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RESEARCH ARTICLE

The Utility and Value of Contract Terms: A Case Study on Interior Contractors

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Abstract

This study applied the conjoint analysis technique to appraise the utility of interior contractors' contract terms and project price conditions. The sample group comprised 112 interior contractors working in 12 shopping centers of a public company in Thailand. The results showed that the advance payment term, the period of an interim payment term, the period to make a payment term, and the project price conditions had average utility ratios (ratio of its utility to the total utility) of 28.23%, 20.03%, 20.20%, and 27.72%, respectively. These results confirmed that each of these three contract terms is as important to interior contractors as the project price condition when the proposed amount is not reduced by 5%. This study also valued the three contract terms by comparing their utility with the utility of the project price condition. The values of the advance payment term, the period of the interim payment term, and the period to make a payment term varied between 0.00–8.75 %, 1.00–8.33%, and 2.00–11.67% of the proposed price, respectively. The value of all three contract terms varied between 10.00–20.00% of the proposed price. The insights provided by this study into the utility and value of these three contract terms could aid project owners or tenants of shopping centers in project price negotiations.

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Keywords

Contract Term; Conjoint Analysis; Project Price; Contract Term Utility; Contract Term Value

Introduction

A project owner should consider offering a contractor better contract terms in exchange for a price reduction. The contractor must consider various factors, such as the scope of the work, contract terms, quality of work, and project duration, when finalizing the project cost with the owner. The contract terms are among the most critical factors, so contractors pay a great deal of attention to them when pricing a project (Upson, 1987; Shash, 1993; Lowe and Parvar, 2004; Jarkas, 2013; Smirnov and Fedoseev, 2013; Yosr, et al., 2019). The duties and responsibilities between a contractor and the project owner are defined via contract terms. Consequently, if contractors are potentially faced with additional liabilities, costs, and risks, they will mitigate these risks by quoting higher prices to the project owner (Clough and Sears, 1994; March, 2009; Sanni, Adebiyi and Okorie, 2020). Conversely, the project owner will try to persuade the contractor to lower the proposed project price during the project price negotiating process. Demanding that the contractor reduce their project price without offering any benefit in exchange is usually not an effective way to negotiate, as receiving a lower contract price decreases the contractor's utility on the project. Moreover, if the contractor's utility on a project is already approaching its lowest acceptable level, the contractor is likely to insist on the recently proposed price or only lower the project price marginally.

Conversely, a project owner could offer a contractor better contract terms in exchange for a project price reduction—examples of such contract terms include providing advance payments to the contractor or shortening the payment period. The net result is that contractors tend to lower the project price if they receive more favourable terms, as accepting such contract terms increases their utility on the project, compensating for the project price reduction.

Determining the utility and value of each contract term can provide helpful guidance in the price negotiations between an owner and the interior contractors. Currently, residential and commercial buildings are shrinking due to increased construction and land costs. Consequently, interior designers use limited spaces more functionally (Dhankhar, 2015). In the shopping center business, project owners and tenants hire interior contractors to decorate various areas at the beginning of the project. Moreover, once a shopping center has been in operation for some time, it may require renovations. Consequently, for project owners and tenants of shopping centers, having information on the utility and value of each contract term from an interior contractor's point of view could be beneficial, allowing them to negotiate prices with interior contractors more effectively. For example, if a project owner or tenant of a shopping center knows that the interior contractor is willing to reduce the proposed price by 5.61% and 4.13% in exchange for receiving a 30% advance payment or shortening the payment term from 30 to 14 days, respectively, they know that they could expect a 9.74% reduction in the project price by offering to adjust both contract terms.

An intensive literature review found that studies on the estimation of the utility and value of contract terms, particularly from the perspective of interior contractors working in shopping centers, are scarce. This research aims to address this gap by applying a conjoint analysis to evaluate the utility of each selected contract term and the project price condition. The value of each selected contract term was also determined by comparing its utility with that of the project price condition.

Literature Review

Past research on contract terms has often focused on contract clauses, highlighting their completeness, coverage, and ambiguity, and comparing clauses between contracts to identify their similarities and differences. For example, Zhang, Zhang and Gao (2006) compared the risk allocation clauses in FIDIC

(Fédération Internationale Des Ingénieurs-Conseils) contract conditions for construction and in China's standard construction contract form; Tochaiwat and Chovichien (2008) analysed the contract clauses related to claims in Thai public construction contracts by comparing them with those of the AIA's A201 (1997) and FIDIC's construction contracts (1999); Zolkafli, Zakaria and Salleh (2011) compared the FIDIC red book and public works contracts in Malaysia in terms of their liabilities, expressed and implied duties, risk allocations, conditions, procedures, and dispute resolution methods; and Lee, et al. (2018) reviewed the general conditions of contracts affecting the extension of time claims in the Malaysian construction industry and determined the extent of ambiguity of various contract forms using a comparative study. Another way of identifying ambiguous contract clauses is through the analysis of court disputes, as done by Lee, et al. (2020), who examined construction-related law cases to determine the ambiguity of extension of time clauses in the Malaysian standard forms of contract.

