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Ming-Teh Wang

Department of Civil Engineering, National Taiwan University, Taipei City, Taiwan, R.O.C., mtwang1@gmail.com

Su-Ling Fan

Department of Civil Engineering, Tamkang University, New Taipei City, Taiwan, R.O.C.

Chi-Chen Tsai

Department of Civil Engineering, National Taiwan University, Taipei City, Taiwan, R.O.C.

Luh-Maan Chang

Department of Civil Engineering, National Taiwan University, Taipei City, Taiwan, R.O.C.

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A COMPARISON OF FLOAT OWNERSHIP ISSUES FOR CONSTRUCTION PROJECTS BETWEEN TAIWAN AND CHINA

Ming-Teh Wang¹, Su-Ling Fan², Chi-Chen Tsai¹, and Luh-Maan Chang¹

Key words: contract administration, float, Taiwan, China.

ABSTRACT

Float ownership is a controversial issue in construction projects. This study, which focuses on Taiwan and China, finds that attitudes regarding float ownership differ among stakeholders with different national and occupational backgrounds. To avoid disputes, practitioners should notice these differences before signing contracts. This study uses surveys to identify the potential differences in attitude regarding three important float ownership issues. The results vary from a previous study undertaken in the United Kingdom. The major findings of the study include: (1) contracts need to include clauses related to float ownership; (2) Taiwanese contractors and Chinese owners tend to view the float as their own; (3) the concept that the party delaying the critical path should take full responsibility may not be practical in resolving inconsistent opinions between the contractor and the owner; (4) the idea of granting contractor time or compensation when owner uses up float is acceptable; and (5) viewpoints of Taiwanese and Chinese neutral parties have no significant differences.

I. INTRODUCTION

Float ownership is a controversial issue (Al-Gahtani, 2009; Hanson, 2006) and is fundamental to delay analysis (Peters, 2003). In delay analysis, we always take the term “float” to mean “total float,” which “represents the amount of the time by which the early finish date of any activity may be delayed without delaying the completion of the project.” (Person, 1991) Ownership is “the exclusive right to use, possess, and dispose of property.” (Martin, 2003) Therefore the meaning of float ownership should be the right to use, possess, and dispose of float.

Currently, there are three prevailing viewpoints regarding float ownership: (1) the contractor owns the float, (2) the owner owns the float, and (3) the project owns the float (Keane and Caletka, 2008). Though each idea is well supported, all three of these viewpoints have their weaknesses (Householder and Rutland, 1990; Person, 1991; Zack, 1993; De La Garza et al., 2007; Trauner et al., 2009). Courts and boards of contract appeals are accustomed to treating the float as belonging to the project on a first come-first served basis. Thus, the party which delays the critical path should take all responsibility. This concept is related to the legal principle which is called the “causation principle of proximate cause” (Wickwire, 2003) or the proximate cause principle.

However, this concept may not be accepted by some practitioners. The issue of whether compensation is justified when the float is used is another complicated issue. Certain protocols and specifications, such as the UK’s Society of Construction Law Delay and Disruption Protocol (SCL protocol) (SCL, 2002) and the US’s AACE International Recommended Practice 29R-03 Forensic Schedule Analysis Practice Guide (FSAPG 29R-03) formally address this issue (AACE, 2011). The UK’s SCL protocol states that the time can only be extended if the owner affects the path which has zero total float (Core Principle 7), and the contractor is entitled to compensation if the float is used by the owner (Core Principle 8). The US’s FSAPG 29R-03 states that the project owns the “Network Float” (Subsection 4.3.E). That means that the contractor might not have to recover compensation for the owner’s non-critical delay (Keane and Caletka, 2008).

Using contract language is a good method to resolve float ownership issues. In Taiwan and China, however, there are no provisions regarding float ownership included in the standard form of contracts (SAIC, 1999; PCC, 2008). Taiwan and China are both members of the World Trade Organization (WTO) and have acceded to the Agreement on Government Procurement (GPA). As a result, companies from each country are able to seek business in the other country in order to expand their construction markets. With a shared linguistic and cultural background, the opportunities for joint ventures in international construction markets by companies from Taiwan and China are also increased. Consistent recognition of float

Paper submitted 09/17/12; revised 12/25/13; accepted 01/10/14. Author for correspondence: Ming-Teh Wang (e-mail: mtwang1@gmail.com).

