# The Impacts of FOREX Fluctuations on International Construction Projects

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Abstract. The international construction project is a most valuable market project and many of the contractor would like to be participate. This is because they are tricked with the exchange rate (money) and directly attracted with the profit they will gain after the project is completed without notice that they will be affected with the FOREX's fluctuation and give them complexity on handling the project further. In additions, nowadays many new vendors try their luck without make a good judgement on the risk. So, the objective of this study is to identify the impacts of FOREX fluctuations on those perspectives at international level. This study also uses quantitative method through questionnaire survey that distributed randomly, and the result obtained were from top management and non-top management in construction hierarchy with different level of experiences. The collected data analysed by using two methods which are Statistical Package for Social Science (SPSS) and Microsoft Excel. From SPSS software, it processed the regression analysis for impacts of FOREX data in the questionnaire. For second method then, the Relative Importance Index being applied to run the data for capability and mitigation actions in determining the ranking of priority. As overall, the impacts of FOREX fluctuation on international construction project has been identified regarding to three mechanisms which are business management, technical and financial. These outputs are useful as a guideline for international construction project companies when they are venturing this challenging market regarding to quality, period and cost of the project.

#### Introduction

Currency FOREX fluctuations are a natural outcome of the fluctuation of exchange rate system that is the norm for most major economies. The exchange rate of one currency versus the other is influenced by numerous fundamental and technical factors that is related indirectly without our notice. These include relative supply and demand of the two currencies, economic performance, outlook for inflation, interest rate differentials, capital flows, technical support and resistance levels, and so on. As these factors are generally in a state of perpetual flux, currency values fluctuate from one moment to the next. But although a currency's level is largely supposed to be determined by the underlying economy, the tables are often turned, as huge movements in a currency can dictate the economy's fortunes and indirectly will affect the industry involved and give huge impact to company that is related most to international business.

Implementing construction projects in a foreign country is a high-risk business activity Zhang (2011). International construction projects normally involve a high level of risks because of the differences in

construction practices, working conditions, cultures, and political, legal, and economic conditions between domestic and overseas markets Bu-Qammaz et al. (2009). Foreign exchange rate (FOREX) risk is considered as significant challenge in the international construction business, as business is strongly affected by these fluctuations Han et al. (2010) and Kim et al. (2009).

The objective of this research is to identify the impacts of FOREX fluctuations to international construction project based on business management, technical and financial perspectives.

## **Research Methodology**

The quantitative method is carrying out to determine the impacts of FOREX fluctuations on international business performance. Quantitative methods aim to classify features, count them, and create statistical models to test hypotheses and explain observations regard to data gained. According to Chang (2010), basic quantitative descriptions can provide a valuable baseline background to help identify issues for a more in-depth, qualitative or quantitative study for a event. Hence, this methodology is suitable because the results and outcomes meet the objective of the study.

In this study, the flowchart containing problem statement and objective, literature review, questionnaire, pilot study, collecting data, analysis and discussion, conclusion and summary and presentation were used to illustrate the steps of the research methodology. From this stage, it can determine how to start the research, identify the problems, how to collect data and analyse the data, make the right recommendation and conclusion.

## 1.1. Methodology Flowchart

Shown below the flow of the methodology process applied in this study. It is indicating the earliest phase until final phase of the research.

The sample sizes for this study are 300 relevance respondents in construction firms especially associated their project at international level. The criteria of the respondent must base on their position in the companies which are in top management group. The top management group consist of contractor, supervisor, general manager, deputy general manager, manager, assistant manager and who are involved in international construction project related to the engineering fields in top level. The reason for this action is because the objectives of this study only can be answer by who are exposed to impacts of FOREX fluctuations in the real field at international level. Only their experiences, knowledges and past actions valid to answer the questions and successfully the original idea to establish a propose framework regarding to this issue. Presence of the surrounding stakeholders, i.e. top management, project management, project champion, software vendor and consultants were identified as the root causes driving performance Akkermans and van Helden (2002) and Boonstra (2011). Furthermore, the selected company a focus in the Selangor and Kuala Lumpur areas since most of the company related to international project are located here. In addition, the relevance respondent compulsorily needs to have experiences in executing the construction project in international. If the knowledge and exposer of FOREX issues is non or low, the data cannot be relying on that respondent.

By referring this table, we can identify the estimate sample size for this study based on the population size. This table sources by Krejcie, R. and Morgan D. (1970) in determining sample size for research activities, (Educational and Psychological Measurement, 30, 607-610). For this study we can see clearly that with the number of population size of 300 the estimated sample size should be obtain is 169 respondents.



