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1:1 Building Workshops as a Practice of Learning in Architectural Community

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Abstract –In architectural schools, mediums of teaching vary from conventional theoretical classes to creative design studios. Lately, it has become popular to include demonstrative activities or design and build workshops out of the school environment. In addition to this, with the initiative of non-profit architectural building communities, students and graduates from different universities in different countries can come together for build-together activities that generally run from one week to two weeks, which can also fill credits required in their curriculum in some cases. In this paper, two workshops attended by the author will be presented and discussed through their approaches and differences in application, and the design works with their details will also be examined in means of material choice, material-related limitations and machinery process. One is held within the International Summer School and Festival of Architecture by HelloWood community, in 2018 July. The other one is by Camposaz community in Roccamonfina 9th edition held in 2017 July. Both projects were timber structures and completed in 7 and 9 days respectively. During the process from their design to cut-to-build, limitations in the amount of time on site, volume of material and number of members of groups were effective as basic considerations overlapping with the real site issues taught in the schools.

Keywords – *Architectural workshops, design-build experience, timber building, timber structures, timber detailing.*

I. Introduction

Timber has always attracted people as a material to use in building. It is convenient to process for simple carpentry works as a natural material as well as to adapt to complex designs as fully treated industrial product. It has versatile use as structural and non-structural elements in architectural and engineering designs from small to large scale and in simple decorative works for interiors. On one side, heavy timber construction, multi-story apartments and bridges are examples of engineering applications. On the other side, timber is the first choice when it comes to express creativity through experimental design in thematic pavilions, installations and concept designs. It is easy to stock in different sizes. It enables designers to configure structures in any size with simple joint details that are known for ages. Timber is often used with its naturally outstanding colour. Finally, timber is the only material that allows a fully hands-on experience from cutting to shape to assemble, unlike concrete, steel or glass.

To give some examples, what makes the Steilneset Memorial (Fig. 1), designed by Peter Zumthor, recognizable is its 60 crossed timber legs in line that form the 120-meter-long main structure. At a first glance, the material preference is simple, and the structural assembly is readable [1]. Zumthor's project in the Allmannajuvet mine also uses timber for the main structural elements. He designed three units for tourist attraction and all of three are placed in timber frame support structures [2]. Both projects exhibit the simple framing techniques in timber utilizing post and beam, braces and diagonals, and how timber frames can stand alone in an expressive manner without being hidden under a skin façade. Lately, Kengo Kuma's massive timber project in Eskişehir, Odunpazarı Modern Museum (Fig. 2), is found an extraordinary one as the whole building appears as large timber stacks built with interlocking technique [3].

Fig. 1 The Steilneset Memorial by Zumthor [1].

Fig. 2 Odunpazarı Modern Museum by Kuma [3].

Kuma's design for the Yusuhara Wooden Bridge Museum is also a form of building from stacking wood. The wooden pier supports the bridge from the middle forming the base for the gate as the length of the timber crossbeams upon each other increases proportionally {4].

Fig. 3 Yusuhara Bridge Museum by Kuma [4].

The Lantern Pavilion by AWP was created to shelter public events under its traditional timber house floating in air outlook. The shelter structure is simply built with square cross-sectioned long timber elements pinned perpendicularly upon each layer, two to three layers, and enveloped with glass. Then the whole shelter was uplifted on heavy timber legs [5].

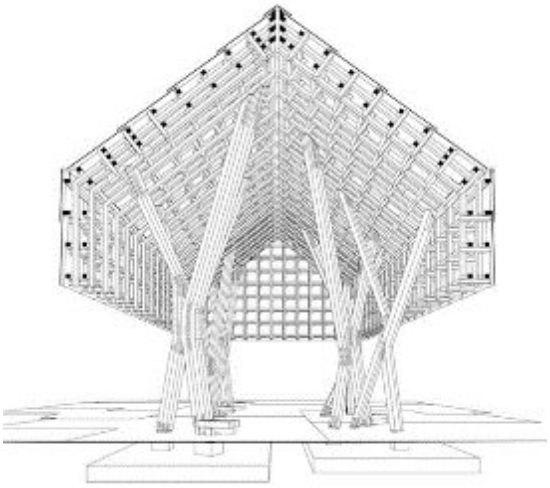


Fig. 4 The Lantern Pavilion by AWP [5].