¹ Department of Civil Engineering, National Taiwan University, Taipei City, Taiwan, R.O.C.

² Department of Civil Engineering, Tamkang University, New Taipei City, Taiwan, R.O.C.

Table 1. Comparison of Institutions in Taiwan and China.

Institution		Taiwan	China
Informal constraints	Cultural norms	Group-oriented, guanxi (interpersonal relationships)	Group-oriented, guanxi (interpersonal relationships)
	Economic system	Free market economy	Transition economy
Formal constraints	Legal system	Civil law system	Civil law system
	Law enforcement	Rule of law	Executive-led government

ownership in construction contracts can reduce disputes. However, standard forms in Taiwanese and Chinese construction contracts typically do not include any specific or standard float clauses. Hence, project participants from Taiwan and China may disagree on the issue of float ownership.

The reasons why project participants from Taiwan and China may perceive float ownership differently may be attributed to their institutions. Market mechanisms in Taiwan and China differ greatly. Taiwan has a free-market economy, while China has made its transition from a centrally planned to a free market economy (Myers, 2008). For law enforcement, contractors in Taiwan mainly prefer to rely on mediation and arbitration to settle construction project disputes (PCC, 2001), whereas China prefers to make use of negotiation (Chan and Suen, 2005; Ling and Low, 2007). Additionally, administrative intervention by the government plays a major role in China (Table 1).

To date, most research has focused on the issue of float management when performing delay analysis to determine who is responsible for the delay (Pasiphol and Popescu, 1995; Al-Gahtani, 2007; De La Garza et al., 2007; Al-Gahtani, 2009). However, research has seldom addressed why participants hold different viewpoints regarding float ownership. Depending on the different positions of float ownership, the results of the delay analysis can vary (Arditi, 2006). The study advances research in comparisons of float ownership issues for two countries. The study, taking the cases of Taiwan and China, focuses on identifying differences and similarities in attitudes regarding float ownership in the early stages of a disagreement, thus avoiding the need to solve disputes in the later and more complicated stages of a dispute. After presenting the data, we discuss the reasons for the results and compare the results with a previous study from the United Kingdom. The study is presented as a step towards using Fisher's exact test to diagnose the similarities and differences in float ownership. If participants in international projects are able to fully discern their differences of opinion regarding float ownership, they may experience fewer disputes.

II. METHOD

1. Participants and Procedure

This paper surveys attitudes regarding float ownership issues among construction professionals in Taiwan and China. The survey results are then analyzed and meaningful findings are identified. The sample was selected from the authors'

pre-existing lists of construction professionals, as well as information gathered from the internet. Using a purposive sampling, 477 participants working in government offices, courts, universities, law firms, construction companies, construction law society, and arbitration institutes were selected and asked for their views via e-mail and hard copy. A total of 99 questionnaires were properly completed. The respondents were divided into six groups based on their occupation and the type of work they were engaged in: Taiwanese contractors' respondents (TCR), Taiwanese owners' respondents (TOR), Taiwanese neutral parties (TNP), Chinese contractors' respondents (CCR), Chinese owners' respondents (COR), and Chinese neutral parties (CNP). Participants placed in the owner's respondents category include government employees, contract administrators, and supervision engineers. The contractor's respondents category includes both main contractors and sub-contractors. The neutral parties' category includes lawyers, university professors, claim consultants, and arbitrators.

2. Measurement and Analyses

We have adapted the questionnaire of Scott et al. (2004), who surveyed practitioners in the United Kingdom for float ownership measurement (Scott et al., 2004). The three important float ownership issues from that study are: (1) who owns the float; (2) who is responsible for the delay if the contractor consumes float first; and (3) who is responsible for the delay if the owner consumes the float first. These three issues have been discussed in the other studies (Pickavance, 2000; Arditi, 2006) as well. Therefore, the instrument of Scott et al. (2004) appears to have good content validity. The questionnaire used in this research includes three questions, each corresponding to an issue mentioned above.

