The application of structural contingency theory to supply chain management – developing a strategic model for prefabricated timber systems

Matthew Ian Holmes

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Certificate of authorship/originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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List of publications during candidature

Conference papers

- Holmes, M., Crews, K. & Ding, G. 2011, 'The influence building codes and fire regulations have on multi-storey timber construction in Australia ', paper presented to the *World Sustainable Building Conference* Helsinki, Finland
- Holmes, M., Crews, K. & Ding, G. 2012, 'Supply Chain Management Strategies for Engineered-to-Order timber structural systems'. Paper presented to the RIC COBRA Conference, Las Vegas, Nevada, USA

Industry presentations

- New innovative prefabricated timber systems for multi-storey construction presentation for EG Property Group – Lunch and Learn session, August 2012, Sydney, Australia
- A case study on construction market needs and expectations for new timber based approaches, presentation for the Forest and Wood Products Australia (FWPA), MADAG group. January 2012 Melbourne, Australia

Reports

- Smith, T., Holmes, M. & Carradine, D. 2012, *A Full Construction, Deconstruction and Reconstruction cycle Cost and Construction analysis of the STIC test building*, Structural Timber Innovation Company (STIC), Christchurch, New Zealand

Posters

- Holmes, M., Crews, K & Ding, G., 2012 Supply Chain Management strategies for prefabricated timber systems in multi-storey non-residential construction, presented to World Conference Timber Engineering (WCTE) 2012, Auckland, New Zealand

Abstract

There is currently limited market penetration for prefabricated timber structural systems in non-residential multi-storey construction in Australia and New Zealand. This limited penetration is caused in part by a fragmented supply chain. There is a need for manufacturers, fabricators and designers to align themselves to better meet the needs and expectations of the non-residential construction environment. There is limited literature available on the impact of the supply chain on other Engineered-To-Order (ETO) products and there is a gap in knowledge on how the supply chain impacts on the performance of prefabricated timber systems. The manufacturer in the prefabricated timber supply chain is the key figure preventing the entire supply chain being structured to better meet the needs of the end user. The prefabricated timber construction supply chain is not structured with the end user in mind, thus decreasing its value. The prefabricated timber supply chain in its entirety should be structured for the non-residential market to better suit the needs of the customer rather than the supplier. Structural contingency theory outlines there should be a fit between the organisational processes and the environment. It states that company models that match the environmental requirements should perform more successfully than those that do not. When applying structural contingency theory to the supply chain the individual dimensions of supply chain should be aligned in order to achieve the best performance.

Case studies interviews were undertaken with industry practitioners and senior leaders from organisations along the supply chain for prefabricated timber systems in Australia, New Zealand (NZ), United Kingdom (UK), Austria, Germany and Finland. These were undertaken to establish how and why the supply chain and organisations along it impact on the performance of prefabricated timber systems. These interviews together with current state-or-art of literature formed the basis of the preliminary supply chain model. Building case studies were then undertaken to further clarify these issues and test structural contingency theory, with the supply chain as the environment, the theory was tested using prefabricated timber systems.