However, research on contract terms is not limited to the study of the completeness, coverage, and clarity of contract clauses. Contract terms define the duties and obligations of the owner and contractor, which greatly influence the contract price. In negotiating the duties and obligations of both parties, one should have information on the utility and value of the various contract terms from the other party's perspective. Having such information, one can more effectively negotiate with the other party. Suriyanon and Chovichien (2009) examined the utility and value of contract terms regarding restrictions to contractors' rights to claim compensation, sampling with a group of representatives of Thai government organizations who are major construction project owners. Their research results showed that Thai government organizations preferred to restrict the contractor's rights to claim for an increase in direct and overhead costs due to force majeure, an increase in overhead costs due to the employer's ineffective performance, an increase in direct and overhead costs due to the employer's interference, and an increase in overhead costs due to differing site conditions. In exchange for restricting each of these six types of claim rights, they were willing to pay 0.210%, 0.164%, 0.090%, 0.087%, 0.132%, and 0.199% of the value of the work, respectively. Klahan and Suriyanon (2021) assessed the utility and value of contract terms from a labour-only painting subcontractor's perspective. Their research showed that five contract terms greatly affected the painting subcontractor's job-taking decision, namely, the unit rate, extra money, retention period, period of interim payment, and amount of work per contract. Moreover, extra money, retention period, period of interim payment, and amount of work per contract terms were valued at 0.08–0.15, 0.03–0.15, 0.00–0.03, and 0.00–0.08 USD/m^2, respectively.

Conjoint Analysis Technique

Green, Krieger and Wind (2001) have identified conjoint analysis as the most widely used marketing research technique for analysing consumer trade-offs. This technique was developed to evaluate the level of satisfaction of people with specific product attributes. The data obtained from such analysis includes the utility value of every level of each attribute. A unique feature of conjoint analysis is that the researcher creates a series of real or hypothetical objects by combining different levels of each attribute, resulting in a design that is presented to the respondents as a set of proposals. The respondents are then asked to evaluate the overall appeal of the objects without providing feedback on the importance of specific attributes or attribute levels. This approach enables the researcher to determine the impact and value of each attribute on the utility judgment of the respondents (Hair et al., 2006).

The conjoint analysis technique has been recently used in the fields of construction engineering and management. Examples of this research include: identifying the utility and value of the contractor's right to claim compensation (Suriyanon and Chovichien, 2009), of various contract terms from a labour-only painting subcontractor's perspective (Klahan and Suriyanon, 2021), and of the benefits provided by a company to engineers working on newer ASEAN (Association of Southeast Asian Nations) member countries—that is, Cambodia, Laos, Myanmar, and Vietnam (CLMV) (Chitchamnong and Suriyanon, 2019); examining the relative importance and their interaction of price and trust in subcontractor selection

(Hartmann and Caerteling, 2010); and assessing how contracting parties trade-off and value relationship quality attributes against each other (Jelodar, Yiu and Wilkinson, 2016; Jelodar, Yiu and Wilkinson, 2017).

This study utilized ranking-based conjoint analysis to investigate the preferences of interior contractors regarding contract terms and project pricing conditions and determine the utility values of those terms and conditions. Utility values represent an individual's personal and subjective assessment of the worth or desirability of a particular object. In conjoint analysis, it is assumed that the total utility of each proposal is determined by combining the utility estimated for each attribute using an additive model, which is also known as part-worth values. To calculate the utility values, a modified analysis of variance (ANOVA) was applied to ensure that the rank order of the total utility estimated for each proposal closely correlates with the observed rank order of the proposals.

In this study, each contract term/project price condition was assigned to either the standard or superior level. The utility value for each contract term/project price condition refers to the utility obtained when adjusting each contract term/project price condition from the standard to the superior level. These values were obtained through a conjoint analysis.

The equation used to calculate the total utility of each proposal is expressed as follows:

$$U_{Tn} = C + U_1 \times X_{1n} + U_2 \times X_{2n} + U_3 \times X_{3n} + U_4 \times X_{4n} + \ldots + U_i \times X_{in} \quad (1)$$

where U_{Tn} denotes the total utility of the n^{th} proposal, C denotes a constant value known as the basic utility, U_i denotes the utility value of the i^{th} contract term/project price condition, and X_{in} represents the nominal variable of the i^{th} contract term/project price condition of the n^{th} proposal. The value of X_{in} is 0 or 1 depending on whether the level of the i^{th} contract term/project price condition of the n^{th} proposal is standard or superior, respectively.

Methodology

To evaluate the utility and value of contract terms, this study applied the following six steps:

1. Identification of contract terms. A literature review, examination of contracts, and interviews with interior contractors were conducted to compile a list of contract terms that directly impacted the pricing of interior contractor projects. Additionally, the level of each contract term and the project price at which the interior contractor might negotiate with the project owner were gauged from the interviews.
2. First round of data collection. Based on the list of contract terms compiled in the first step, sample data were collected to determine the importance of each contract term and project pricing condition. Respondents were asked to rank all the listed contract terms and project price conditions according to the level of importance they assigned to each.
3. Selection of contract terms for conjoint study. The three contract terms that were most significant to the contractors were identified based on the data collected during the first round. These three contract terms, along with the project price condition, were utilized as attributes for designing the proposal in step 4.
4. Design of proposals. A set of proposals was created for the conjoint analysis experiment, following the orthogonal design concept and considering the specific number and levels of attributes identified in the study.
5. Second round of data collection. The participants were requested to rank all the designed proposals from the most to the least satisfactory. The results obtained from this step were used to evaluate the utility and value of contract terms in step 6.

