The Effect of Market Competition and Institutional Regulation on Productivity: A Conceptual Modelling

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Mohd Azrai Azman[1], Nor Nazihah Chuweni[2], Faridah Muhamad Halil[3], Ku Mohammad Asyraf Ku Azir[4], Boon L. Lee[5], Farah Nazira Juhari[6]

[1,4,6]Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Cawangan Sarawak, Malaysia, [2]Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, Cawangan Perak, Malaysia, [3]Faculty of Architecture Planning and Surveying, Universiti Teknologi MARA, Shah Alam, Malaysia, [5] QUT Business School, Economics and Finance, Queensland University of Technology, Australia
Corresponding Author's Email: asyraf765@uitm.edu.my

Abstract

Market competition and institutional regulation has been long regarded as a force that can improve productivity in the economy. Nevertheless, it is still unclear whether market competition and institutional regulation that governs the market can affect the performance of large construction firms (LCF) in Malaysia in terms of productivity. It is important because productivity performance is best known to measure long-term economic performance, improving competitiveness and living standards. In response, this paper aims to discuss and present a conceptual model that links the constructs of market competition, institutional regulation, and their interactions with firm-level construction productivity. In addition, this paper also evaluates methods to measure these variables and model their relationships based on appropriate theoretical and statistical considerations. It is expected that this study has both theoretical and practical implications. Therefore, it could help with theoretical propositions between constructs studied, which can be tested in the future. It is anticipated future research could help with theoretical and policy implications regarding market competition and institutional regulation that could improve LCF's long-run productivity performance based on sustainable economic incentives.
Keywords: Market Competition, Institutional Regulation, Productivity, Construction Industry, Construction Firms, Malaysia

Introduction

After the 2008 Global Financial Crisis, the Malaysian government sought market-oriented policies to improve lagged economic growth. The changes in policies include the removal of investment barriers in the domestic market (National Economic Action Council, 2010), liberalisation of the financial market (Bank Negara, 2011) and subsidy reform

(International Monetary Fund, 2015; Sufian & Habibullah, 2010). On 15 November 2020, the Malaysian government recently signed the largest free trade agreement in the history of the world, Regional Comprehensive Economic Partnership (RCEP) Agreement with 14 countries. Such policy shifts in institutional regulation could change the country's economic landscape, including the construction industry. From 2010 to 2016, the domestic market share of the Malaysian large construction firms (LCF) decreased by 10%, involving almost all construction segments except for electrical specialist contractors (CIDB, 2012, 2014, 2017). In the same period, foreign construction firms' market share increased from 10.3% to 20.1%. The government acknowledged that the new policy might increase competition in the construction market. Nevertheless, policymakers believed that the policy could bring more investments into the country, with more opportunities for both domestic and LCF (CIDB, 2016). However, the effect of market competition and institutional regulation on Malaysia's construction industry is currently unclear. There is a lack of evidence on whether or not the market competition and institutional regulation may bring changes in the industry performance over the long term.

The effect of market competition on the construction industry is still ambiguous in Malaysia and many countries. Industry segmentation can cause difficult predictions (de Valence, 2011). There is a lack of evidence on whether LCF in the industry itself could be affected by the market competition. When looking at a particular segment of the firm, the level of competition largely depends on the firm offerings (de Valence, 2011). For example, LCF could enter private finance projects, devise corporate strategies, and are more susceptible to foreign competition. However, some LCF may enjoy market power (measured by market concentration) that would decrease the market competition. Small and medium firms (SMF) largely depend on LCF for subcontracting works, meaning SMF are highly competitive. In addition, they are protected from foreign competitors, and they are most likely specialised. The results from mainstream management and economics were vague too. Market competition is often believed to improve performance because it will pressure firms to optimise their resources, lower costs, and adopt innovations (Ye et al., 2015). However, each industry may respond to market competition differently; for example, the manufacturing industry could adapt to competition better than the services industry because the regulations imposed regarding price control and entry regulation are less intense (Buccirossi et al., 2013). Also, the effect of market competition could be non-linear in terms of impact, as found by (Chen et al., 2018). The level of transaction costs, organisation costs, and measurement problems differ across industries (Chari & Dixit, 2015). Therefore, this research looks at how market competition affects LCF's productivity.

