact—© Authors, 2024.

MG-03				
Ref.	**Approach**	**Method**	**Data**	**Indicator**
[55]	Interpretation of data derived from the architectural analysis of the artifacts.	The methodology adopted is fundamentally comparative and combines a morphological and climatic analysis of the site with architectural design.	The data include local climatic measurements, geological data, analysis of locally available construction materials, and energy consumption data.	Qualitative indicators: perceptual aspects. Quantitative indicators: reduction in energy consumption and resource management.
[66]	Analysis of methodologies that minimize environmental impact through minimal land use and the potential for site reconversion.	Comparative analysis with previous agricultural construction projects to evaluate the effectiveness of the proposed solutions. The project is based on the use of natural and recyclable materials.	The data include geological and hydrological measurements of the site, tests on local natural materials, and analysis of the thermal and mechanical properties of the materials used.	Qualitative indicators: perceptual and aesthetic aspects. Quantitative indicators: quantity of recycled material used, energy savings compared with conventional constructions, and material characteristics.
[67]	Comparative analysis of wineries, ranging from vernacular constructions to high-tech architectural projects.	Historical analysis of the materials used in the construction of wineries. The authors compare the energy performance of traditional architectural solutions with modern construction techniques.	Measurements of the thermal and physical properties of construction materials and analysis of energy flow through building surfaces.	Qualitative indicators: level of aesthetic and landscape integration of wineries. Quantitative indicators: energy exchange values of different types of construction materials.
[75]	Morphological and architectural analysis of a specific case.	The method employed for the analysis is based on direct surveys of the site and the assessment of climatic and topographical conditions to optimize the design.	The data collected include the measurement of the impact of climate and temperature on wine production and the characteristics of the soil.	Qualitative indicators: level of landscape integration of the building within the natural context, aesthetic perception.
[76]	Comparative analysis of the building systems aimed at energy containment of the structures.	Analysis based on direct sources and the examination of the building system designs in the case studies subject to comparison.	The data include the measurement of the impact of climate and temperature on wine production, as well as consumption and management costs.	Qualitative indicators: level of landscape integration of the building. Quantitative indicators: metric data of the building, energy consumption for management, and data relevant to the enological discussion.

The last category (MG-04) is not aimed at defining the research model but rather at guiding the selection of case studies that can generate concrete interest for the experimental activity, thereby allowing progress in research on the topic. The literature

presented in Table 6 is, in fact, focused on identifying the territorial development aspects related to the design theme of winery buildings. As already noted in the introductory paragraph, these structures influence the perception of the overall landscape, also generating renewed economic development for the area due to the wine tourism chains that are consequently activated, whose territorial contribution cannot, therefore, be considered marginal.

Table 6. Classification and characterization of the literature elements analyzed for the macro-group related to aspects concerning the development of wine tourism—© Authors, 2024.

MG-04				
Ref.	**Approach**	**Method**	**Data**	**Indicator**
[77]	Investigation into the performance of wine tourism, understood as a catalyst for improving sustainability in Spanish wineries.	The method used by the authors is based on a structural equation modeling (SEM) approach to analyze the relationships between wine Tourism and the sustainable performance of wineries.	The data are derived from a structured questionnaire administered to 196 Spanish wineries.	Qualitative indicators: perception of the social legitimacy (CSL) of the wineries by the local community and visitors.
[68]	Interpretation of data derived from sustainable practices in the wine sector and how they contribute to economic, environmental, and social valorizations.	The methodology is based on statistical analysis. The authors collected data from 1579 wineries across 42 countries.	The data come from a global survey conducted among 1579 wineries, with 57 relevant indicators for sustainable wine tourism, collected through questionnaires.	Quantitative indicators: sustainability factor scores, correlations between sustainable wine production and sustainable tourism, and statistical values for national sustainability clusters in the wine sector.
[62]	Interpretation of data derived from interviews based on the concepts of agricultural sustainability and socioeconomic innovation in the context of Tuscan wine networks.	The method employed is a qualitative study based on semi-structured interviews with 24 Tuscan wineries.	The data are derived from interviews with 24 Tuscan wineries, including details on certifications, production, company size, market strategies, and resource management practices.	Qualitative indicators: producers' perception of the importance of sustainability. Quantitative indicators: the size of the wineries and quantity of wine produced.
[65]	The authors interpret the data collected from field research to analyze the sustainable practices adopted by wineries in relation to wine tourism.	The analysis includes the integration of sustainability into tourism management, with particular attention to logistics and the conservation of landscape and biodiversity.	The data collected include observations derived from field research conducted in vineyards and wineries. The data also include the assessment of the impact of sustainable practices on the landscape and consumers.	Qualitative indicators: perception of sustainable practices by visitors, degree of conservation of the natural landscape and biodiversity. Quantitative indicators: amount of renewable energy used, reduction of waste produced.
[69]	Interpretation of data collected through	The methodology used is that of an exploratory case	The data collected include 100 interviews and	Qualitative indicators: perception of

interviews and field observations to assess the impact of intangible cultural heritage on sustainable tourism in rural areas.	study, with interviews of local witnesses and the collection of oral narratives.	the analysis of documents related to the local food and wine heritage of the Marche region.	sustainability values and cultural tradition by visitors and the local community. Quantitative indicators: number of participants in tours, statistics on guided visits.

The collection of contributions briefly outlined here leads to the need to reflect on architecture related to viticulture and the foundational relationship between the built structure and the environment, especially in light of the preservation and enhancement measures outlined in the Code of Cultural Heritage and Landscape. This includes the contribution that these buildings can offer in achieving the objectives of conservation and preservation of the natural context and its identity value [79].

In this regard, the aim of this research focuses on exploring the methods and operational practices through which wineries are configured as a coherent and integral part of the landscape. This contribution extends beyond merely serving the wine production chain for productive purposes to also include the enhancement of the surrounding territory (references MG-01 and MG-02). This involves reflecting on the concept of architectural quality, understood not merely as an aesthetic characteristic of the building but as the adaptive capacity to harmonize the constructed space with its environmental context, thus enriching the sensory and perceptual experience, which a large portion of the enotourism audience typically seeks (MG-04). In this sense, the qualitative appreciation of coherence for wine architecture will be used in this work as a product of a conscious design approach, where formal and constructive aspects converge in a unified direction, considering a multitude of factors related both to the architectural object and to the context in which it is situated [80].

To this end, construction aspects will also be evaluated, with a focus on those choices that simultaneously function as both technological responses and architectural tasks, given the impact these decisions can have on the morphological level, significantly altering the "linguistic register" [81] of the building (MG-03). The implementation of these elements is considered to represent a substantial contribution of innovation compared with the current state of the art in landscape integration. It is important to clarify that the body of literature pertaining to MG-04 does not aim to identify techniques or evaluation methods for the landscape integration of wine-related structures (unlike the other three macro-groups identified). Instead, this body of literature is exclusively focused on delineating phenomena associated with wine tourism experiences and the wine market, including their economic and social dimensions. These phenomena are so deeply rooted and stratified within the territory that they render the discussion on the landscape integration of structures linked to the wine industry a central topic. This focus is intended to substantiate the experimental activity proposed in this research and to minimize the authors' discretion in the selection of the case study.

3. Materials and Methods

This section aims to develop a method for systematizing the various components that influence the landscape, understood as a combination of natural and anthropic elements, in order to allow for an interpretation of the territorial context based on both qualitative and quantitative data. These data pertain to the architectural quality of wineries, environmental integration, and landscape appreciation. The section will describe in detail the investigative criteria implemented and the research tools employed, outlining, within a

single taxonomic framework, indicators and approaches related to technological, morphological, typological, and constructional characterization. Through an analytical model, already developed using descriptive sheets, key aspects derived from the scientific literature on the selection of Tuscan case studies are explored in order to assess the effectiveness of the proposed framework. The goal is to define a replicable and potentially universal approach, also applicable in professional practice, capable of guiding design choices by combining functionality, sustainability, and landscape integration opportunities.

3.1. Thesis and Hypotheses of the Research

The ultimate goal of this work is to develop an evaluation tool that can be applied not only in the qualitative analysis of aesthetic cases to assess their coherence and design quality in relation to the landscape context but also to support designers in the conceptual phases of the project. This tool will encompass, within a single, organized reference framework, morphological, typological, technological, and territorial integration aspects in line with the research domain outlined in the scientific literature presented in Section 2 of this paper. The core of the analysis is based on the synergistic relationship between the built structure and the environment, which wineries establish with their context. This approach contributes to the ongoing debate about the role that rural buildings can play in promoting sustainability, wine tourism, and the enhancement of local characteristics. These aspects will be investigated using descriptive sheets specifically developed to achieve the following:

- Analyze the morphological and functional characterization of the winery building in relation to the landscape context;
- Identify the design strategies adopted during the conceptual phase, focusing on choices aimed at ensuring harmonious integration between architecture and landscape, thus enhancing the overall territorial context;
- Evaluate the technological and construction choices made, including the impacts they have on the built form and the perceptual aspects that follow.

Based on the scientific references presented in Sections 1 and 2, the theories underpinning this work aim to demonstrate the existence of a close correlation between the aesthetic, functional, and performance aspects of wineries and their level of integration into the landscape. This is derived from the hypothesis presented in Table 7, which has already been organized according to the areas of interest within the research undertaken.

Table 7. Identification of the research hypotheses—© Authors, 2024.

Code	Domain	Hypothesis
Ip-01	Architectural quality of the built structure	Wineries that are characterized by consistent architectural quality contribute to strengthening territorial identity and enhancing territorial attractiveness. There is a positive interdependence between the adoption of certain architectural choices when aimed at ensuring proper landscape integration and the perception of the agricultural context by the users.
Ip-02	Integration between building and landscape	The choices made in terms of construction, typology, settlement, and morphology directly influence the perception of the agricultural landscape. Integration with the landscape, also through the mindful selection of the aforementioned elements, promotes a lower environmental impact of the built structure.
Ip-03	Nature-based, Material and	The natural context, particularly the land contour, determines the most effective building typology and technological choices associated with it.

Technological Solutions	Passive strategies, particularly Nature-Based Solutions that involve using the land as a technical element for the building envelope components, are among the most effective options to provide a significant improvement in microclimatic conditions. Technologically advanced solutions, on-site energy generation, and high-efficiency systems can be used subsequently to achieve energy and comfort goals after exploring passive solutions, provided they are well integrated with the surrounding context.