Chile Pavilion in Expo Milan is an example of contemporary version of heavy timber construction. Although its solid box shape, the diagrid timber façade provides the transparency to the inner box and the lightness feeling to the whole structure as it is also uplifted [6].

Fig. 5 Chile Pavilion by by Undurraga Devés Arquitectos [6].

In addition to these architectural designs, timber is also preferred for educational experimental projects in the last years. For example, the Hila Pavilion is the product of the students' summer workshop at the University of Oulu in 2014. The shape of the pavilion is a cube with vault-like voids inside opening at three sides. The whole structure is 5x5x4 meters and erected with only 6x6 cm cross-sectioned spruce timber, which are cut at different lengths only. The assembly was completed in 5 days [7].

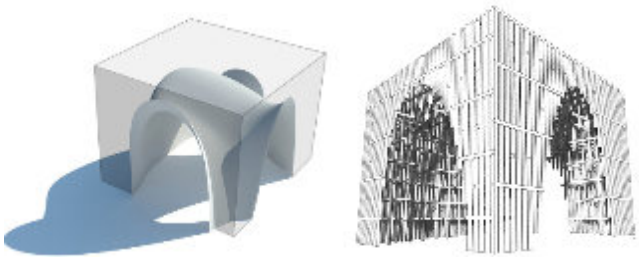


Fig. 6 Hila Pavilion [7].

Another alike example is Future Space Pavilion by Peter Pichler Architecture in Milan. The architect's aim was to demonstrate timber as the material of sustainability and as the ability to create spatial experience. The structure was erected with only rectangular cross-sectioned timber of around 1600 pieces and by placing each on top other, which can be read from the section [8].

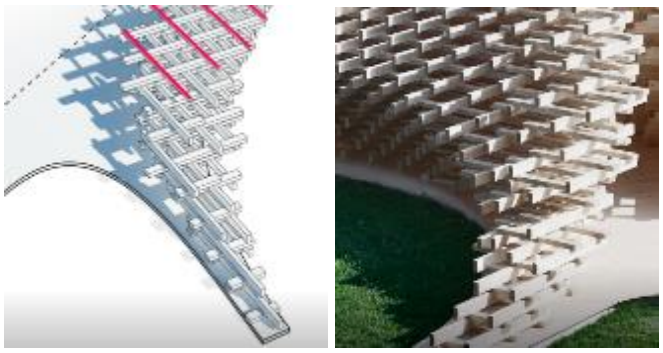


Fig. 7 The Future Space Pavilion [8].

Such use of timber as in the examples proves the versatility of it as a natural material. Through simple cuts, any 3-dimensional form, from simple to complicated, can be assembled on site by hand with simple joint techniques. Besides, it can be used untreated as well as with treatment only polishing its natural colour. The simplicity in its application makes timber far preferable in the architectural community to teach and to practise with material from the design stage to cut-to-build stage. The paper examines two timber workshops that the author attended both as a participant. It is aimed to highlight the differences between the two and the methods and the process of both experiences from the perspective of a learner.

II. Material and Method

The first timber workshop to be discussed was held in 2017, between 23rd June and 2nd July. The workshop was organized by Camposaz, a non-profit architectural community established in Italy since 2013. They organize workshops to build small installations where the design would enhance the landscape better. They have an official website that via they accept applications for the workshop calls they announce. Around 12 are selected for each workshop and at least one tutor leads the group, who is an architect, along with one professional carpenter to guide the process. The participation is fully free and open to architecture students as well as new graduates. The workshops are held in actual locations, mostly in Italy, and the participants are asked first to design considering the local context and the function given. As the workshop lasts for 10 days, this stage takes one or two days, and the construction follows once the tutor and the carpenter confirm the design.

The workshop in 2017 was the 9th edition of Camposaz [9], as they sometimes organize more than one in a year. The edition was held in Roccamonfina, a small town located in the province of Caserta in southern Italy. 12 participants were divided into two groups and both were given different functions to deal with – one to build a children playground and the other to build a tourist info point. Both were in proximate spots in a park at the opposite of the municipality building and the near of a historical bell tower. The participants could pick the project they wanted to work for, so the groups were formed by 6 in each. The author picked the group for children playground (Fig. 8). The groups were tutored by two architects from Camposaz and one carpenter supported both groups. First two days were left free for the groups to think, to discuss and to sketch their ideas. On the third day, designs were consolidated by the tutors and a small model was made as a closure of the design stage (Fig. 9).

