Data Article

Dataset describing problem factors of partnering relationships in the Malaysian construction industry

Eric Yao\textsuperscript{a}, Yet-Mee Lim\textsuperscript{a}, Choi-Meng Leong\textsuperscript{a,∗}, Wai-Chow Lee\textsuperscript{b}, Chuen-Khee Pek\textsuperscript{c}

\textsuperscript{a}UCSI Graduate Business School, UCSI University, Malaysia  
\textsuperscript{b}Swiss Institute of Management and Innovation, Zug, Switzerland  
\textsuperscript{c}Faculty of Business and Management, UCSI University, Malaysia

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\textbf{Keywords:}  
Main contractor  
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\textbf{A B S T R A C T}

The dataset indicates the problem factors which may influence the development of partnering relationship between two key project parties - the main contractor and the subcontractor. A total of 53 problem factors were identified and were clustered into five categories. An online questionnaire was used to elicit the viewpoints of these key parties with regards to the extent to which the factors have an impact on the partnering relationship in the Malaysian construction industry. The target respondents were managers and engineers of various construction companies in Malaysia with the main contractors or subcontractors who have projects in Kuala Lumpur, Shanghai and New Delhi. Both descriptive and quantitative analysis approaches were used to present the data. Relative Importance Index method was used to determine the top challenges to building favourable partnering relationships; and Partial Least Squares Structural-Equation Modelling (PLS-SEM) analysis was conducted to examine the role played by each cluster of factors in explaining the quality of partnering relationship between the main contractors and subcontractors. This data set would assist practitioners to work on the major problem factors to improve the quality of partnering relationship between the key participants in

\* Corresponding author.  
\textit{E-mail address: leongcm@ucsiuniversity.edu.my} (C.-M. Leong).

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 Specifications table

| Subject | Supply Chain Management |
|---------|-------------------------|
| Specific subject area | Partnering Relationships in Construction Industry |
| Type of data | Excel File |
| | SmartPLS version 3.2.8. |
| How the data were acquired | The data was collected from the targeted respondents through online survey, which was distributed via online platform, namely Google Forms. Data were coded in Excel file format and processed via SmartPLS version 3.2.8. |
| Data format | Raw Analyzed Filtered |
| Description of data collection | The dataset were collected from managers and engineers of various construction companies in Malaysia with the main contractors or subcontractors who have projects in Kuala Lumpur, Shanghai and New Delhi using purposive sampling technique. Data were gathered from 144 respondents. We excluded the non-targeted respondents, leaving 124 respondents. |
| Data source location | City/Region: Kuala Lumpur, Shanghai, New Delhi |
| | Country: Malaysia, China, India |
| Data accessibility | Repository name: Mendeley Data |
| | Data identification number: 10.17632/hh8h42ypgr.2 |
| | Direct URL to data: https://data.mendeley.com/datasets/hh8h42yprg |

 Value of the data

- The data collected help to identify the problem factors leading to the adversarial relationships among the construction industry players as a result of conflicting interests in the supply chain.
- The data will assist practitioners to focus on the major problem factors which have existed between participants in the construction industry in their present and future projects.
- Specifically, the data indicate that problems related to the subcontractors (substandard quality of work and non-adherence to the conditions of the contract) negatively affect the main and subcontractor partnering relationship, which in turn, affects the performance of the construction projects.
- The data imply that careful selection of subcontractors is important. Stringent selection of subcontractors and close monitoring of their performance are critical in enhancing successful project implementation with the aim of maximizing profit and minimizing risks.
- The data will raise the awareness of the stakeholders such as Malaysian private construction companies (e.g. Gamuda Berhad, UEM Group Berhad etc.), Ministry of Works, various agencies under Ministry of Works such as The Construction Industry Development Board (CIDB) of Malaysia, and research committees (e.g. Universiti Malaya, Universiti Kebangsaan Malaysia etc.) with regards to the problem factors in the partnering relationships while undertaking projects overseas.
- Finally, the dataset serves as the baseline for academic researchers to compare and contrast the partnering problem factors which will be of great help to the industry pro-
fessionals in the domestic (e.g. Malaysian Institute of Property & Facility Managers, and The Building Management Association of Malaysia) and international construction business (e.g. International Facility Management Association).