Based on the hypotheses formulated above, it is, therefore, possible to place the research topic within a domain of reflection characterized by three foundational aspects: the architectural quality of the built structure, the integration between the building and the surrounding landscape, and the technologically advanced solutions that can be adopted in the construction of the winery building to ensure its environmental sustainability. This aligns with the macro-groups of the scientific literature 01, 02, and 03 highlighted in Section 2. Although not directly addressed in this research, it seems appropriate to further clarify that the general sensitivity guiding the economic flows of sustainable tourism—particularly linked to landscape enjoyment, the tasting of natural products, and the concept of wellness in rural areas [82]—represents the fourth dimension within which the topic is situated. On the other hand, as Maialetti has already observed [83], the establishment of crops has a significant influence on the transformative dynamics of the rural landscape, identifying multiple development trajectories and consequently producing considerable socioeconomic effects.

3.2. Definition of the Analysis Method and Interpretation of Architectural, Technological, and Landscape Integration Characterization

The body of scientific literature examined, based on the hypotheses formulated, unmistakably identifies the holistic and multidisciplinary characterization of the topic. Thus, the need emerges to isolate the most common approaches, indicators, and analytical tools to identify, in a single taxonomic expression, the evaluative criteria necessary to simultaneously experiment with the quality of the built structure, the quality of the landscape aspects closely connected to it, as well as the recurring practices aimed at ensuring the sustainability of the structure. This is particularly relevant in contexts where wine tourism may have fostered a renewed sensitivity to the theme of landscape integration, influencing the production sector also with regard to the architectural research of the buildings designed to meet the business needs within the framework of a unified experiential promotion connected to the wine landscape. The systematization approach for macro-groups, as used in organizing the scientific reading in Section 2 of this work, identifies a strong methodological predominance based on comparative analysis methods conducted using mixed indicators, both qualitative and quantitative. Regarding the aspects strictly related to the landscape domain and the integration between the building and the rural context, the framework suggests two approaches:

- The first relates to the territorial context, focusing on the study of landscape characterization derived from geomorphological, dimensional, organizational, and perceptual aspects.
- The second is more focused on the building itself, concerning the interpretation of the morphological-typological aspects of the winery building, with particular attention to the spatial configuration of the structure, its distribution, organization, and dimensions.

These aspects are predominant in research related to the MG-01 and MG-02 areas, given the importance of the architectural theme in the conservation and protection of the wine heritage, which has often led various authors to engage in investigations based on

literature already oriented to describe the building and its context within a unified framework, according to critical-descriptive readings of compositional aspects. In particular, this approach finds significant support in the frequently mentioned research by Zhukova and Barsukova [60], but the same framework could still be expanded, finding similar methodologies in the works of Giménez Ibáñez [84] and Bailey [85]. These references, although not systematized in the previous paragraph, nonetheless represent "sources" upon which many of the recently proposed studies are based. Similarly, the research of Rosado [72], which has connected wine production and territorial development through three case studies in Alentejo and Andalusia, as well as more general studies by Myga-Piątek [73], investigating the evolution of wine landscapes in Europe and beyond, including the Mediterranean basin, Asia Minor, Transcaucasia, and Central Asia, can be considered. All these studies share the methods and approaches mentioned above and confirm the fertility of the topic.

Quantitative-based research can instead be found in the MG-03 area, where measurements related to technological and plant systems aimed at ensuring the eco-efficiency and sustainability of the structures allow for the dimensional definition and verification of selected strategies. Specifically, it was deemed relevant for the purposes of this research to focus on the following:

- The type of technology used in relation to the building envelope of the winery.
- The characteristics of the materials employed.

These references are ultimately aimed at experimenting with a direct integration between architectural quality and environmentally conscious choices that share with this work the hypothesis that climatic and energy factors can lead to architectural choices that are as attentive to the environmental profile as to the qualitative aspect of architecture.

Based on the review presented in Section 2, it is deemed possible to discretize and compare the multiplicity of aspects identified using a combination of qualitative indicators, organizing the information found for experimentation according to descriptive thematic layouts. This aims to propose a method that is useful and focused on the direct characterization of wineries in relation to landscape integration and the sustainability technological choices adopted within contexts where the wine tourism experience plays a priority role in the economy of local communities. The multiplicity of descriptive elements, already derived from the systematized framework of the scientific literature on the subject, that can be used in the development of evaluation sheets is shown in the following Table 8.

Table 8. Descriptive layout of the characterization of wineries for architectural aspects and landscape integration—© Authors, 2024.

No.	Area	Code	Themes	Indicator	Evaluation Elements	Ref.
1	Geographical identification and general characterization.	CG-01	Localization.	Cartographic identification or global reference.	Geographical location.	MG-01 MG-02
				Identification of the landscape ensemble.	Graphic representation.	
		CG-02	Morphological characterization of the land.	Accessibility, altimetric characterization of the land.	Orthophoto of the area.	
		CG-03	Characterization of the vineyard layout.	Identification of the settlement type.	Orthophoto, field assessments.	

2	Analysis related to the characterization of the architectural structure.	CA-01	Architectural consistency.	Identification of the building.	Physical and dimensional characteristics.	MG-01
		CA-02	Architectural layout.	Typological and settlement organization.	Project drawings, images, critical description.	
		CA-03	Architectural concept.	Identification of design techniques.	Photographic documentation, critical description.	
		CA-04	Architectural detail.	Identification of architectural details significant for morphological purposes.	Project drawings, photographic documentation, critical description.	
3	Analysis related to the characterization of the rural landscape.	AP-01	Characterization of the general landscape.	Identification of the landscape ensemble.	Regulatory elements derived from regional planning. Environmental characterization elements.	MG-02
		AP-02	Characterization of the individual construction elements that make up the landscape.	Identification of significant anthropic elements.	Photographic documentation, brief description.	
		AP-03	Characterization of the natural elements of the context.	Identification of significant natural elements.	Photographic documentation, brief description.	

Based on the review presented in Section 2, it is deemed possible to discretize and compare the multiplicity of aspects identified using a combination of qualitative indicators and organizing them. In addition to Table 8, an investigation into the technological choices related to the environmental sustainability of the structure is provided, with the elements listed in Table 9. The table is divided into four main categories:

- Building Typology;
- Passive Design Strategies;
- Nature-based and Technological Solutions;
- Energy and Comfort Analysis.

The selection of technological solutions must be made in relation to the building typology of the winery. Consequently, the first indicator evaluates the relationship between the building and the land (above-ground, semi-underground, or underground building), a key aspect that determines not only the functional layout and the integration of the building into the context but also the choice of materials and technological solutions to select those most suitable for ensuring optimal internal microclimatic conditions.

Subsequently, the second set of indicators analyzes passive design strategies that utilize the natural characteristics of the surrounding environment to reduce energy consumption, improve thermal comfort, and reduce environmental impact. These design solutions involve the orientation of the building, the use of natural light, and natural ventilation to optimize energy consumption.

The third category of indicators explores the integration of Nature-Based Solutions (NBS), technological systems, and cladding materials to improve the building's energy performance. NBS can include the use of green roofs and green walls as natural shading and/or drainage systems or leverage thermal mass to enhance energy performance. The integration of passive technological solutions, such as sunshades, can be similarly employed to achieve a balance between environmental sustainability and thermal, energy, and visual comfort.

Table 9. Descriptive layout characterizing the technological level and sustainability aspects of the building—© Authors, 2024.

No.	Area	Code	Themes	Indicator	Evaluation Elements	Ref.
1	Analysis of winery building typology	BT-01	Building-site relationship	Architectural layout	Technical drawings	MG-03
2	Passive design strategies	PS-01	Building orientation	Location of the building	Technical drawings	
		PS-02	Solar gains and natural daylight	Location and sizing of openings	Technical drawings	
		PS-03	Natural ventilation	Identification of cross-ventilation; stack effect	Technical drawings	
3	Energy and comfort analysis: Nature-based and technological solutions	EC-01	Shading systems	Identification of NBS or technological systems	Technical drawings; Photographic documentation	
		EC-02	Thermal stability	Identification of massive materials or NBS	Technical drawings; Photographic documentation	
		EC-03	Finishing elements	Identification of cladding materials or NBS or technological systems	Technical drawings; Photographic documentation	

Finally, the last group of indicators focuses on the quantitative evaluation of the building's energy performance and internal comfort through the assessment of natural lighting, ventilation, passive heating and cooling, and a detailed set of thermal parameters (thermal transmittance, periodic thermal transmittance, and thermal mass). The elements presented in Tables 8 and 9 form the matrix of indicators, which are considered sufficiently comprehensive to formulate an analytical method for interpreting the architectural appreciation of the structure and its ability to harmoniously integrate into the territorial context. The elements pertaining to the investigation of sustainability aspects of the built structure have been deliberately addressed separately. Co-constructive technologies can, on the one hand, help strengthen the perception of the structure's eco-efficiency, but on the other hand, they require quantitative analysis, which is not directly comparable with the purely qualitative indicators set for architectural and landscape aspects. This distinction has been elaborated based on primary indications drawn from the scientific literature analyzed in Section 2 of this work.

The MG-04 area, related to the wine tourism context, addresses aspects that are collateral to the research presented here, focusing primarily on evaluating sites and

experiences that characterize the regions where significant case studies on the topic may be found. The categorization of the analyzed texts and their subsequent taxonomic organization into four macro-categories (MG-01, MG-02, MG-03, MG-04) was accomplished through an initial review of the selected texts. This was followed by the taxonomic structuring of the contributions identified in the literature, aligned with the themes underlying the hypotheses that shaped the research.

The proposed methodology can be summarized in seven interconnected and sequential phases, where each phase originates from the premises of the preceding one, leading to the subsequent level of experimentation. This methodology is graphically represented in Figure 2 below.

Figure 2. Descriptive diagram of the methodology and experimental phases applied in the research—© Authors, 2024.

The process discussed here begins with the definition of the context and objectives, aiming to explore the interaction between architectural structures, such as wineries, and the rural landscape, with a focus on architectural quality, environmental integration, and sustainability. Through a review of the scientific literature, relevant theoretical contributions are identified to establish a solid conceptual foundation.

As outlined, the collected data are then organized into four thematic macro-groups: architectural, landscape, technological, and economic aspects related to wine tourism. Subsequently, representative case studies of iconic wineries in Tuscany are selected, with particular emphasis on newly constructed buildings, to test the analytical method.

Based on the identified data, descriptive sheets are designed and compiled to evaluate the architectural, technological, and landscape integration of the analyzed buildings.

Qualitative and quantitative indicators are applied to measure aesthetic impact, sustainability, and design strategies. A replicable analytical model is being proposed to guide design choices with a balance between functionality, sustainability, and landscape integration. This methodology is applicable to diverse contexts and case studies, even those significantly different from one another, and can be adapted to the specific characteristics of the architectural structures under investigation.