The first question (Q1) is: who owns the float? There are five answers to choose from: (1) the contractor should have the right to use the float; (2) the owner should have the right to use the float; (3) the float may be used by either the contractor or the owner, according to whichever party requires it; (4) float ownership should be clearly defined in the contract; and (5) don't know. In Q1, unlike the original questionnaire of Scott et al. (2004), we replaced the answer "Where the contractor does not require it, the employer should have use of the float." with the option of "the project owns the float."

The second question (Q2) and third question (Q3) are both based on the case study used by Scott et al. (2004): a construction project for a building has eight work items with two possible implementation paths (the "as planned" schedule,

Table 2. Basic information of the hypothetical case.

Activity	Activity Name	Duration (Weeks)	Predecessors
1	Clear site and set up offices	2	
2	Pier foundations	3	1
3	Erect steelwork	2	2(FS-1)
4	Paint steelwork	1	3
5	Clear site	1	4, 8
6	Services	2	1
7	Erect lamp posts and signs	1	6
8	Footpath paving & guardrail	1	7

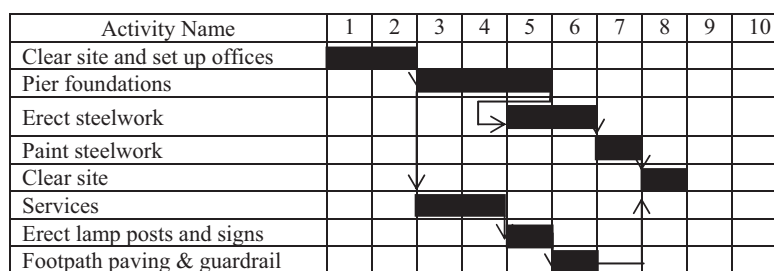


Fig. 1. Hypothetical case: as-planned schedule.



Fig. 2. Hypothetical case: as-built schedule for scenario 1.

shown in Table 2 and Fig. 1). For reasons attributable to the contractor, work is delayed (delivery of the lampposts is delayed), leading to a one-week delay in implementing the “erect lamp posts & signs” work item. Subsequently, there is a further delay attributable to the owner (instructions to perform additional footpath paving), leading to a one-week delay in implementing the “footpath paving and guardrail” work item. These two delays cause a combined one-week delay in overall project completion (i.e. the path in question had a one-week float). The study uses the formulas to describe the allocation of the one-week delay responsibility between the owner and the contractor. For example, in the formulas below, such as (T1, C1, D1), T1 denotes that the owner grants the contractor an extension of the construction period by one week, C1 denotes that the owner pays the contractor prolongation costs for a period of one week, and D1 denotes that the contractor should pay the owner liquidated damages for a period of one week.

The second question (Q2) is: if contractor-caused delay has occurred first, with owner-caused delay occurring later, how

should responsibility for the loss resulting from the one-week delay be apportioned between the owner and the contractor? The “as built” schedule is shown as a Gantt chart in Fig. 2. There are five answers to choose from: (T0, C0, D1), (T1, C0, D0), (T1, C1, D0), (T0.5, C0.5, D0.5), and “don’t know.” The third question (Q3) is: if the owner-caused delay has occurred first, with the contractor-caused delay occurring later, how should responsibility for the loss resulting from the one-week delay be apportioned between the owner and the contractor? The “as built” schedule is shown as a Gantt chart in Fig. 3. There are six answers to choose from: (T0, C0, D0), (T0, C0, D1), (T1, C0, D0), (T1, C1, D0), (T0.5, C0.5, D0.5), and “don’t know.” In Q2 and Q3, a “don’t know” answer choice is added, since the concept of float ownership is not yet widely known in Taiwan and China.

Various analysis methods and procedures were employed in this research. First, the surveyed data was entered into the computer software of Statistical Package for Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago). The most frequent values for each group were entered in place of missing values

Table 3. Basic profile of respondents.

Nationality	Category	Numbers of respondents	Work experience (percentage for each category)		
			Less than 2 years	2 until 5 years	More than 5 years
Taiwan	Contractors' Rep.	27	3.7	0	96.3
	Owners' Rep.	21	9.5	0	90.4
	Neutral parties	11	0	27.3	72.8
China	Contractors' Rep.	15	26.7	53.3	20.0
	Owners' Rep.	13	23.1	30.8	46.2
	Neutral parties*	12	27.3	18.2	54.6

Note. * One person does not wish to reveal their work experience.

