

Critical Factors in the Willingness to Adopt Innovative Wood-Based Building Materials in the Construction Industry: The Case Of CLT

Maria Fernanda Laguarda-Mallo
University of Minnesota
Minneapolis, MN

Cross-Laminated Timber (CLT) is an innovative structural system based on the use of large-format, multi-layered panels made from solid wood boards glued together, and layers at 90 degrees. Developed in the early 1990 in Switzerland, the system has been successful in Europe for the past 20 years, and more recently has made inroads into the North America markets. There is an abundance of information on the technology of building with CLT. However, one area that has received limited attention has been the potential adopters' perceptions and willingness to adopt CLT, which will ultimately lead to trial and adoption of this new system. No previous research has been reported or is underway analyzing the adoption of CLT by major decision makers in the construction industry. This research contributes to a better understanding of the adoption process and market potential for CLT and other innovative wood-based construction materials in the U.S. This project aimed at identifying the critical factors influencing the willingness of U.S. construction professionals to adopt innovative wood-based construction materials. The overall objective was achieved by: (a) investigating the level of awareness, perceptions, and willingness to adopt CLT among structural engineers and construction firms; (b) developing a conceptual model including the most critical factors that influence the adoption of innovative wood-based construction materials among structural engineers and construction firms; and (c) identifying distinct market segments for CLT adoption in the U.S.

The project was carried out in five stages: (1) Literature review related to CLT and adoption of innovations; (2) Nation-wide survey of 3200 engineering and construction firms, to statistically infer the level of awareness, perceptions and willingness to adopt CLT; (3) Interviews to 60 engineering and construction firms, to follow up on the information obtained in the surveys and gain a deeper understanding on CLT; (4) Development of a model of the factors that influence the willingness to adopt CLT among U.S. engineering and construction firms. Factor analysis was for this analysis; (5) Identification of the most promising markets segments for this innovative wood-based building system in the country. Cluster analysis software was used to identify segments.

This study found that environmental and aesthetic performance were the main perceived advantages of CLT. The most commonly cited disadvantages of CLT were its fire performance, durability, and lack of availability in the U.S. market. Regarding familiarity with CLT among the target audience, results show that the level of awareness about CLT is low. The conceptual model developed for U.S. engineering firms includes factors such as firm size, aesthetics, moisture performance, vibration performance, LEED credits, and availability of design tools as the main factors affecting willingness to adopt CLT. Using cluster analysis, six distinct market segments were identified in the two populations of interest (U.S. engineering and construction firms). The outcomes from this research help fill the gap in the knowledge about the market adoption process for innovative wood-based materials in the construction industry. This study also contributes to advance the development of the CLT industry in the U.S. by increasing the demand of wood-based construction materials and supporting the creation of employment in a sector of critical importance to the U.S. economy. The target audience for this study is comprised of construction professionals, manufacturers, organizations supporting the wood industry, government agencies, and building officials. Findings from this thesis provide useful information that will help these actors accelerate the adoption of CLT through well-designed educational programs, demonstration projects, marketing strategies, and policy incentives.

Keywords: Cross-Laminated Timber, Adoption, Innovation, Perceptions, Awareness