

Control in an Inter-Organisational Context: Measuring and Managing Sub-Contractors' Performance

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Abstract

Purpose: This study examined the performance management and control system used by a construction organisation to assess and manage their subcontractors' performance.

Design/methodology/approach: A case study approach was conducted using semi-structured interviews with managers from a construction company and two of its subcontractors. Data were also collected by attending eight sessions of site coordination meetings (SCM) and reviewing corresponding documents. Benchmarking with a set of performance criteria was also conducted. Data were analysed using thematic analysis by categorising qualitative evidence into codes and forming themes.

Findings: Time and quality measures were the most heavily weighted factors in measuring the performance of the subcontractors, with the other measures being occupational safety and health (OSH), workforce productivity, commitment, and communication effectiveness. The cost measures were not emphasised, as it was factored into the contract agreement. The performance measurement system was not seen to be effective in ensuring satisfactory project performance, due to vague contractual agreements.

Research limitations: The findings of this study do not represent the entire industry as the data collected were solely from a single construction organization.

Practical implications: The flaws and inadequacy in the fundamental processes of performance management system (e.g., the ambiguities in the contract terms, the single-loop feedback, a reward and punishment system, and traditional performance measures) contributed to the long unresolved unsatisfactory performance of the Malaysian construction sector.

Originality/value: This study provides insights into how a contemporary construction organisation utilise a performance management and control system to manage the performance of their subcontractors in a complex multi-organisational collaboration.

Keywords: Performance management, control system, construction, subcontractor performance

Introduction

Construction activities are typically heterogeneous, and often involve multi-disciplinary tasks requiring the collaboration of multiple contractors of different trades and expertise, as it is difficult for a single contractor to execute all the various construction activities (Bingol & Polat, 2020). Therefore, construction organisations commonly adopt the subcontracting practice during the project implementation stage, breaking down the building contract into smaller parts and subletting to other specialty contractors (hereinafter referred to as subcontractors). A subcontractor is a party that carries out a specific work scope that cannot be efficiently performed by the main contractors (Choudhry et al. (2012). The subcontracting practice, if not managed properly, is likely to result in adverse effects on project performance, creating further challenges for the construction organisations (Tam et al., 2011).

Owing to the high involvement of subcontractors in construction supply chain integration, the project performance is notably dependent on the collective performance of the subcontractors (Bingol & Polat, 2020). Thus, to overcome the project performance issues, a performance management and control system ought to be in place to effectively measure and manage the performance of the construction subcontractors who operate in the multi-organisational project environment. Such a system must be configured contemporarily to match the unique conditions and needs of the project itself. Furthermore, it must also be able to assist construction organisations in making decisions pertaining to the improvement of project performance (Chan, 2009). Therefore, this study aimed to examine how a construction organisation uses a performance management system (PMS) to manage the performance of their subcontractors during the construction stage. In so doing, this study also benchmarked the performance measures used against the best practice in the industry, as suggested by previous researchers.

Even though performance management and control systems have formed a subject of research in the construction industry (Bingol & Polat, 2020), most of this research focuses on identifying success factors, and performance measurement at the organisational and project level of construction organisation. In terms of managing construction subcontractors for project performance, many studies focused on the subcontractor prequalification and selection method. However, there is a lack of insight regarding PMS use by construction companies to evaluate and manage their subcontractor performance. In essence, this study aims to contribute to the collective knowledge on effective PMS use in managing subcontractors' performance by exploring the systems used by a contemporary construction organisation. It provides insight and clarity regarding the PMS processes that require refinements and modifications as part of the change management which aligns PMS with contextualised project performance goals. This research also pinpoints the weakness of PMS in handling subcontractors, which contributes to poor project performance.

The remainder of this paper is structured as follows: Section 2 presents the findings from the literature review; Section 3 explains the proposed theoretical framework; Section 4 describes the methodology used to conduct the study; Section 5 provides the findings; Section 6 discusses the implications of the research findings; and Section 7 provides a conclusion for this study.

