

## A SUSTAINABLE AND SYSTEMATIC MEDIF SYSTEM

\*Norizzati Ibrahim<sup>1</sup>, Che Maznah Mat Isa<sup>2</sup>, Nur Kamaliah Mustaffa<sup>3</sup>, Nur Izzati<sup>4</sup>, Mohd Khairolden Ghani<sup>5</sup>

<sup>1,2,3,4</sup>School of Engineering, College of Engineering, Universiti Teknologi Mara Malaysia

<sup>5</sup>Construction Research Institute of Malaysia (CREAM), Construction Industry Development Board Malaysia

\*Corresponding author's email: izzati6752@uitm.edu.my

### ABSTRACT

Construction projects internationally are one of the main catalysts that contribute to the growth of the Malaysian economy through the implementation of mega infrastructure projects. In this regard, the Malaysian government has taken other initiatives through the establishment of the Construction 4.0 Strategic Plan (2021-2025). The report points out that models for entry decisions into overseas markets have underdeveloped locally and abroad. Therefore, the current study is very important in realizing the Construction 4.0 Strategic Plan (2021-2025) through the development of a sustainable and strategic MEDIF system. MEDIF was formulated to help Malaysian construction firms make more strategic entry decisions to enter the international market based on poor to excellent measurement scale values. The MEDIF system was developed as a result of a survey of 74 managers who have experience handling projects at the international level. The data were analyzed using Rasch Model, SEM model, and also SPSS software to strengthen the structure of the MEDIF system. The MEDIF system has identified the most strategic locations (continents) to conduct construction operations based on scale measurements of 1 to 6. The MEDIF system found that the most strategic entry locations were Europe, followed by the United States, Asia, ASEAN, Africa, and Australia. The joint venture has been identified as the most strategic entry mode to ensure that construction firms can sustain in host countries. Finally, the MEDIF system has identified joint ventures as the most suitable entry mode for new entrants to countries located in Europe.

**Keywords:** construction, internationalization, system, entry decisions, sustain

### 1. INTRODUCTION

The Construction 4.0 Strategic Plan (2021-2025) emphasizes the important role of the Malaysian construction industry in developing the country's economy. However, the number of international projects is seen to be declining, with no projects reported since 2020. This is believed due to the lack of knowledge and access related to the global market, which consequently makes it difficult for Malaysian companies to successfully win projects abroad.

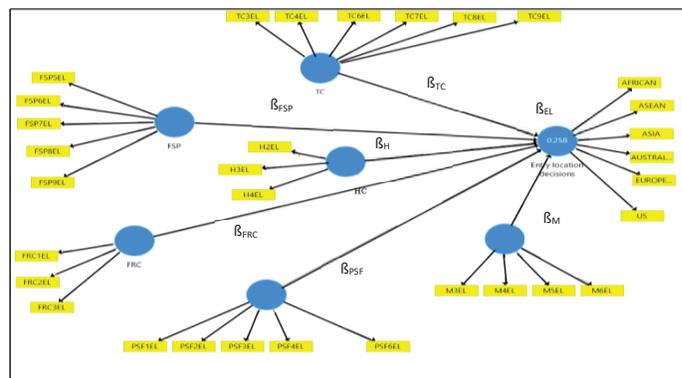
Furthermore, insufficient studies that are focused on developing a systematic model to measure multi-entry decisional integration is have also been identified as emphasized in Construction 4.0 Strategic Plan (2021-2025). The strategic model is believed to be crucial in providing a clear guide to the construction firms in adopting effective international market entry decisions. Hence, this current study has developed a sustainable and systematic Multi-entry Decisional Integration Framework (MEDIF) that includes choosing the right location, proper timing, and suitable entry mode to enter international markets.

## 2. METHODOLOGY

This study adopts a quantitative method using a survey questionnaire administered to managers from construction firms to solicit their opinions influencing their internationalization process. Data were obtained from a survey study through 74 Malaysian construction firms with experience operating internationally. Firstly, the entry location decisions of Malaysian construction firms were analyzed using SPSS version 22 software. Reliability analysis with Cronbach's alpha was calculated for the variables measuring the same dimension to provide evidence of reliability. The greater the degree of consistency and stability in an instrument, the greater its reliability where a value greater than 0.70 was considered acceptable (Lozano-Torró, García-Segura, Montalbán-Domingo and Pellicer, 2019). Normality tests were conducted to assess whether the data on the variables collected are normally distributed. In this study, the normality of the variables was established by evaluating the data distributions for skewness and kurtosis. The standard error is the range of possible errors that occurs in data (Good standard error value < 1.0). The data were further analyzed using Structural Equation Modeling (SEM) using Smart PLS software to obtain the relationship between the factors and the entry decisions into the international market. Partial Least Squares (PLS) analysis is used to help strengthen the theory of study at the early level or a slight consolidation or limited data (Bido, da Silva, and Ringle, 2014). This model is also very useful for solving complex data (many variables observed) and/or models with less consecrated theoretical support (Bido, da Silva, and Ringle, 2014). This research also uses a literature review from previous research.