3.3. Wine Architecture in Tuscany: Case Study Description

The projects that will be analyzed below, referring to the vineyard context of Tuscany, will have the relationship between architecture and landscape as their central theme. Both functional reasons dictate this theme, as these buildings are located in a rural context strongly characterized by vineyard cultivation and the cultural aspect discussed in the previous paragraphs. Another aspect that significantly influences the design of wineries, especially concerning historical wine-producing regions like Italy, is the relationship with existing architectural heritage. Indeed, numerous wineries decide to expand their production spaces; in these cases, the designer must interface with the existing buildings and can do so following paths similar to those discussed for the landscape, ranging from a highly mimetic and respectful approach in terms of forms, materials, and characteristics to a stark contrast with the existing part. The selection of the case study related to the Tuscany region arises from the opportunity to identify, within this territory, the characteristics outlined in the MG-04 area, as highlighted in Section 2 (Background). This choice is justified by the unique attributes of the region's economy and its significant role in the Italian wine industry.

The selected architectures (Figure 3) are distinguished by their significant wine production, occupying extensive areas and shaping the surrounding landscape. This is evident both in the built structures, developed in the early 2000s, and in the cultivated landscapes, which illustrate the Tuscan setting with rows typical of viticulture. Beyond considerations strictly related to architectural quality and landscape, it is essential to highlight how wine production in this area has progressively become a foundational element of the local economy, owing to the unique characteristics imparted by the diversity of grape varieties and the volume of bottles released to the market. These aspects are further detailed in Table 10 below, which positions the selected wineries within the classification of the macro-group related to enotourism development aspects (MG-04). The economic relevance and influence exerted by these wineries on the local area allow for their inclusion within the principles of enotourism development outlined in the relevant academic literature, thus reinforcing the choice of case studies.

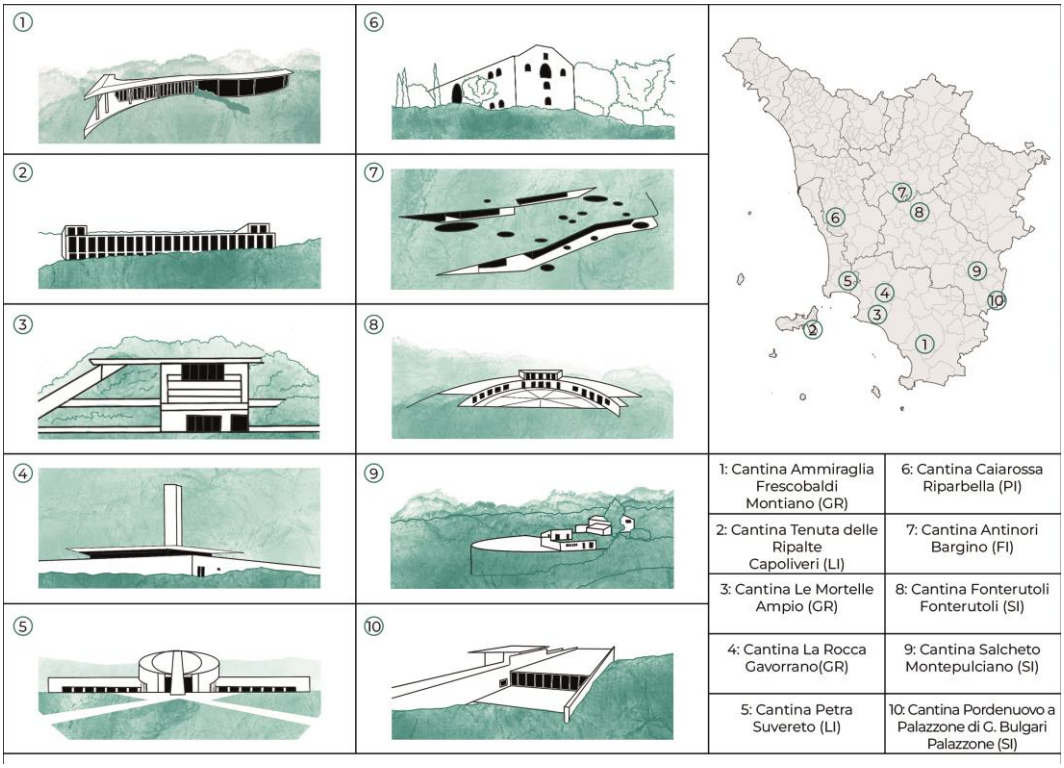


Figure 3. Localization of the ten analyzed wineries in the Tuscan territory—© Authors, 2024.

Table 10. Summary data regarding the wine production of the ten analyzed wineries—© Authors, 2024.

Winery	Grape Varieties Cultivated	Production Area [ha]	Production [bottle/year]	Construction Year
Tenuta delle Ripalte winery	Aleatico, Alicante, Gorgaccio, Carignano	150	120.000	2010
Caiarossa winery	Cabernet Sauvignon, Cabernet Franc, Merlot, Alicante, Petit Verdot, Petit Manseng, Syrah, Viognier, Chardonnay, Sangiovese	70	130.000	2001
Antinori winery	Chianti Classico, Canaiolo, Ciliegiolo, Colorino, Malvasia, Mammolo, Cabernet Sauvignon, Cabernet Franc	130	250.000	2012
Castello di Fonterutoli winery	Chianti classico, Sangiovese, Merlot, Colorino, Malvasia Nera, Super Tuscans, Cabernet Sauvignon	117	100.000	2008
Petra winery	Cabernet Sauvignon, Cabernet Franc, Merlot, Petit Verdot, Sangiovese, Syrah	100	300.000	2003
Le Mortelle winery	Cabernet Sauvignon, Cabernet Franc, Vermentino, Ansonica, Viognier, Carménère	170	195.000	2010
"La Rocca" winery	Cabernet, Merlot, Petit Verdot, Sangiovese, Syrah, Vermentino	83	180.000	2007
Tenuta Ammiraglia Frescobaldi winery	Cabernet Sauvignon, Cabernet Franc, Merlot, Petit Verdot, Vermentino, Syrah	150	275.000	2006

Salcheto winery	Sangiovese, Trebbiano, Malvasia, Canaiolo Nero, Mammolo, Merlot, Vermentino,	60	130.000	2011
Podernuovo winery in Palazzone by Giovanni Bulgari	Cabernet Sauvignon, Cabernet Franc, Merlot, Sangiovese, Petit Verdot, Chardonnay	50	100.000	2012

The Tuscany region offers a multitude of particularly heterogeneous experiences that are well-suited for evaluating the influence that wineries can have on the overall landscape. In light of the framework presented in Table 8, the experimentation of the evaluation method explored in this paper is limited to three case studies, considered particularly relevant due to the general appreciation they have received from the scientific community over time. These refer to the Antinori Winery, designed by Archea Associati, the "La Rocca" Winery, created by Renzo Piano Building Workshop, and the Bulgari Winery in Podernuovo, designed by Alvisi Kirimoto. These works have been widely recognized for their significance in the national architectural landscape and also in relation to the contemporary developments of the scientific debate, given the important role each of them plays in the evolution of the building typology in question. It should also be noted that while the examples concerning the reuse and conversion of historical buildings, as well as restoration, recovery, and retrofitting projects, are considered absolutely interesting—particularly in terms of the experiential aspects that may arise from the perception of the historicized heritage [86]—the selected case studies for the application of the evaluation sheets exclusively refer to new construction interventions. This choice was made in order to avoid inappropriate comparisons between projects that may have been limited by technical, functional, and plant adaptability constraints and projects that may have otherwise benefited from an ideation phase free from such specific limitations, possibly related to the historical coexistence and protection values of the existing building. Furthermore, the decision to experimentally select the three aforementioned wineries also derives from the extensive attention that the scientific community has dedicated to these buildings over time. Table 11 collects the bibliographic references used to address the description of the architectural appreciation aspects in the formation of the evaluation sheets.

Table 11. Identification of the scientific literature describing the architectural quality of the selected case studies—© Authors, 2024.

No.	Winery	Designer	References
1	The Antinori Winery in Chianti Classico	Marco Casamonti/Archea Associati	[87–93]
2	"La Rocca" Winery	Renzo Piano Building Workshop	[63,94–97]
3	Podernuovo Winery in Palazzone by Giovanni Bulgari	Alvisi Kirimoto	[98–102]

These are three works designed by prominent figures in the architectural landscape, selected for their particular qualitative value within the context in which they are located, and already featured in numerous national and international architecture magazines. Each is characterized by specific peculiarities.

In detailing the case studies listed below, it is not deemed appropriate to delve further at this stage into discussions concerning the vernacular and rural architecture of the Tuscany region. The typological and morphological characterization of these structures could represent a subsequent research step, also to experimentally assess the potential effectiveness of the analysis sheets in relation to traditional architectures.

3.3.1. The Antinori Winery in Chianti Classico

The Antinori Winery, designed by Marco Casamonti/Archea Associati, is an underground architecture located in the Chianti Classico region. The functional spaces of the building, along with its associated services (restaurant, production and storage areas, offices, sales point, tasting rooms, and infrastructure), occupy an area of approximately 12 hectares, while the green roof hosts the rows of the educational vineyard (Figure 4).

