Bulletin of the *Transilvania* University of Braşov
Series II: Forestry • Wood Industry • Agricultural Food Engineering • Vol. 7 (56) No.2 - 2014

TRADITIONAL STRUCTURES REGARDING WOODEN VERNACULAR ARCHITECTURE AND FURNITURE IN SIBIU, VALCEA AND BUZAU COUNTIES - ROMANIA

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Abstract: *This analysis is based on the investigation of specific structures used in traditional vernacular architecture and furniture by researching rural settlements specially chosen for this purpose on the following criteria: presence of specific structures in the construction and furniture, diversified utilisation patterns of wooden species, architectural and furniture joints. The three case studies illustrate and provide some conclusions in this regard but they provide also an additional practical experience to the theoretical analysis through on-site investigation.*

Key words: *Romanian vernacular, rural context, structure, wood joints.*

1. Introduction

Wood as a material is closely related to living. The tradition of wooden buildings, in spite its fragmented and discontinuous development has always managed to adapt itself to the modern context due to its important role in the (mostly rural) collective conception concerning life and living [1], [7], [8], [11].

Regarding the repertoire of construction systems and materials, it can be stated that these reflect general principles on the effective use of local resources, and offer diverse expressions not only on a structural level, but also on a functional and aesthetic one [10].

The necessity of emergence and development process concerning wood and wood joints was directly influenced and limited by the biological size and the species of wood, [9] both in cross section and length. It should be noted that in terms of wooden joint principles, they largely determine the construction sustainability and the main factors that were taken into account were the following: the type and intensity of the efforts that must pass joints; the geometry and typology of the joint section; the environment the joint will be subdued to [4].

2. Objectives

The objective of this paper is to address in a critical and synthetic manner forms and structural typologies of wooden vernacular construction and furniture of the Romanian civilization in order to obtain results that will set the basis of the development process of an improvement methodology regarding traditional cultural

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and architectural values in the contemporary context.

3. Method

This analysis is based on the investigation of specific structures used in traditional vernacular architecture and furniture by researching rural settlements specially chosen for this purpose on the following criteria: presence of specific structures in the construction and furniture, diversified utilisation patterns of wooden species, vernacular furniture joints. The three case studies illustrate and provide some conclusions in this regard but also offer a practical experience through on-site investigation.