Figure 2.1 Flow Chart

## 1.2. Questionnaire Design

The questionnaire is an effective way to obtain a data from respondents. Othman (2014) quantified customer loyalty and satisfaction drivers by conducting an international survey questionnaire and meanwhile he identified satisfaction as a mediating variable in articulating employee loyalty. According to Saunders et al. (2009), questionnaires tend to be used for explanatory research where cause-effect relationships can be examined, or for descriptive studies which involve attitudes and opinions to enable the researcher to investigate the variability in different phenomena. This indicated that questionnaire is reliable way to getting an information. The strategy in questionnaire distribution

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most museties laituations	N	5	N	5	N	5
most practical situations	10	10	220	140	1200	291
Source: Krejcie, R. & Morgan D. (1970).	15	14	230	144	1300	297
Datamining Sompla Siza for Research	20	19	240	148	1400	302
Determining Sumple Size for Research	25	24	250	152	1500	306
Activities, Educational and Psychological	30	28	260	155	1600	310
Measurement, 30, 607-610,	35	32	270	159	1700	313
	40	36	280	162	1800	317
	45	40	290	165	1900	320
Where:	50	44	300	169	2000	322
	55	48	320	175	2200	327
N = Population Size	60	52	340	181	2400	331
S - Sampla Siza	65	56	360	186	2600	335
5 – Sumple Size	70	59	380	191	2800	338
	75	63	400	196	3000	341
	80	66	420	201	3500	346
	85	70	440	205	4000	351
	90	73	460	210	4500	354
	95	76	480	214	5000	357
	100	80	500	217	6000	361
	110	86	550	226	7000	364
	120	92	600	234	8000	367
	130	97	650	242	9000	368
	140	103	700	248	10000	370
	150	108	750	254	15000	37
	160	113	800	260	20000	37
	170	118	850	265	30000	379
	180	123	900	269	40000	380
	190	127	950	274	50000	38
	200	132	1000	278	75000	38.
	210	136	1100	285	1000000	38

is distribute randomly to relevance respondents in construction firm especially had experiences in construction project at international level possibly at top management level. About 300 questionnaires survey will distribute to the respondents on the selected areas which are Selangor and Kuala Lumpur because of the arising development of construction industry at that areas. The required data are related to the project whether completed or on-going based on CIDB data. The respondents of the survey questionnaires included contractor, supervisor, general manager, deputy general manager, manager, assistant manager and who are involved in international construction project related to the engineering fields in top management. Stated by Akkermans and van Helden (2002) and Boonstra (2011) presence of the surrounding stakeholders, i.e. top management, project management, project champion, software vendor and consultants were identified as the root causes driving performance. They are considered to be the most suitable respondents for the research to explain the decision-making structure and strategic posture of their organisations Pertusa-Ortega et al. (2010).

Next, the respondents need to choose the given answer by tick or circle at the correct one. The questions must have related and present the affect and effect of the FOREX fluctuation in international construction project and actions that can mitigate the impacts by considering the possible capabilities and by reviewing relevant literature. This also had been admitted by Govindarajan (1989) and Nandakumar et al. (2010), they stated that the development of the questionnaire for the quantitative survey started with the review of relevant literature on competitive strategies, decision-making styles and organisational performance to identify the variables, and this was refined by researchers in construction and the built environment to evaluate the content validity. This questionnaire will be using the Likert Scale. Likert scales fall within the ordinal level of measurement that is, the response categories have a rank order, but the intervals between values cannot be presumed equal, although, as Blaikie (2004) points out. This method helps in describing the quantitative value to qualitative value efficiently and to make it amenable to statistical analysis. Generally, the method being used is to ease the researcher to analyse the data efficiently in the last phase of survey. The Likert Scale answers are rank as below:

- a) 1 for STRONGLY DISAGREE
- b) 2 for DISAGREE
- c) 3 for QUITE AGREE
- d) 4 for MUCH AGREE
- e) 5 for STRONGLY AGREE.

## 1.3. Pilot Study

Pilot study can be translated as a small preliminary study that being conducted to examine and evaluate the gaps in the questionnaire so some adjustment on the design can be done. This is very essential because every error or misunderstanding on the question that being used in real survey on selected population will cause invalid in data and the objective will be unachievable. The pilot study also being conducted in advance to obtain expecting result from the respondent in full-scale study. The expecting outcome then being used to forecast the future outcome from the population size. It allows the researcher to have initial hypotheses about the study.

For this study, the pilot study being conducted to 110 relevance respondents in construction firms on selected areas especially someone that have experiences in international level at top management. The pilot study being conducted to a lot respondent because having a difficulty to get cooperation with related companies. So, unfortunately the result of this pilot study is just getting 3 answered questionnaire from 2 different company with each of the respondent have different position in their company and all the respondent come from top management background.

## Validity Test

Validity test being used in quantitative study in order to measure the accuracy concept in the research. It's very important to consider validity of the data collection tool when conducting research. This is because misleading of data collection tool will be misleading in achieving research objectives. Thus, denying the contribution of this research to the international construction players especially new vendor that attracted to international market. For this test, Cronbach's  $\alpha$  is commonly used to determine the internal consistency of the instrument. The result of Cronbach's  $\alpha$  usually in between 0 to 1. An acceptable score is one that is 0.7 and higher.