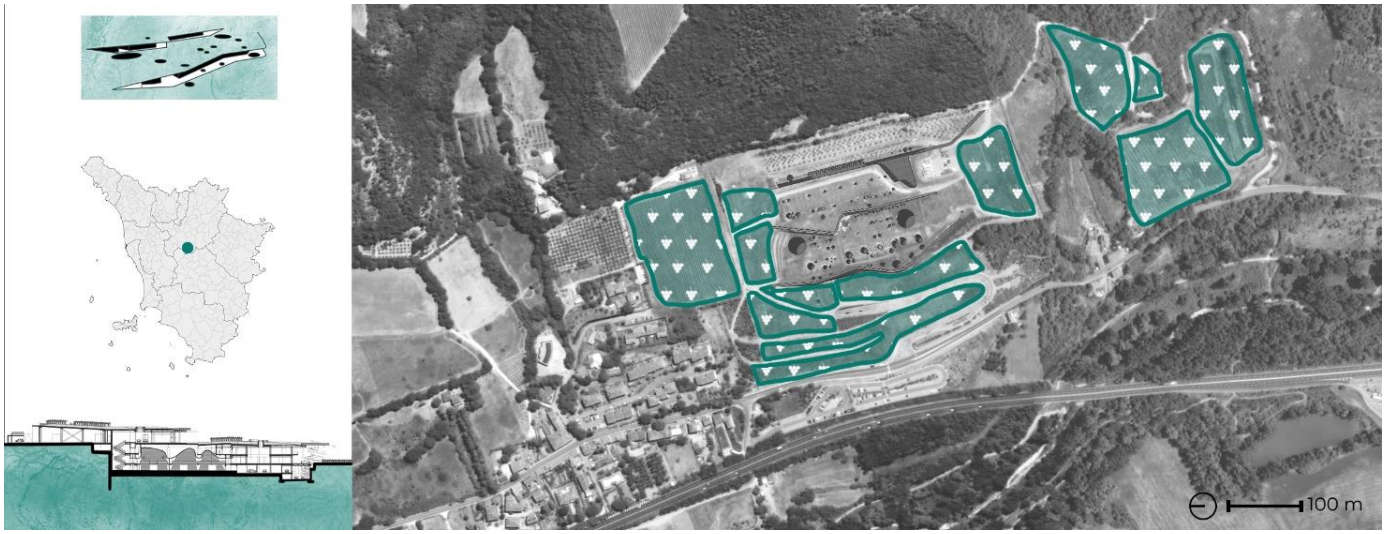
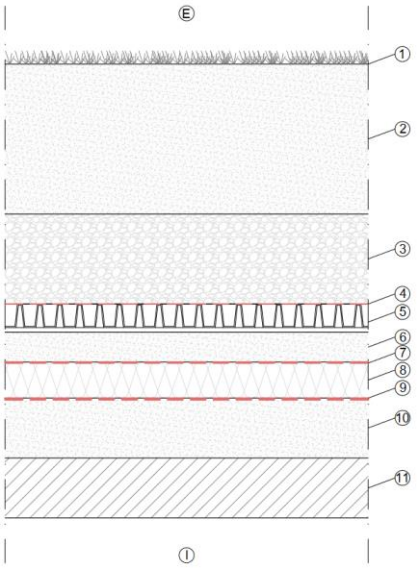


Figure 4. The winery designed by Marco Casamonti/Archea Associati and the area occupied by the vineyard—© Authors, 2024. It should be noted that the section depicted in the bottom left corner of the image is an original reworking of the drawing initially provided courtesy of Marco Casamonti/Archea Associati.

The interior space is characterized by vaulted environments lined with terracotta bricks that evoke the typical imagery of historic Tuscan wineries. Natural light and ventilation are provided even at the lower levels through cylindrical light wells made of corten steel, which pass transversely through the entire section of the building. The underground structure of the winery ensures, on one hand, perfect landscape integration with the surrounding countryside and, on the other, an important role in microclimate mitigation and stability. The ground with which many elements of the building envelope come into contact ensures good thermal stability and a stable indoor environment, acting passively. Additionally, the green roof plays a protective role both for water retention and for UV protection of the structural layers. The technological components hypothesized for the element just described and refined based on the information gathered from the selected literature are presented in Table 12.

Table 12. The Antinori Winery in Chianti Classico: Example of the stratigraphy of the green roof. Th.: Thickness; Th. Cn.: Thermal Conductivity; Th. Rs.: Thermal Resistance; Ms.: Mass; SH. Cp.: Specific Heat Capacity; Vp.Rs.: Vapor Resistance—© Authors, 2024.

Drawing	ID	Layer	Th. [mm]	Th. Cn. [W/m K]	Th. Rs. [m² K/W]	Mass [kg/m³]	SH. Cp. [kJ/kgK]	Vp. Rs. [-]
	1	Planting	1.00	0.2000	0.005	980	0.84	20
	2	Soil substrate	450.00	0.2000	2.250	980	0.84	20
	3	Lava gravel	28.00	1.2000	0.023	1700	1.00	5
	4	Geotextile protection layer	1.45	0.1100	0.013	25	1.34	1
	5	Drainage layer	47.00	0.1000	0.470	25	1.35	70
	6	Reinforced concrete slab	50.00	2.5000	0.020	2400	1.00	130
	7	Geotextile protection layer	1.00	0.2200	0.005	0	1.00	40,000
	8	Extruded polystyrene board	60.00	0.0350	1.714	40	1.45	150
	9	Double-layer root-resistant membrane	5.00	0.1000	0.050	25	1350.00	70
	10	Tapered screed	100.00	0.5000	0.200	1000	1.00	7
	11	Structural slab	250.00	0.6600	0.379	1100	0.84	7

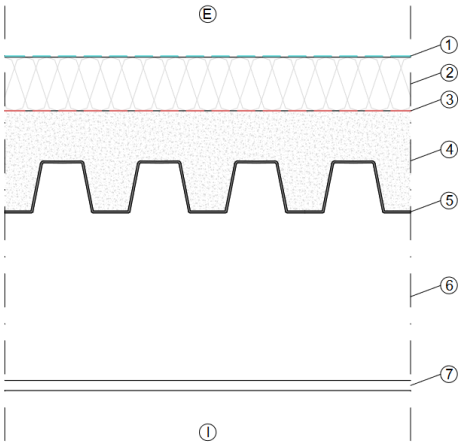
3.3.2. "La Rocca" Winery

The "La Rocca" Winery, built according to a stereotomic logic, features a morphological design that rises above the surrounding landscape through the juxtaposition of technological and volumetric elements (Figure 5). The horizontal line of the glass volume, which overlooks the hilly landscape, is dedicated to spaces connected to tourism and is covered by a suspended roof made of metal pergolas. The underground winery takes the form of an amphitheater and is illuminated by zenithal light coming from a tower, which also serves as a meteorological station. The external cladding of the building, for the opaque sections, is completed with chromatic finishes that emulate the tones and colors of the surrounding land.

Figure 5. The "La Rocca" Winery by Renzo Piano Building Workshop (RPBW) and the area occupied by the vineyard—© Authors, 2024. It should be noted that the section depicted in the bottom left corner of the image is an original reworking of the drawing initially provided courtesy of Renzo Piano Building Workshop Architects.

The elevated position of the winery allows the land to be utilized only in the basement area to ensure ideal microclimatic conditions for the impressive barrel cellar carved into the rock at a depth of 50 m, where nearly 2000 barriques rest in the darkness. This space is illuminated by the tower, which serves as a landmark externally, capturing light that is reflected through three circular mirrors toward the heart of the complex. The exterior of the winery is characterized by its slender metal structure and the sunshade system, which evokes the vineyard rows and allows for the regulation of solar input. The technological system hypothesized for the execution of the horizontal closure element is described and analyzed in Table 13 below.

Table 13. "La Rocca" Winery: Example of the stratigraphy of the green roof. Th.: Thickness; Th. Cn.: Thermal Conductivity; Th. Rs.: Thermal Resistance; Ms.: Mass; SH. Cp.: Specific Heat Capacity; Vp.Rs.: Vapor Resistance—© Authors, 2024.

Drawing	ID	Layer	Th. [mm]	Th. Cn. [W/m K]	Th. Rs. [m² K/W]	Ms [kg/m³]	SH. Cp. [kJ/kgK]	Vp. Rs. [-]
	1	Waterproofing membrane	3.00	0.1700	0.018	1050	1.00	50,000
	2	Polyurethane foam board	90.00	0.0220	4.091	35	1.40	60
	3	Aluminum vapor barrier	0.25	220.0000	0.000	2700	0.88	9,999,999
	4	Composite reinforced concrete slab	75.00	2.5000	0.030	2400	1.00	130
	5	Steel decking	1.00	52.0000	0.000	7800	0.45	9,999,999
	6	Dropped ceiling space	250.00	1.5625	0.160	-	-	-
	7	Plasterboard	15.00	0.2100	0.071	700	1.00	10

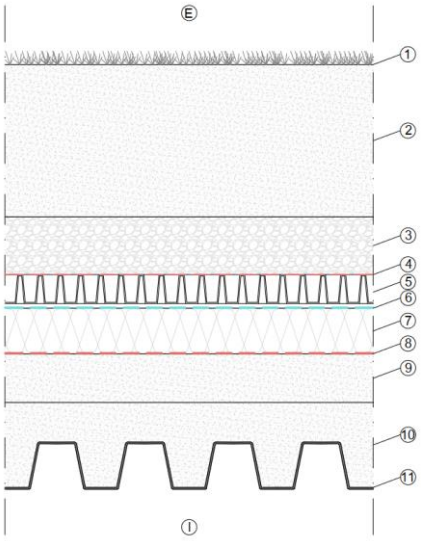
3.3.3. Podernuovo Winery in Palazzone by Giovanni Bulgari

Podernuovo Winery in Palazzone by Giovanni Bulgari is located in San Casciano dei Bagni, at the southeastern edge of the province of Siena. The design formally reflects the image of the vineyards, taking cues from the landscape as project references, leading to the formal definition of a minimal structure in its volumetric composition (Figure 6). The semi-underground volumes are enclosed between parallel concrete walls of varying lengths, which organize the space and the internal distribution of the building in a heterogeneous manner. In this case, as well, the structural elements are painted with colors resembling the tones of Siena earth, seeking a perceptual relationship with the landscape based on the materials used.

Figure 6. Podernuovo winery in Palazzone by Giovanni Bulgari, designed by Alvisi Kirimoto, and the area occupied by the vineyard—© Authors, 2024. It should be noted that the section depicted in the bottom left corner of the image is an original reworking of the drawing initially provided courtesy of Alvisi Kirimoto.

The spaces dedicated to wine production are located in the partially underground portions of the building to maintain constant temperature and humidity levels. Additionally, alongside the semi-underground structure, the reinforced concrete walls and the green roof further enhance the thermal inertia of the winery. Externally, a system of metal canopies shields both the bottling area and the office block from potential excessive sunlight during the summer. Finally, a geothermal system contributes to enhancing the efficiency of the existing thermal systems. The analysis of the proposed detail for the vegetative roof and its characterization is outlined in Table 14.

Table 14. Podernuovo winery in Palazzone by Giovanni Bulgari: Example of the stratigraphy of the green roof. Th.: Thickness; Th. Cn.: Thermal Conductivity; Th. Rs.: Thermal Resistance; Ms.: Mass; SH. Cp.: Specific Heat Capacity; Vp.Rs.: Vapor Resistance—© Authors, 2024.