6. Data analysis.
   6.1 Utility of each attribute level. A statistical computer program was used to evaluate the utility of each attribute level based on the ranking patterns obtained in step 5.
   6.2 Ratio of utility to maximum possible utility. The utility ratios, representing the level of importance of each contract term or the project price condition for the interior contractor, were calculated in this step. The utility ratio of each attribute was determined by dividing its utility value by the maximum possible utility value of the proposal, which occurred when all proposal attributes were at the superior level.
   6.3 Value of the three contract terms. The value of each contract term was calculated by dividing its utility by the utility of the project price condition and then multiplying the result by the value of the project price considered in the study.

Identified Contract Terms

A literature review, examination of contracts, and interviews with interior contractors were conducted to identify all contract terms that have a direct impact on the pricing of interior design projects. During the contract examination phase, ten interior contractors were contacted and asked to submit their most recent contract for the study, as well as invited to participate in individual interviews. However, only five of the contacted contractors responded and agreed to be interviewed. The results of these processes yielded a list of six contract terms that directly influenced the contractor's project pricing, which are listed in **Table 1**.

The interview findings also suggest that interior contractors may not be willing to lower their proposed price by more than 5% during price negotiations if the owner does not offer any flexibility in the contract terms. The level of each contract term and the project price (proposal attributes) at which the interior contractor might negotiate with the project owner, according to the interviews, are also shown in **Table 1**.

Table 1. Contract terms and project price and their levels

Contract terms and project price		Level of contract terms and project price	
		Standard level	Superior level
1	Advance payment	None	30% of the contract price (Repaid through 30% deduction from each progress payment)
2	Period of an interim payment	30 d	14 d
3	Period to make a payment	30 d	14 d
4	Time to release retention. (Given retention amount is 5% of the project price)	12 mo after project completion	3 mo after project completion
5	Amount of liquidated damages (per day) specified in the contract	0.10% of the project price	0.01% of the project price
6	Time to fix damage occurring during defect notification period	7 d	15 d
7	Project price	5% reduction of the proposed price	Contractor proposed

First Round of Data Collection

The first round of sample data collection was conducted to determine the relative importance of the six identified contract terms and the project price condition. The sample group was asked to consider the standard and superior levels of each contract term and project price condition. They were then asked to evaluate their satisfaction with receiving an adjustment in each contract term and the project price condition from the standard to the superior level. Finally, they were asked to rank the six contract terms together with the project price condition based on their level of satisfaction.

This first round of data collection was conducted between September and October 2020. The process involved selecting and contacting a Thai public company that owned shopping centers, followed by identifying all their shopping centers located in the Bangkok Metropolitan Region. Subsequently, the facility manager of each shopping center was asked to provide a list of interior contractors who had at least one year of experience working on projects worth more than 1,000,000 THB (30,000 USD) per year. All 240 interior contractors on the resulting list were contacted and invited to participate in the survey. However, only representatives who were responsible for contract negotiation were eligible to participate in the study, and each participating contractor was limited to one representative. A total of 118 of the contacted contractors responded to the survey.

Table 2 presents data from the first survey round, including the averages of the rank values assigned to the different contract terms and the project price condition. These averages were used to determine the overall ranking, which is also presented in Table 2.

Table 2. Ranking of the contract terms/project price condition resulting from the first round of data collection

No.	Contract terms and project price	Rank (Number of the samples selected)										Ranking position
		1	2	3	4	5	6	7	Total	Average	SD	
1	Advance payment	11	71	32	4	0	0	0	118	2.25	0.67	1
2	Period of an interim payment	4	6	71	25	2	10	0	118	3.38	1.05	3
3	Period to make a payment	4	8	12	73	9	12	0	118	3.94	1.08	4
4	Time to release retention (Given retention amount is 5% of the project price)	24	1	2	11	66	14	0	118	4.15	1.71	5
5	Amount of liquidated damages (per day) specified in contract	7	16	1	2	18	56	18	118	5.10	1.82	6
6	Time to fix damage occurs during the defect notification period	0	0	0	0	0	18	100	118	6.85	0.36	7
7	Project price	68	16	0	3	23	8	0	118	2.33	1.85	2

The data in **Table 2** show that the sample group members have different opinions about the project price. Only 68 of the 118 respondents think the 5% project price reduction is the most critical issue for them. Moreover, 16, 3, 23, and 8 respondents indicate that it is the 2nd, 4th, 5th, and 6th most important issue for them, respectively, suggesting that 42% of the sample group gives more weight to the contract terms than to the 5% project price reduction. The average rank value of the project price reduction is 2.33, which is more than that of the advance payment term (2.25), broadly confirming that the project price reduction issue is not the only factor that interior contractors consider during contract negotiations. Contract terms, especially advance payment terms, also strongly influence their decisions.

Selection of Contract Terms Used in the Conjoint Analysis

To apply the conjoint analysis technique for assessing the utility and value of contract terms, the level of satisfaction of the sample group with the set of created proposals was required. The attributes that the sample group had to consider in each proposal were the studied contract conditions and the project price. The number of proposals that needed to be created for the sample group to evaluate varied directly with the number of proposal attributes and their levels. If the number of contract conditions increased, the number of proposals that needed to be evaluated and compared increased proportionally, making the evaluation and comparisons of too many proposals an increasingly heavier burden for the participants. The considerable differences between proposals could also be confusing.

