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Durability and subsequent costs of low-cost multi-storey residential buildings

Research Project Z 6 – 10.07.03-07.05
supported by Bundesamt für Bauwesen und Raumordnung, Bonn

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1. Aims of the research project

Efforts to minimize construction costs of multi-storey residential buildings may involve the danger of using construction methods whose long-term suitability is doubtful.

This research study was conducted to assess the practical performance of low-cost multi-storey buildings. The aim was to give recommendations to designers and builders on constructions whose long-term performance has proved to be satisfactory.

2. Collecting data/conducting the research project

Following the study of relevant publications on the subject, a survey was carried out among architects, development builders („Bauträger“) and building experts, which resulted in specifying 33 low-cost multi-storey residential buildings located in various parts of Germany. They were mainly constructed between 1994 and 1996.

The costs of construction were stated as between 1,020 Euro per m² and 2,330 Euro per m² of living area. Of the buildings concerned, 26 were built of stone/concrete, 7 were timber

Summary Account

constructions. Eleven houses had already been „modernized“ during the first 5 to 15 years after construction. This being a comparatively large proportion (33 %), the question was whether certain types of construction can be generally said to be of limited durability. The detailed inspection and examination of 14 multi-storey buildings was undertaken to get relevant information.

3. Findings

The data provided by the survey do not support the conclusion that low-cost buildings are more prone to damage than conventional constructions.

Due to the small sample of inspected buildings, the conspicuously large proportion of „modernized“ houses cannot be regarded as statistically significant.

3.1 Potential for reducing building costs

There are various factors contributing to the total cost of a building. As is generally agreed, the potential for cost reduction is greatest at the beginning of the planning and construction stage and is decreasing considerably in the actual process of building. According to a rough estimate, the potential for cost-saving at the end of the planning stage is frequently less than 50%.

The aspects specified in the survey as affecting building costs have been categorized as ‚constructive' or ‚non-constructive' factors.

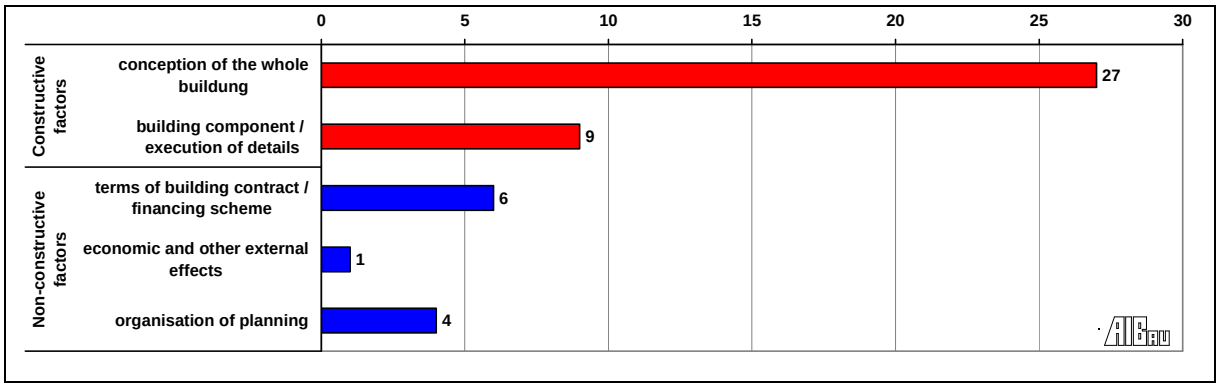

Fig. 1: Factors affecting potential savings as specified in the survey (number of items stated, multiple statings possible)

As far as ‚non-constructive' factors are concerned, potential savings are mainly determined by the price of land, the use of public development funds, special contractual agreement on higher planning expenditure necessitated by the aim of cost reduction, as well as intensive cooperation required at a very early stage of all who are involved in the building process.These factors affect the total amount of building costs already at the beginning of a project.

According to the experts questioned in the survey, ‚non-constructive' aspects do not substantially affect the durability of a building. In their opinion, building costs are mainly determined by the conception of the whole building and by the execution of structural parts. Therefore the main focus of the research study is is on the aspects of rationalization and the prefabrication of building components.

The possibility of maintenance work on components as well as long service intervals may essentially contribute to keeping costs low. It is therefore important to get comprehensive information about the life cycle of certain types of construction and materials.

3.2 Evaluation of saving potential

After the close examination of the construction types applied to the 14 multi-storey buildings in question, ca. 60 different areas were distinguished. Cost-saving types of construction had been applied both to stone/concrete houses and to timbered structures. These constructive measures were categorized in three groups:

- recommended measures
- conditionally recommended measures
- measures not to be recommended

More detailed information can be obtained from the full-length research report.

3.3 Summary of findings

The research study is focussed on the possibilities of cost reduction in the execution of structural components of multi-storey houses. It points out various positive examples, but also draws attention to construction details which are prone to damage. The types of construction examined in the project may either be recommended, or recommended on certain conditions, or not recommended at all.

Summary Account

The results of the investigation do not point to any direct correlation between the amount of money spent for building on the one hand, and the likelihood of damage or the necessity for modernization on the other hand. There was also no evidence that certain types of construction (e.g. stone/concrete or timbered houses) are more prone to damage than others.

With careful planning and construction it is possible to build houses at low cost whose long-term performance will be satisfactory and damage-free. This research study may assist planners in choosing the appropriate types of construction.