

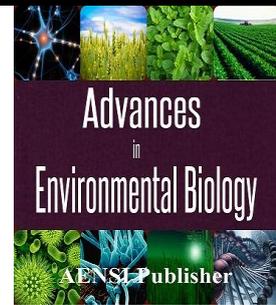


AENSI Journals

Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/AEB/>



Innovation Practices in Construction Firms

¹Nor'Aini Yusof, ²Mohammad Iranmanesh and ³Ernawati Mustafa Kamal

^{1,3}School of Housing, Building and Planning, Universiti Sains Malaysia

²School of Management, Universiti Sains Malaysia

ARTICLE INFO

Article history:

Received 12 October 2014

Received in revised form 26 December 2014

Accepted 1 January 2015

Available online 17 February 2015

Keywords:

Innovation Practices, Firm Characteristics, Construction Industry, Malaysia

ABSTRACT

The construction firms need to implement particular practices to successfully adopt or generate innovation to ensure growth and survival. The aim of this study is to investigate the association between construction firms' characteristics and their level of innovative practices implementation. Data was gathered through a survey of 105 firms in the Malaysian construction industry. Data was analyzed using the non-linear canonical correlation technique. The results indicate that old and big firms with non-public clients exercise more innovation creation practices. Young and small firms with public clients implement more innovation adoption practices. Contractor firms which work nationally or internationally practice innovation adoption and creation practices simultaneously. The consultancy or property developer firms that operate within the state try to be innovation creators. The results also show a good relationship between old and big construction firms and universities. The findings of the present study help the policy makers to promote innovation in construction effectively.

© 2015 AENSI Publisher All rights reserved.

To Cite This Article: Nor'Aini Yusof, Mohammad Iranmanesh and Ernawati Mustafa Kamal., Innovation Practices in Construction Firms. *Adv. Environ. Biol.*, 9(5), 124-126, 2015

INTRODUCTION

When evaluated against other industries the construction industry is characterised by low output and value; two things it is often criticized for. Lack of innovation is the main reason for low productivity [1, 2]. To address this issue, many researchers have concentrated on searching for strategies that will help construction firms to be innovative. Innovation can be categorized to innovation adoption and creation according to its innovator. In general terms, innovation creation is about introducing a new product or service ahead of other competitors [3], whereas innovation adoption is about adopting ideas from the competitors [4]. Innovation creation and innovation adoption are two distinct phenomena that are implemented by different practices [5]. The practices that lead to adoption or creation of innovation were identified in the previous studies [5, 6]. The aim of the present study is to display the relationship between construction firms' characteristics (age, size, type, business scale, and major clients) and innovation practices. The findings of this study are useful for policy makers to recognize the level of innovation practices implementation among construction firms' based on the firms' characteristics which can help them to promote innovation among construction firms in more effective ways.

Methodology:

A quantitative survey with a structured questionnaire was employed in the present study. 16 items were used to measure innovation adoption and creation practices in construction firms (Table 1). Out of the 16 items, 5 items (Adoption 4, Adoption 9, Creation 1, Creation 5, and Creation 6) were adversely phrased. Before doing factor analysis, the adversely phrased items were re-phrased with their actual meaning. The total amount of items was measured with a 6-point Likert-scale ranging from 1=strongly disagreed, 2=disagreed, 3=slightly disagreed, 4=slightly agreed, 5=agreed and 6=strongly agreed. Impartial answers, neither agreed nor disagreed, were not allotted for in order to ensure participants expressed their true opinion and conveyed their preference. The items were adopted from the Yusof et al. [5] study.

The survey questionnaire was given face-to-face to the top management of developers, consultants and contractor firms operating in Penang, Malaysia. Because the sought out participants were acquired indiscriminately from lists of members of housing developer associations, contractor associations and

Corresponding Author: Nor'Aini Yusof, School of Housing, Building and Planning, Universiti Sains Malaysia
E-mail: ynoraini@usm.my,

professional bodies who work in firms that operate in Penang, purposive sampling was used. The state of Penang is the most active state in Malaysia in terms of construction activities; because of this it was chosen for the case study. Non-linear canonical correlation technique was used to analyse the data. The main purpose of applying the nonlinear canonical correlation technique is to determine how similar sets of categorical variables are related to one another.

Table 1: Measurement Scales.

Innovation adoption	
Adoption 1	We are the creative imitator instead of a design pioneer.
Adoption 2	We usually introduce a familiar and well-known design to the client.
Adoption 3	For us, innovation is just a tool for getting things better, rather than an end-product.
Adoption 4	We do not make modification based on the existing/proven succeed products.
Adoption 5	We are imitating designs from the market to minimize the uncertainty of our products.
Adoption 6	It has been a culture to adapt a well-known design.
Adoption 7	As long as the design/product meet the client's criteria, proposing something extra ordinary/beyond the expectation would not necessary.
Adoption 8	Whenever there is a new designed product introduced by other design firm, we would try to imitate their design.
Adoption 9	We never refer to the existing design in the market when we design.
Innovation creation	
Creation 1	We do not compete to be the first to introduce new design ahead other design firms.
Creation 2	We design to surprise the market rather than to please the market.
Creation 3	My firm invests heavily in r&d for new idea and technology.
Creation 4	In any chances, we tried to impress the client with our novel and "dare-to-try" design.
Creation 5	We don not aim to be the first to introduce a new design.
Creation 6	We would never want to be the pioneer of new product.
Creation 7	My firm has a very strong linkages with the universities and research centres.