In this study, three contract terms were studied along with the project price. Consequently, the sample group had to consider four attributes on each proposal. The levels of each proposal attribute were also set to the two mentioned earlier. Thus, the total number of possible proposals was 16 (2 × 2 × 2 × 2 proposals). Based on the set number of attributes and their levels, if the orthogonal design principle was applied to the proposal design process, the number of proposals that need to be considered and ordered by the sample group could be reduced to just eight, a reasonable number that would not be a burden to the participants nor confuse them.

Based on the results shown in **Table 2**, the top three most important contract terms to the contractor are as follows:

1. Advance payment term: receiving an advance payment of 30% of the contract price, repaid through 30% deductions from each progress payment.
2. Period of an interim payment term: adjusting the period of an interim payment term from 30 to 14 d.
3. Period to make a payment term: adjusting the period to make a payment term from 30 to 14 d.

Therefore, the conjoint analysis used these three contract terms and the project price condition as the proposal attributes. All proposals were designed based on these attributes.

ADVANCE PAYMENT

Advance payment is the money a project owner pays before receiving construction services from a contractor. The contractor may use this advance in various ways. For example, at the beginning of a project, the advance may be spent on purchasing materials. It may also be used to alleviate cash-flow problems due to delayed payments during construction (Hussin and Omran, 2009). Past research has shown that receiving advance payments from a project owner positively affects the contractors' net cash flow. It also influences the cost and time performance of the project (Aje and Adedokun, 2018).

PERIOD OF INTERIM PAYMENT

Interim or progress payment is the money a project owner pays the contractor for the work completed in each pre-specified period. The contractor is under less financial pressure in terms of project cash flow should interim payments be received from the project owner (Kenley, 2003). The period of interim payment varies by project as specified in its contractual conditions (Ansah, 2011). The more frequently the contractor is allowed to submit requisitions for interim payments, the less financial pressure they must bear.

PERIOD TO MAKE A PAYMENT

After the contractor submits the final payment request, the project owner requires a period to evaluate the proposed amount and prepare the money transfer to the contractor. This period should not be overly long. The longer the project owner requires to make a payment, the more financial pressure the contractor must bear. Past research has shown that the period to make a payment greatly influences a contractor's cash flow and project profitability (Adjei, et al., 2018). Consequently, the period to make a payment term is among the most critical factors affecting the contractor's bid/no bid decision (Enshassi and Mohamed, 2010).

PROJECT PRICE

Contractors certainly want to win projects at the highest possible price, as they seek to maximize their project margins. Since the probability of winning a project is inversely proportional to the proposed project price, the contractor must consider the trade-offs between the level of expected profit (based on the project price) and the probability of winning the project when they price it (Akintoye and Skitmore, 1990).

Proposal Design

This study employed the principles of orthogonal design to create a set of independent proposals. Orthogonal design is a type of fractional factorial design that allows the main effects of all attributes in a conjoint study to be estimated while using fewer profiles or proposals. This design assigns a balanced subset of profiles or proposals to every level of each attribute. Catalogues of potential designs and statistical computer programs are available for generating orthogonal designs with a variable number of attributes and attribute levels (Rao, 2014).

As indicated in the previous section, the proposals developed in this study comprised four attributes: advance payment term, period of interim payment term, period to make a payment term, and project price.

Table 3. Proposals created in this study

No.	Proposal Attribute	Proposal							
		P. 1	P. 2	P. 3	P. 4	P. 5	P. 6	P. 7	P. 8
1	Advance payment	None	30%	None	None	None	30%	30%	30%
2	Period of an interim payment	14 d	30 d	14 d	30 d	30 d	14 d	30 d	14 d
3	Period to make a payment	14 d	14 d	14 d	30 d	30 d	30 d	14 d	30 d
4	Project price	5% reduction in the proposed price	5% reduction in the proposed price	As proposed	5% reduction in the proposed price	As proposed	5% reduction in the proposed price	As proposed	As proposed

Each proposal attribute included two levels: standard and superior. Following the principles of orthogonal design and considering the specific number of attributes and levels, eight proposals were created for the conjoint analysis experiment. The proposals generated using the orthogonal design command in the SPSS software are described in Table 3.

Second Round of Data Collection

Between November and December 2020, the 118 participants who had responded to the first-round survey were contacted to participate in the conjoint analysis study. Out of these, 112 individuals responded and completed the second round of surveys.

CHARACTERISTICS OF THE SAMPLES

The characteristics of the organization representatives and their respective organizations are presented in Table 4.

Table 4. Characteristics of the sample group respondents

Representative Characteristics	No.	%	Organization Characteristics	No.	%
Gender			**Type of the organization**		
Male	104	92.86	Limited company	72	64.29
Female	8	7.14	Limited Partnership	40	35.71
Age			**Age of the organization**		
≤ 30 yr	14	12.50	≤ 10 yr	37	33.04
31–40 yr	55	49.11	10–20 yr	41	36.61
> 40 yr	43	38.39	> 20 yr	34	30.36
Area of education			**Types of service**		
Decorative Arts and Architecture	51	45.54	Construction service only (No design service provide)	32	25.89
Engineering	39	34.82	Design and construction service only (No construction service for work that the company does not design)	27	23.21
Business administration and others	22	19.64	Both types of service	59	50.89
Level of education			**Average contract price**		
Bachelor's degree and lower	83	74.11	≤ 5 M THB (≤ 150,000 USD	84	75.00
Master's degree and higher	29	25.89	5–10 M THB (150,000–300,00 USD)	28	25.00
Years of experience in the interior project			**Average annual income.**		
≤ 10 yr	43	38.39	≤ 20 M THB (≤ 605,000 USD)	30	26.79