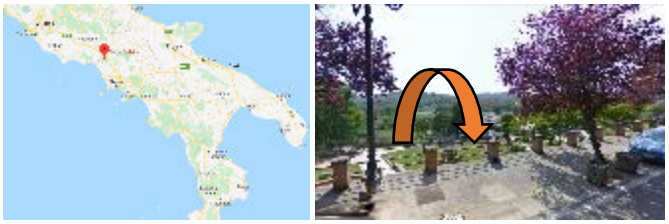


Fig. 8 The location of the workshop and the construction site.

The issue of sizing and measuring came out as the second stage to proceed. All the timber material came on a truck to the site and the members of the groups carried all the material by hands they needed to the sites they work. Timber material was consisted of different cuts, small and large cross-sectioned timber and flat timber. The amount of the material and the sizes were significant inputs when dimensioning the designs. At the stage of deciding how the structure would stand better, the tutors and the carpenter mainly guided and chose the type of timber required. This was critical because all the material stacked on site was to cover the needs of both groups (Fig. 10). The final design of the children playground had an octagonal shape with slight concave deck inside that uplifted on eight heavy trusses.

Fig. 9 The modelmaking of the children playground design.

Fig. 10 The group works at the design stage and the decision of timber cut required to build the structures.

Fig. 11 The group works with the tutors and the carpenter to dimension the structure and to place the tree passing from inside the playground.

A mid-size tree existed in the spot of the structure so a circular void in the deck was decided to leave between the two trusses of eight. Before dimensioning the structure, the group members and the tutors tried different varieties of lengths and heights by practicing with elastic rubber bands. Once the decision was made, the whole structure was accordingly rotated around to make it in this design (Fig. 11). Following this, the construction stage began with cutting the pieces of trusses and join them with cross lap technique and wood screws of minimum 100 mm for structural purpose. The first truss went quite experimental since some measurements were taken on it to fix the mistakes particularly cross lap joints and the inner diagonals' head cuts. When the first truss was completed as a whole, all the measurements were copied to cut the following seven trusses, so the process speeded up, and the trusses were stacked on site after a long hard work. Since the positions of the trusses were decided, each was carried to their unique spot and placed. To keep them in the upright position the trusses were temporarily fitted with timber braces, so the structure gained its octagonal shape (Fig. 12).

Fig. 12 The heavy trusses stacked and positioning them on site.

This was followed with cutting the floor beams between the trusses. To support the deck and to fit the trusses rigidly, five arrays of beam orders were planned from the central gap of the concave. To cut the beams' head with angles precisely, the measurements were taken on the structure. The trusses and beams were cut from 10x10 cm cross-sectioned timber (Fig. 13). The trusses had 3 m long posts and 90 cm from top was left to form the railing to prevent children from falling. Hence, outer braces and railing tops from 3x6 cm timber were cut and fitted on the eight side of the deck. This was necessity also because the security while working on top of the structure. Flat timber was used to cut the deck panels, meanwhile the railing pieces were cut from 3x6 cm timber (Fig. 14). The group members were also divided into two groups, one was working on fitting the deck and the other was working on fitting the fences to speed up the process as the deadline was approaching. As the railing and outer braces were completed, the temporary braces were removed. Then, vertical timber laths were cut and fitted on braces to complete the look as fences and to increase the security of children. The final stage was to design and dimension a stair that a child could climb. The stair climbs the deck from the side of the tree, which was very close to the park bench. Therefore, one leg of the stair pressed on the ground while the other on the bench (Fig. 15).

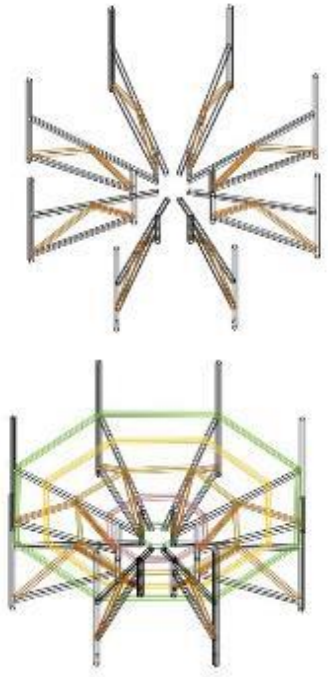
Fig. 13 The beams and braces for fences fitted on the structure.