### 2.1: Structural Equation Modelling (SEM) Analysis

This study used the Partial Least Squares (PLS) software to identify the factors that influence the firm's decision to go to the international market (Ramayah, Mohamad, Jaafar, Abdul-Aziz, and Wong, 2010). Dependent variables for this study refer to entry location (i.e. ASEAN, Asia, Africa, Europe, United States, and Australia) and independent variables are the determinants to enter the international market that new entrants need to consider (i.e: target country (TC), home country (H), market (M), firm-resources (FRC), projects (PSF) and firm-specific factor (FSP). The criteria average value (AVE) must be > 0.50 (Fornell and Larcker, 1981). Next, the CA value must be above 0.60 or 0.70 and the value of CR 0.70 and 0.90 is considered reliable (Fornell and Larcker, 1981). The third step is the values of the t-test for each correlation relation between variables should be calculated between -1.96 and +1.96. The value of AVE of 0.36 is adequate for the areas of the social and behavioural sciences (Ramayah, Mohamad, Jaafar, Abdul-Aziz, and Wong, 2010). A conceptual model was constructed to examine the relationship between key factors with entry decisions is as shown in **Figure 1** for the fourth step.



**Figure 1. A conceptual model for the relationship between key factors and entry locations**

Interpretation of path coefficients ( $\beta$ ) as in **Figure 1** constructed upon completion of procedures for adjustment quality evaluation. Value of TC, FSP, H, FRC, PSF, and M are independent variables or the key factors while Y is a dependent variable or refer to entry location (EL) in a multiple regression model

as explicit based on (Ramayah, Mohamad, Jaafar, Abdul-Aziz and Wong, 2010). The model in **Figure 1** is equivalent to the following model in a multiple regression as in equation (1).

$$Y = \beta_{EL} + \beta_{TC} + \beta_{FSP} + \beta_H + \beta_{FRC} + \beta_{PSF} + \beta_M$$

## 2.2: Development of Measurement of MEDIF

This sub-section is to achieve the objective of "to identify the key determinants and determine associated measures of the determinants for multi-decisional integration in international construction".

## 2.3: Scales of the Measurements for EMAC, ETAC, ELAC, and MEDIF from Poor to Excellent Decision Making to International Market

In this case, there are five (5) important decisions that the firm needs to consider, of which a total of 10 pairs are based on a study by Coombs (1953); and Dillon, Madden, and Firtle (1994). The calculation to obtain the number of pairs is as below;

$$\text{No. of pair} = \frac{n(n-1)}{2} = \frac{5(5-1)}{2} = 10 \text{ pairs}$$

Entry decisions are labeled using the grade scores obtained by the firm labeled from the letters A to E as below;

- A= can extremely sustain
- B= high potential to sustain
- C= moderately sustain
- D= high risk to sustain
- E= very high risk to sustain

The order of the best entry decision to go to the international market is arranged from top to bottom or from A to E. This means the top position shows the best entry decision that needs to be considered by the firm to go to the international market as tabulated in Figure 4.2. The arrangement of the grid should be carefully observed, where the entry decisions to the international market are measured as in **Figure 2**.



**Figure 2. A Preference Matrix of Entry Decision to International Market**

Although the score that will be obtained by the firm is low, the firm still has the opportunity to go to the international market because all these key factors/determinants are very significant for entry into the international market. If the score obtained is low, the firm must find a solution to increase the score.

## 2.4: Measurement of the Most Strategic Entry Location or Continent for Entry into International Markets

The following equations are derived from the SEM analysis used in the development of the MEDIF system;

$$\text{ASEAN} = 0.136 + 0.129TC_2 + 0.173FSP_5 + 0.114PSF_4 + 0.074FRC_3 + 0.232H_1 + 0.025M_7$$

$$\text{European} = 0.213 + 0.032TC_4 + 0.195FSP_7 + 0.116PSF_2 + 0.210FRC_3 + 0.030H_1 + 0.390M_1$$

$$\text{Australia\&Oceania} = 0.255 + 0.049TC_8 + 0.069FSP_8 + 0.138PSF_1 + 0.249FRC_3 + 0.422H_3 + 0.357M_1$$

$$\text{Asia} = 0.213 + 0.156TC_2 + 0.328FSP_8 + 0.085PSF_3 + 0.130FRC_2 + 0.341H_3 + 0.027M_1$$

$$\text{African} = 0.325 + 0.483TC_6 + 0.087FSP_2 + 0.206PSF_2 + 0.054FRC_1 + 0.168H_4 + 0.208M_4$$

$$\text{United States} = 0.260 + 0.300\text{TC8} + 0.151\text{FSP8} + 0.276\text{PSF6} + 0.079\text{FRC3} + 0.165\text{H3} + 0.206\text{M4}$$