Literature Review

Performance management system (PMS) use in multi-organisational collaboration

In the literature, the plethora of perspectives on the concept of collaboration have resulted in many forms and definitions of the terms, depending on the disciplines in question (Bedwell et

al., 2012; Saukko et al., 2020). An interesting definition was expressed by Bedwell et al. (2012), who noted collaboration as “an evolving process whereby two or more social entities actively and reciprocally engage in joint activities aimed at achieving at least one shared goal” (Bedwell et al., 2012). The emphasis on an *evolving process* implies that the different parties engage and interact in a dynamic and continuously changing organisational environment, aiming at achieving the desired outcome(s) to improve the organisation’s competitive advantages, as collaboration promises more opportunities for resources and the combination of resources.

In a competitive business environment, multi-organisational collaboration is considered an effective approach to overcome many challenges. According to Panahifar et al. (2018), effective collaboration significantly influences an organisation’s performance, making the performance management system, at an organisational level, indispensable for continuous improvements and success (Ramanathan, 2014). A performance management system (PMS) refers to a system for defining, controlling and managing the achievement of organisational outcomes, along with the actions taken to achieve the outcomes (Otley, 1999; Broadbent & Laughlin, 2009; Ferreira & Otley, 2009). In a multi-organisational context, Van Fenema and Keers (2018) defined the role of PMS as concerning structures and processes, enabling the system to represent and provide information to an organisational level PMS, to define objectives shared by cooperating organisations, and to align the actual value creation in achieving the established objectives.

Whilst many studies emphasise the benefits of collaboration in a multi-organisational context, prior research has also challenged the use and measurement of collaboration, due to a lack of unified understanding of behaviours and practices (Saukko et al., 2020), implying the complex nature of multi-organisational collaboration. In engineering project collaboration, Børve et al. (2017, p.1002) highlighted a few important features of multi-organisational collaboration: “commitment to mutual project objectives, collaborative problem solving, and a joint governance structure in facilitating collaborative relationships and trust”. Hence, the use of a PMS in a multi-organisational collaboration context is crucially important for improving project delivery performance, helping organisations to establish better communication, orientation of interests and objectives, trust, and teamwork.

Performance management in construction organisations

Many organisations operate in an environment featuring high-intensity collaboration involving multiple parties. This phenomenon has led to a growing consensus on the importance of inter-organisational management control (Che Ibrahim et al., 2020). Realising effective performance management for a construction project requires the collective performance of multiple subcontractors, who possess different characteristics in terms of expertise and specialisation, signifying a challenging task to be completed by the organisation, as subcontractors might possess different interests or goals in a project. However, Choudhry et al. (2012) commented that there was a lack of focus on the issues pertinent to construction subcontractors, implying a greater challenge for collective performance. In more recent studies, the performance management and control systems used by construction organisations in evaluating their subcontractors during the project implementation stage were hardly explored. For example, a recent study conducted by Adinyira et al. (2020) examined the relationship between subcontractor risk management and quality performance, whereas El-khalek et al. (2019) studied the long-debated subcontractor prequalification and selection method for project success.

Whilst there have been many studies discussing PMS in different contexts, PMS issues in construction organisations remain under-explored. This explains the long unresolved issues of design and use of a PMS for evaluating and monitoring subcontractor performance during the project execution stage. Therefore, this study intends to fill the research gap in the literature by investigating PMS use to manage subcontractors' performance in the complex inter-organisational construction project environment, specifically the PMS used during the project execution stage.

Measures for project performance

In measuring construction project performance, the assessment criteria have now shifted towards a more balanced form, with the addition of new perspectives and indicators (Yong & Mustafa, 2013). For example, in managing and measuring the performance supply chain at the construction stage, organisations could adopt various performance criteria which ultimately align with the strategic objectives of the construction organisations. However, it is important to note that these performance measures need to be defined in accordance with the subject (stakeholder), and should be based on the purpose and the use of performance measurement (Tripathi & Jha, 2018).