Drawing	ID	Layer	Th. [mm]	Th. Cn. [W/m K]	Th. Rs. [m² K/W]	Ms [kg/m³]	SH. Cp. [kJ/kgK]	Vp. Rs. [-]
	1	Planting	1.00	0.2000	0.005	980	0.84	20
	2	Soil substrate	250.00	0.2000	1.250	980	0.84	20
	3	Lava gravel	95.00	1.2000	0.079	1700	1.00	5
	4	Geotextile protection layer	1.00	0.1100	0.009	25	1.34	1
	5	Drainage layer	60.00	0.1000	0.600	25	1.35	70
	6	Polymer-modified bitumen membrane	1.00	0.1700	0.006	1200	1.00	188,000
	7	Polyurethane foam board	75.00	0.0220	3.409	35	1.40	60
	8	Aluminum vapor barrier	0.25	220.0000	0.000	2700	0.88	9,999,999
	9	Tapered screed	80.00	0.5000	0.160	1000	1.00	7

10	Composite reinforced concrete slab	65.00	2.5000	0.026	2400	1.00	130
11	Steel decking	1.00	52.0000	0.000	7800	0.45	9,999,999

3.4. The Application of the Analysis Method: The Direct Experimentation of Landscape Interpretation Sheets

The evaluation layout developed is partially based on the "Landscape Fact Sheets" created by De Montis [57] and serves as an additional contribution to the debate on the analysis method for evaluating landscape integrity. However, it is grounded on data specifically related to the theme of wineries, considering the particularities that characterize the architectural topic. For example, descriptive elements developed by other authors related to heterogeneous cultivation types have been excluded. In this sense, starting from general sheets, an investigative model that had already been tested was replicated but adapted to a specific case, deeply rooted in its own peculiarities, while still sharing the methodological framework with the relevant literature.

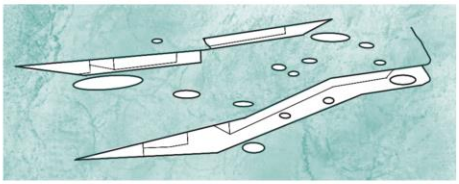
The subsequent Figures 7, 8, and 9) illustrate the characteristic elements of the Antinori Winery in Chianti Classico. Figures 10, 11, and 12 that follow describe the aspects analyzed for the "La Rocca" Winery, while Figures 13, 14, and 15 showcase the distinctive features of the Podernuovo Winery in Palazzone.

Figures 7, 10, and 13 aim to describe the elements identified based on the literature screening and the topics isolated in Figures 8, 11 and 14, illustrating the theme, indicator, and the corresponding values adopted. The first section of Figures 7, 10, and 13 refers to the broader territorial context and aspects closely linked to the landscape, while Section 2 focuses on describing the elements of architectural appreciation and the relationship that certain morphological characteristics establish with the reference environment. The first part includes elements closely related to the geographical location, infrastructure layout, and settlement system, while the second part refers to the typical architectural models explored, also based on the bibliography provided in Table 8.

Figures 9, 12, and 15 explore the technological characterization of the wineries, derived from the analyzed projects, with a particular focus on the building's roof, whose architectural form simultaneously characterizes the morpho-type and serves as a construction solution to ensure the efficiency of the building envelope. The first part of the evaluation sheets refers to the building-site relationship, which decisively influences technological and functional aspects. The second part concerns passive design strategies at the building scale in terms of orientation, solar gains/natural daylight, and ventilation, which significantly determine the microclimatic well-being, energy consumption, and environmental impacts. Finally, the third part focuses on technological and material choices. For each case study, a significant stratigraphy of the roof is indicated, considered an architectural feature that is thought to characterize the morphology of these buildings, simultaneously reflecting compositional choices aimed at ensuring the harmonious integration of the building and technological solutions designed to guarantee the sustainability of the structure. It should be noted that the examined stratigraphies, being authorial interpretations based on field surveys and graphic elements published in industry journals, do not represent the quality of the actual executed design but rather a plausible technological solution that could have been adopted.

Antinori winery in Chianti Classico
Marco Casamonti/Archea Associati

1. Geographical identification and general characterization - CG-01
Localization: Via Cassia per Siena, 133, 50026, Firenze(FI) (43.6123601, 11.1918790)



1. Geographical identification and general characterization - CG-02/CG-03

Description: Orthophoto, original scale 1:5000, year 2023

Data source: Online cartography of the Tuscany Region

2. Analysis concerning the characterization of the architectural artifact - CA-01

Description: Critical text

Data source: Authors' elaboration

Size and Integration: The building occupies an area of 28,000 square meters with a volume of approximately 281,000 cubic meters. It integrates into the landscape through two cuts into the hillside.

Design Concept: The design is conceived to harmonize with the landscape, embedding the structure within the hillside to minimize its visual impact. The roof is covered with vine rows, creating a natural continuation of the surrounding vineyards.

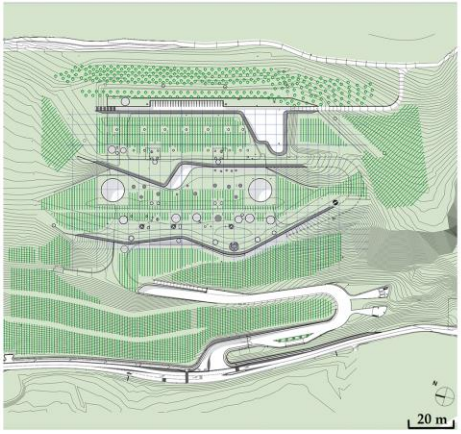
Key Materials: The main materials used are corten steel, wood, and Impruneta terracotta, chosen for their durability and aesthetic harmony with the environment.

Material Dialogue: The interplay between corten steel, wood, and terracotta creates a balance between modernity and tradition, complementing the natural surroundings.

2. Analysis concerning the characterization of the architectural artifact - CA-02

Description: Architectural layout

Data source: Courtesy of Marco Casamonti/Archea Associati.



2. Analysis concerning the characterization of the architectural artifact - CA-03

Description: Architectural concept. Photo of the architectural artifact and its relationship with landscape
Data source: Courtesy of Marco Casamonti/Archea Associati. Photo credits: © Pietro Savorelli e Associati

Figure 7. Operational sheets for landscape integration interpretation tested in the case study of the Antinori Winery—© Authors, 2024.

Figure 8. Operational sheets for landscape integration interpretation tested in the case study of the Antinori Winery—© Authors, 2024.

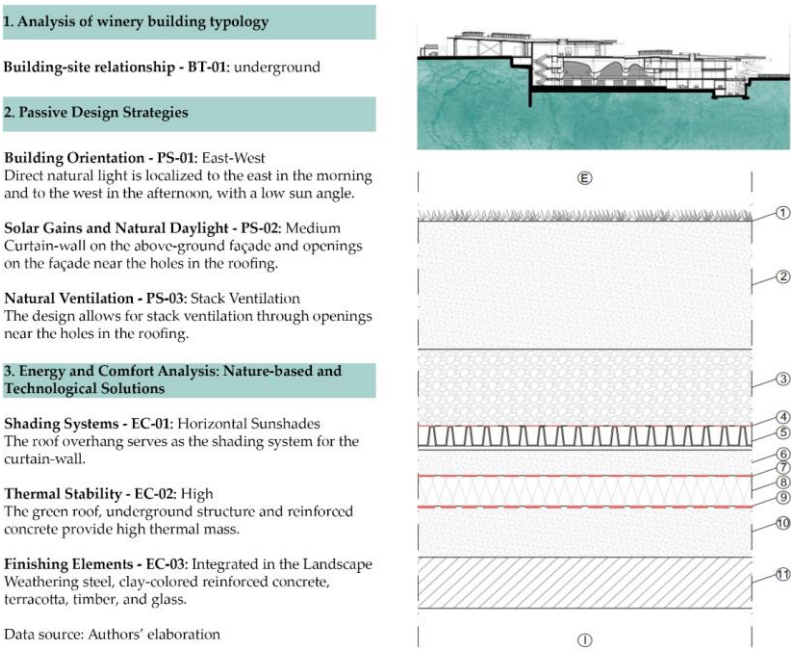


Figure 9. Antinori Winery in Chianti Classico: Synthetical factsheet concerning the technological and sustainability aspects of the building—© Authors, 2024. The section depicted in the top right corner of the image is an original reworking by the authors of the initial representation provided courtesy of Marco Casamonti/Archea Associati.

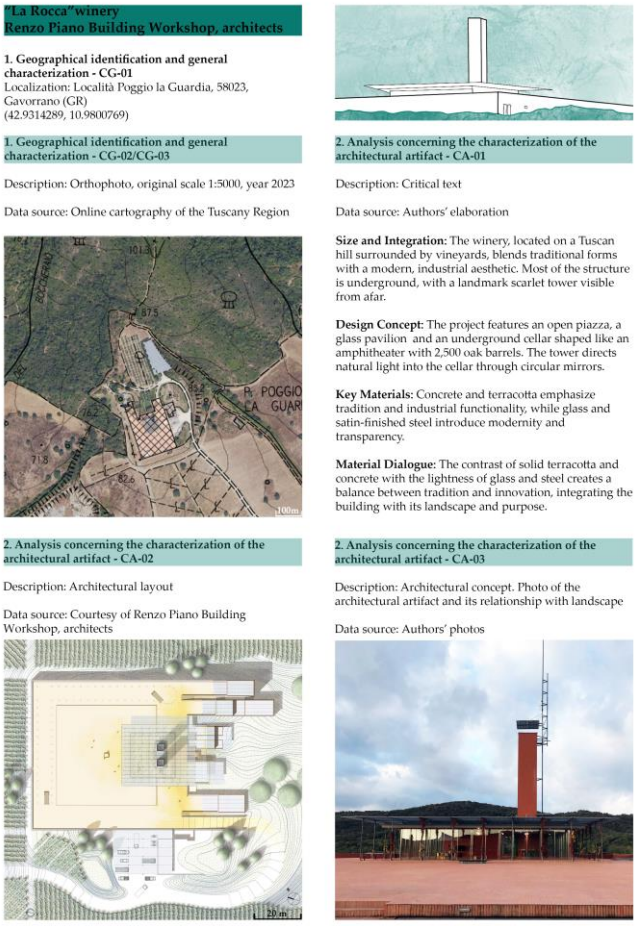


Figure 10. Operational sheets for landscape integration interpretation tested in the case study of the "La Rocca" Winery—© Authors, 2024.