Objective

Quality supply chain management practises are critical in the business industry [1,2,3]. However, few studies have examined the entirety of a partnered relationship from the perspectives of both sides especially in the construction industry. Furthermore, it is not addressed how problem elements and partnering relationships relate to the effective completion of building projects. The adoption of partnership relationships in supply chain management has been hampered by several discrepancies despite practitioners’ realisation that these relationships must be long-lasting and mutually beneficial. These inconsistencies are caused by a number of participant-related issues. The dataset aims to reveal the participant-related issues in the construction industry.

1. Data description

The dataset [4] comprises of the problem factors leading to conflicts between two parties in the construction industry, specifically the problem factors impeding the development of partnering relationships. Fifty-three (53) problem factors were identified from the literature and were grouped into five categories: (1) factors related to the project owner, (2) factors related to the main contractor, (3) factors related to the subcontractor, (4) factors related to the consultant, and (5) factors related to the external environment. In addition, the dataset also presents the relationship indicator between contractor and subcontractor, which reflects the level of partnering or quality relationship between main contractor and subcontractor. Data were coded in Excel file format and processed via SmartPLS version 3.2.8. Table 1 presents the 53 problem factors by category as well as the relationship indicator. Pilot testing was also conducted and therefore MC21 and PO7 were excluded from the questionnaire for final data collection due to the low loading values. The data is described and tabulated from Tables 2 to 6.

Table 2 presents the profile of the respondents, which comprises the type of project, types of project owners, role of respondent, working experiences in construction sector, country of project located and project budget. Table 3 shows the top 10 problem factors relating to the main contractors and the subcontractors generated by using relative important index (RII) equation. There are 11 problem factors in this top 10 list due to the tie of two factors in rank 7. Five of these 11 problem factors are related to the main contractor and five are related to the subcontractor. Only one problem factor is related to the project owner.

Table 4 presents the validity and reliability checking of the data. Factors with loadings of more than 0.70 were retained in the research model and those with less than 0.70 were deemed not reliable and hence, omitted. Cronbach’s alpha values and composite reliability (CR) of the factors are all above 0.70 indicating that the items assigned to the respective constructs are reliable. The extracted average variances (AVEs) are all above 0.50 which shows that convergent validity is established in the measurement model [5]. Table 5 shows that the heterotrait–monotrait (HTMT) values are all less than 0.85 indicating that discriminant validity is also established (Hair et al., 2017).