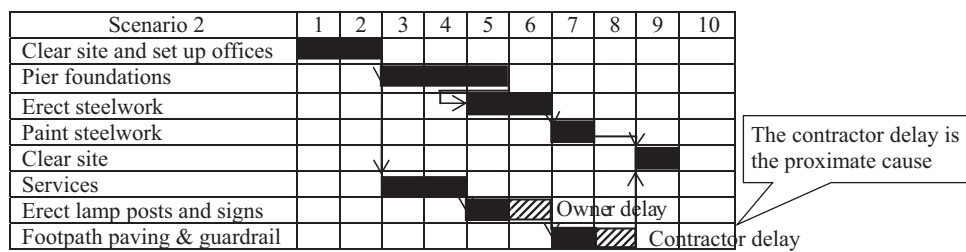


Fig. 3. Hypothetical case: as-built schedule for scenario 2.

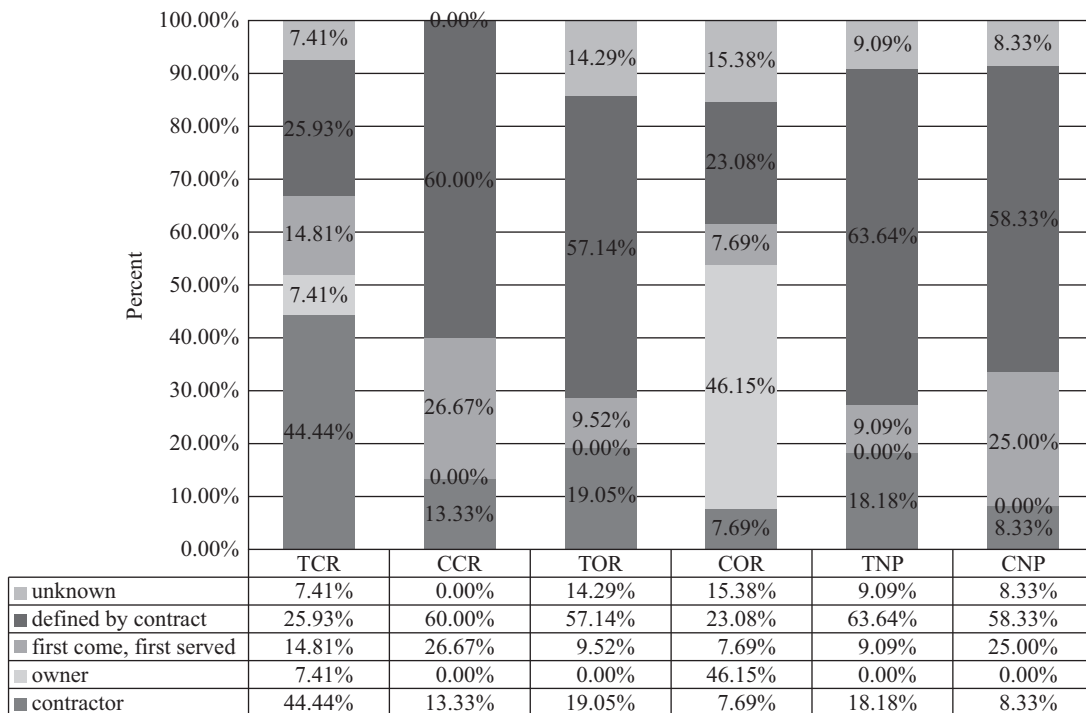


Fig. 4. Results of float ownership for issue 1.

(Kumar and Chadrasekar, 2010). Second, a clustered bar chart generated by SPSS software was used to assess the initial results. Finally, Fisher's exact test, which is useful for comparing nominal variables between two groups (Colman and Pulford, 2008) with relatively small size was used to detect national and group differences. The two-sided significance

level was set at $p = 0.05$ at the 95% confidence level.

III. RESULTS

Table 3 displays the basic profile of the respondents to the survey in the study. 59 completed questionnaires were ob-

Table 4. Statistical results for issue 1.