Table 4. continued

Representative Characteristics	No.	%	Organization Characteristics	No.	%
10–20 yr	55	49.11	20–40 M THB (605,000–1,210,000 USD)	33	29.46
> 20 yr	14	12.50	> 40 M THB (> 1,210,000 USD)	49	42.75
Current position			**Expected profit (% of the total project cost)**		
Proprietor	28	25.00	≤ 47.25%	42	37.50
Director	14	12.50	47.26–67.25%	46	41.07
Manager	40	35.71	> 67.25%	24	21.43
Engineer	30	26.79			

RANKING ORDER OF THE PROPOSALS

The sample group of the second-round survey were asked to rank the eight designed proposals from one to eight, with one meaning "most satisfied" and eight meaning "least satisfied." Among the numerous possible ways of arranging the eight proposals, the sample group only arranged them into eight distinct patterns. The details of which and the number of samples arranged in each pattern are shown in Table 5.

Table 5. Ranking of the eight proposals

Pattern	Ranking of each proposal								Samples arranged in each pattern	
	P.1	P.2	P.3	P.4	P.5	P.6	P.7	P.8	No.	Percentage
1	4	5	2	8	7	6	1	3	9	8.04
2	2	5	1	8	7	6	3	4	5	4.46
3	5	6	1	8	7	4	2	3	22	19.64
4	6	5	3	8	7	4	2	1	25	22.32
5	6	4	3	8	7	5	2	1	14	12.50
6	5	4	3	8	7	6	2	1	19	16.97
7	7	3	4	8	6	5	2	1	7	6.25
8	6	3	4	8	7	5	2	1	11	9.82

Utility of Each Attribute Level

The participants in the study were categorized into eight groups, based on their distinct patterns of ranking the designed proposals. The ranking patterns for each group were used as input for the conjoint analysis. The utility for each attribute level obtained for each sample group was analysed using the SPSS program, and the results are presented in **Table 6**. Additionally, Kendall's Tau coefficient value and its level of statistical significance are also shown in **Table 6**.

Kendall's Tau coefficient of all groups is between 0.857 and 1.000, and its level of statistical significance is between 0.000 and 0.001. These results show that the ranking order of the proposals identified was highly

correlated with those predicted from the model developed using conjoint analysis, and that this correlation is statistically significant. The predicted ranking order of the proposals for each sample can be identified by ranking the predicted total utility of each proposal, in ascending order. Moreover, the predicted total utility of each proposal can be calculated from a model developed using data obtained from the conjoint analysis, as shown in **Table 6**.

Table 6. Utility of each attribute level and Kendall's Tau correlations per sample group

Attributes	Level of attribute	Utility (Util.)							
		G. 1	G. 2	G. 3	G. 4	G. 5	G. 6	G. 7	G. 8
Constant (Basic utility)		0.25	0.75	0.25	0.25	0.25	0.25	0.75	0.50
Advance payment	None	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30% of the project price	1.50	0.00	1.50	3.00	3.00	2.50	3.50	3.50
Period of an interim payment	30 d	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	14 d	1.50	2.50	2.50	2.00	1.50	1.50	0.50	1.00
Period to make a payment	30 d	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	14 d	3.00	3.50	2.00	1.00	1.50	2.00	1.00	1.50
Project price	5% reduction in the proposed price	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	As proposed	2.50	1.50	2.50	2.50	2.50	2.50	2.50	2.00
Correlations	Kendall's Tau	0.964	1.000	0.857	1.000	0.964	0.857	0.909	0.909
	Sig.	0.001*	<0.001*	0.001*	<0.001*	0.001*	<0.001*	0.001*	0.001*

Based on **Table 6**, the utility value for each contract term and the project price can be computed by comparing the utility value of its superior level to its standard level. The utility value for each contract term and the project price is calculated as follows:

$$U_i = U_{isp} - U_{ist} \quad (2)$$

where U_i, U_{isp}, and U_{ist} are the utility value, the utility value of the superior level, and the utility value of the standard level of the i^{th} contract term/project price condition, respectively.

For example, for sample group No. 4, the utility value of the advance payment term is 3.00 Util. (U_{Asp} =3.00 Util., U_{Ast} = 0.00 Util.; 3.00 Util. – 0.00 Util.).

Once the utility value of each contract term and the project price have been determined, the total utility for each sample group can be estimated by developing a model and applying Equation (1). In this section, a model for estimating the total utility of sample group No. 4 was created as an example of model development from the data shown in **Table 6**. This total utility model can be expressed as follows:

$$U_{Tn} = 0.250 + 3.0 \times X_{An} + 2.0 \times X_{In} + 1.0 \times X_{Mn} + 2.5 \times X_{Pn} \quad (3)$$

where U_{Tn} denotes the total utility of the n^{th} proposal of sample group No. 4. X_{An} denotes the nominal variable of the advance payment term of the n^{th} proposal. X_{An} is 0 when no advance payment is provided and 1 when 30% of the project price is provided as advance payment. X_{In}, the nominal variable of the period of an interim payment term of the n^{th} proposal, is 0 when the period of an interim payment is 30 d and 1 when the period of an interim payment is 15 d. X_{Mn}, the nominal variable of the period to make the payment term of the n^{th} proposal, is 0 when the period to make the payment is 30 d and 1 when the period to make the payment is 15 d. X_{Pn}, the nominal variable of the project price condition of the n^{th} proposal, is 0 when the project price is reduced by 5% of the proposed price and 1 when the project price is the same as proposed by the contractor.