## 1.4. Method of Data Analysis

This study will be conducted to respondents who are involved in civil engineering field, to testing the questionnaires quality and to identify the feedback from the questionnaire either achieve the goals or not at the pilot study level. If the feedback gives a positive respond. So, after doing the pilot study, the questionnaires are distributed to selected population to get actual result for this study. The data gained will be analysing to get the exact output related to the study. So, data analysis is important part in achieving the objectives and in another meaning content analysis is 'a technique for gathering data, it involves codifying qualitative and quantitative information into pre-defined categories in order to derive patterns in the presentation and reporting of information' Guthrie et al. (2004, p. 287). So, for this study there are few effective methods applied to analyse the data in effective and efficient way.

## SPSS (Statistical Packages for Social Science)

To assist in planning and carry out strategies that will improve the outcome of this study, the Statistical Packages for Social Science (SPSS) software being applied to predict the collective data and analyse it. SPSS enables qualitative data to be organised, closely monitored, easily coded, retrieved through direct searching and interrogated to build propositions and theories, due to the systematic recording of the information and data Saunders et al. (2009). This software is a comprehensive system for analysing data and aiding the data interpretation process more easily Allen and Bennett (2010). By implementing this software, the data will enable transferred automatically from spread sheet to graphic to present the data in more attractive manner. This methodology is useful in investigating the combination of conditions and pathways that lead to a performance (outcome), and this is particularly relevant in the project-based construction field because such projects frequently involve complex relationships among the variables of interest Jordan et al. (2011). The data gathering from analysing process will know as raw data and it will use as our reference.

## **Regression Analysis**

Regression well known as method being use in quantitative method in a research and being applied associated to analyse and modelling number of variables when there is relationship consists of dependent variable that the variable can stand by itself and one or more independent variable that the variable depending on dependent variable. In easy way the regression analysis is to examine the relationship nature of both variables in an effective way. In this analysis the SPSS software being using to ease the process of analysing the variables in systematic way. It is allowed specify multiple models in a single regression command. In this study the regression method will be applied on the questionnaire on the Part C which is related to impacts of FOREX fluctuation to the international construction project as dependent variable based on three perspectives which is business management, technical and financial that will be independent variable. Thus, the regression analysis is being applied

to get better understanding which among independent variables is quite correlated to dependent variables and to test those relationship.

Regression model, basically, specifies the relation of dependent variable (Y) to a function combination of independent variables (X) and unknown parameters ( $\beta$ )

 $Y \approx f(X,\beta)$ 

Regression equation can be used to predict the values of 'y', if the value of 'x' is given, and both 'y' and 'x' are the two sets of measures of a sample size of 'n'. The formulae for regression equation would be

$$y^* = a + bx$$

Where,

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$
$$a = \frac{\sum y - b \sum x}{n}$$



### Microsoft Excel

The raw data from the questionnaire on the Part D and Part E will be key-in to Microsoft Excel by using Relative Importance Index (RII) equation. The frequency of each question been determined from Likert scale rating, the formula of Relative Importance Index (RII) then key-in to the Microsoft Excel, the value of Relative Importance Index (RII) can be determined and it will ease to rank the variables on Part D which the mitigation action to mitigate the FOREX risk and Part E which is related to the capabilities required that need to be enhance by company itself. This ranking system actually helps to determine the elements in each variable that need to be emphasize strongly in FOREX issues. Lastly the data will be present in the chart by Excel assist to illustrate it output more clearly.

#### **Relative Importance Index (RII)**

The relative importance index is the method in arranging the variables according to their relative prior in ranking. By knowing the ranking, it actually leads to knowing the relationship of the variables to the study. To knowing and rate numerous causes of project become failure the RII is widely adopted metric in AEC risk management in the literature El-Sayegh (2008) and Sambasivan and Wen Soon (2007) Odeyinka et al. (2006). According to those scholars, have been mentioned in their study that RII being adopted to knowing how relevance the impacts of numerous risks to project metrics such as cost, schedule and performance. The RII method being used by Gunduz et al. (2013) in their research on determining the essential relative causes of delay in construction project in Turkey. Thus, it shown that the RII method is relevance to use in determining the significant mitigation actions and capabilities in this study

Relative Importance Index = 
$$\frac{\sum w}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where *w* is the weighting given to each factor by the respondent, ranging from 1 to 5. For example,  $n_1$  = number of respondents for Little Important,  $n_2$  = number of respondents for Some Important,  $n_3$  = number of respondents for Quite Important,  $n_4$  = number of respondents for Very Important). *A* is the highest weight (i.e. 5 in the study) and N is the total number of respondents. The relative importance index ranges from 0 to 1 (Tam and Le, 2006).

#### Figure 2.3 Relative Importance Index Equation

#### **Result and discussion**

From the Figure 3.2 above we can say that 11.2% of the respondents do not agreed that companies will be affected with the impacts of FOREX meanwhile 88.8% respondents have contradicted answers with minority opinions. But in holistically majority of those company agreed that their company affected by FOREX fluctuations when conduction their project at international level. This output shown that it is align with statement stated by Dikmen et al. (2007) and Han et al. (2010) and Kim et al. (2009) and Ling and Hoi (2006) in their previous research which is foreign exchange rate (FOREX) risk is considered as significant challenge in the international construction business, as business is strongly affected by these fluctuations. Thus, it is clearly that FOREX play a vital role in international market. So, a well preparation is necessarily for company that tends to venture international market.