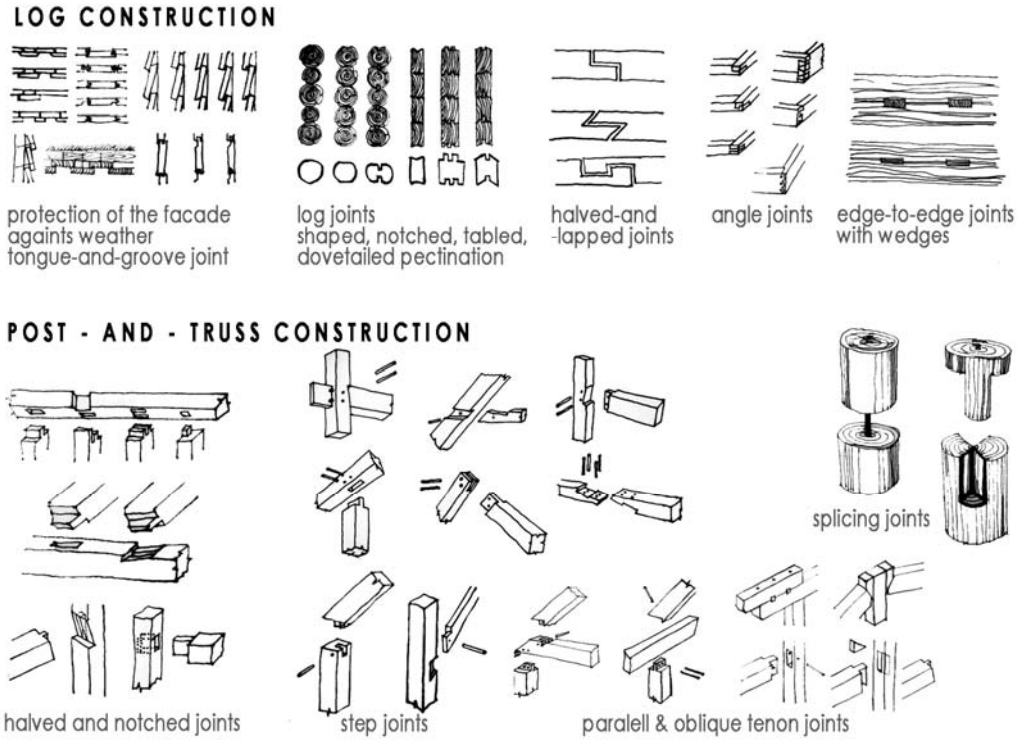

Fig.1. *Summarizing table of the two main typologies concerning vernacular house structure*

The analysis of the wooden structures characteristic for vernacular architecture and furniture concerning the rural settlements that were chosen was performed through the on-site investigation of approx. 20 households in each county (Vâlcea, Sibiu, Buzău), 80% of which containing objects (wooden furniture) that were relevant for the research and could be classified. Regarding the structural analysis the features of interest were the following: specific construction details, specific local wooden structure, diverse methods and principles concerning wood joints; definition of general and specific structural characteristics in the construction and furniture and formulation of conclusions; whereas in the case of furniture the following features were taken into account: design, destination, joints.

Traditional joints have been used since ancient times, made empirically by famous craftsmen, whose secret has been passed from father to son. Traditional joints group multiple geometric configurations, depending on the desired specific and aesthetic impact [16].

Regarding the Romanian territory, wooden constructions have known a long tradition and spread throughout the country. Archaeological research testifies to the existence of the first houses in the year 5800 BC. These homes were built in the form of a partially underground housing unit with the wall structure made of logs and plastered with clay [6], [14].

The first designs were realised without the use of any „artificial" tools, a large sector which might be regarded as an example of this is wattlework where pieces of wood are simply gathered and not at all processed. This type of construction could not offer enough stability, so the next measure consisted in weaving the pieces into regural geometric forms, the wattle being used as an infill material for the walls, rural buildings combining wattle walls with skeleton-framed, more solid walls.

The transition to bronze tools, has influenced the appearence of log construction in Europe and with a slight delay, in Romanian territory. The principle of log construction is that the elements are stacked horizontally one on top of the other and held in the desired position using different types of notches. When analysing this type of construction, it becomes clear that a single joint made it possible to elaborate complex curved surfaces. When erecting a log construction, the main consideration is the execution of the cornenrs: the very first log joint – a semicircular notch on the top to receive the next log – may also have been performed only with stone tools. The emergence of another material – iron – set precedent for the appearance of new tools with which all the joints that are familiar in the present could be made. Among the most important were the joints employing wooden nails (secure the lap joints) wedges (forerunner of the jointing nails and the simple peg used to retain a piece of wood in its allotted position) and pegs (prevent movement of the lowest beam). [5], [15].

Traditional timber construction can be divided into two categories: log construction and the considerably older skeleton construction [16].

The appearance of log construction is characterized exclusively by the horizontal arrangement of its timbers. In skeleton construction it is the vertical members which take on the load bearing function, the section placed underground being the post and the one above, the column.

The changes concerned mainly two areas: the filling between the vertical elements and the evolution from the post-and-beam to column-and-beam construction. It was then only a small step to connecting the separate bracings, and the posts were linked together, the horizontal timber, thus becoming a sill beam with a load-distributing function. As horizontal intermediate elements did not provide adequate bracing for the walls, the diagonal bracing was lap-jointed over the horizontal members [16].

There were two principal methods of column-and-beam construction: the simpler post-and-truss method and the box-frame method.

Principle of post-and-truss construction: each pair of opposing columns or posts is linked by means of a horizontal beam to form a frame. Header beams join the frames together.

Principle of box-frame construction: the rigidly connected members – sill beam, columns or posts, and header beam – form a frame on each side of the structure. The frequency of diagonal members led to the

development of a very diverse range of step joints.