The total utility of sample group No. 4 on proposal No. 3 can be determined by using Eq. (3) to calculate the total utility of each proposal. For sample group No. 4, proposal No. 3 has a total utility equal to 5.75 Util. (X_{An} = 0, X_{In} = 1, X_{Mn} = 1, X_{Pn} =1; 0.25 Util. + 3.00 Util.× (0) + 2.00 Util. × (1) + 1.00 Util.× (1) + 2.50 Util.× (1) = 5.75 Util.).

Utility Ratio to the Maximum Possiblity Utility

To determine the relative importance of each contract term and project price, it is necessary to calculate the ratio of their utility value to the maximum possible utility of the proposal, as the utility value of each term and project price is an absolute value and cannot express their relative importance. These ratios provide a measure of the relative importance of each contract term and the project price condition to the interior contractor. The maximum possible utility of the proposal is the utility to the contractor when receiving the most desirable proposal—that is, when the level of all the proposal attributes is superior.

1. 30% of the project price is provided as an advance payment,
2. the period for an interim payment is 14 d,
3. the period to make the payment is 14 d, and
4. the project price is as the contractor proposed.

To calculate the maximum possible utility of the proposal, the following expression can be used:

$$U_{Max} = C + U_A + U_I + U_M + U_P \quad (4)$$

where U_{Max} denotes the maximum possible utility of the proposal, C denotes a constant value known as the basic utility, and U_A, U_I, U_M, and U_p are the utility values of an advance payment condition, an interim payment condition, the period to make the payment condition, and the project price condition, respectively.

The equation used to calculate the utility ratio is as follows:

$$UR_i = U_i / U_{Max} \quad (5)$$

where UR_i denotes the ratio of the i^{th} contract term/project price condition to the maximum possible utility, U_i represents the utility of the i^{th} contract term/project price condition, and U_{Max} is the maximum possible utility.

The utility ratio of the project price of sample group No. 4 is calculated and shown as an example of using equation (4) and (5). The utility of the project price of sample group No. 4 is 2.50 Util. (U_{Psp} = 2.50 Util., U_{Pst} = 0.00 Util.; 2.50 Util. – 0.00 Util.). The maximum possible utility of sample group No. 4 is 8.75 Util. (C = 0.25 Util., U_A = 3.00 Util., U_I = 2.00 Util., U_M = 1.00 Util., U_P = 2.50 Util.; 0.25 Util. + 3.00 Util. + 2.00 Util. + 1.00 Util. + 2.50 Util.). The utility ratio of the project price (UR_p) of sample group No. 4 is then 0.2857 (U_P =2.50 Util., U_{Max} = 8.75 Util.; 2.50 Util./ 8.75 Util.).

In this study, the utility ratios of each contract term and the project price of each contractor group were calculated. Subsequently, the average utility ratios of each contract term and the project price could be calculated. The average utility ratio was calculated by weighting the utility of each group by its population. The rankings of the contract term and the project price based on their relative importance can then be obtained by comparing their utility ratios, as shown in **Table 7**.

Table 7. Ranking of the contract terms/project price condition based on their utility

Proposal attributes	The utility ratio of each contract term and the project price (Ranking position)									U/R to U/R of project price
	G. 1	G. 2	G. 3	G. 4	G. 5	G. 6	G. 7	G. 8	Average	
Basic utility	0.0286	0.0909	0.0286	0.0286	0.0286	0.0286	0.090	0.0588	0.0382	-
Advance payment	0.1714 (3.5)	0.0000 (4)	0.1714 (4)	0.3429 (1)	0.3429 (1)	0.2857 (1.5)	0.4242 (1)	0.4118 (1)	0.2823 (1)	1.0182
Period of an interim payment	0.1714 (3.5)	0.3030 (2)	0.2857 (1.5)	0.2286 (3)	0.1714 (3.5)	0.1714 (4)	0.0606 (4)	0.1176 (4)	0.2003 (4)	0.7226
Period to make a payment	0.3429 (1)	0.4243 (1)	0.2286 (3)	0.1142 (4)	0.1714 (3.5)	0.2286 (3)	0.1212 (3)	0.1765 (3)	0.2020 (3)	0.7287
Project price	0.2857 (2)	0.1818 (3)	0.2857 (1.5)	0.2857 (2)	0.2857 (2)	0.2857 (1.5)	0.3030 (2)	0.2352 (2)	0.2772 (2)	1.0000

Table 7 provides valuable information, as summarized below.

1. The advance payment term has an average utility ratio of 28.23% and a maximum utility ratio of 42.42% (sample group No. 7).
2. The period of an interim payment term has an average utility ratio of 20.03% and a maximum utility ratio of 30.30% (sample group No. 2).
3. The period to make a payment term has an average utility ratio of 20.20% and a maximum utility ratio of 42.43% (sample group No. 2).
4. The project price condition has an average utility ratio of 27.72% and a maximum utility ratio of 30.30% (sample group No. 7).
5. The average utility ratio of each term compared to the average utility ratio of the project price is between 0.7226 (0.2003/0.2772; period of an interim payment) to 1.0182 (0.2823/0.2772; advance payment).