### 3. RESULTS AND DISCUSSION

Top managers of the firm need to decide whether to 'proceed' or 'not proceed' to the international market by considering the sequence of the most strategic entry decisions according to ranking and level of effectiveness of multi-entry decisions made in influencing firms to sustain in the global marketplace as tabulated in **Figure 3**.

Entry Location(EL)	Entry mode(EM)		Entry timing (ET)	Score	Grade	Rank of best entry decision	The effectiveness of entry decision
Asia	Mobile	BOT/JVP	LF	92.72	A	3	The firm can extremely sustain
ASEAN	Mobile	JVP	LF	92.46	A	4	The firm can extremely sustain
Europe	Mobile	JVP	LF	98.12	A	1	The firm can extremely sustain
AUSTRALIA	Mobile	JVP	EF	85.53	A	6	The firm can extremely sustain
Africa	Mobile	SVP/BOT	LF	93.77	A	2	The firm can extremely sustain
The United States	Mobile	SVP	LF	91.98	A	5	The firm can extremely sustain

**Figure 3. The final multi-entry decision integration to the international market**

As a result of the measurement analysis in **Figure 5**, the most important options that firms need to consider are to countries located in continental Europe in order of ranking and effectiveness of entry decision, followed by Africa, Asia, ASEAN, United States; and Australia and Oceania.

### 4. CONTRIBUTION AND USEFULNESS/COMMERCIALISATION

This MEDIF system is the first to be developed in line with government policy in The Construction 4.0 Strategic Plan (2021-2025) to develop a model in helping construction firms to enter the international market. This system is important when there are no models or systems developed in Malaysia that are emphasized in The Construction 4.0 Strategic Plan (2021-2025). This system is very important in helping construction firms make strategic entry decisions to go to the international market. This MEDIF system is unique as it combines multi-entry decision (entry timing, entry mode, and entry location) as well as factors that allow the firm to sustain in the international market. The MEDIF system has received cooperation from Construction Industry Development Board (CIDB) Malaysia to attract Malaysian construction firms to foreign markets.

### 5. CONCLUSION

The MEDIF system development is in line with the Malaysian government's efforts to improve the country's economy through the increase of construction projects in the international market. The MEDIF system assists firms in making the most strategic entry decisions in the selection of entry location, entry mode, and entry timing into the global market. The system can identify risks if firms make erroneous entry decisions. Firms can identify the firm's potential to succeed in the global market based on the scores obtained. The findings of the MEDIF system show that the most strategic entry location for new entrants in Europe by using the joint venture project (JVP) to ensure the firm sustain in the international market.

### ACKNOWLEDGEMENT

The authors gratefully acknowledge the Ministry of Higher Education Malaysia for providing the Fundamental Research Grant Scheme (600-IRMI/FRGS 5/3 (025/2019) and also to the School of Civil Engineering, College of Engineering, UiTM Shah Alam for their supports in carrying out this research. We would like to thank all managers who have participated in this study.

## REFERENCES

- Bido, D., da Silva., and Ringle, C.(2014). Structural Equation Modeling with the Smartpls. Brazillian Journal of Marketing, 13 (2).
- Coombs, C. H. (1953)."Theory and Methods of Social Measurement", in *Research Methods in the Behavioral Sciences*, eds.
- Dillon, W. R., Madden, T. S and Firtle, N. H. (1994), *Marketing Research in a Marketing Environment*, 3rd edition, Irwin, p. 298.
- Fornell, C., and Larcker, D.F. (1981). Evaluating SEM models with unobservable variables and measurement error. *J. Market Res* 18(1):39–50
- Lozano-Torró, A., García-Segura, T., Montalbán-Domingo, L. and Pellicer, E. (2019). Risk Management as a Success Factor in the International Activity of Spanish Engineering. *Administrative Science Journal*, 9, 15. doi:10.3390/admsci9010015
- Ramayah, T., Mohamad, O., Jaafar, M., Abdul-Aziz, A., and Wong, S.S. (2010). Internationalisation of Malaysian contractors. *Journal of International Business and Entrepreneurship Development*, 5(1), 18–27.
- Thurstone, L. L., (1927), "A Law of Comparative Judgment", *Psychological Review* 34, pp. 273-86.