Figure 3.2 Impacts of FOREX toward Malaysian company

## 1.5. FOREX fluctuations at company level

The question focused on the effect of FOREX fluctuations at the company level. It is purposely asked to identify whether the FOREX issues can influence the company abilities and performance or not. For instance, foreign exchange exposure, economic exposure may be visualized as the overall impact of foreign exchange rate fluctuations on stockholders' wealth or i.e. the market value of the common stock Menguturk (1994) and Karadagli (2015). In this study 107 respondents have shown different opinions depend on their wisdom and knowledge during executing the project in international level. The result being interpreted in the bar chart below:



Figure 3.3 FOREX effect the company level

Most of the respondent give a positive feedback on the relationship between FOREX fluctuations and it impacts at the company level. The rest just not agreed with the justification. This is because each company has their own strength and ability to overcome the problems occurred. More stable the company more ease the company to cater the problems. That's why there is a contradiction answer in this question because their performance at company level not affected by the FOREX fluctuations. But majority of the respondent agreed with the statement that the FOREX fluctuations effect their company level. So, it is clearly show that FOREX fluctuations give impacts at the company level which is align with the statement stated by Menguturk (1994) and Karadagli (2015).

## 1.6. FOREX fluctuations at project level

The last question in the company background in this section is related to company performance at the project level during conducting the project abroad when the FOREX fluctuations occurred. According to Shane et al. (2009) and Ling and Hoang (2010) and Zhi (1995) in their observations hierarchy for determination of risk in overseas project can be categories to four stage which are country, industry, firm and project stage. From the data gathering in the full-scale study, it shows the same result as the previous question as figure below:



Figure 3.4 FOREX effect project level

Based on the figure 3.4 we can interpret that 74 out of 107 respondents agreed that their company are affected by the FOREX fluctuations at their project level. Usually the company will involve in high level of risk on their project if related with FOREX conflict. This higher risk causes larger project costs and losses in time compared with domestic projects Xiang et al. (2012). It is proved that FOREX fluctuations will give bad influence on project level. But in another opinion from the rest of the respondent in this study is contradict with the figure shown and justification from Xiang et al in their previous research. This is because at project level if the management can wisely tackle the problem properly it will not affect any progress of the project. This ideology being applied by those respondents. Thus, it can be concluded that majority of the respondent give a positive feedback on the justification that FOREX fluctuations effect company at the project level.

## 1.7. FOREX fluctuation toward international construction projects

Based on result obtained from section C we can determine the dependency those three perspectives which are business management, technical and financial toward the impact of FOREX fluctuations to the international construction project by applying regression analysis in SPSS software. Meanwhile for section D and section E, we can tabulate all the information in the tabulate data in detail arrangement based on the frequency of answer given by the respondents in the questionnaire by applying Relative Importance Index in Microsoft excel. The purpose of this action is to see clearly the parameters that the companies need to focus on in order to sustain in the international construction business. Besides, the data were rank and analyse directly from the real industry's knowledge, wisdom and experiences during their past task in international level. Thus, the data is valid to be consider as lesson and catalyst for other players in construction industry to make improvement. It is an advantage even though it is just a research.

# Impacts of FOREX fluctuations towards international construction projects based on business management, technical and financial perspectives (Top management level)

Table 3.2 illustrate the output of this study after running the SPSS software under linear regression analysis method. The data obtained in the table are the result from 44 respondents that identified categorize in top management level about the impacts of FOREX fluctuation that they figured will be the main factors that influence the international construction project in the terms of business management, technical and financial perspectives. This method being undergo because it is crucial in order to examine whether each set of independent variables is separate for each subpart of the structural model Hair et al. (2014). In addition, by applying this method we will examine the dependency of independent variables toward dependent variable. Based on the research made by Hair et al. (2014) from his previous study he found out that the analogous to the assessment of formative measurement models must satisfy tolerance levels below 0.20 or lower with the value of VIF above 5.0.

The summary tables indicated that the values of R which is representing the simple correlations shows a quite high degree of correlation at 0.641 which is approach to 1 meanwhile the values of  $R^2$  indicates 41.1% of total variation in the dependant variable which is impacts of FOREX fluctuation can be explained by the independent variables which is technical capability. This shows that the technical capability can influence the impacts of FOREX fluctuation and they have a quite relationship between those dependant and independent variable during executing international construction projects.