Fig. 14 The deck and fences were about to complete.

Fig. 15 The stairs and the finished outlook of the children playground.

Towards the completion, to provide softer edges, sanding by hand using sanding belts was applied to the laths of fences. Neither treatment nor polishing was applied. The construction was completed just on time and the site was cleaned hours before the opening with public ceremony. Both construction sites were kept open and visible to public. So, the pedestrians could see the evolution of the structures and talk to the participants. The workshop of the Camposaz was intense, and the group members were able to direct the design stage. The details of the structure were thought, discusses and created on site. The workload was shared between the group members. All learned about the process of building this kind of heavy timber structure, which is illustrated in Figure 16.

The second workshop the author attended was held in Hungary in the summer of 2018, between 7th and 16th July. The HELLOWOOD was the organizer [10], which is founded in 2010 as Hungarian architectural community. They had activities in collaboration with more than 70 universities in 30 countries. They organize workshops within the concept of International Summer School and Festival of Architecture. To say, they include also guest lecture series, screenings and live music performers. The workshops are held in the same location since 2017, Csoromfölde, which is a rural place at three hours distance by bus from the capital Budapest (Fig. 17). They have an official website where they announce their activities and workshops. Differently than Camposaz, they announce the workshop and open a call for design proposals for a given theme, which was *Cabin Fever* for 2018 and *Carnival* for 2019. So, students as well as professional studios can submit their design proposals largely based on timber material, however, not necessarily to be solely made by timber.



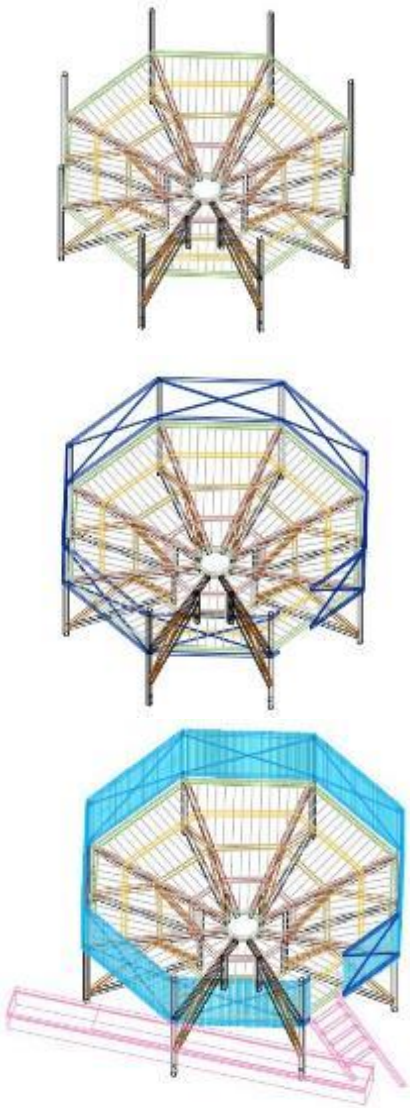


Fig. 16 The CAD illustration of the structure of the children playground.

The deadline for the submissions was late April of 2018 and the jury of HelloWood decided on selected projects late May, which was also the deadline for participants' application. Unlike Camposaz, HelloWood requires a participation fee and last 10 days. For the 2018 workshop, around 90 participants were selected and allocated in 7 projects to perform during the event. The selected projects are published on their website so the participants can submit their three preferred projects in order to attend at. The first day of the workshop was about meeting the group members and the leaders (the winners of submissions) and presentations of the leaders regarding their proposals. The following eight days were scheduled to complete the structures. On site, a tool station was provided where the participants could go and take what was necessary. There was strict breakfast, lunch and dinner breaks in a mensa-like place under a large timber roof with only posts and beams, and no walls around to provide open air area, which was used also for night events (talks, screenings and live performances).

The project that the author joined as a participant was the Ziggurat Delivery, by ZarCola (Fig. 18). A Milan based office run by E. Giancola and F. Zarattini. The team was consisting

of 12 members, a couple and the author herself were graduates and the remaining were senior undergraduate students. One local carpenter was assigned to each project group.