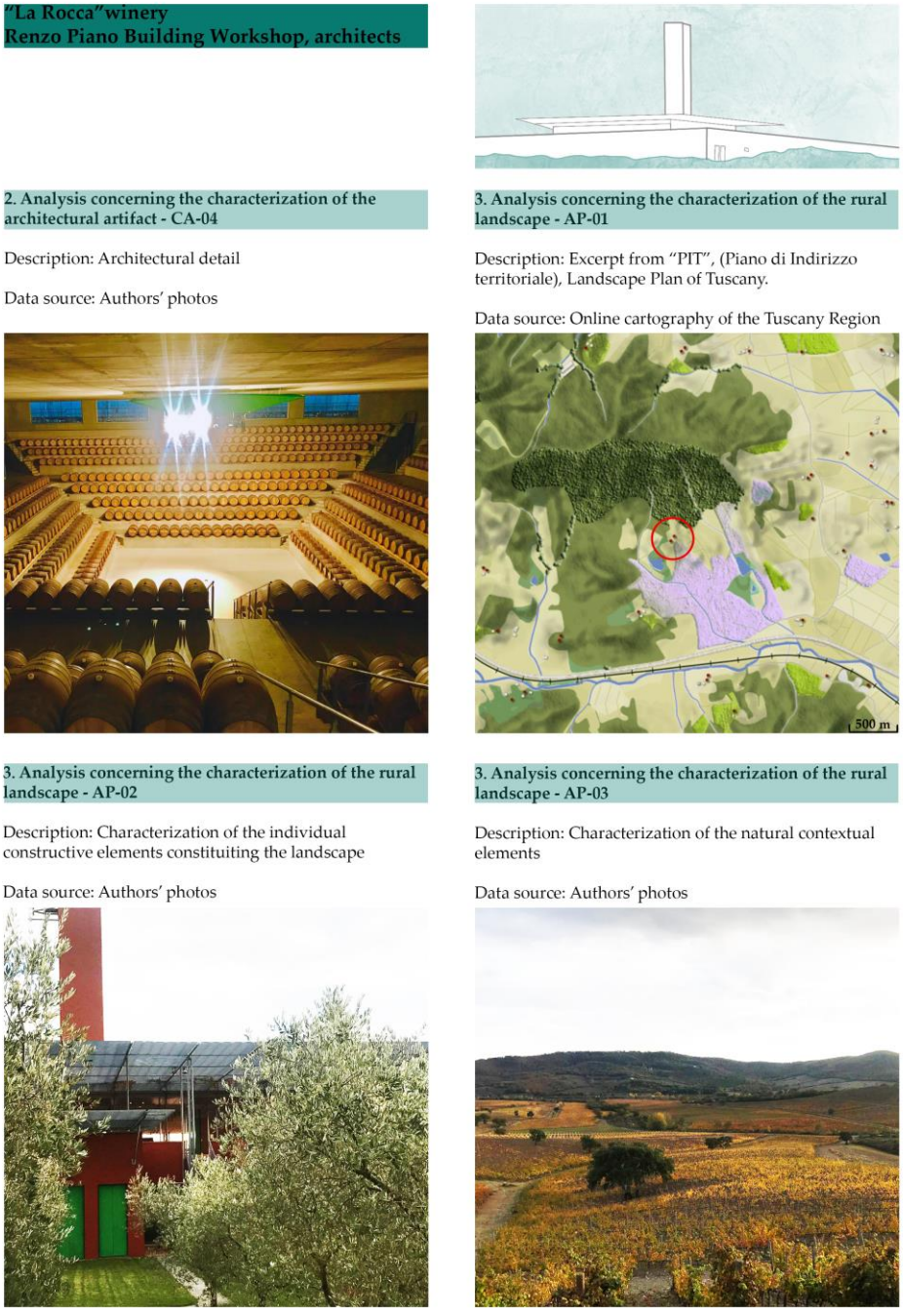


Figure 11. Operational sheets for landscape integration interpretation tested in the case study of the "La Rocca" Winery—© Authors, 2024.

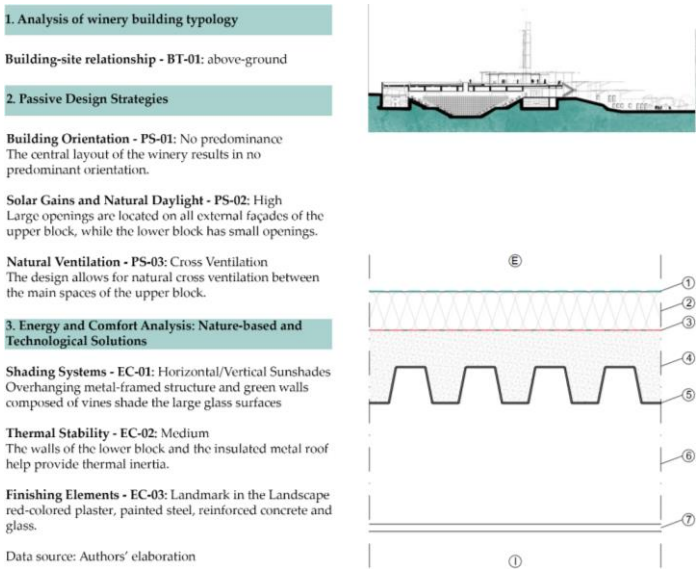


Figure 12. "La Rocca" Winery: Synthetical factsheet concerning the technological and sustainability aspects of the building—© Authors, 2024. The section depicted in the top-right corner of the image is an original reworking by the authors of the initial representation provided courtesy of Renzo Piano Building Workshop Architects.

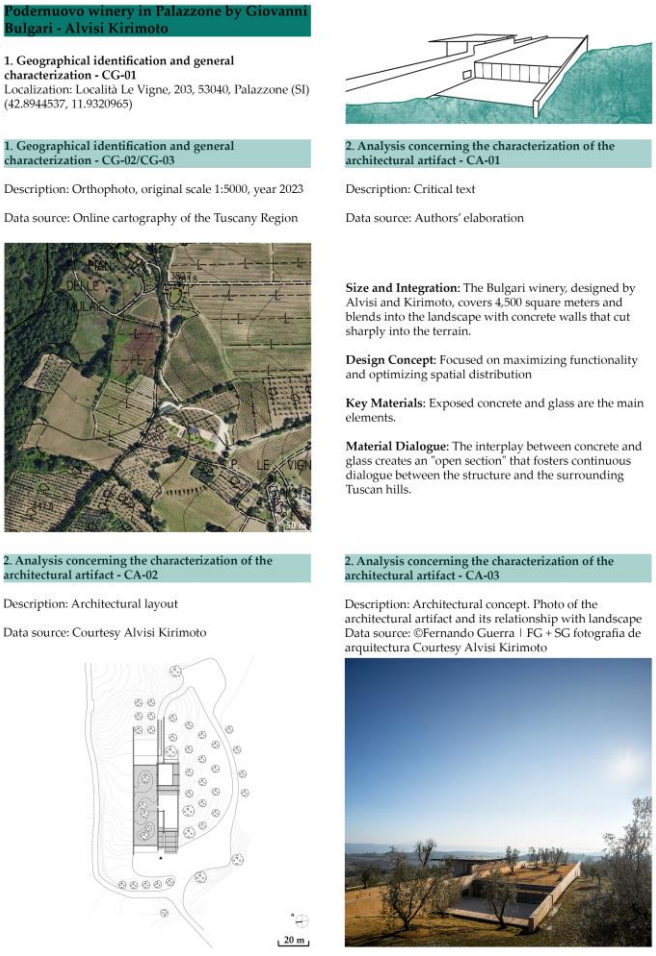


Figure 13. Operational sheets for landscape integration interpretation tested in the case study of The Podernuovo winery in Palazzone by Giovanni Bulgari—© Authors, 2024.

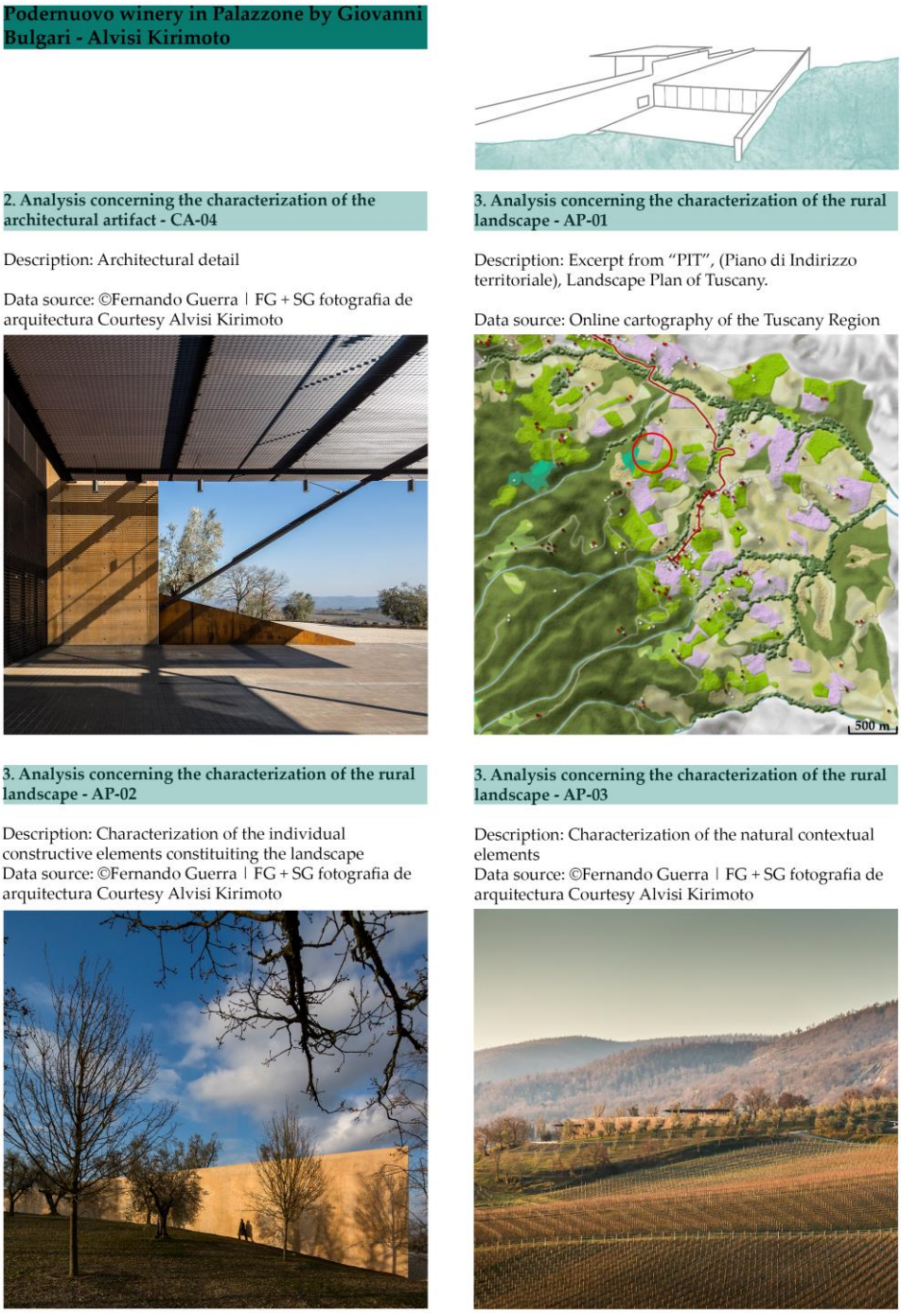


Figure 14. Operational sheets for landscape integration interpretation tested in the case study of The Podernuovo winery in Palazzone by Giovanni Bulgari—© Authors, 2024.