Table 6 presents the path coefficients of the model. The R-Square value of 0.246 shows that all the five independent variables, namely project consultant-related, main contractor-related, subcontractor-related, project owner-related, and environmental-related problem factors could explain about 25% of the variance in the partnering relationship. However, only the cluster of factors related to the subcontractor significantly affected the quality of the partnering relationship.
| Problem factors by category                                                                 | Factors Related to the Main Contractor                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Factors Related to the Main Contractor                                                      | MC1 Main contractor does not fully understand contract content                                                                                                                                                                       |
|                                                                                          | MC2 Assigning part of the works to new subcontractor, without the consent of original subcontractor                                                                                                                                 |
|                                                                                          | MC3 Failure to provide the subcontractors with essential services such as electricity, water, etc                                                                                                                                 |
|                                                                                          | MC4 Failure of the main contractor to use the insurance in case of injury of subcontractor’s labour                                                                                                                                 |
|                                                                                          | MC5 Failure to provide proper security at the site for plants and equipment                                                                                                                                                           |
|                                                                                          | MC6 Main contractor provides off-site location for storage of material                                                                                                                                                              |
|                                                                                          | MC7 Main contractor personnel are absent frequently at site                                                                                                                                                                            |
|                                                                                          | MC8 Involvement of the main contractor in several projects at the same time                                                                                                                                                         |
|                                                                                          | MC9 Scheduling conflicts between the contractor and subcontractor                                                                                                                                                                   |
|                                                                                          | MC10 Scheduling conflicts among the subcontractors                                                                                                                                                                                    |
|                                                                                          | MC11 Inappropriate arrangement to the subcontractors works                                                                                                                                                                           |
|                                                                                          | MC12 Low experience and low capability of the main contractor                                                                                                                                                                        |
|                                                                                          | MC13 Awarding the specific subcontractor because of his low price only                                                                                                                                                              |
|                                                                                          | MC14 Main contractor’s financial problem                                                                                                                                                                                             |
|                                                                                          | MC15 Delay in contract progress payments                                                                                                                                                                                              |
|                                                                                          | MC16 Interruptions and termination of work by the contractor                                                                                                                                                                           |
|                                                                                          | MC17 Delay in shop drawings and sample material approval                                                                                                                                                                              |
|                                                                                          | MC18 Delay by the main contractor in providing the necessary materials to the subcontractor                                                                                                                                              |
|                                                                                          | MC19 Providing low-quality materials that result in low-quality workmanship                                                                                                                                                           |
|                                                                                          | MC20 Delay of the main contractor in submitting the formal documents to the supervision staff, which leads to delay in implementing the works                                                                                       |
|                                                                                          | MC21 Failure to provide complete clarifications of drawings to the subcontractor                                                                                                                                                      |
| Factors Related to the Subcontractor                                                        | SC1 Non-adherence of the subcontractor to the time schedule                                                                                                                                                                            |
|                                                                                          | SC2 Delay of the works behind the time schedule                                                                                                                                                                                       |
|                                                                                          | SC3 Failure to save and take care of the materials and equipment at site                                                                                                                                                            |
|                                                                                          | SC4 Exhausting the plant and resources of the main contractor                                                                                                                                                                         |
|                                                                                          | SC5 Partnering the works to another subcontractor without getting approval of main contractor                                                                                                                                       |
|                                                                                          | SC6 Subcontractor personnel are absent frequently at site                                                                                                                                                                              |
|                                                                                          | SC7 Subcontractor involves in several projects at the same time                                                                                                                                                                     |
|                                                                                          | SC8 Neglecting the instructions of the main contractor                                                                                                                                                                                 |
|                                                                                          | SC9 Subcontractor fail to deploy sufficient workers at site                                                                                                                                                                           |
|                                                                                          | SC10 Non-adherence to the conditions of the contract                                                                                                                                                                                  |
|                                                                                          | SC11 Lack of quality work during construction                                                                                                                                                                                         |
|                                                                                          | SC12 Lack of experience and ability of the subcontractor in similar projects                                                                                                                                                           |
|                                                                                          | SC13 Subcontractor fail to deploy sufficient equipment and machinery at site                                                                                                                                                          |
|                                                                                          | SC14 Neglecting the safety measures                                                                                                                                                                                                    |
|                                                                                          | SC15 Changes in material and labour costs before completion                                                                                                                                                                            |
| Factors Related to the Project Owner                                                        | PO1 Awarding the tender to the contractor with lowest price                                                                                                                                                                            |
|                                                                                          | PO2 Delay in providing complete information such as additional drawings, benchmarks, set-backs etc.                                                                                                                                 |
|                                                                                          | PO3 Giving instructions to the subcontractor directly without consulting the main contractor                                                                                                                                              |
|                                                                                          | PO4 Objection of the owner on the implementation method used by the subcontractor                                                                                                                                                      |
|                                                                                          | PO5 Poor variation management                                                                                                                                                                                                           |
|                                                                                          | PO6 Delay in releasing payments to the main contractor                                                                                                                                                                                 |
|                                                                                          | PO7 Short period allowed for implementing the project                                                                                                                                                                                  |
| Factors Related to the Project Consultant                                                   | CO1 Inaccurate among the tender documents                                                                                                                                                                                            |
|                                                                                          | CO2 Incomplete work-drawing and technique specifications                                                                                                                                                                               |
|                                                                                          | CO3 Delay of approval of the finished work                                                                                                                                                                                             |
|                                                                                          | CO4 Delay in approving materials samples and shop drawings                                                                                                                                                                              |
|                                                                                          | CO5 Lack of experience of the consultant’s team                                                                                                                                                                                         |
| Factors Related to the External Environment                                                  | EE1 Shortage of construction materials and equipment in the market                                                                                                           |
|                                                                                          | EE2 Weather conditions                                                                                                                                                                                                               |
|                                                                                          | EE3 Geological problems on the site                                                                                                                                                                                                    |
|                                                                                          | EE4 Breach of the contract due to project termination                                                                                                                                                                                 |
|                                                                                          | EE5 Closing the commercial border crossings                                                                                                                                                                                          |

(continued on next page)
Table 1 (continued)