Fig. 17 The wokshop location of HelloWood in Csoromfölde [9].

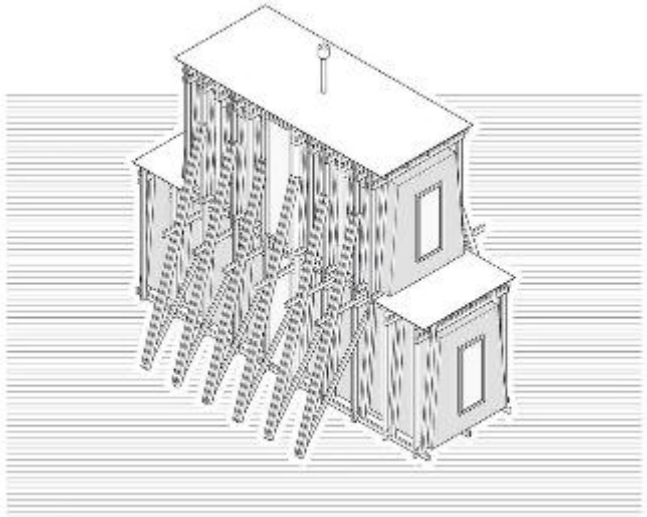


Fig. 18 The model of the Ziggurat Delivery project [9].

The project has two storeys. The ground floor is a living space and upper floor has two small spaces like two separate rooms, which are reachable through separate vertical stairs from the middle of the structure. The floors and walls are rectangular frames filled with a cement based mineral foam material to provide thermal insulation, Airium, as in description. The ground floor has big window frames and a door on both sides. A simple base was prepared with ground spikes by the carpenter before the workshop began (Fig. 19).

Fig. 19 The base and first installations of the project.

Fig. 20 The installation of nine frame units and wall panels filled with Airium material.

The structure has nine frame units on ground floor and five on upper floor. To support the upper floor wall units, big buttress-like timber diagonals are located at the six central axes of the structure. Once the ground floor was assembled with posts on them, temporary diagonals were used not to lose their perpendicular position, so that the wall panels could fit in without any oblique to happen (Fig. 20). Each frame units with walls and floor were detailed by technicians of HelloWood with the consultation of the project leader before the workshop began. So, the participants did not involve in any stage of joint or assembly detailing. All details were prepared as handouts (Fig. 21) so that the group members and the leader could follow the instructions, without confusing the pieces.

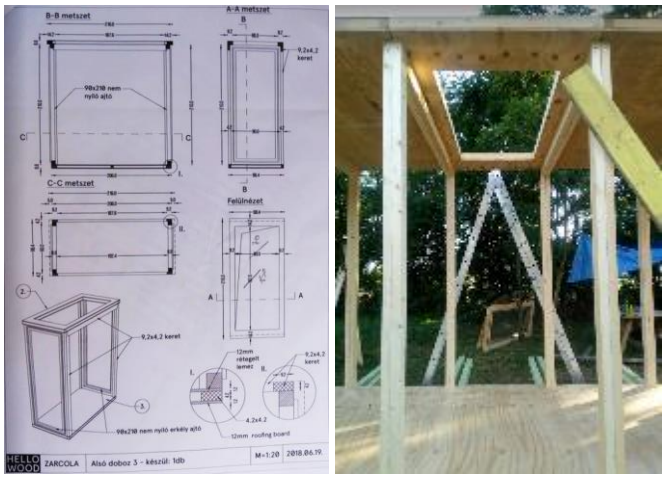


Fig. 21 The structural drawing detailed of a frame unit by HelloWood as a handout to follow assembly.

Fig. 22 The installation of floor and wall panels filled with Airium material. Each panel was sized to fit in between base double-beams.

The floor and wall panels were also prepared, only a truck came on few days to fill in the panels with the insulation foam material. After few minutes the material could get dried and the participants fit the panels and carried them to their positions. The wall and floor panels had same thickness (Fig. 22). Once the ground floor was fully assembled, outer posts to support the buttresses were placed in between the double long base beams. This continued with the installation of floor beams for the upper floor as shown in Figure 23. As understood from the design, there was a gap between the floors because of the preferred structural configuration.

Fig. 23 The installation of outer posts and floor beams for upper floor.

