TU Delft- Faculty of Architecture
Msc. Architecture, Urbanism and Building Science
Master Track: Architecture
Graduation Studio: Architectural Engineering, Studio 11

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The relationship between research and design

The overall goal and focus of this project is put on sustainability. The use, context, design and technique are thus highly interrelated and aimed to reach a truly sustainable solution for the building task of a seaweed farm in the Netherlands.

The research of this project is focused on natural building materials that are available in the Netherlands. An analysis of the project location, programme and design raised criteria that define timber frame construction combined with rammed earth construction as the most appropriate and therefore most sustainable materialization for the building. Both timber and rammed earth show specific properties and requirements for construction, which influenced the design process through all phases.

The design nevertheless arises from the idea of seaweed curling down the shore into the ocean and puts its main focus on the combination of this design concept with the materials.

The relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object)

The theme of the AE studio is based on integration of Architecture and Technology. Further it motivates to rethink our profession and how we can add value to the current building sector.

The building sector causes big amounts of CO2 emissions and is one of the least sustainable industries in the world. Therefore my technical research was focused on local natural building materials in the Netherlands. Natural raw materials are minimally processes available resources that are renewable and can be reused or recycled easily. Using natural building materials helps to minimize the waste and emission during processing, transportation, operation and disposal.

This graduation project rethinks conventional building materials and gives an attempt of how to build in a more sustainable way by using timber and rammed earth construction.

The relationship between the methodical line of approach of the studio and the method chosen by the student in his framework

The methodical line of approach of the AE studio tries to combine two components, a research and design component the idea is that the research and the design will have greater influence on each other through parallel working and in a further sense create a strong relation between the research and design of the project. The first phase of the graduation year, before the P2 exam, is mainly dedicated to the research, but also asks for preliminary design ideas. The second half of the graduation is focused on the

design that should be based on the outcome of the research. In this phase it is important to integrate the knowledge gained through the research into the design of the project.

The research of this particular graduation project was focused on defining suitable raw natural building materials for the project. This resulted in a rather broad research on the diverse criteria, such as programme, location, design and sustainability. Therefore I could already integrate a majority of the programme research as well as design research in the actual technical research. Although this was a good way to combine the different aspects of a project with each other it didn´t allow me to go as deep in the technical research of the materials itself. A benefit nevertheless was that the programme of the seaweed farm was defined at an early stage, which gave me a good base for the design.

During the design phase I had to rethink the outcome of the research and make new choices for instance I decided to change the reed roof into a green roof for a greater benefit. The Timber and rammed earth construction gave important guidelines for the design but also offered a lot of options. During the design process the design concept became more relevant for choosing the right construction method.

The approach of combining research and design is a great opportunity to benefit from different components of a project and to achieve an interrelated solution. I have learned that it is from high importance to stay focused and in the best-case narrow down the research subject in matter of gaining great depth of knowledge. The experiences that I could make during this project will help me a lot with my next challenges.

The relationship between the project and the wider social context

This project relates to the wider social context on multiple levels.
A growing population will demand more food, what also means extra agricultural space will be needed, therefore the relocation of the food production by shifting agriculture partly into the ocean in form of a seaweed farm can make a major difference. Seaweed farming is not only a more sustainable way of food production but also gives us the possibility to use a new vast area as agricultural space. In a further sense the seaweed cultivation would allow to reuse current agricultural space for different task as for instance public spaces or dwellings. What is more no drinking water will be needed and wasted for growing food and the seaweed would help to purify the seawater.

Producing seaweed locally would ensure sustainable manufacturing and reduce CO2 emissions of the transportation by reducing import from Asia. Integrating seaweed in the Dutch and European cuisine will also help to reduce current extensive meat consumption and the related environmental issues. On top of that seaweed as food is very healthy and would enrich the diet of the nation.

The graduation project further points out the importance of the materialization of a structure in the bigger picture. The project promotes to look at the complete lifecycle of materials, their embodied energy, and integrate these factors in the decision-making.
The seaweed farm offers a good example for building with natural building materials in a sustainable manner.