Joints that are present in the configuration of Romanian vernacular wooden housing can be separated in two main categories: – movable and fixed joints – with several subtypes: log joints (shaped, notched, tabled, dovetail joints), halved and lapped joints, angle joints, edge-to-edge joints with wedges, halved and notched joints, step joints, parallel and oblique tenon joints, splicing joints, joints employing wooden wedges, nail and pegs.

In the case of wooden furniture, we can distinguish the following joints: butt-joints, halved-and-lapped joints, mortise and tenon joints, angle joints, joints employing pegs and wedges.

The following table will illustrate a range of traditional wooden structures and joints regarding vernacular construction (fig.1) and furniture (fig.2).

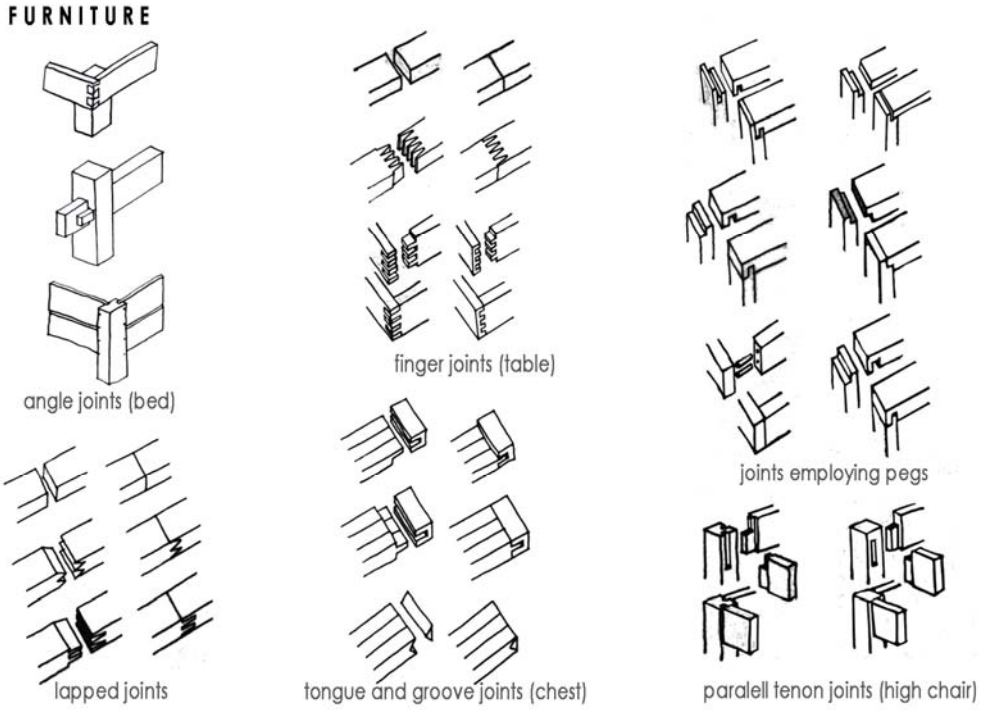

Fig.2. *Summarizing table of wood joints concerning vernacular furniture of Vâlcea, Sibiu, Buzău Counties*

In the case of the analysed area the specific furniture items are the following: beds, low tables (round with three legs) tall tables, cupboard table, carved chairs, low round chairs (with simple joints), dish shelves, wooden cases and chests. These objects were realized in the first phase, by simple, fixed assembly methods, the most common joints being the notch, lapped and butt joints. The next phase meant using specialized tools and led to the emergence of more complex joints like the tenon joints, finger joints, dovetail joints, or joints which employed wooden pegs [12].

Returning to the construction, the roof is the most complex part of a construction there being possible to distinguish a wide variety of roof types, but in the case of

traditional structures we can distinguish two forms based on completely different principles: the *purlin roof* (takes its name after the purlins which have to carry the inclined roof members - rafters) and the *spar roof* (was based on establishing a stable triangle where the inclined members are fixed to a third, horizontal member) [13], [16].