	TCR	TOR	TNP	CCR	COR	CNP
TCR	—					
TOR	0.109	—				
TNP	0.226	1.000	—			
CCR	0.064	0.323	0.552	—		
COR	0.018*	0.007*	0.041*	0.004*	—	
CNP	0.098	0.634	0.829	0.922	0.031*	—

Note. * $P < 0.05$

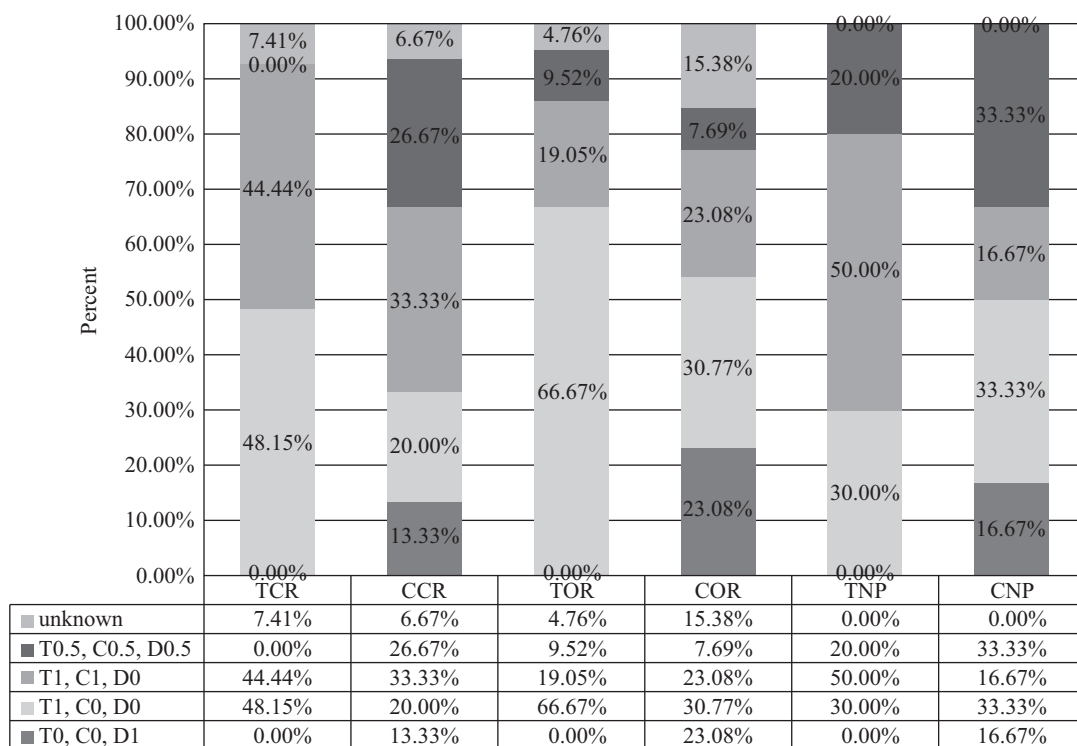


Fig. 5. Results of float ownership for issue 2.

tained in Taiwan, including 27 from contractors’ respondents, 21 from owners’ respondents, and 11 from neutral parties. 40 completed questionnaires were obtained from China, including 15 from contractors’ respondents, 13 from owners’ respondents, and 12 from neutral parties.

1. Results of Issue 1: Initial Float Ownership Issue

Fig. 4 shows the results of float ownership for issue 1. Most Taiwanese contractors’ respondents (TCR) said that the float belongs to the contractor (44.44%), which is very different from other surveyed groups in Taiwan. Similarly, Chinese owners’ respondents (COR) most commonly agree that the float belongs to the owner (46.15%), which is also very different from other surveyed groups in China. The other 4 groups all support the idea that the bearer of the right to use the float should be clearly defined in the contract (TOR = 57.14%, TNP = 63.64%, CCR = 60.00%, CNP = 58.33%).

Fisher’s exact test further confirms these differences. Table 4 shows that, at the 95% confidence level, there is a significant relationship ($P < 0.05$) between the following pairs: Taiwanese contractors’ respondents and Chinese owners’ respondents ($P = 0.018$), Taiwanese owners’ respondents and Chinese owners’ respondents ($P = 0.007$), Taiwanese neutral parties and Chinese owners’ respondents ($P = 0.041$), Chinese contractors’ respondents and Chinese owners’ respondents ($P = 0.004$), Chinese neutral parties and Chinese owners’ respondents ($P = 0.031$).