Second tabulated data which is ANOVA table shown that the dependant variable which is impacts of FOREX fluctuation was predicted well by the regression model. The regression model statically significantly predicts the outcome variable which the independent variable will has dependency relationship with dependant variable. It can be shown and proved that the data is good fit to apply through the come-out of significant column 'Sig." with value of P is 0.000 which is less than 0.05. Have been mentioned by Tukur (2008) in his research to quantify the strength of evidence against null hypothesis P < 0.05 (5% significance) is as a standard level for concluding that there is evidence against the hypothesis tested and the regression model valid to use. Other than that, for the third table, it has actually informed us that the technical capability contributes statically significantly to the regression model by looking at its significant column value. This coefficient table also provide information to forecast the in fluency of impacts of FOREX fluctuation through technical capability. It can be interpreted through regression equation as:

Table 3.2 Linear regression analysis (Top management

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.641 <sup>a</sup>	.411	.400	.52207

a. Predictors: (Constant), Ave\_Technical

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Mode	əl	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.884	1	9.884	36.266	.000 <sup>b</sup>
	Residual	14.173	52	.273		
	Total	24.057	53			

a. Dependent Variable: Mean\_Impact

b. Predictors: (Constant), Ave\_Technical

#### Coefficients<sup>a</sup>

		Unstandardize	d Coefficients	Standardized Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	1.553	.351		4.426	.000
	Ave_Technical	.537	.089	.641	6.022	.000

a. Dependent Variable: Mean\_Impact

#### Excluded Variables<sup>a</sup>

					Partial	Collinearity Statistics
Model		Beta In	t	Sig.	Correlation	Tolerance
1	Ave_Management	079 <sup>b</sup>	433	.667	061	.348
	Ave_Financial	.168 <sup>b</sup>	.847	.401	.118	.291

a. Dependent Variable: Mean\_Impact

b. Predictors in the Model: (Constant), Ave\_Technical

## Impacts of FOREX fluctuation = 1.553 + 0.537 (technical capability)

Finally, what can be conclude at the last table visually is the impacts of FOREX fluctuation as dependent variable have a weak relationship with business management and financial capability as independent variables, this was caused by the expelled relay shown between those variables and somehow, it's had strong dependency relationship with technical capability. It can be proved through result at Table 4.5.1 that shown strong agreed that the dependency of impacts of FOREX toward technical capability with synchronize P value 0.000 that less than 0.05 and regression equation established through that correlation.

Thus, from this research we can identified that the enhancement of technical capability among construction industry player will help them in countering the impacts of FOREX fluctuation. Dikmen et al. (2005) mentioned the different sources of competitive advantage and identified technical capability as the top priority for construction firm. This capability is referred to as the ability of a company to perform a variety of direct activities in construction by defining the type, size, and complexity for completing projects Warszawski (1996) and Wethyavivorn (2009). But the slightest degree of chances needs to be considered and be an enhance in order to fill the small gap that maybe become a vast leakage in future if we neglected. This is because it is being supported by previous

scholar that mentioned to used resources in effective way and specialist in performing the project within time, cost and with good quality, the management capability is necessarily Ajibade (2006). The primary factor to choose the management ability is by arranging all the resources through a proper plan which is planning, organizing, leading and controlling to achieving the purpose of study Abiola (2000) and Jolly et al. (2016). As mentioned by Ozorhon et al. (2010) performance was also measured using multidimensional measures at the financial and operational levels. This finding is parallel with previous studies that revealed Vietnamese and Chinese contractors lagging behind their competitors due to weak financial capacity Zhao, Shen and Zuo (2009). Thus, its shown that those two capabilities need to be take concern too even though have low dependency relationship in mitigating impacts of FOREX fluctuations.

## 4.0 Conclusion

Based on the first objective of the research it can be concluded that the objectives and aims of this study are achieved successfully. The impacts of FOREX fluctuation on international construction project has been identified regarding to three mechanisms which are business management, technical and financial. There were 24 impacts of FOREX fluctuations to the international been identified and been categorize accordingly to their tendency of influence. Based on the figured impacts it will expose the risk and complexity of the FOREX fluctuation that truly correlated to each other. The correlation can be translated through their dependency that can be tested through regression analysis that functioned to determine the correlation between dependent variable and independent variable. In this case, those three perspectives be an independent variable that can stand alone without any support meanwhile for the impacts of FOREX fluctuation that classified as dependent variable it become contradict because its reliability on independent variables. Through SPSS and RII test the output come out with solution that technical mechanism had strong relationship with the impact of FOREX and had weak dependency on business management and financial mechanism. By knowing and identified these impacts, holistic overview on mitigation action need to be considered to tackles the issue of impacts of FOREX fluctuations based on 3 mechanism highlighted thus create a catalyst toward the next research objective.