The elements that form the traditional roof structure are (fig. 3): *rafters* (sawn timber sections ranging from 70-90 mm or a single piece round wood with the diameter of 100-120 mm, are placed at equal distances from each other of approx. 700-900 mm); *purlins* (sawn wood sections ranging from 100x120 mm to 150x250 mm); *posts* (vertical elements of the roof structure similar to pillars made of logs with a diameter of 120-140 mm or sawn timber sections between 120x120 cm, 140x140 cm), *collars* (horizontal elements which hold the rafters together with the aim of creating a stable triangle).

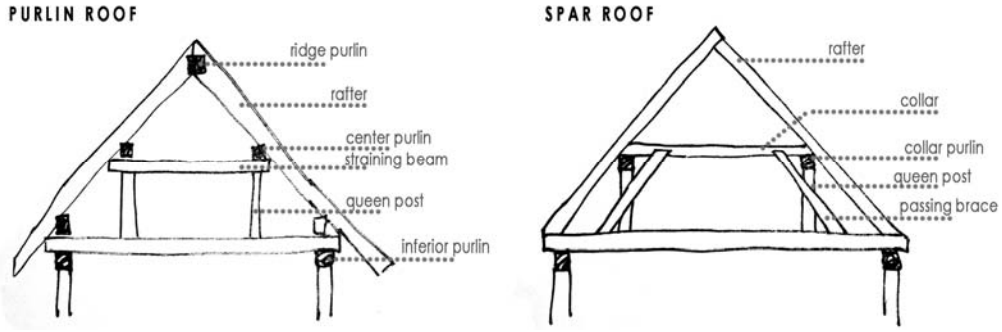

Fig.3. *Summarizing table of roof structure typologies occurring frequently in the studied areas of Vâlcea, Sibiu and Buzău Counties*

4. Results and discussions

Regarding the structure of the building oak is the most frequent choice (*Quercus robur or Quercus pedunculiflora*) in the manufacture of the sill beams and posts. Over time, fir (*Abies Alba*) replaced oak, due to the decreased geographical spread of the species. This type of round fir log structure is very common in the studied areas and has a number of typologies: round horizontal beams – log construction, post-and-truss construction, and mixed structures.

The wall structure of vernacular housing is typically made of logs (fir, oak) with dimensions ranging between 120-150 mm for the width and 200-300 mm for the height. These horizontal elements have special joints at the corner intersections, dovetail or lap joints being used.

The roof structure consists of round wooden beams, the purlin or spar roof typologies being most frequent. The framework of the roof consists of the following elements: purlin (ridge, center, inferior), rafters, posts, collars. The roof is traditionally covered with wooden shingles with a width between 400-600 mm.

In the case of furniture, initially the joints were simple, but with the diversification of tools (XVI-XVII centuries) besides the butt and lapped joints, tenon, finger and dovetail joints have started to be utilized and more ornamentation of the wooden surfaces [3].