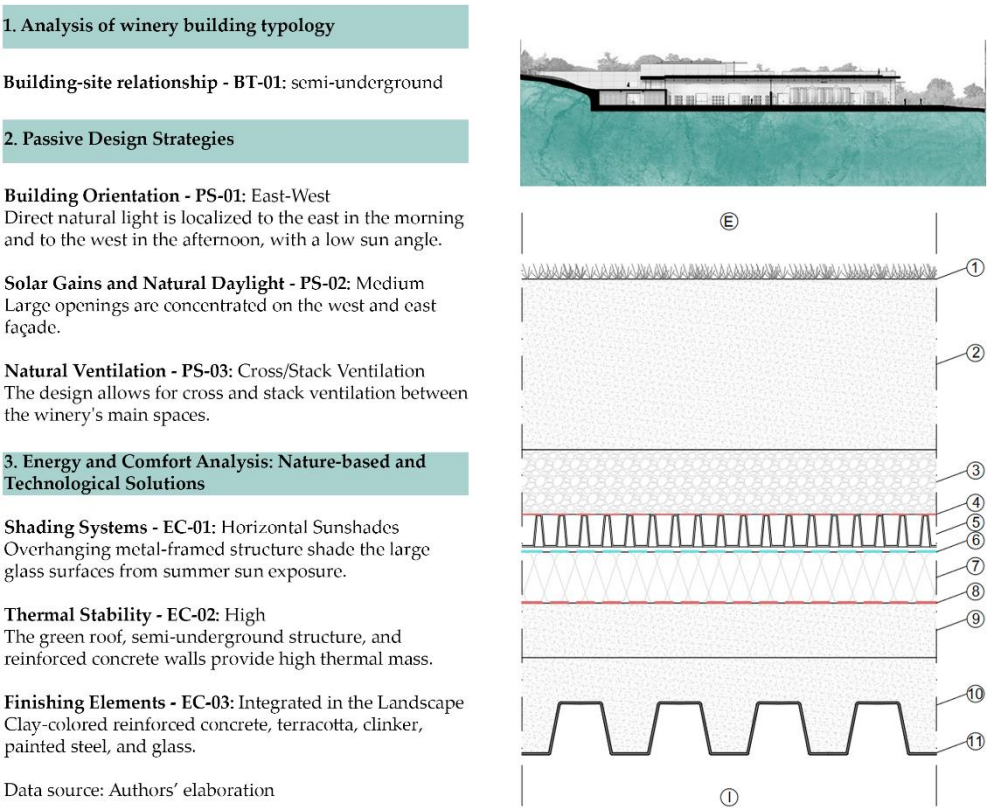


Figure 15. The Podernuovo winery in Palazzone by Giovanni Bulgari: Synthetical factsheet concerning the technological and sustainability aspects of the building—© Authors, 2024. The section depicted in the top-right corner of the image is an original reworking by the authors of the initial representation provided courtesy of Alvisi Kirimoto.

4. Results and Discussion

The analysis method proposed in Section 3 is based on a combination of cross-referenced data derived from the pre-established research domain, with a direct application of the model in the cases of wineries in the Tuscany region. These cases are considered particularly significant in terms of architectural quality, landscape integration, and the technological solutions adopted. This section discusses the results obtained with regard to the hypotheses formulated in Section 3.1. After defining the theoretical domain within which the research is situated and conducting a review of the scientific literature on the topic (Section 2), the analysis of the wineries selected as case studies was carried out, providing a triple description: in addition to evaluating the architectural appreciation of the buildings, aspects related to the landscape context and technological and construction solutions were examined, as implemented to ensure the sustainability of the structures. Descriptive elements were systematized within the analysis sheets, where data on anthropogenic and environmental modifications characterizing the rural landscape were associated and cross-referenced.

4.1. Verification of the Original Hypotheses

The proposed sheets contain descriptive aspects of the morphological and functional characterization of the winery building in relation to the landscape context, identifying both qualitative and quantitative aspects according to the analysis criteria derived from the scientific literature reviewed. In line with the hypotheses that led to this study, the definition of the scientific literature on the topic allowed for the isolation of descriptive elements that define the relationship between the winery and the landscape without addressing distinctions between specific natural contexts. Based on the academic references

identified, a threefold approach emerged: on the one hand, many authors focused on the architectural quality of the building itself, while others concentrated on the relationship between the building and the environment. A third stream pertains to technological and construction solutions. The result of the designed layouts allows for the identification, in a unified reference framework, of all the aforementioned elements, combining design strategies from a perspective that inextricably links architecture, technological and construction choices, and landscape.

In relation to hypothesis [Ip-01], the cross-referenced data clearly demonstrate how architectural choices, considered appreciable and widely explored qualitatively in the reference literature, can contribute to strengthening territorial identity. For example, both in the case of the "La Rocca" Winery and the Bulgari Winery, design choices aimed at replicating, in the finish of the built element, the colors of the surrounding landscape impart a harmonious landscape integration to the buildings. On the other hand, particularly evocative and symbolically rich distributive choices, such as the churchyard-winery solution designed by the Renzo Piano Building Workshop, are also intended to enhance the attractiveness of the buildings, making the experience of the visitor particularly enjoyable in the museum and tasting paths within the wineries. This prompts reflection on the interdependent relationship between architectural choices and the identity of a place.

Similarly, the underground or semi-underground solutions analyzed identify settlement solutions of a morphological nature that limit the visual impact of anthropogenic elements on the natural context, with the emerging part of the building strongly minimized relative to the total construction, confirming hypothesis [Ip-02], according to which even a preliminary analysis of architectural typology can lead to ensuring harmonious landscape arrangement, directly contributing to the formation of a positive perception of the agricultural landscape. The first section of the sheets, containing the descriptive elements indicated in Table 7, highlights the need to consider multiple aspects of architectural quality when approaching winery design, given the direct link between the anthropogenic factor and the natural environment due to the impact the linguistic register of the work has on the context.

The second section of the sheets allows for the evaluation of technological and construction choices that directly affect the built form and the perceptual aspects that follow. A concrete example is the green roof designed by Archea Associati for the Antinori Winery, where the architectural feature of the vegetal cover simultaneously serves as an advanced technological solution aimed at ensuring optimal thermal insulation for the building and a formal solution aimed at blending the structure with the surrounding environment, minimizing its insertion and consequent impact [103]. On the one hand, the technological package allows the building to benefit from significant thermal transmittance values, while on the other, it completely conceals the image of the building within its context, making the anthropogenic presence almost imperceptible among the vineyard rows. In this sense, the dual interpretation of the sheets leads to the implicit construction of guidelines for winery design and the simultaneous enhancement of the context, suggesting replicable architectural solutions for similar settings. This would seem to support hypothesis [Ip-03], which suggests that the choice of technical solutions adopted to ensure the reduction of energy consumption, improvement of internal microclimatic conditions, and sustainability of the building is strongly influenced by building typology but also significantly impacts the morphology of the structure and its integration with the context.

This section of the sheet highlighted how the building typology, defined by the interaction of the winery with the land, determines the possibility of applying certain passive design strategies at the building scale, particularly the use of solar gains through natural daylight and natural ventilation, as well as solutions to improve thermal and energy performance. From this perspective, it was observed that when the building is above-

ground, as in the case of the "La Rocca" Winery, the composition of the volumes is freer, even though it can be identified within modular architecture [104], but the choice of technical elements and materials is often independent, driven by the desire to achieve harmonious integration with the surrounding landscape. In this view, materials with colors similar to terracotta, or painted to resemble it, are commonly used, such as concrete, plaster, or weathering steel. Traditional materials, like terracotta itself or clinker, are also frequently used.

In this sense, this study also aimed to address operational aspects related to design, clarifying how the elements derived from the scientific literature were effectively implemented in the selected case studies, which were chosen based on their importance in the national and international architectural landscape, as they are widely recognized by the scientific community as appreciable quality productions [105]. The analysis reveals not only an evaluative model based on a series of descriptive elements comparable within the developed sheets but also a set of characteristics to consider in the preliminary design phases. In this sense, the analytical sheets are proposed not only as tools for critique and interpretation of the built structure but also as useful guidelines for new designs, encompassing all the elements the literature has indicated, both quantitatively and qualitatively, whose combination can define methods and practices for approaching the topic, which are necessary even in the ideation phase of the project to support decision-making choices. The proposed method, if appropriately characterized for different building types, can thus aspire to universal applicability, not only limited to the Italian context or the type of wineries.

With appropriate adjustments and a well-defined research domain, these sheets can indeed collect different descriptive elements and be layered in an original manner depending on the selected topic, as long as it is related to the broader theme of the building-landscape relationship.

4.2. Elements of Agreement and Divergence with the Established Scientific Literature Related to the Research Domain

If the sheets produced by authors like De Montis focus primarily on the landscape ensemble, concluding with recommendations to ensure a more complete integration between the building and the environment, suggesting the removal of architectural elements deemed incoherent, this work has found a specific focus in the study of wineries, shifting the point of analysis. In contrast to literature particularly oriented to evaluate the overall context, i.e., architectural elements that may or may not constitute examples of correct landscape integration [106], this study aims to interpret the architectural artifact in relation to multiple environmental determinants. In line with the hypotheses already defined in the research framework, the ultimate goal of this work is to develop an interpretive, analytical tool that can also support and facilitate design decisions related to the ideation phases of the project, considering, within the two matrix expressions, landscape, architectural, and technological aspects.

From the sections examined in the MG-01 and MG-02 areas, it is evident that many authors use evaluative sheets for landscape analysis, integrating territorial and morphological-typological assessments, and using photographic and descriptive materials. This work is associated with the possibilities already tested for the analysis of built rural landscapes and analysis of the construction quality of the buildings present, limiting the case study analysis to instances already appreciated from an architectural standpoint and their harmonious integration with the context. This approach fosters a renewed complexity of the topic, also derived from the implementation of technological characterization of wineries. It is based on analytical sheets designed to simultaneously describe aspects that can be evaluated both quantitatively and qualitatively, including areas related to territorial

aspects, as well as typological, settlement, and technological aspects. This approach aligns with the interpretative analyses expressed in the literature included in MG-03.

The introduction of construction characterization, evaluated not only in terms of the eco-efficiency of the building itself but also as a conscious architectural choice capable of morphologically influencing the building and its subsequent landscape integration, represents an innovative element for research on the topic. The green roof designed by Archea for the Antinori Winery, along with other co-constructive choices made in the analyzed case studies, assumes the role of architectural syntagms that modify the interpretation of the building and the harmonious perception of the winery in relation to its context. These choices arise from the altered sensitivity of the wine tourism market, which leads to the assimilation of the viticultural agricultural landscape with the notion of a sustainable landscape [107].