Institutional regulation shapes a country's economic outlook, which is important for economic progress. It can be decided by government policies or laws that limit what market players can do in the market economy and can either reward or hinder economic progress (Acemoglu et al., 2005; North, 2005). For example (see

Figure 1) indicates that institutional regulations can include policies limiting money flow into the country and policies that enforce property rights and market orientation (from openness to protectionism). According to most economists, positive reforms in institutional regulation might boost productivity growth (Acemoglu & Dell, 2010). It is because institutional regulation incentivises the efficient use of resources for output. Studies have been conducted to see how institutional governance affects production. However, studies by Lasagni et al (2015), Ng and Yu (2014); Castelnovo et al (2019); Borghi et al (2016) concentrated on the non-construction sector, While, others may utilise an aggregate measure of institutional regulation without providing a comprehensive study of how different institutional regulations may impact productivity (Borghi et al., 2016; Castelnovo et al., 2019). Furthermore, some research focuses just on one institutional regulation while ignoring others, which may only explain a portion of the effect (Bekaert, Harvey, & Lundblad, 2011). As a result, policymakers find it difficult to determine which institutional regulation clearly impacts LCF's productivity.
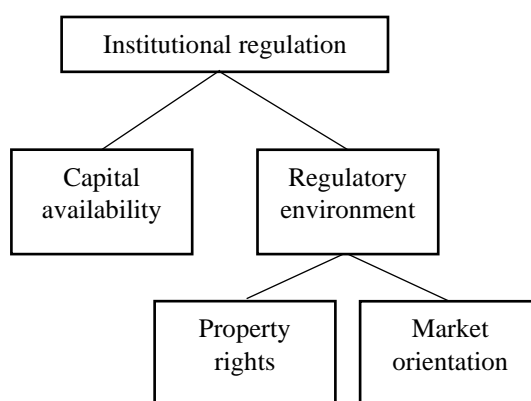

Figure 1: Typology of institutional regulation (authors' explanation)

Economic crises, such as the Global Financial Crisis of 2008, can lead to changes in institutional regulation (Bakir & Gunduz, 2017). The increase in capital available in relation to the growth of financial markets may result in improved resource allocation (Acemoglu et al., 2005). It makes product markets and market intermediaries more accessible (Khanna & Palepu, 1997). A robust regulatory framework also enhances the chance of companies (managers) adhering to a more robust governance structure, lowering the danger of expropriations (Djankov et al., 2008). Furthermore, through market openness, the regulatory framework allows companies (managers) to allocate resources more freely to discover the optimum solution to maximise company outputs (North, 2005). The Heritage Foundation (2020) indicates an improvement in some indices of institutional regulation in Malaysia from 2009 to 2020, but how it might affect productivity is not known. As a result, the influence of capital availability and the regulatory environment on Malaysian LCF must be investigated.

As previously stated, favourable changes in institutional regulation may aid companies in resource coordination by allowing them to freely employ their resources to maximise

returns and lower the danger of mismanagement. Firms (managers) are under pressure from the market to adapt to changes (Esquivias & Harianto, 2020). However, the interplay between competition and institutional regulation on construction productivity may not have the expected positive effect. Helmke and Levitsky (2004) hypothesised that enterprises (managers) would resist the changes. They may find an alternative to mitigate the "trouble" through legal or unlawful ways. According to Bhaumik et al (2012), changes in institutional regulation may produce winners and losers, with not all businesses benefiting from the changes. It is because the idea of institutional regulation is complicated and requires deliberation (Krammer, 2015). Construction industry aspects may differ from those seen in other industries. The construction business is thought to lack innovation, be labour-intensive, and rely heavily on government contracts (Ferrante et al., 2019). As a result, research into the moderating role of institutional regulations on market competition as well as their impact on construction productivity is required.

TFP assesses how effectively production factors were utilised to create goods and services. Workers, fixed capital, and materials used in an industry, or a firm are factors of production, whereas goods and services are the outputs. The aggregate amount of outputs over the aggregate units of labour, materials, and capital is the Total Factor Productivity (TFP) that will be employed in this study. The TFP indicator is essential because higher TFP signifies more robust economic development and a higher quality of life. TFP is responsible for the global variance in income per capita (Weil, 2013). TFP can detect changes in regulation more precisely than other partial productivity measures, such as labour productivity, since it includes all productivity components, such as technological change, technical efficiency, and others (Abdel-Wahab & Vogl, 2011). New regulations, for example, may push construction companies to grasp the skills. As a result, it improves technological efficiency. Malaysian construction sector labour productivity remained unchanged from 1970 to 2010 (Chia et al., 2014). However, following the 2008 Global Financial Crisis, labour productivity appears to have improved slightly between 2010 and 2016, which could be owing to renewed infrastructure expenditures and more market-oriented policies (changes in institutional regulation) (Gen & Ng, 2017). However, no previous research has been done to determine if changes in market competition and institutional regulation may affect TFP of LCF. As a result, this research aim and objective are to:
- Determine which type of institutional regulation, market competition and interaction are accountable for the changes in TFP.
- Examines various measurement techniques and models to these variables' relationships based on pertinent theoretical and statistical factors.