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## References

Aabo, T., Høg, E., & Kuhn, J. (2010). Integrated foreign exchange risk management: The role of import in medium-sized manufacturing firms. Journal of Multinational Financial Management, 20(4–5), 235–250. https://doi.org/10.1016/j.mulfin.2010.08.002

Ahn, Y.-H., Holley, P., & Kang, J. S. (2009). Risk Management of Exchange Rates in International Construction. International Journal of Construction Education and Research, 5(1), 24–44. https://doi.org/10.1080/15578770902717550

Aje, O. I., Odusami, K. T., & Ogunsemi, D. R. (2009). The impact of contractors' management capability on cost and time performance of construction projects in Nigeria. Journal of Financial Management of Property and Construction, 14(2), 171–187. https://doi.org/10.1108/13664380910977619 Al-Momani, R., & Gharaibeh, M. R. (2008). Foreign exchange risk management practices by Jordanian nonfinancial firms. Journal of Derivatives & Hedge Funds, 14(3–4), 198–221. https://doi.org/10.1057/jdhf.2008.16

Allmark, P., & Machaczek, K. (2015). Financial capability, health and disability. BMC Public Health, 15(1), 243. https://doi.org/10.1186/s12889-015-1589-5

Amer, I. (2014). Modelling foreign exchange rate exposure. Journal of Economic and Administrative Sciences, 30(2), 96–120. https://doi.org/10.1108/JEAS-03-2013-0009

Amizan, M., & Mohamed, B. (2013). The Impacts of FOREX Fluctuations on Construction Business Performance : An Organisational Capabilities Perspective, (March 2016).

Arcelus, F. J., Gor, R., & Srinivasan, G. (2013). Foreign exchange transaction exposure in a newsvendor setting. European Journal of Operational Research, 227(3), 552–557. https://doi.org/10.1016/j.ejor.2012.10.014

Atkinson, A., McKay, S., Collard, S., & Kempson, E. (2007). Levels of financial capability in the UK: Results of a baseline survey. Public Money & Management, 27(1), 29–36. https://doi.org/10.1111/j.1467-9302.2007.00552.x

Awil, A., & Aziz, A. R. A. (2012). International Markets: Malaysian Construction Contractors and the Stage Theory. Australasian Journal of Construction Economics and Building, 2(1), 94–106. https://doi.org/10.5130/ajceb.v2i1.2890

Azcona, N. (2017). Non-Traded Goods and Real Exchange Rate Fluctuations: A Structural VAR Analysis. International Advances in Economic Research, 23(2), 137–148. https://doi.org/10.1007/s11294-017-9635-y

Bhanugopan, R., Wang, Y., Lockhart, P., & Farrell, M. (2017). Managerial skills shortages and the impending effects of organizational characteristics. Personnel Review, 46(8), 1689–1716. https://doi.org/10.1108/PR-04-2016-0093

Bhargava, V., & Brooks, R. (2002). Exploration of the role of expectations in foreign exchange risk management. Journal of Multinational Financial Management, 12(2), 171–189. https://doi.org/10.1016/S1042-444X(01)00048-2

Central, P. (1995). Cash & amp ; foreign exchange management practices Chinese state e.

Che Maznah, M. I., Hamidah, M. S., & Preece, C. N. (2015). Determining Significant Factors Influencing Malaysian Construction Business Performance in International Markets. Journal of Construction in Developing Countries, 20(2), 1–23.

Chen, C., Asce, A. M., Wang, Q., Martek, I., & Li, H. (2014). International Market Selection Model for Large Chinese Contractors, 142(3), 1–11. https://doi.org/10.1061/(ASCE)CO.1943-7862.0001122.

Chiang, Y.-C., & Lin, H.-J. (2005). The Use of Foreign Currency Derivatives and Foreign-Denominated Debts to Reduce Exposure to Exchange Rate Fluctuations. International Journal of Management, 22(4), 598–604. Retrieved from http://search.ebscohost.com/login.aspx?direct=tr ue&db=bth&AN=19780587&site=ehost-live Chileshe, N., & Boadua Yirenkyi-Fianko, A. (2012).

An evaluation of risk factors impacting construction projects in Ghana. Journal of Engineering, Design and Technology, 10(3), 306–329. https://doi.org/10.1108/17260531211274693

Choi, J. J., & Jiang, C. (2009). Does multinationality matter? Implications of operational hedging for the exchange risk exposure. Journal of Banking and Finance, 33(11), 1973–1982. https://doi.org/10.1016/j.jbankfin.2009.04.014

Cleary, P., & Quinn, M. (2016). Intellectual capital and business performance. Journal of Intellectual Capital, 17(2), 255–278. https://doi.org/10.1108/JIC-06-2015-0058

Dhargalkar, A. (2015). Common Challenges To Hedging Foreign, (August).

EEden, L., Dai, L., & Li, D. (2010). International Business, International Management, and International Strategy. International Studies of Management and Organization, 40(4), 54–68. https://doi.org/10.2753/IMO0020-8825400405

Ehrlich, M., & Tiong, R. (2012). Improving the Assessment of Economic Foreign Exchange Exposure in Public–Private Partnership Infrastructure Projects. Journal of Infrastructure Systems, 18(June), 57–67. https://doi.org/10.1061/(ASCE)IS.1943-555X.0000069.

Ehrlich, M., Woodward, D., & Tiong, R. (2012). A state-of-practice survey on managing FX exposure in project companies, construction companies and SMEs. Journal of Financial Management of Property and Construction, 17(1), 29–48. https://doi.org/10.1108/13664381211211037

Eybpoosh, M., Dikmen, I., & Birgonul, M. T. (2011). Identification of risk paths in international construction projects using structural equation modeling. Journal of Construction ..., 137(12), 1164–1175. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000382.

