Abstract of the Master Thesis

Master´s Degree
International Project Management
(Building, Real Estate and Infrastructure)

Application of the Build-to-Order Concept for the Construction Industry –
A New Approach to increase Efficiency & Flexibility in Off-site Construction

Submitted by: Marcel Stark
Student Matriculation No: 810791
Submission Date: 14.01.2019

Supervisors:
Prof. Jürgen M. Volm
University of Applied Sciences Stuttgart

Patrick Suter
ERNE AG Holzbau, Stein Switzerland
Abstract

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Publisher Hochschule für Technik Stuttgart / University of Applied Sciences

Topic: Real Estate/ Construction Industry

Word Count: 582
Abstract Body
The construction industry lacks far behind other production industries. The results are poor levels of production efficiency, productivity and quality in the construction sector as well as uncertainty in time and budget. Hence, the construction industry should adopt lessons learned from production industries like the manufacturing industry. Regarding these facts, organisations in the construction sector work on new construction technologies. One of these new construction technologies is the shift to industrialization in the construction industry. This process represents mass customization of building systems which is modular construction and is also called off-site construction (OFC). The main content of OFC can be described as the move of on-site construction activities into a controlled factory similar to a manufacturing hall to increase standardization and efficiency in the construction process. Additionally, the construction industry needs to invent product systems which are flexible and efficient for changing customer requirements.

Successful production industry concepts are the build-to-order (BTO) concept and supply chain management (SCM). Therefore, the main topics of the master thesis are the build-to-order concept, supply chain management as well as off-site construction and the combination of these topics. The build-to-order concept is applied in the manufacturing industry with the aim to increase flexibility and customization and can also be described as a form of mass customization and a production approach that concentrates on customer demand and responsiveness for changing customer requirements. The aim to apply the build-to-order concept in construction, specified in off-site construction is to produce customized products (buildings) in a flexible way with the efficiency of mass production.

The research question of the master thesis “How to increase efficiency & flexibility in off-site construction by implementing the build-to-order concept?” is answered by developing a framework for the application of the build-to-order concept in off-site construction. For achieving the research aim and answering the research question the following multiple objectives were identified:

- To set the concepts of off-site construction, supply chain management and build-to-order into context for its application in the construction industry
- To analyse the problems and constraints in conventional construction industry and its supply chain
- To explore the potential to apply the build-to-order concept in off-site construction
- To develop and validate a framework for the application of the build-to-order concept in off-site construction
The basis for the master thesis and the framework development is secondary data collection via literature investigation regarding the main research topics of BTO, OFC and SCM. Additionally, primary data is elaborated by six expert interviews and two focus group interviews with two experts per group. The discussion and the validation of the framework and its applicability in practice is emphasized with the focus group interviews.

It is concluded that the constraint of OFC to have a loss of flexibility and customization can be solved with the application of the build-to-order concept in off-site construction and the help of modularity. To sum up, the framework for the application of the BTO concept in OFC, on the one hand, enables a high degree of standardization and efficiency as well as a high degree of standardization in the production process. On the other hand, it simultaneously enables a high degree of customization and flexibility as well as a high degree of customization in the product design.

As the developed framework is a theoretical approach, the framework was not tested in practice. Thus, the different options of applicability in practice are theories. A future research topic could be to test the developed framework in practice in form of a case study.