Quality of Partnering Relationship

| RI   | Description                                                                 |
|------|-----------------------------------------------------------------------------|
| RI1  | Mutual objectives were established to benefit both parties                  |
| RI2  | Gain and pain sharing was agreed between the parties                        |
| RI3  | A high degree of trust exist between parties                                 |
| RI4  | Parties did not blame each other when problems occurred                      |
| RI5  | Both parties work jointly together                                           |
| RI6  | Communication between the parties was open and effective                     |
| RI7  | The problem solving mechanism between the parties was effective              |
| RI8  | Risk allocation between the parties was clear and fair                       |
| RI9  | Performance was reviewed and fed back on a regular basis                     |
| RI10 | Improvement was continuously made during the project                         |

Table 2
Profile of the respondents

| Profile                        | Category                                      | Frequency | Percentage |
|--------------------------------|-----------------------------------------------|-----------|------------|
| Type of Project (PT)           | Residential                                   | 18        | 15%        |
|                                | Non-Residential (Office, Factory etc.)        | 29        | 23%        |
|                                | Infrastructure (Railway, Road, Tunnel etc.)   | 72        | 58%        |
|                                | Social Amenity (Hospital, Campus etc.)        | 5         | 4%         |
| Types of Project Owner (PO)    | Private Limited company                       | 13        | 10%        |
|                                | Public limited company                        | 37        | 30%        |
|                                | Government                                    | 74        | 60%        |
| Role of Respondent (RR)        | Main Contractor                               | 73        | 59%        |
|                                | Subcontractor                                 | 51        | 41%        |
| Working                        | 1-5 years                                     | 15        | 12%        |
| Experiences in Construction    | 6-10 years                                    | 35        | 28%        |
|                                | 11-15 years                                   | 46        | 37%        |
| Sector (WE)                   | 16-20 years                                   | 20        | 16%        |
|                                | More than 20 years                            | 8         | 6%         |
| Country of Project Located (PL)| Malaysia                                      | 38        | 31%        |
|                                | China                                         | 44        | 35%        |
|                                | India                                         | 42        | 34%        |
| Project Scheduled Duration (PS)| 0-12 months                                   | 13        | 10%        |
|                                | 12-36 months                                  | 70        | 56%        |
|                                | 36-60 months                                  | 38        | 31%        |
|                                | 60-120 months                                 | 3         | 2%         |
| Project Budget (USD) (PB)      | Between 120,000-240,000                        | 11        | 9%         |
|                                | Between 240,000-1.2 Million                   | 10        | 8%         |
|                                | Between 1.2 Million - 2.4 Million             | 18        | 15%        |
|                                | Between 2.4 Million - 24 Million              | 29        | 23%        |
|                                | Between 24 Million - 120 Million              | 37        | 30%        |
|                                | Between 120 Million - 240 Million             | 11        | 9%         |
|                                | More than 240 Million                         | 8         | 6%         |

2. Experimental design, materials and methods

The research utilized a quantitative approach, in which a self-administered online questionnaire was developed to incorporate the problem factors affecting the quality of the partnering relationship between the main contractors and subcontractors. The problem factors were adopted from the framework of [6]. The measurement items used a five-point Likert scale with 1 = “strongly disagree” and 5 = “strongly agree”. The questionnaire for this dataset is attached as a supplementary file. Questionnaire was distributed via Google Forms to the construction managers and engineers of project contractors and subcontractors in Kuala Lumpur, Shanghai and New Delhi. Before the online survey was conducted, the respondent was informed on the participation of the survey is based on voluntary basis. The Confidential Agreement was attached
Table 3
Top 10 Ranking of Problem Factors

| Problem Factor                                           | Related to         | Relative Important Index (RII) | Rank |
|----------------------------------------------------------|---------------------|--------------------------------|------|
| Main contractors' financial problem                     | Main contractor     | 0.868                          | 1    |
| Lack of quality work during construction                 | Subcontractor       | 0.861                          | 2    |
| Delay in contract progress payments                      | Main contractor     | 0.856                          | 3    |
| Interruptions and termination of work by the contractor  | Main contractor     | 0.855                          | 4    |
| Delay in releasing payments to the main contractor       | Project Owner       | 0.847                          | 5    |
| Awarding the specific subcontractor because of his low  | Main contractor     | 0.834                          | 6    |
| price only                                              |                     |                                |      |
| Providing low-quality materials that result in low-quality workmanship | Main contractor     | 0.823                          | 7    |
| Non-adherence to the conditions of the contract         | Subcontractor       | 0.823                          | 7    |
| Delay of the works behind the time schedule             | Subcontractor       | 0.813                          | 8    |
| Lack of experience of the subcontractor in similar projects | Subcontractor       | 0.81                           | 9    |
| Fail to deploy sufficient workers at site                | Subcontractor       | 0.808                          | 10   |