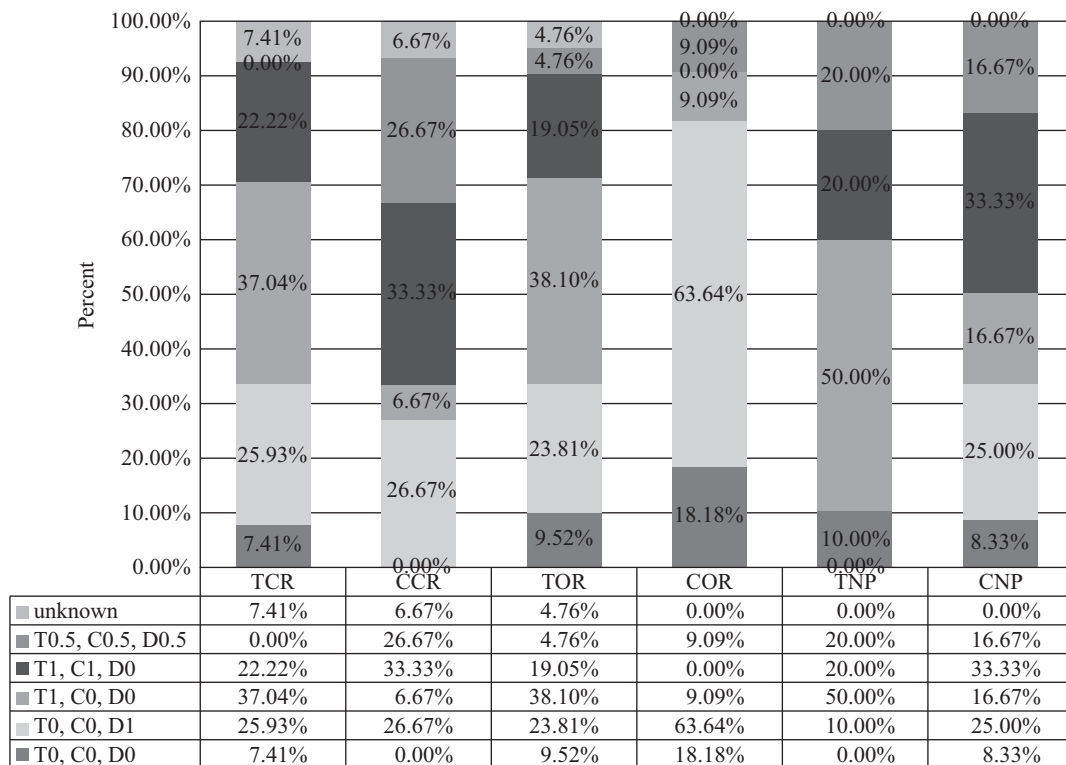
2. Results of Issue 2: Contractor Delays First

Fig. 5 shows the results of float ownership for issue 2. Taiwanese contractors’ respondents (TCR) are most likely to choose T1, C0, D0 (= 48.15%), whereas for Chinese it was T1, C1, D0 (= 33.33%). Among owner respondents, Taiwanese are most likely to choose T1, C0, D0 (= 66.67%), whereas for

Table 5. Statistical results for issue 2.

	TCR	TOR	TNP	CCR	COR	CNP
TCR	—					
TOR	0.110	—				
TNP	0.154	0.125	—			
CCR	0.007*	0.028*	0.804	—		
COR	0.022*	0.083	0.320	0.670	—	
CNP	0.002*	0.083	0.381	0.840	0.556	—

Note. * $P < 0.05$

**Fig. 6. Results of float ownership for issue 3.**

Chinese it was T1, C0, D0 (= 30.77%). For neutral parties, most Taiwanese chose T1, C1, D0 (= 50.00%), whereas Chinese were more likely to choose T1, C0, D0 (= 33.33%) and T0.5, C0.5, D0.5 (= 33.33%).

Fisher's exact test of the results obtained for issue 2, as shown in Table 5, it is noted, at the 95% confidence level, there is a significant relationship between the following pairs: Taiwanese contractors' respondents and Chinese contractors' respondents ($P = 0.007$), Taiwanese contractors' respondents and Chinese owners' respondents ($P = 0.022$), Taiwanese contractors' respondents and Chinese neutral parties ($P = 0.002$), and Taiwanese owners' respondents and Chinese contractors' respondents ($P = 0.028$).