Literature Review
In general, greater productivity has been the key to improving people's material well-being mainly due to resource allocation and technological advancement, allowing a nation to reach greater standards of life and provide wealth to the population (Weil, 2013). Furthermore, increased productivity boosts competitiveness and resistance to financial and economic shocks (Imrohoroglu & Tuzel, 2014). Furthermore, increased productivity is related to increased employment and wage increases (Mollick & Cabral, 2009). Nonetheless, the construction sector in developing economies is plagued by inefficient production methods such as on-site and off-site coordination issues, a lack of automation, and excessive labour used (Hasan et al., 2018).

According to New Institutional Economics, managerial competency and technological diffusion within the sector may necessitate an enabling environment that incentivises the business to have a multiplier impact. As a result, a better explanation is why the construction industry in developing economies like Malaysia may have inherited inefficient (less productive) processes than wealthy nations (Dixit et al., 2019). In this case, According to Acemoglu et al (2005), improved institutional regulation is the enabling environment that matters for productivity improvement. This results in economic activities aided by the improvement in capital availability and market-oriented policies such as property rights, which provide economic incentives to produce without bottlenecks (Acemoglu & Dell, 2010; North, 2005). As a result, a good incentive structure combined with positive institutional regulation may boost construction productivity, boosting the firm's and the industry's competitiveness.

Institutional regulation is the laws, rules, and policies that the government has codified and enacted to manage financial markets, regulatory enforcement, and market orientation (Holmes et al., 2013). Institutional regulation affects long-term productivity by defining economic players' incentive structure (firms and individuals) in the sector by propelling or obstructing economic activity (Acemoglu & Dell, 2010; North, 1990, 1991, 2005). As a result, changes in institutional regulation may alter decision-makers' actions, affecting industrial outputs directly. In the construction industry, for example, the favourable impact of Public-Private Partnership (PPP) delivery in China is linked to considerable improvements in the Chinese legal system (Zhang et al., 2015), and Singapore's national policy for research and innovation improving the country's construction industry (Na et al., 2007).

Following the Global Financial Crisis of 2008, more market-oriented policies were implemented to boost capital inflow and encourage economic development to recover from the crisis' aftermath (NEAC, 2010). To strengthen economic freedom and property rights, more investment and commercial obstacles have been relaxed (NEAC, 2010). Also, the government has started to liberalise financial institutions (Bank Negara, 2009, 2011) and implemented subsidy reform (Sufian & Habibullah, 2010). Policymakers anticipate that the effort will boost the capital market and foreign direct investment inflows (FDI). In developing economies, market-oriented policies are linked to increased productivity (Qureshi, Diaz-Sanchez, & Varoudakis, 2015). Furthermore, effective institutional regulation is essential for countries to recover from economic crises (Bakir & Gunduz, 2017).

Improvements in different regulations are also anticipated to enhance the competitive environment in the construction industry. However, lack of competition will obstruct significant productivity gains (Carson & Abbott, 2012; Giang & Pheng, 2011). Chancellor and Abbott (2015) find that policies in apprenticeship training boosts the industry TFP in Australia. In China, regulations that emphasise economic incentives improve labour productivity instead of governmental order without meaningful incentives to enforce prefabrication in the industry (Zhang et al., 2015). When comparing various areas in China, regional variation may have an impact on productivity. This is due to the industrial structure and technology level, implying differing institutional regulations across the regions (Wang et al., 2013). In another instance, a change in environmental legislation may create a reversal in technical change (TC) for civil engineering businesses in Spain since it takes time for enterprises to discover better