Meanwhile the construction was in progress for the upper floor, cladding of the ground floor exterior walls also started. The material chosen for the cladding was not natural wood-based material. It was polymer based duromer high-pressure laminates hardened with acrylic polyurethane resin. As in description provided, it serves for effective weather protection without losing the colour and surface appearance for many years. The boards came with their standard size and had to be measured and cut according to the façade look. For example, for the front façade of the ground floor, three orders of siding cladding were designed in order to achieve a clean look and avoid material waste (Fig. 24). The cladding was applied with screws on the wall panels and each cladding boards overlapped 3 cm. Differently than screwing timber elements, boards needed to be screwed first to open a hole so that the board would not get damaged.

Fig. 24 The cladding of the façade and the detail of joints at the base.

The wall panels of the upper floor had inclined to create a tower-like look and so the buttress-like side diagonals would look more effective (Fig.25). During the construction of the upper floor, for the security reasons, it was dangerous to climb up with only moveable stairs. At this stage, the floor beams stretching exterior provided space for temporarily fitting flat timbers to use as scaffolding (Fig. 26). The group members were mostly divided into subgroups to proceed faster since almost all steps became repetitive, such as cutting posts and beams, cladding, treating wood by painting, etc. However, in time, it turned out same people dealt with doing same job.

Fig. 25 The cladding of the side façade and the installation of upper floor wall panels.

Fig. 26 During the installation of upper floor, the stretching double beams provided space for scaffolding.

Fig. 27 The wood treatment with green paint on site.

As seen from the images, the timber elements used were treated by painting (with only a manually used roll machine as in Figure 27). Three layers of treatment were applied and all structural elements visible from outside were treated so. Like what happened in Camposaz, the vertical stairs were completed by the leader and the carpenter, since the group members were busy with the rest of the structure. Most of the construction work was completed just in the night before the opening ceremony. The next morning, lamps were installed with electricity and few furniture were placed to create a living interior. Although the workload was heavy, at the end of the workshop all groups were able to finish their project. The site was cleaned up by the groups and the inside of the structures. Information sheets were placed on each project site, so the visitors could find the participants and the idea of project.

Fig. 28 Towards the completion of the construction of Ziggurat.

III. DISCUSSION

With the participation to two different building workshops, the author had the opportunity to review both events and their positive and negative approaches. Firstly, to outline the event of Camposaz,

- The participation is free,
- The workshop begins with design process since it is a location-based event,
- The participants can put their actual ideas and discuss among their groups and with their tutors,
- Material consideration is taken seriously as the tutors warn the participants not to waste material,
- The design is fully timber, and the structural detailing is also done on site by the participants with the help of carpenter,
- The scale of the design is kept proportionately so is the construction workload.
- As the groups are formed of smaller number of people, the knowledge exchange became easier.
- As the participants must deal with their own design and construction, the tutors were guides only other than following the instruction.

Secondly, to outline the event of Hellowood,

- A participation fee is required to attend,
- The design process is totally removed from the event, and it only focuses on the construction,
- The participants were more of like workers to complete the building on site,
- The event is not totally a timber workshop event, other types of materials (cement, cotton, metals, glass, etc.) were used in all projects on site,
- The scale of the projects was so large that some of the groups encountered the risk of failing to complete on time,
- Additionally, because there was a variety of materials used, material waste was an issue on site,
- The groups were of large numbers of people, in some groups there were 20 people,

- Like the design was preselected, the structural detailing was also completed by the HelloWood team. Only handouts were given on site to the participants to follow the assembly stages.

The comparison above is not to prefer one over another. Rather, it is to reveal the better approaches when it is about to organize and to participate to a similar event. For a learner, a fresh architecture student it might be too complicated to deal with structural detailing of an actual design. Likely, for a graduate, it might be too tedious to deal with repetitive jobs by following only instructions. Hence, for such events, it should be clearly stated whether the event is for freshers or experienced graduates. So that one could expect to perform accordingly.

IV. CONCLUSION

The two workshops that the author attended in the summer of 2017 (Camposaz) and 2018 (HelloWoord) were significant experiences in terms of practising with timber by touch, by applying the joint techniques learnt at the school on slides, to practise with all types of saws, time management on site as a project delivery, etc. Notwithstanding, it can be highlighted that the participation to such events is also about body strength that one must put a significant physical effort to keep up until the completion of the projects and the ceremony day.

ACKNOWLEDGMENT

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