

The Relationship between Research and Design

The Research Project and subsequent Report I produced on the implementation of bamboo as a viable building material has very much informed my design and overall graduation project.

“which bamboo engineering and construction techniques are suitable for creating an affordable, livable and sustainable open architecture system?”

The research started from the observation that despite the great range of beneficial opportunities for bamboo to be widely implemented and used as an affordable and sustainable building material and thereby being an alternative to polluting materials with high embodied energy such as concrete and steel, the material was not yet used in this sense on any scale of impact yet.

I found that this was due to a twofold case of resistance, firstly on a broad social level and secondly on the legislative level. Due to lifelong (involuntary) association with poorly constructed bamboo structures, the material, in most tropical regions has become synonymous with poverty and decay. Through interviews and literature review I found most Indonesians aspire for a more modern western like aesthetic in their homes, crediting concrete and steel with more status and a higher feeling of safety. On a governmental level, the irregular organic shape and therefore heterogenic load dissipation as well as the hollow structure, which results in a low fire resistancy, causes obstacles for testing and building code approval.

I hypothesized however, that there were strategies to be found that could change this perception, I narrowed them down to three overarching strategies:

- (re)appreciating the vernacular
- Modernized vernacular
- Substitutives

Through my literature review, photographic documentation of material and construction techniques in Indonesia and interview with locals and discussion with experts I came to understand that on the material level, the substitutive material showed the most promise. These materials include a range of processed, mostly laminated bamboo building products. This results in them being normalized in shape an strength distribution, have increased fire resistancy due to their massive volume and finally they adhere to the more modern, contemporary aesthetical preferences of Indonesian residents.

I later conducted more in-depth, specific researches into vernacular architecture and appurtenant passive climate solutions. I finally also conducted a practical experiment into different building materials and their ability to ventilate and insulate against sound. This research has influenced everything from storyline, urban plan, down to detailing.

The relationship between your graduation topic, the studio topic, the master track and the master programme.

I enrolled in to the Shared Heritage Lab: Semarang Studio initially driven by my pre-existing affection and fascination for bamboo as one of the most promising sustainable building materials for the 21st century. I got this fascination through an earlier project I conducted in Nepal, where we weren't allowed to use the material due to governmental and public disapproval of the material. By taking these findings to a new context, namely Java, Indonesia and finding the same resistance there, I was able to dive deeper into the roots of the issue. Especially being able to travel to Indonesia for multiple weeks of field research, workshops, interviews and a conference has allowed me a greater understanding of not only this issue, but also, the culture, context and building culture. The extreme context of Semarang with its numeral existential threats fits well into the studio of Architectural Engineering which employs architecture to tackle environmental, socio-economic and technical issues in a holistic manner.

As for Architecture, I'm always amazed at both the depth and breadth of the field, common strains however can in my opinion be found in its interdisciplinary approach, each project or research touching on many related field and secondly its strive to create a better world, be it in an aesthetic, economical, sustainable or any other way. I think these two aspects have also played key roles during the graduation project. Finding holistic humanitarian and ecological solutions for people and nature in need against actual contemporary existential threats has been very motivating.

Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work.

In the critical reflection on my research methodology I discussed my work through two opposing subdomains of ethnographic research. Namely the etic and emic realms. One could say the etic domain regards the facts and pure observations of a material culture. The emic realm of investigation is concerned with how this material culture is perceived in the minds of the actors and spectators of that culture. I think my emic research into the perception of bamboo as a building material in Indonesia has been of outstanding value, through interviews with laymen and bamboo(building) experts and academics I have acquired a deep understanding of how the material is perceived in the (local) public and governmental eye.

This has allowed me to come up with design solutions that respect the reality of the situation and find ways to come up with unique solutions both despite and with courtesy of the public and governmental resistance. Being able to share and discuss my findings at a large architectural conference at the University of Bandung has further sharpened my understanding and argumentation.

Diving deeper into the emic perception of the material has allowed me to reach beyond the mere technical, sustainable and economic arguments for bamboo. I believe this is in line with the research methodological line of inquiry.

Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, touching upon the transferability of the project results.

The project handles a variety of very actual and universal contemporary themes.

-The need for sustainable bio based building materials

-Land subsidence

-Sea-level rise

The in-depth ethnographic approach has resulted in findings that handle and respect cultural complexity. Coming to solutions that not only answer technical issues, but also strategize how to implement and interweave these solutions with existing culture and building traditions. This Framework can be extrapolated to different contexts to find custom fit solution that answer global question issues on an acute and local scale.

Specifically for the tropical regions the world the following topics are handled:

- (re-)appreciating and (re-)innovating vernacular architecture

- The public acceptance and legal implementation of bamboo as a fully-fledged and widely used source for building material

The findings in the Research Report show important insights in what exactly are the problems in bamboo implementation and legalization as a building material. It serves a Western architect well to take these realities into account. Western academics and architects seem to appreciate vernacular architecture and natural building materials, but one should not forget that our frame of reference, through highly polished and labour intensive bamboo projects, is very different from the reality of living around bad examples of the material all day. We should not forget that we design to serve humanitarian needs, not please our personal aesthetic preferences.

In more abstract poetic wording the project can teach us about respecting the destructive and creative power of nature and forging a new relationship between us and her.

Ethical issues and dilemmas

I would like to discuss the following topics here:

- I) The threat of observing and acting from a western mind set.

In my opinion it is very important not to superimpose ideas on a culture or community, but rather investigate and be led by their demands, wishes, threats, opportunities, prejudices and preferences and see how you can evolve from such a complex reality to a fitting solution.

I therefore have tried to create a project that can be a catalyst for a new vernacular rather than a 'one size fits all solution' like the Ville Radieuse. I feel strengthened in this position through the writing of Christopher Alexander in his 'The City is not a Tree'.

- II) Use of laminated instead of raw bamboo for the superstructure.

This choice is informed by a number of factors, firstly a respect for the given context and the reality of the public and governmental resistance to bamboo. As stated, laminated bamboo provides a superior fire resistance, dimensional stability, prefabrication and customization possibilities as well as a desired aesthetic. Even with the processing and laminating accounted for laminated bamboo still has a net lower embodied energy than hardwood. There are steps being made with finding more sustainable PLA free resins and some of the materials I have found use a soy-based bio resin.

- III) Building an elevated cluster is megalomania.

To this I would firstly argue point to the fact that Semarang is an extreme context, a city that faces massive land subsidence, flooding issues from both monsoons as an inevitably rising sea level, typhoons, poverty, hygiene, social segregation just to name a few. Extreme Threats ask for extreme measures.

The common alternative, namely, relocating poor people towards poorly located, badly built concrete blocks where costs of living is high and quality of life and economic opportunity is low to 'fix' a kampung's flooding problem, that I would say is an inhumane, abstract, megalomaniac approach. These people are socio-economically, emotionally and culturally bound and specialized towards their home environment. We should strive to safeguard the continuation of their social fabric no matter the cost.

- IV) The solution requires greater skill and resources than people individually have

This is where the cooperation aspect comes in. A social factory can help to gather and add up the existing resources towards a where the sum is greater than its parts. A communal effort is required to guarantee safety, protection from existential threats, durability, sustainability comfort and functionality. Only together a platform can be created where people can thrive by having a basis for a better quality of life that safeguards the continuation of this quality for future generations.