Table 4
Composite reliability and average variance extracted

| Constructs                                           | Items | Loadings | Cronbach’s Alpa | Composite Reliability (CR) | Average Variance Extracted (AVE) |
|------------------------------------------------------|-------|----------|-----------------|----------------------------|----------------------------------|
| Consultant                                           | CO1   | 0.874    | 0.910           | 0.932                      | 0.732                            |
|                                                      | CO2   | 0.875    |                 |                            |                                  |
|                                                      | CO3   | 0.877    |                 |                            |                                  |
|                                                      | CO4   | 0.865    |                 |                            |                                  |
|                                                      | CO5   | 0.782    |                 |                            |                                  |
| Environmental                                        | EE4   | 0.952    | 0.792           | 0.900                      | 0.818                            |
|                                                      | EE5   | 0.854    |                 |                            |                                  |
| Main contractor                                      | MC16  | 0.780    | 0.776           | 0.869                      | 0.689                            |
|                                                      | MC17  | 0.868    |                 |                            |                                  |
|                                                      | MC18  | 0.840    |                 |                            |                                  |
| Project owner                                        | PO2   | 0.806    | 0.817           | 0.872                      | 0.576                            |
|                                                      | PO3   | 0.739    |                 |                            |                                  |
|                                                      | PO4   | 0.802    |                 |                            |                                  |
|                                                      | PO5   | 0.735    |                 |                            |                                  |
|                                                      | PO6   | 0.709    |                 |                            |                                  |
| Quality of partnering relationship                    | RI10  | 0.778    | 0.928           | 0.941                      | 0.665                            |
|                                                      | RI2   | 0.733    |                 |                            |                                  |
|                                                      | RI3   | 0.831    |                 |                            |                                  |
|                                                      | RI5   | 0.843    |                 |                            |                                  |
|                                                      | RI6   | 0.802    |                 |                            |                                  |
|                                                      | RI7   | 0.861    |                 |                            |                                  |
|                                                      | RI8   | 0.808    |                 |                            |                                  |
|                                                      | RI9   | 0.859    |                 |                            |                                  |
| Subcontractor                                        | SC10  | 0.834    | 0.759           | 0.886                      | 0.796                            |
|                                                      | SC11  | 0.947    |                 |                            |                                  |

with the questionnaire when the questionnaire was distributed to the respondents. Purposive sampling was used as the questionnaire targeted project practitioners such as project managers, site managers, and engineers. A total of 144 completed questionnaires were received. However, 20 of these returned questionnaires were not usable as they were completed by non-target respondents, yielding the final sample size of 124. This sample size of 124 exceeded the minimum sample size of 92 generated from G*Power with the effect size of 0.15, significant level of 0.05, power of 0.80, and five predictors. Following the approach used by [6], the Relative Importance Index method was used to rank the problem factors as perceived by the main contractors and
subcontractors. Partial Least Squares-Structural Equation Modelling (PLS-SEM) was used to check the convergent validity and discriminant validity of the data via measurement model assessment while structural model assessment was performed to verify the cluster of factors that plays a role in explaining the MC-SC partnering relationship.

**Ethics statements**

Before the commencement of the project, the Institutional Ethics Committee (IEC) of UCSI University had granted the approvals for the data collection (IEC-2022-FBM-081). The self-administered survey was carried out in complete anonymity for the respondents. No sensitive or private data that could be used to identify the respondents was gathered. Before the online survey was conducted, the respondents’ consent to participate in the survey was obtained.

**CRediT author statement**

Eric Yao: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; Yet-Mee Lim: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; Choi-Meng Leong: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; Wai-Chow Lee: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing; Chuen-Khee Pek: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing.

**Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
Data Availability

Dataset Describing Problem Factors of Partnering Relationships in the Malaysian Construction Industry (Original data) (Mendeley Data)

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