methods to deal with new environmental rules (Kapelko & Abbott, 2017). Previous studies show the results of TFP changes in the construction industry in detail. However, there is a limitation in the literature on changes in market competition, institutional regulation, and their interaction that could affect TFP in the construction industry and its firms so far, which requires urgent attention. Based on the literature review, Figure 2 indicates the proposed theoretical framework.
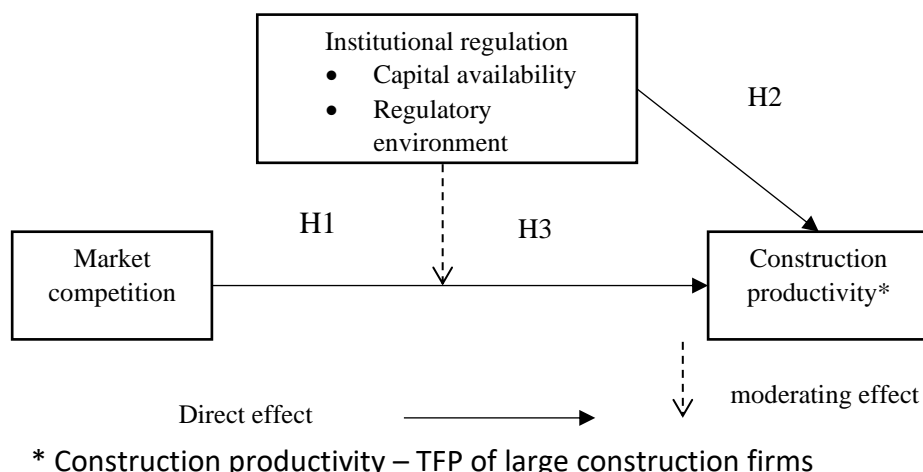

* Construction productivity – TFP of large construction firms

Figure 2: Theoretical framework

Based on the literature, the followings are the proposed hypotheses
H1: Construction productivity can be affected by the level of market competition.
H2: Construction productivity can be affected by a different type of institutional regulation.
H3: A different type of institutional regulation moderates the effect of market competition on construction productivity.

Based on the literature, the followings are the proposed research questions:
1. How and to what extent does market competition affect construction productivity in Malaysia?
2. How and to what extent does institutional regulation affect construction productivity in Malaysia?
3. How and to what extent does interaction between market competition and regulation affect construction productivity in Malaysia?

Based on the literature, the followings are the proposed research objectives:
1. Evaluate the effect of market competition on construction productivity
2. Evaluate the effect of institutional regulation on construction productivity
3. Evaluate the moderating effect of institutional regulation on market competition and its impact on construction productivity

Research Method
Data Collection
The results of this study can be easily duplicated and derived since it employs quantitative methodologies. The following research procedure and analysis will be used to test the

suggested theoretical framework. With the exception of institutional regulation's variables, all other variables will be built using data from annual reports of publicly traded companies. The information is publicly available. Annual Reports of Malaysian LCF listed on the Malaysia Stock Exchange between 2009 and 2020 will be used to collect firm-level data. Approximately 50 LCF will be chosen based on the initial assessment, and they are involved in civil engineering, building, and specialised works.

To build institutional regulation's variables. The approach proposed by Holmes et al. (2013) will be used in this study. A variety of indices, including the International Country Risk Guide (ICRG), the Index of Economic Freedom, and the World Bank, can be used to approximate institutional regulation. Changes in capital availability, for example, maybe seen in Capital Investments and the value of stocks traded / GDP in those indexes.

Measuring Institutional Regulation
The principal components analysis (PCA) can be used to aggregate indices into uncorrelated principal components (Garrido, Gomez, Maicas, & Orcos, 2014; Voigt, 2013). This is due to the fact that indices can be highly correlated. In this situation, PCA's rotations like Varimax maximise the sum of squared loadings' variances. The goal is to aggregate each index into a few components (variables). As a result, the standardised projected value of PCA will be used as institutional regulation's variables.

Measuring Market Competition
This study employs a novel technique proposed by Boone (2008) for market competition, in which the author evaluates two aspects that cause competition intensity. Profit may be generated through efficiency when multiple companies strive to outdo each other by delivering products and services (Boone, 2008). In this case, equation (1),

$$\ln \pi_{it} = \alpha + \beta_\theta \ln c_{it} + \varepsilon_{it} \qquad\qquad (1)$$

where π_{it} stands for relative profit and c_{it} is normalised relative efficiency. β_t gives Boone indicator (the indicator of market competition), which describes a change in profit margin for a firm as a result of firm efficiency. ε_{it} is error term. The lesser the β_θ, the greater the efficiency, and hence the larger the profits. Boone (2008) demonstrates that the new indicator considers both the Cournot (quantities) and Betrand (price) models, making it more accurate than the degree of market power (measured by market concentration).