These results confirm that the project price condition is not the only single important factor for interior contractors to consider—that is, the three contract terms examined in this study are essential to them too.

Value of the Three Selected Contract Terms

The utility of the contract term is the utility of receiving an adjustment of the term from the standard level to the superior level. The value of the contract term is the equivalent fraction of the project price (as a percentage of the proposed project price) that provides utility to the interior contractor equal to that of the contract term. The value of each contract term can be determined by dividing the utility of each contract term by the utility of the project price condition and multiplying it by the value of the project price used in the study. The equation for calculating the value of each contract term is expressed as follows:

$$V_i = (U_i / U_P) \times \Delta \quad (6)$$

where V_i represents the value of the i^{th} contract term, U_i denotes the utility of the i^{th} contract term, U_p is the utility value of the project price condition, and Δ represents the value of the project price considered, which in this study is equivalent to 5% of the project price, since the proposed amount will not be reduced by 5%.

The advance payment term value of sample group No. 4 can be calculated from utility data in **Table 6** as an example of using equation (6). For sample group No. 4, the utility of the advance payment term (U_A) is 3.00 Util. (U_{Asp} = 3.00 Util., U_{Ast} = 0.00 Util.; 3.00 Util.– 0.00 Util.). The utility of the project price condition (U_P) is 2.50 Util. (U_{Psp} = 3.00 Util., U_{Pst} = 0.00 Util.; 2.50 Util. – 0.00 Util.). Thus, the utility of the advance payment term equal to 6% of the proposed project price (U_A = 3.00 Util., U_P = 2.50 Util., Δ = 5% of the proposed project price; (3.00 Util./2.50 Util.)* 5% of the proposed project price).

Table 8 presents the values of each contract term that have been calculated using the utility data from **Table 6**, as well as the average values of each contract term, which have been computed by weighting the value of each contract term of each group by their population.

Table 8. Values of the contract terms

Contract term	The value of the contract terms (in % of the proposed project price)								
	G. 1	G. 2	G. 3	G. 4	G. 5	G. 6	G. 7	G. 8	Average
Advance payment	3.00	0.00	3.00	6.00	6.00	5.00	7.00	8.75	5.06
Period of an interim payment	3.00	8.33	5.00	4.00	3.00	3.00	1.00	2.50	3.68
Period to make a payment	6.00	11.67	4.00	2.00	3.00	4.00	2.00	3.75	3.78
Sum of the three clauses	12.00	20.0	12.00	12.00	12.00	12.00	10.00	15.00	12.53

Values for each contract term from **Table 8** were rearranged in **Table 9**. For each term, the values of each group were sorted from highest to lowest. The population of each group was used to calculate the cumulative population (as a percentage of the total population) that the value of the contract term was greater than or equal to the specified value. The calculated data are shown in **Table 9**.

The contract term values and their cumulative population listed in **Table 9** were then plotted, the results of which are shown in **Figure 1**.

Data presented in **Table 8**, **Table 9**, and **Figure 1** provide the following insights. The value of the advance payment term to the interior contractor ranges from 0.00–8.75 % of the proposed price, the average value being 5.06% of it. More than 95.89% of the population value advance payment term is equal to (or more than) 6.00% of the proposed price.

The value of the period of an interim payment term to the interior contractor ranges from 1.00–8.33% of the proposed price, the average value being 3.68% of it. More than 83.93% of the population value advance payment term is equal to (or more than) 3.00% of the proposed price.

Table 9. The sorted contract term values from highest to lowest and its cumulative population

No.	Advance payment			Period of an interim payment			Period to make a payment			Sum of the three terms		
	Grp No.	Value	Acc. Pop. (%)	Grp No.	Value	Acc. Pop. (%)	Grp No.	Value	Acc. Pop. (%)	Grp No.	Value	Acc. Pop. (%)
1	8	8.75	9.82	2	8.33	4.46	2	11.67	4.46	2	20.00	4.46
2	7	7.00	16.07	3	5.00	24.11	1	6.00	12.50	8	15.00	14.28
3	4	6.00	38.39	4	4.00	46.43	3	4.00	32.14	1	12.00	22.32
4	5	6.00	50.89	1	3.00	54.6	6	4.00	49.11	3	12.00	41.96
5	6	5.00	67.86	5	3.00	66.96	8	3.75	58.93	4	12.00	64.29
6	3	3.00	87.50	6	3.00	83.93	5	3.00	71.43	5	12.00	76.79
7	1	3.00	95.54	8	2.50	93.75	4	2.00	93.75	6	12.00	93.75
8	2	0.00	100.00	7	1.25	100.00	7	2.00	100.00	7	10.00	100.00