3. Results of Issue 3: Owner Delays First

Fig. 6 shows the results of float ownership for issue 3. Among contractor respondents, Taiwanese contractors' respondents

(TCR) most commonly chose T1, C0, D0 (= 37.04%), whereas for Chinese it was T1, C1, D0 (= 33.33%). For owner respondents, Taiwanese owners most commonly preferred T1, C0, D0 (= 38.10%), which is very different from the most popular Chinese choice of T0, C0, D1 (= 63.64%). In the category of neutral parties, Taiwanese neutral parties, like other Taiwanese groups, were most likely to choose T1, C0, D0 (= 50.00%), whereas Chinese neutral parties were most likely to choose T1, C1, D0 (= 33.33%).

Fisher's exact test analysis of the results obtained for issue 3 suggests that Chinese owners' attitudes are very different from those of TCR, TOR, TNP, and CCR. Table 6 shows that at the 95% confidence level, there is a significant relationship between the following pairs: Taiwanese contractors' respondents and Chinese contractors' respondents ($P = 0.025$), Chinese owners' respondents and Taiwanese contractors' respondents ($P = 0.026$), Chinese owners' respondents and Taiwanese

Table 6. Statistical results for issue 3.

	TCR	TOR	TNP	CCR	COR	CNP
TCR	—					
TOR	0.974	—				
TNP	0.281	0.669	—			
CCR	0.025*	0.097	0.173	—		
COR	0.026*	0.084	0.010*	0.044*	—	
CNP	0.276	0.672	0.480	0.924	0.164	—

Note. * $P < 0.05$

neutral parties ($P = 0.010$), Chinese owners' respondents and Chinese contractors' respondents ($P = 0.044$).

IV. DISSCUSSION

In this study, we propose that construction stakeholders with different national and occupational backgrounds have different attitudes regarding float ownership. A key contribution of the study is its range of data, gathered from multiple principle stakeholders—owners, contractors and neutral parties. Further, we investigated respondents from more than one country in the construction industry, an approach seldom taken in previous research. Furthermore, Fisher's exact test was applied to search for statistical differences in the relatively small sample size.

The findings of this study contribute to float ownership literature in the following ways. First, allowing float ownership to be defined in the contract is clearly a popular option. The results show that Taiwanese owners' respondents, Taiwanese neutral parties, Chinese contractors' respondents and Chinese neutral parties all think it better to clarify the float ownership in the contract. This finding further supports the perception found in other studies that float ownership should be regulated in the contract (De Leon, 1986; Arditi and Pattanakitchamroon, 2006; Al-Gahtani, 2009).

Second, the results of this research suggest that Taiwanese contractors and Chinese owners both view the float as belonging to themselves. This difference may be due to the different transaction mechanisms in Taiwan and China. While Taiwan possesses a free market economy and operates on capitalist principles, China's economy is planned in accordance with its communist system. If the float is viewed as a kind of asset, in a communist system it must, like all other assets, belong to the state, while in a capitalist system it is the object of competition in the free market. While administrative power is strong in a planned economy, the owner possesses the greatest power to own assets in monopolistic construction markets.

Third, the recent perspective provided by the common practice that the party who delays the critical path should take all responsibility may not be practical in resolving inconsistent opinions between the contractor and the owner. This view might even be used as a tool to support the contracting party

themselves. For taking Taiwanese contractors' responses for example, in issue 2, when the owner's delay was the proximate cause, 44.44% of Taiwanese contractors' respondents chose T1, C1, D0, however, when the contractor's delay was the proximate in issue 3, only 25.93% of Taiwanese contractors' respondents chose T0, C0, D1.

Fourth, granting the contractor time or compensation seems to be acceptable in both Taiwan and China. The results of issue 3 demonstrate that even when the contractor is the proximate cause of project delay, several stakeholders, including Taiwanese contractors' respondents, Taiwanese owners' respondents, Taiwanese neutral parties, Chinese contractors' respondents and Chinese neutral parties, view the granting of time or cost to contractor as acceptable.