Measuring Total Factor Productivity
The ratio of aggregate output to aggregate input is known as total factor productivity (TFP). It can also be calculated by dividing an output quantity index by an input quantity index (Coelli, Rao, O'Donnell, & Battese, 2005). A proper index number is required to aggregate the quantity of outputs and inputs. If no pricing data or production technology are available, revenue share, also known as the Geometric-Young index, can be used to compute output and input indexes (G-YI) (O'Donnell, 2016).

G-YI fulfils key index number theory assumptions (O'Donnell, 2016). G-YI is also multiplicatively complete, meaning it can be expressed in aggregate quantities. This particular

feature is necessary for deriving a complete estimate of TFP (O'Donnell, 2012). Equation 2
computes the G-YI output aggregator.,

$$Q(q_{it}) = \prod_{n=1}^{N} q_{nit}{}^{bn} \qquad (2)$$

where q_{nit} are outputs bn is share of outputs. G-YI aggregate inputs can be calculated in a
similar fashion. Therefore, TFP is $Q(q_{it})/X(x_{it})$.

Modelling
The Generalised Method of Moments (GMM) is expected can be used to model relationships
between market competition, institutional regulation, and their moderating impact on TFP.
The endogeneity problem related to the model's endogenous variables can be mitigated using
GMM. Inefficient test statistics and biased parameters can therefore be avoided. The
modelling of market competition and institutional regulation is represented by equation (3),
whereas the interaction effect model of market competition and institutional regulation is
represented by equation (4):

$$Y_{it} = \alpha + Y_{it-1} + \sum_{m=1}^{M} B_{\mathrm{m}} x_{mit} + \sum_{t=1}^{T-1} B_t d_t + \sum_{c=1}^{C} B_c \theta_c + \sum_{r=1}^{R} B_r \lambda_{rt} + e_{it}$$
$$(3)$$

$$Y_{it} = \alpha + Y_{it-1} + \sum_{m=1}^{M} B_{\mathrm{m}} x_{mit} + \sum_{t=1}^{T-1} B_t d_t + \sum_{c=1}^{C} B_c \theta_c + \sum_{r=1}^{R} B_r \lambda_{rt} + \sum_{s=1}^{S} B_s (\theta_c * \lambda_{rt}) + \varepsilon_{it} \qquad (4)$$

Y_{it} is observed firm TFP, α is slope intercept, Y_{it-1} is observed past TFP, β *is* beta coefficient,
x_{mit} is control variables, d_t is time dummies, θ_{ct} is level of market competition at varying
periods, λ_{rt} is the different types of institutional regulation at varying periods.

Robustness Tests and Checks
To ensure that the results are robust and qualitatively equivalent to alternative results,
robustness tests and checks will be performed. First, to test if the proposed instruments are
valid, Sargan's test will be applied, and then an alternative variable to θ_{ct} will be developed
and substituted to see if the alternative variable result is similar to the original (θ_{ct}).

Results and Discussion
    Although this paper is still in the conceptual phase, which requires further testing, it is
expected to reveal whether or not market competition and the interaction effect of
institutional regulation can improve LCF's TFP in the long run. As suggested by some authors,
the construction industry is lacked in competition due to the reasons of too much depending
on public procurements, low level of innovation and high labour intensity (Vendrell-Herrero,
Darko, & Vaillant, 2020). The effect of market competition can be difficult to predict, while
some suggest that market competition can improve firm performance. Some results show
that market competition negatively impacts operational performance in microfinance
banking (Hossain, Galbreath, Hasan, & Randøy, 2020). Also, there is an inverted-U relationship
between market competition and productivity in the manufacturing industry (Polemis, 2020).
There is no research focusing on the impact of market competition on productivity in
construction research. However, using construction bidding data in Japan, the number of
bidders entrance can reduce bidding prices, while bid-rigging can increase bid prices (Arai &
Morimoto, 2017). In regard to moderating role of institutional regulation on market
competition-productivity, there is a lack of research in this area. However, in other similar

research, manufacturing firms' financial dependency on banks positively moderates the banking competition-firm productivity (Leroy, 2019).

Conclusion

This paper develops the conceptual modelling that establishes the relationship between market competition and TFP of LCF in Malaysia. In this case, the moderating role of institutional regulation will also be investigated. In the context of the gaps and literature review, this paper establishes the theoretical framework, hypotheses, questions and objectives for the upcoming study. Also, this paper reviews methods that will be used so that they are appropriate based on theoretical and statistical considerations. It is anticipated that this paper could guide the next phase of the research and contribute to market competition, institutional regulation, and construction industry research.

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