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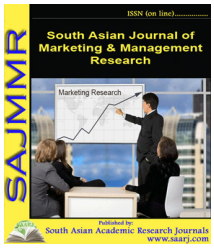

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SELF-MANUFACTURING OR OUTSOURCING DECISIONS IN PREFABRICATED CONSTRUCTION: A MARKET EQUILIBRIUM SUPPLY CHAIN MODEL

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ABSTRACT

Prefabricated construction is a more environmentally friendly option than conventional on-site building. The prefabricated building method, however, still faces many difficulties. Self-manufacturing or outsourcing choices, for example, are critical to the prefabricated building industry's industrial structure and organization, as well as the company's production and operation decision-making. The prefabricated building supply chain in this study is made up of one upstream component manufacturer and two downstream contractors. The big contractor may self-manufacture or outsource the precast component, while the small and medium-sized business (SME) contractor can only purchase components from the component maker. Under various choices, such as component self-manufacturing or outsourcing, a complete game model (Cournot-Stackelberg model) was developed. The equilibrium solutions of production, price, and profit may be obtained by solving the profit functions of various firms in the prefabricated building supply chain. The optimum choice on production and operation, as well as the profit boundary conditions, are indicated by these equilibrium solutions. The profit levels of businesses in the supply chain are evaluated through a dynamic simulation in the changing process of prefabricated construction market size under various behavioral choices once important factors are assumed. The following are the findings: profit levels of all supply chain enterprises and the entire supply chain increase as market size increases, downstream contractors and the entire supply chain have a higher profit level under the component self-manufacturing decision, but upstream component suppliers have a higher profit level under the component self-manufacturing decision. Managerial implications are proposed from the perspectives of extensive publicity, mandatory implementation, strengthening industrial chain integration, and intensifying component factory guidance to promote the development of prefabricated construction, based on the results of the game-theoretic analysis and numerical simulation. Finally, the major issues that should be researched more in the future are given.

KEYWORDS: *Market Equilibrium, Outsourcing Decision, Prefabricated Construction, Supply Chain, Self-Manufacturing Decision,*

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