Fonseka, M. M., Tian, G., & Li, L. (2014). Impact of financial capability on firms' competitiveness and sustainability. Chinese Management Studies, 8(4), 593–623. https://doi.org/10.1108/CMS-09-2011-0066

Gautier, A., Granot, F., & Levi, M. (2002). Alternative foreign exchange management protocols: An application of sensitivity analysis.

Journal of Multinational Financial Management, 12(1), 1–19. https://doi.org/10.1016/S1042-444X(01)00023-8

Grant, K., Edgar, D., Sukumar, A., & Meyer, M. (2014). Risky business: Perceptions of e-business risk by UK small and medium sized enterprises (SMEs). International Journal of Information Management, 34(2), 99–122. https://doi.org/10.1016/j.ijinfomgt.2013.11.001

Grossmann, A., Paul, C., & Simpson, M. W. (2017). The impact of exchange rate deviations from relative PPP equilibrium on the U.S. demand for foreign equities. Journal of International Money and Finance, 77, 57–76. https://doi.org/10.1016/j.jimonfin.2017.06.005

Hakkarainen, A., Kasanen, E., & Puttonen, V. (1997). Foreign exchange risk management: Evidence from Finland. Managerial Finance, 23(7), 25–44. https://doi.org/10.1108/eb018633

Hoelzl, E., & Kapteyn, A. (2011). Financial capability. Journal of Economic Psychology, 32(4), 543–545. https://doi.org/10.1016/j.joep.2011.04.005

Hutson, E., & Laing, E. (2014). Foreign exchange exposure and multinationality. Journal of Banking and Finance, 43(1), 97–113. https://doi.org/10.1016/j.jbankfin.2014.03.002

Isa, C. M. M., Saman, H. M., & Nasir, S. R. M. (2014). Specific-factors Influencing Market Selection Decision by Malaysian Construction Firms into International Market. Procedia -Social and Behavioral Sciences, 129(2002), 4–10. https://doi.org/10.1016/j.sbspro.2014.03.641

Janabi, M. a. M. Al. (2006). Foreign-exchange trading risk management with value at risk: Case analysis of the Moroccan market. The Journal of Risk Finance, 7(3), 273–291. https://doi.org/10.1108/15265940610664951

Jean, R. J. B., Sinkovics, R. R., Kim, D., & Lew, Y. K. (2015). Drivers and performance implications of international key account management capability. International Business Review, 24(4), 543–555. https://doi.org/10.1016/j.ibusrev.2014.10.011

Jolly, B., Isa, F., Othman, S. N., Afiq, M., & Ahmdon, S. (2016). The Influence of Management Capability , Marketing Capability and Competitive Advantage on Malaysian Construction Project Performance. International Review of Management and Marketing, 6(S8), 142–148.

Kapila, P., & Hendrickson, C. (2001). Exchange Rate Risk Management in International Construction Ventures. Journal of Management in Engineering, 17(4), 186–191. https://doi.org/10.1061/(ASCE)0742-597X(2001)17:4(186)

Karadagli, E. C. (2015). Economic exposure of emerging market firms. Actual Problems of Economics, 166(4), 67–74.

Kim, H., & Hur, S. (2009). Effect of foreign exchange management on firm performance using genetic algorithm and VaR. Expert Systems with Applications, 36(4), 8134–8142. https://doi.org/10.1016/j.eswa.2008.10.036

Kim, S., & Lee, J. (2014). International macroeconomic fluctuations. Macroeconomic Dynamics, 19(7), 1509–1539. https://doi.org/10.1017/S1365100513000916

Kubo, K. (2014). Foreign Exchange Market Reform in Myanmar: Achievements and Challenges. Southeast Asian Economies, 31(2), 210. https://doi.org/10.1355/ae31-2d

Lantz, B. (2013). Equidistance of Likert-Type Scales and Validation of Inferential Methods Using Experiments and Simulations. Electronic Journal of Business Research Methods, 11(1), 16–28. https://doi.org/10.1111/j.1365-2929.2004.02012.x

Leung, D., & Yuen, T. (2007). Labour market adjustments to exchange rate fluctuations: Evidence from Canadian manufacturing industries. Open Economies Review, 18(2), 177–189. https://doi.org/10.1007/s11079-007-9007-y

Liu, J., Zhao, X., & Yan, P. (2016). Risk Paths in International Construction Projects : Case Study from Chinese Contractors. Journal of Construction Engineering and Management, 142(Nbsc), 1–11. https://doi.org/10.1061/(ASCE)CO.1943-7862.0001116. Lyons, R. K. (2001). New Perspective on FX Markets: Order-Flow Analysis. International Finance, 4(2), 303–320. https://doi.org/10.1111/1468-2362.00075

Mateev, M., & Andonov, K. (2016). Do cross-border and domestic bidding firms perform differently? New evidence from continental Europe and the UK. Research in International Business and Finance, 37, 327–349. https://doi.org/10.1016/j.ribaf.2016.01.001

Mbabazize, P. M., Daniel, T., Management, E., & Ekise, I. E. (2014). The Role Of Foreign Exchange Risk Management On Performance Management Of Exporting Firms In Developing Countries : A Case Study Of Uganda 's Exporting Firms, 2(3), 1–18.

