CONSTRUCTION CAPITAL PRODUCTIVITY MEASUREMENT USING A DATA ENVELOPMENT ANALYSIS

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Abstract

During the past few decades, the construction industry has experienced a series of changes including the innovation of construction technologies and the enhancement of management strategies. These improvements should have had a considerable effect on industrial efficiency and productivity performance, but research is needed to address whether the capital productivity levels of the construction industry have in fact shown such a huge improvement. This paper aims to develop an analysis procedure to measure capital productivity changes and to reasonably quantify factors affecting productivity levels in the construction industry. Based on the data envelopment analysis method, this research has developed a novel model measuring capital productivity and has applied it to the Australian construction industry. The numerical results indicate that the average annual capital productivity levels of the construction industry are slowly growing in all the Australian states and territories except for Queensland and Western Australia. In addition, construction technologies are shown to have a close relationship with the changes in capital productivity according to the temporal-spatial comparisons of productivity indices. The research findings are expected to be beneficial for making policy and strategic decisions to improve the capital productivity performance.

Keywords

Construction industry, Capital productivity, Data analysis envelopment, Australia

INTRODUCTION

Productivity as a core index in economics aims to measure technical progress, economic efficiency, real cost control and production technology. The Royal Commission into the Building and Construction Industry (RCBCI) argued that there are three common productivities in the construction industry, namely multifactor productivity, labour productivity and capital productivity (RCBCI 2002). Among them, capital productivity aims to measure the ratio of industry output to capital input and evaluate the added benefits of increased flexibility (Gray 2006). It can provide an overall capital utilisation level of the construction industry.

Previous research laid out a path to show the development of capital productivity in the construction industry using formalised measurements. Capital productivity as a primary single-factor index can express a construction company’s financial