On the other hand, the scientific literature that generally concerns the agricultural landscape often relies on multidisciplinary contributions, using theoretical definitions and proposing qualitative and quantitative evaluation methods. This literature has led to new definitions of the topic based on architectural, typological, and settlement characteristics for rural buildings. In this sense, the topic addressed here shifts the focus of the research from territorial studies to those pertaining to landscape ecology, not limiting the complexity of the subject to just a mix of geographical characterization but favoring an environmental approach closely linked to sustainability themes. This approach is consistent with the established literature produced earlier by other authors, which remains undeniably current today [108–111].

The distinctive characteristics of the architectural elements analyzed herein cannot be attributed solely to the contextual features or the design sensibilities employed. It is worth noting that the proposed building type and settlement pattern also align, at a phenomenological level, with sector-specific regulations that influence this domain. The enactment of the oft-cited Code of Cultural Heritage has indelibly redefined the concept of landscape, integrating aesthetics, culture, and territorial function. This redefinition necessitates careful consideration of ministerial (or regional) constraints aimed at preserving the territorial identity of a given area.

The legislation safeguards traditional features, restricting territorial and architectural transformations except for adjustments deemed strictly necessary and consistent with traditional materials, colors, and construction typologies. This approach underscores the centrality of the landscape as an identity-defining element, balancing cultural valorization and sustainable development. This principle is clearly reflected in the case studies analyzed, where the quality of the works directly mirrors the conceptual implementation embedded within the regulatory framework.

The normative synthesis thus conveys a broader vision, fostering and animating architectural discourse. It transcends mere conservation, positioning the landscape as a strategic component in promoting a growth model that respects historical memory and the aesthetic value of territories.

5. Conclusions

This research aimed to primarily assess the interactions between the built structure and the environment, proposing an investigative method designed to explore the relationship between the built element and the rural landscape, thus enabling the evaluation of design choices made according to descriptive and qualitative aspects. The research domain was limited to the specific case of wineries and their relationship with the natural environment. Despite the various typologies of wineries analyzed in Tuscany, it is possible to conclude that the relationship between architecture and landscape is a determining criterion for this type of building in every case. The vineyard landscape became part of

the architectural composition, and the architects aimed to synergize the natural elements in the project, even when the building did not intend to blend into it. From this perspective, the built and natural ingredients are integral parts of the same surrounding landscape, balanced not to allow either one to prevail clearly. Indeed, contemporary wineries must have an attractive image that reflects the brand, especially for tourism purposes [112]. Consequently, the building can only be partially hidden. However, at the same time, it cannot overpower the agricultural landscape, which is the central element of the architectural project and wine production itself.

The design of the wineries proves particularly effective in determining the driving forces behind the issue of landscape integration, presenting an experimental opportunity to combine holistic aspects, even from disciplines that are far apart. This theme, therefore, imposes reflection on possible solutions already based on multiple and rigorous evaluations. On the other hand, as observed, the design of the buildings examined requires the use of design methods inspired both by the context and by the set of symbolic, collective, and economic values to which the wineries bear direct witness [113]. The use of evaluative sheets, often introduced in atlases or regulatory systems, although based on such a specific case, is considered to have the potential for universal application with the necessary modifications and adjustments. Confirming the theories proposed by De Montis, often cited here, the possibility of resorting to the design of analysis sheets capable of encompassing a multitude of aspects (territorial, geographical, typological, settlement, technological) has allowed for interpreting the various characterizations of the wineries. In addition to highlighting the direct interaction between built structures and the agricultural landscape, this method has enabled the systematization of territorial aspects with construction choices, elevating advanced technological solutions to compositional as well as construction choices, outlining a universal approach replicable in geographically distant contexts and for different types. The same method indeed outlines a taxonomic framework that combines operational and critical aspects, widely used in landscape planning, useful for interpreting any context characterized by the coexistence of natural and anthropic elements, not only in reference to the purely agricultural context but also peri-urban areas, where a dialectical comparison between territory and building modifications, between nature and productive uses, between historical legacy and innovation needs, between loss of function and new possibilities for use, is more easily observed [114]. These approaches could also be experimented with in the contexts of Italian villages, especially those of smaller dimensions in the interior areas of the country, where history and traditions confront the need for innovation and where environmental value becomes an opportunity for the protection of pre-existing structures [115].

It should be clarified that the model used for the evaluation sheets, in practice, has not exhausted every aspect related to sustainability. While a framework is proposed to integrate a multitude of aspects, the scope of the investigation was limited to the environmental domain, assuming the existence of the wine tourism context and the potentially related sociological and economic aspects [116], which can still be linked to the MG-04 category of the preliminarily identified scientific literature, as well as to other established sector studies in the last decade [117–121]. These aspects are closely tied to the holistic conception of sustainability in general and deserve further exploration in the future in order to incorporate these aspects into the evaluative model, ultimately leading to a more complete result.

Similarly, case studies already appreciated by the scientific community for their architectural quality were selected based on a broad literature formed on the topic and are commonly recognized for their objective quality [122] in order to avoid discretionary evaluation of potentially new projects that have not yet been discussed by architectural critics. From the set of evaluative sheets, the indispensable need to combine a variety of aspects

when approaching the theme of landscape emerges. The proposed overall evaluation identifies, in this sense, several categories to consider even in the design phase, ensuring the integrity of the contexts even in the case of new building transformations. These categories lead to recommendations relevant to the areas that initially motivated the research hypotheses of this work, which are better represented in Tables 15 and 16 below.

Table 15. General recommendations for the implementation of evaluation sheets and their application in the design phase—© Authors, 2024.

Code	Scope	General Recommendations
R-01	Architectural quality of the built structure	Ensuring the architectural quality of the building during the design phase contributes to strengthening territorial identity and enhancing territorial attractiveness through the correct implementation of technological solutions and morpho-typological choices that are consistent with the overall landscape and its peculiarities.
R-02	Integration between building and landscape	Ensuring the integrity of the landscape, aiming to limit the perception of the anthropic element by also employing strategies of mimicry with the context and identifying settlement systems for new constructions in line with the morphology and characteristics of the soils.
R-03	Nature-based, Material and Technological Solutions	The technologically advanced solutions, aimed at ensuring the efficiency of the building, should be evaluated not only by prioritizing passive strategies but also in relation to the morphological impacts they have on the structure, seizing the design opportunity of sustainability to lead to a broader and more general concept of landscape ecology.

Table 16. Elements to be implemented in pursuit of the general recommendations for each identified scope—© Authors, 2024.

Code	Elements
R-01	Identification of specific criteria aimed at facilitating the selection of eco-compatible materials inspired by an aspirational mimicry of the colors and textures of the surrounding landscape. Approaching the topic of wineries from the perspective of enotourism promotion, with the goal of preserving the integrity of the landscape and aligning design strategies with local identity. Fostering the involvement of local communities in the design process through bottom-up approaches, ensuring alignment with regional objectives and values.
R-02	Integrate spaces and elements aimed at enhancing the experiential character of the facilities, including areas and pathways dedicated to corporate merchandising, while simultaneously ensuring the functional efficiency of the production structure. Implement Life Cycle Assessment (LCA) tools to evaluate the long-term environmental impacts of the materials and construction methods used, ensuring the effective sustainability of the production process.
R-03	Utilize vegetative walls and green roofs to enhance the thermo-hygrometric conditions of wineries, employing passive thermal control strategies. Implement sustainable active systems, such as geothermal installations and high-efficiency energy solutions, to optimize resource management and achieve overarching sustainability goals.

In light of the analyses carried out, there is still the possibility of implementing the model with elements not yet considered, potentially expanding the research domain itself to arrive at a more comprehensive analysis matrix capable of incorporating categories from fields that are even distant from rural construction. Future research aspects aiming for the universal application of the analysis sheets could indeed also consider the identification of "architectural value" components [123] based on a perceptual approach that can be tested on the building organism. The issue of how individuals react to or interpret

the structural elements and the shape of the related landscape and how a subject perceives a particular organizational context, creating a consequent psychological organization based on form, certainly deserves further attention. Understanding the physiological principles that contribute to the formation of a visual judgment of the landscape and its elements (both natural and anthropic) constitutes an additional step in future research, which could further enhance the proposed sheets.

The architecture of the analyzed wineries appears to invite a broader reflection on the enhancement and preservation of the landscape, promoting the harmonious integration of architecture within both natural and cultural contexts. Alongside forms that respect the contours of the land, combined with sustainable technologies like green roofs and renewable energy systems, the use of local materials, such as stone and wood, ensures minimal environmental impact. These features serve as direct evidence of the intrinsic sustainability of such experimental designs.

These buildings celebrate the deep connection between viticulture and tradition, becoming symbols of territorial identity. Integrated within landscape planning frameworks, they generate economic value without compromising the beauty or historical memory of the places they inhabit.

Similarly, additional indicators and approaches could be implemented in the same interpretive sheets to assess the quality of interventions related to recovery, reuse, and retrofitting, which often concern historical rural buildings, even in terms of energy adaptation, repurposing, and the efficiency of structures dispersed within the agricultural landscape of significant value [124]. These are all issues worthy of further in-depth exploration and attention, considering the relevance of these topics in contemporary discourse.

This is in pursuit of the conviction that the perception of the form of the built environment and the landscape should not be reduced to a matter of purely aesthetic appreciation (or not only that) but should consist of contents and meanings that can be understood based on rigorous investigative categories, and as such, are susceptible to multiple structural analyses.

Author Contributions: Conceptualization, S.B., C.C., and M.L.S.; methodology, S.B. and C.C.; software, S.B., C.C., and M.L.S.; validation, S.B., C.C., and M.L.S.; formal analysis, S.B., C.C., and M.L.S.; investigation, S.B., C.C., and M.L.S.; resources, S.B. and M.L.S.; data curation, S.B. and M.L.S.; writing—original draft preparation, S.B., C.C., and M.L.S.; writing—review and editing, S.B., C.C., and M.L.S.; visualization, S.B., C.C., and M.L.S.; supervision, A.M.; project administration, A.M.; funding acquisition A.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors express their profound gratitude to Alvisi Kirimoto Studio, Archea Associati, Studio di Architettura, and the Renzo Piano Foundation for their invaluable collaboration during the analysis and study phases of their respective projects. Similarly, the authors extend their thanks to the three architecture firms for granting permission to use selected images included in the analytical interpretation sheets and for allowing access to additional original project documents, which were instrumental in conducting the evaluations central to this research work.

Conflicts of Interest: The authors declare no conflicts of interest.

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