Fifth, the study finds that the views of Taiwanese neutral parties and Chinese neutral parties are similar. This is evidenced by the fact that neutral parties from different nationalities but the same occupation holding similar views. This is in contrast to the opinions of Taiwanese contractors, which differ from the opinions of Chinese contractors for issues 2 and 3, and the opinions of Taiwanese owners, which differ from the opinions of Chinese owners on issue 1. Consequently, findings show that decisions from neutral parties are not affected by their nationality or occupation. The opinions of neutral parties may be an important reference for both contractors and owners.

Sixth, our study differs considerably from the British study of Scott et al. (2004). Because there are different numbers in each group in our study, a weighted summation calculation is performed for calculating the overall results (Table 7). The overall results show that Taiwanese respondents tend to view the float ownership issue as a risk-sharing issue because a plurality selected answer T1, C0, D0 in issues 2 and 3. Chinese respondents appear to hold the view that the float belongs to the project because most of them selected T1, C0, D0 and T0, C0, D1 in issues 2 and 3 respectively. Respondents from the United Kingdom, however, appeared to hold the view that the float belongs to the contractor because most chose T1, C1, D0 both in issue 2 and 3. Both Chinese and Taiwanese contractors are reluctant to claim compensation when a delay has occurred, which may be attributed to the fact that both Taiwan and China have similar culture norms. Taiwanese and Chinese contractors are likely to view maintaining good guanxi

Table 7. Overall statistical results.

Countries surveyed	Issue 1	Issue 2	Issue 3
	Answer category	Answer category	Answer category
Survey in Taiwan	Defined by contract	T1, C0, D0	T1, C0, D0
Survey in China	Defined by contract	T1, C0, D0	T0, C0, D1
Survey in the UK	Contractor	T1, C1, D0	T1, C1, D0

(interpersonal relationships) with the owner or owner as being more important than claiming compensation. In both Taiwan and the United Kingdom an extension of time may be granted in issue 3, perhaps attributable to their free market economies where the general feeling is that ownership of the float can be treated as private property.

There is a limitation to this research. The response rate of this survey is 20.8%. The reason for this low response rate may be due to the conservative norms of Taiwanese and Chinese culture, which shows reluctance to express opinions in questionnaires. Notwithstanding the limitation, the study illustrates several practical implications. Despite the shared linguistic and cultural background of Taiwanese stakeholders and Chinese stakeholders, both parties should maintain caution when handling float ownership. In particular, Taiwanese stakeholders need to clarify float ownership issues with Chinese owners before they sign a contract. So do Chinese stakeholders who cooperate with Taiwanese contractors. If owners and contractors cannot reach an agreement, advice of neutral parties will be helpful for both parties.

In this paper, we offer a research into three float ownership issues, which are selected for comparison between Taiwan and China. Having a comparison between the two, we hope that in the future the scale of similar research will be enlarged in order to investigate these issues even more thoroughly in the cross-strait context. For example, future questionnaires might take into account the factors of transaction mechanisms, law enforcement, the proximate cause principle or neutral events. In addition, future studies could also use economic analysis to model float ownership, based on the functions of schedule planning and float usage, and their impact on both the timing and cost to the project parties.

V. CONCLUSIONS

The study investigated the opinions collected by Taiwanese and Chinese construction participants on float ownership issues. The main findings of the study are: (1) clearly defining float ownership in the contract is a preference of most participants except Chinese owners and Taiwanese contractors; (2) both Taiwanese contractors and Chinese owners contend that the float should belong to themselves; (3) the concept that the party delaying the critical path should take full responsibility may not be practical in resolving inconsistent opinions between the contractor and the owner; (4) the idea of granting the contractor time or compensation, when the owner uses up

the float and project delay occurs, is acceptable in Taiwan and China, except Chinese owners; (5) the neutral parties of Taiwan and China have no significant differences on the three survey issues to each other; and (6) the attitudes regarding float ownership from Taiwanese and Chinese stakeholders are considerably different from those of British ones.

Although Taiwan and China possess similar cultural backgrounds and legal systems, the different institutions of their economies and marketing mechanisms may induce divergent opinions on these issues. However, if participants can reconcile these different opinions in executing a project, the disputes may be reduced and efficiency of the project can be greatly enhanced.

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