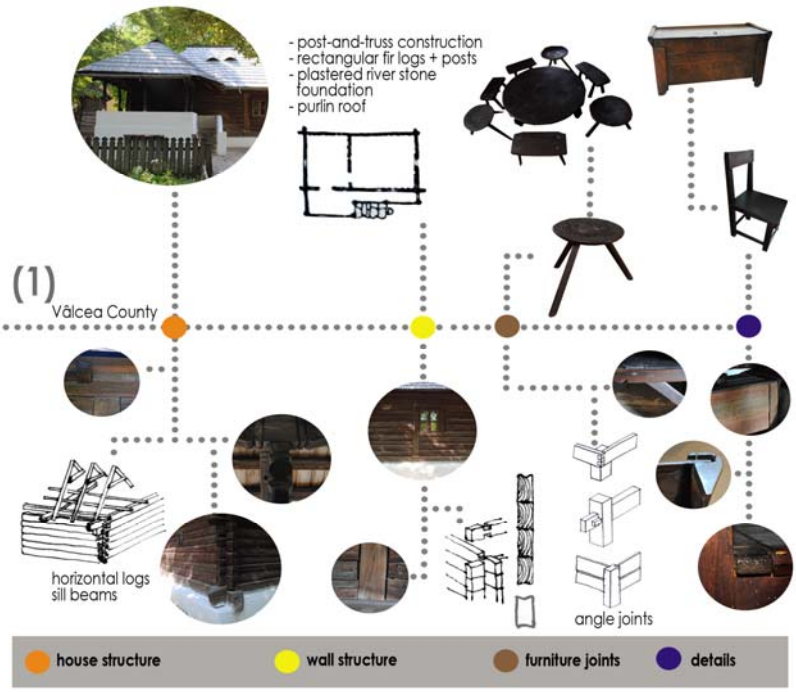

Fig.4. *Vernacular house structure and furniture of Vâlcea County*

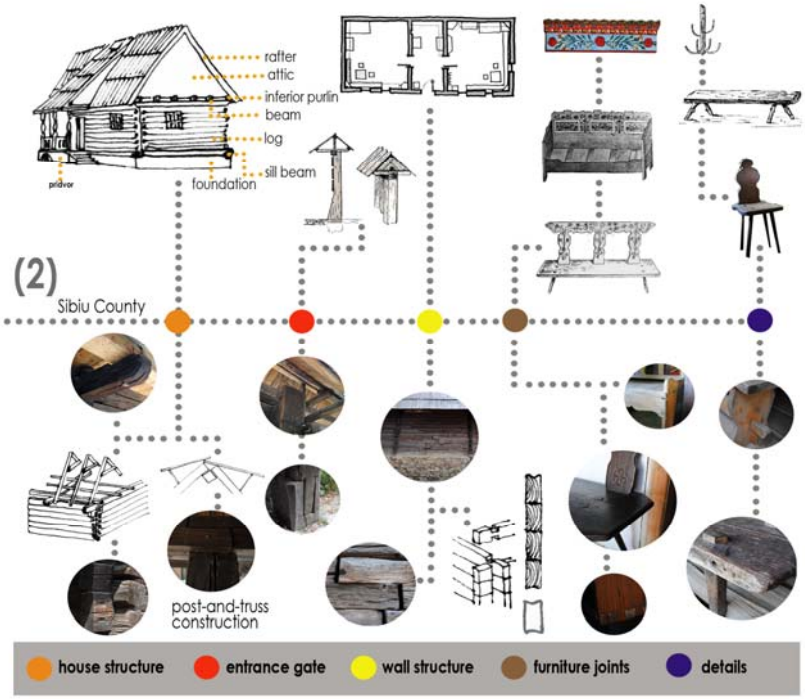

Fig.5. *Vernacular house structure and furniture of Sibiu County*

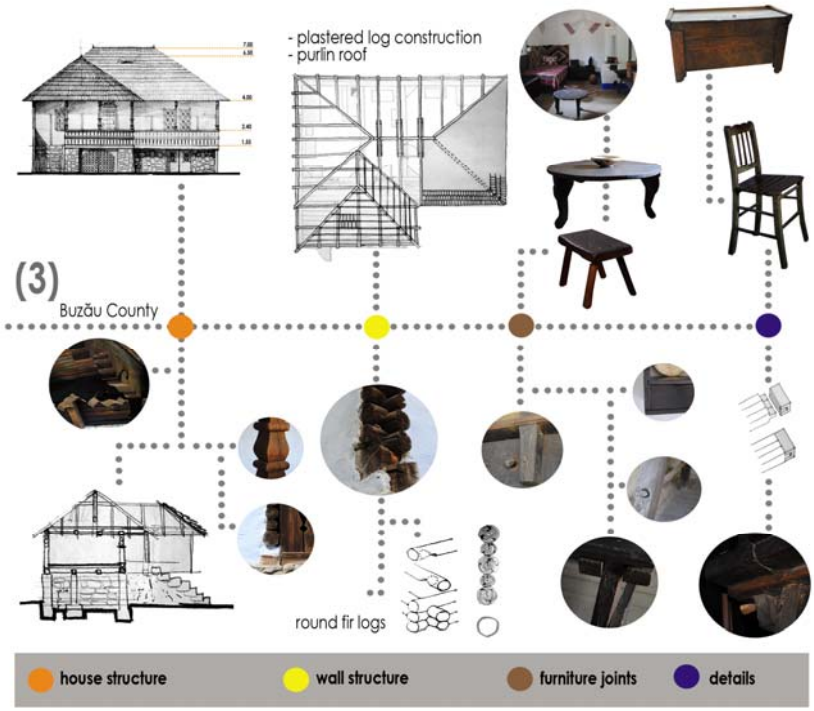

Fig.6. *Vernacular house structure and furniture of Buzau County*

Figures 4, 5 and 6 above contain drawings regarding the structure of the house, walls and the roof in all three case studies. These tables also contain several examples of joints concerning vernacular wooden furniture, and photographic data collected during the on-site investigation.

5. Conclusions

The vernacular house embodies a complex set of elements of everyday life - occupation, needs and activities of the inhabitants. The traditional Romanian wooden construction is a result of imagination, but also a direct reflection of the needs and the specific lifestyle of several generations [2]. These functional elements have been in an interdependent relationship with the structural ones, along with the change regarding the needs of residents; new solutions had to be found in order to satisfy the inhabitant's needs on both levels. Thus, we can observe links between the spatial layout evolution of vernacular housing (due to functional reasons and specific needs) and the structural developments that made possible the diversification of wooden joints which led to various architectural, functional, and stylistic forms.

Acknowledgements

This paper is supported by the Sectoral Operational Programme Human Resources Development (SOP HRD), ID134378 financed from the European Social Fund and by the Romanian Government.

References

1. Baran M., 2011. Evaluation of ecological design strategies in traditional houses in Diyarbakir, Turkey. Journal of Cleaner Production 19, p. 609-619.
