Modularising design processes of façades in Denmark: re-exploring the use of design structure matrix

Modularity has shown great potential in the manufacturing industry, reducing order lead time and creating variety with limited resources. In the construction industry, the implementation of modularity has been limited to off-site production (OSP). The construction design process incorporates a substantial number of disciplines and stakeholders. Moreover, in the application OSP, the design phase is critical due to the necessity of freezing the design early in the process. This study explores the opportunities for optimising the design processes for OSP through the application of modularity. Framed by a large general contractor, the research is based on a case study of façade design, which is representative of design processes for OSP. Research is based on a theoretical framing within design management and modularity, combined with empirical material from 20 interviews and a two-hour-long workshop with a cross-functional design team. The findings were that (1) the application of a modularity perspective in design has the advantage of accelerating the execution process, as the workload and coordination are transferred to the design process, which, in turn, requires enhanced design management. (2) The design structure matrix (DSM), an approach for operationalising modularity theory, is a promising tool for planning and scheduling complex design processes. The DSM method successfully enabled the identification of dependencies and interfaces between the crucial cross-organisational design activities that are related to the façade design process. (3) The developed process modules are helpful to visualise and execute the process for both project participants and managers.

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