Ming, H. C. (2017). Enterprise Risk Management with Foreign Exchange Exposures : Evidence from Taiwan Tourism Industry. Asian Economic and Financial Review, 7(9), 882–906. https://doi.org/10.18488/journal.aefr.2017.79.88 2.906

Mohamed, M. A. Bin, Teo, M., Kajewski, S., & Trigunarsyah, B. (2015). A Relationship of Managing Impacts of FOREX Fluctuations and Organizational Capabilities in Construction Business. Proceedings of the 6th International Conference on Construction Engineering and Project Management 11-14 October 2015, Busan, Korea, (October), 477–480.

Mun, K. C. (2007). Volatility and correlation in international stock markets and the role of exchange rate fluctuations. Journal of International Financial Markets, Institutions and Money, 17(1), 25–41. https://doi.org/10.1016/j.intfin.2005.08.006

Nair, J., Reddy, D. B. S., & Samuel, A. A. (2014). Conceptualizing Dimensions of Enterprise Resource Planning Systems Success. International Journal of Enterprise Information Systems, 10(1), 53–75. https://doi.org/10.4018/ijeis.2014010104

Oyewobi, L. O., Windapo, A. O., Rotimi, J. O. B., & Jimoh, R. A. (2016). Relationship between competitive strategy and construction organisation performance. Management Decision, 54(9), 2340–2366. https://doi.org/10.1108/MD-01-2016-0040

Pramborg, B. (2005). Foreign exchange risk management by Swedish and Korean nonfinancial firms: A comparative survey. Pacific Basin Finance Journal, 13(3), 343–366. https://doi.org/10.1016/j.pacfin.2004.04.003

Preece, C. N. (2014). Determining Significant Factors Influencing Malaysian Construction Business ' Performance in International Markets, 20(January), 1–23.

Rashid, A., & Waqar, S. M. (2017). Exchange rate fluctuations, firm size, and export behavior: an empirical investigation. Small Business Economics, 49(3), 609–625. https://doi.org/10.1007/s11187-017-9849-7

Sirpal, R. (2009). Methods of payment and foreign- exchange risk management among firms in Brunei Darussalam. The Journal of Risk Finance, 10(4), 377–392. https://doi.org/10.1108/15265940910980678

Song, S. (2015). Exchange rate challenges, flexible intra-firm adjustments, and subsidiary longevity. Journal of World Business, 50(1), 36–45.

Talebi, H., Hoang, W., & Gavrilova, M. L. (2014). Multi-scale foreign exchange rates ensemble for classification of trends in forex market. Procedia Computer Science, 29, 2065–2075. https://doi.org/10.1016/j.procs.2014.05.190 Trifonova, S. (2016). the Exchange Rate Arrangements-Government Finance Relationship and, 117–128.

Turner & Townsend. (2015). International Construction Market Survey 2015, 72. Retrieved from http://www.turnerandtownsend.com/media/1603/ international-construction-market-survey-2015.pdf

Valmohammadi, C., & Ahmadi, M. (2015). The impact of knowledge management practices on organizational performance. Journal of Enterprise Information Management, 28(1), 131–159. https://doi.org/10.1108/JEIM-09-2013-0066

Vereen, S. C., Sinacori, B., & Back, W. E. (2016). Critical risk considerations for cost estimating on international construction projects. International Journal of Construction Project Management, 8(2), 153–169.

Wang, S. Q., Dulaimi, M. F., & Aguria, M. Y. (2004). Risk management framework for construction projects in developing countries. Construction Management and Economics, 22(3), 237–252. https://doi.org/10.1080/0144619032000124689

Xiao, J. J., & O'Neill, B. (2016). Consumer financial education and financial capability. International Journal of Consumer Studies, 40(6), 712–721. https://doi.org/10.1111/ijcs.12285

Yazid, A. S., & Muda, M. S. (2006). The Role of Foreign Exchange Risk Management in Malaysia.

Yildirim, Z., & Ivrendi, M. (2016). Exchange rate fluctuations and macroeconomic performance. Journal of Economic Studies, 43(5), 678–698. https://doi.org/10.1108/JES-01-2015-0010

Zhang, D., Wang, Y., Wang, J., & Xu, W. (2013). Liquidity management of foreign exchange reserves in continuous time. Economic Modelling, 31(1), 138–142. https://doi.org/10.1016/j.econmod.2012.11.053

Zhu, W., Zeng, R., Li, X., Zhu, Y., & Zhang, Z. (2017). Managerial drivers of Chinese labour loyalty in international construction projects. Journal of Civil Engineering and Management, 23(8), 1109–1122. https://doi.org/10.3846/13923730.2017.1381644