2. Cantacuzino G.M., 1977. Fountain and halt (in Romanian). Eminescu literature Publishing House, Bucharest.
3. Capesius R., 1974. Traditional Romanian furniture (Romanian). Dacia literature Publishing House, Cluj.
4. Cismaru M., 2003. Wooden structures regarding furniture and finite. "Transilvania" University Publishing House, Braşov.
5. Crişan R., 2003.Wooden Constructions (Romanian), "Ion Mincu" University Publishing House, Bucharest.
6. Curinschi V., 1981. The history of architecture in Romania (in Romanian) Technical literature Publishing House, Bucharest.
7. Gronegger T, Perger J, Caminada G., 2013. Beyond modernisms – A manifesto for dealing with rural culture of building, cultural landscape, crafts, identity and diversity. Research manuscript, New Design University, Sankt Polten, Austria.
8. Jose M., 2010. Methodological bases for documenting and reusing vernacular farm architecture. Journal of Cultural Heritage 11, pp. 119-129.
9. Lăzărescu C., 2010. Wooden Structures, Volume IV: Traditional Structures. *Transilvania* University Publishing House, Braşov.
10. Mitrache G., 2008. Tradition and Modernism in Romanian Architecture, (in Romanian). *Ion Mincu* University Publishing House, Bucharest.
11. Oikonomou A., 2011. Architectural structure and environmental performance of the traditional buildings in Florina, NW Greece, Building and Environment 46, p. 669-689.
12. Olărescu A., 2012. The tradition of built rural landscape, Arges and Muscel (in Romanian). *Transilvania* University Publishing House, Brasov.
13. Păcală V., 1915. The monograph of Răşinari village (in Romanian). Arhidiecezan Typography, Sibiu.
14. Pănoiu A., 1977. Wood Architecture, (in Romanian). Technical Publishing House, Bucharest.
15. Scott E., 1983. Lavorare Il Legno. Mitchell B. Publishers, Castel San Pietro Terme, Bologna, Italy.
16. Zwerger K., 2000. Wood and Wood Joints. Birkhauser Publishing House, Basel.