RESULTS AND DISCUSSION

(i) The Sample:

The majority of respondents were contractors (66.9%), followed by consultancies (19.6%), and property developers (8.8%). The bulk of the participants' firms work at the national level (65.0%) and their key patrons are from the public sector (57.3%). About 62.2% of the replying organizations' age is between 11 and 20 years. Based on these figures one can conclude that in Malaysia, construction firms are recognised and knowledgeable service providers. 30.0% of the firms have been in operation between 6 to 10 years. The remaining are 7.8% have been operating for under 5 years. With regard to the number of personnel in the businesses, the data revealed that 53.5% of the organizations have a permanent workforce of less than 50. The distribution is as follows 29.3% below 20 employees and 24.2% between 21 to 50 employees. The additional participating companies' sizes show 46.5% have above 51 permanent personnel.

(ii) Non-Linear Canonical Correlation Analysis:

Three sets of variables were compared in the present study by taking firm characteristics variables in set-1, innovation adoption in set-2, and innovation creation in set-3. The non-linear canonical correlation fits well to the two sets considered for the analysis. Fig. 1, reveals the overall findings of the nonlinear canonical correlation analysis using the quantification of centroids by two dimensions. Based on the original and projected centroids, four corners were identified. Within each corner, those variables which are highly correlated are displayed. The big and old firms whose major clients are non-public sector, dominate in Corner I. These firms make modifications based on the existing successful products, compete to be the first to introduce new designs, and have very strong ties to universities and research centres. On the other hand, these firms seldom introduce a familiar and well-known design to the client, are not imitating designs from the market to minimize the uncertainty of their products, and would not try to imitate new designs whenever it is introduced by other design firms. The construction firms that work nationally and internationally as contractor dominate are located in Corner II. These firms have a culture of a well-known design adoption, refer to the existing design in the market when they design, and at the same time invest heavily in R&D for new ideas and technology. They do not try to propose something beyond the customers' expectations. The construction firms that work within the state as consultancy or property developers fall in Corner III. These firms never refer to existing designs in the market and try to be the first to introduce a new designs. They also try to propose something beyond expectations. Finally, the young and small construction firms dominate in Corner IV. These firms usually introduce a familiar and well-known design to the client, imitate designs from the market to minimize the uncertainty of their products, and try to impress the client with their novel and "dare-to-try" designs. These firms don't have strong links with universities and research centres.

Summary:

The aim of the present study was to demonstrate the relationship between construction firms' characteristics and innovation practices. The results show old and big firms with non-public clients try to create innovation as they have good relationships with universities and try to introduce new designs. On the other hand, the young

and small firms with public clients, try to adopt innovative designs from the market and usually introduce well-known designs to the consumers. They do not have strong relationships with universities. In addition, the results demonstrate that the contractor firms which work nationally or internationally try to adopt and create innovation simultaneously. In contrast, the consultancy or property developer firms that operate within the state try to create innovation and to propose something beyond expectations.

<p style="text-align: center;">Corner-I</p> <p>Firm Age: Old (above 11 years) Firm Size: Big (above 51 employees) Firm Major Clients: Non-Public Sector</p> <p>Adopt 2 : St.D Adopt 4 : St.A Adopt 5 : St.D Adopt 8 : St.D Create 1 : St.A Create 6 : St.D Create 7 : St. A</p>	<p style="text-align: center;">Corner-II</p> <p>Firm Business Scale: National/ International Firm Type: Contractor</p> <p>Adopt 6 : St.A Adopt 7 : St.D Adopt 9 : St.A Create 3 : St. A</p>
<p style="text-align: center;">Corner-III</p> <p>Firm Business Scale: Within State Firm Type: Non-Contractor</p> <p>Adopt 7 : A Adopt 9 : St.D Create 5 : A</p>	<p style="text-align: center;">Corner-IV</p> <p>Firm Age: Young Firm (less than 10 years) Firm Size: Small (less than 50 employees) Firm Major Clients: Public Sector</p> <p>Adopt 2 : St.A Adopt 5 : St.A Adopt 8 : St.A Create 2 : St.D Create 4 : St.A Create 7 : D</p>

Note: St.D = Strongly Disagree, D = Disagree, Sl.D = Slightly Disagree, Sl.A = Slightly Agree, A = Agree, St.D = Strongly Agree

Fig. 1: Findings of Non-Linear Canonical Correlation Analysis.

ACKNOWLEDGEMENTS

The authors acknowledge the financial support of Ministry of Education Malaysia through the Fundamental Research Grant Scheme (FRGS) (Grant number 203/PPBGN/6711254) which made the publication of this paper possible.

REFERENCES

- [1] Winch, G.M., 2003. How innovative is construction? Comparing aggregated data on construction innovation and other sectors – a case of apples and pears, *Construction Management and Economics*, 21: 651-654.
- [2] Taghizadeh, S.K., K. Jayaraman, I. Ismail, M. Iranmanesh, 2013. Service Innovation Management on Market Performance through Relevancy of Market conditions: Guide to Telecommunications Industry, Malaysia, *Australian Journal of Basic & Applied Sciences*, 7: 241-252.
- [3] Kerin, R.A., P.R. Varadarajan, R.A. Peterson, 1992. First-Mover Advantage: A Synthesis, Conceptual Framework, and Research Proposition, *Journal of Marketing*, 56-19.
- [4] Naranjo-Valencia, J.C., R.S. Valle, D.J Jime'nez, 2011. Innovation or Imitation? The role of Organizational Culture, *Management Decision*, 49-17.
- [5] Yusof, N.A., E.M. Kamal, L. Kong-Seng, M. Iranmanesh, Are innovations being created or adopted in the construction industry?: exploring innovation in the construction industry, *SAGE Open*, 4: 1-9.
- [6] Czarnitzki, D., S. Thorwarth, 2012. The Contribution of In-house and External Design Activities to Product Market Performance, *Journal of Product Innovation Management*, 29: 878-895.