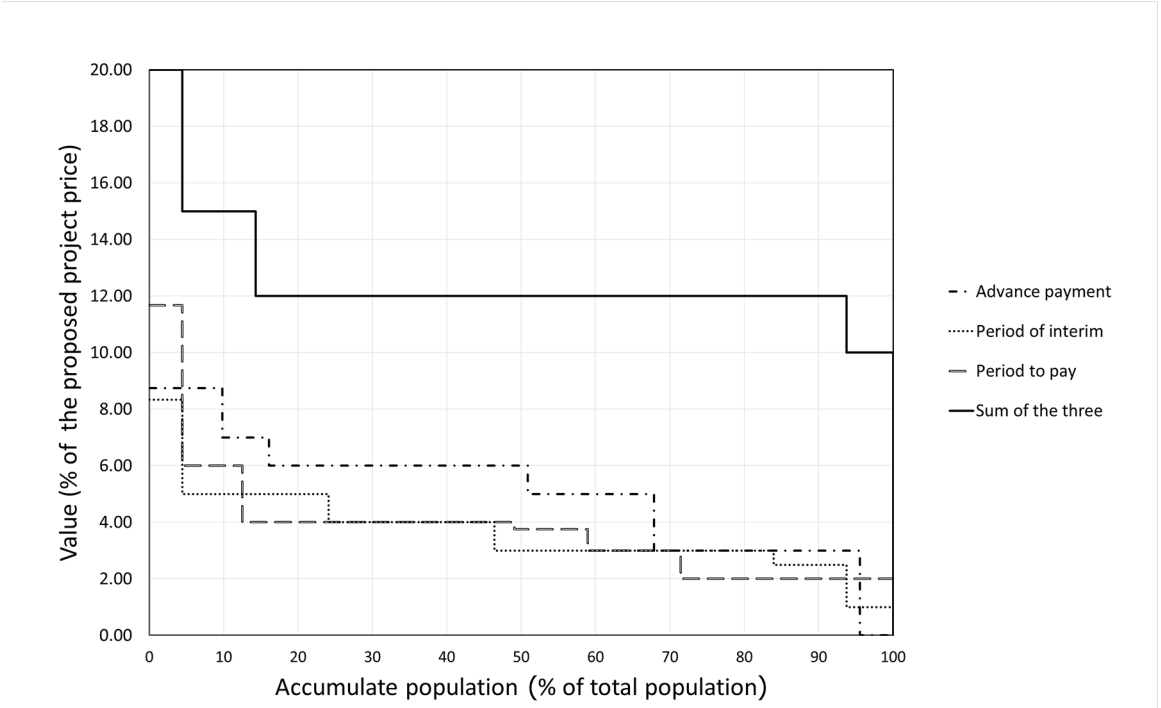

Figure 1. Contract term values and its cumulative population

The value of the period to make a payment term to the interior contractor ranges from 2.00–11.67 % of the proposed price, the average value being 3.78% of it. More than 58.93% of the population value advance payment term is equal to (or more than) 3.75% of the proposed price.

The value of the three contract terms to the interior contractor ranges from 10.00–20.00% of the proposed price, the average value being 12.53% of it. More than 93.78% of the population value advance payment term is equal to (or more than) 12.00% of the proposed price.

The findings of this study offer valuable insights to shopping center project owners and tenants, allowing them to negotiate prices more effectively with interior contractors. For instance, as illustrated in Figure 1, if a shopping center owner or tenant can revise the interim payment term from 30 days to 14 days, they may expect a project price reduction of between 1.25% and 8.33%. Additionally, the data suggests a 50% confidence level for a potential 4% decrease in the project price. Armed with this information, project owners and tenants can gain a better understanding of the value of each contract term and negotiate more favourable terms with the contractor, resulting in substantial cost savings for the project.

CONCLUSIONS

In this study, the conjoint analysis technique was applied to appraise the utility of three contract terms and the project price condition to interior contractors, the three contract terms being:

1. Advance payment term (receiving an advance payment of 30% of the contract price (repaid through 30% deductions from each progress payment)).
2. Period of an interim payment term (adjusting period of an interim payment term from 30 d to 14 d).
3. Period to make a payment term (adjusting period to make a payment term from 30 d to 14 d).

The project price condition considered is that the proposed amount will not be reduced by 5%.

The contribution of this research pertains to three areas. Firstly, results from this research showed that the average utility ratio of each term compared to the average utility ratio of project price ranged from 0.7226 –1.0182, suggesting that the three contract terms studied in this research are as essential to interior contractors as the project price condition.

Secondly, the values of the three contract terms calculated based on their utility were presented. The average value of the advance payment term, the period of an interim payment term, and the period to make a payment term were 5.06%, 3.68%, and 3.78% of the proposed price, respectively. Moreover, the average value of the three contract terms was 12.53% of the proposed price. This information should be helpful to project owners and tenants of shopping centers in their project price negotiations.

Finally, the results proved that the conjoint analysis technique could be effectively used to appraise the utility and value of contract terms. Future researchers could apply the analytical methods used in this research as a guideline to appraise the utility and value of other contract terms.

Limitations of the Research

Given that this study's sample group was limited to interior contractors working in 12 shopping centers owned by a public company in Thailand, it is important to exercise caution when applying the findings to negotiations with interior contractors in other shopping centers, particularly in estimating the utility value and value of the three contract terms for negotiating the contract price with contractors on projects outside of Thailand. Moreover, the variability in defining the scope and contract terms of interior projects across different countries, as well as differences in the attitudes of interior contractors towards project pricing, may limit the generalizability of this research to other contexts. Furthermore, the unique characteristics of interior work, such as its complexity, short contract time, and high profit margin, distinguish it from other types of construction work. Consequently, the findings of this research may not be directly applicable for negotiating with other types of construction contractors in Thailand or for interior projects in other countries.

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