This study undertook a review of previous literature to identify the best practices for performance criteria in assessing subcontractor performance during the construction stage. The construction performance indicators summarised from the previous studies include: completion and delivery of a project on time (Chan & Chan, 2004; Memon et al., 2014); project completed within budget (Chan & Chan, 2004; Ribeiro et al., 2013); quality and conformity of works (Chan & Chan, 2004; Tunji-Olayeni et al., 2014); construction wastage; subcontractor's self-implementation of project quality plan (PQP); occupational health and safety (OSH) (Chan & Chan, 2004; Manu et al., 2013); workforce productivity (Chan & Chan, 2004; Tunji-Olayeni et al., 2014); active and effective communication link (Bingol & Polat, 2017); social-environmental performance (Chan & Chan, 2004; Chan, 2009); and subcontractor's commitment (Yong & Mustafa, 2013). Table 1 shows the criteria for assessing a subcontractor's performance in construction projects.

Table 1. Performance criteria relevant to assessing subcontractor's performance.

No	Criteria
1	Complete within project cost
2	Complete within project schedule
3	Deliver high-quality work and high conformity
4	Material wastage
5	Implementation of project quality plan (PQP)
6	Occupational health and safety
7	Workforce productivity
8	Active and effective communication
9	Social-environmental performance
10	Commitment

Conceptual Framework

This research is underpinned by Otley's (1999) performance management framework, which addressed five questions reflecting the managerial perspective on organisational goals and

objectives, strategies and plans, target setting, rewards, and feedbacks. Therefore, the role of information usage is included in the framework of this research. Figure 1 shows the conceptual framework developed for this study. It analyses the performance management activities of the construction organisation in managing their subcontractors' performance using Otley's (1999) PMS framework. The use of information was also explored as the medium to enable the effective implementation of PMS for evaluating and managing subcontractors' performance.

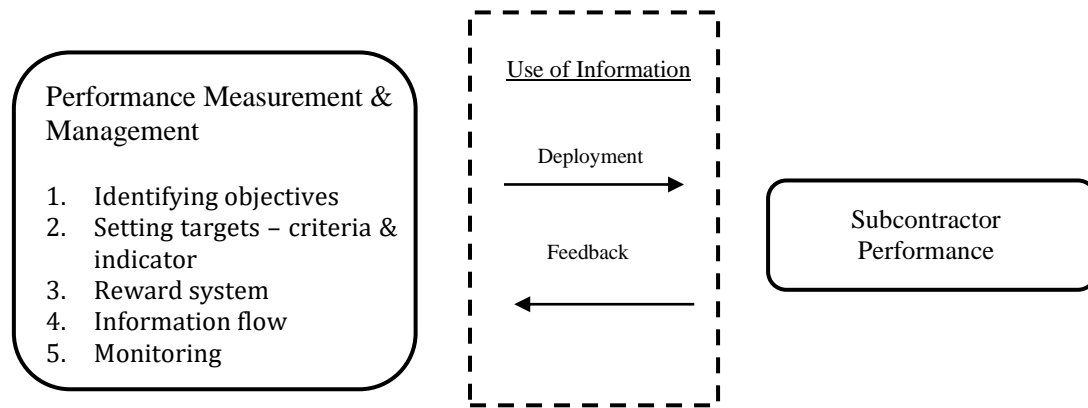


Figure 1. Conceptual framework

Method

Research design

A single-case study approach was utilised in this research, as the research questions could be answered by detailed descriptions and subjective experiences of the subject. In addition, the complex nature of the research subject, and the involvement of multiple entities, generated great ambiguity, which could be appropriately dealt with by using a case study method (Noor, 2008). Therefore, a case study approach was selected, as an efficacious and strategic research methodology enabling meaningful findings on the research issues.

Setting and participants

This case involved a construction company, the Main Contractor (TMC)¹, engaging in various large-scale construction projects throughout Malaysia. This contractor was selected as it is a major contractor with various subcontractors. In order to ensure better insights, the managers of TMC's subcontractors (Subcon1 and Subcon2) were also interviewed.

TMC carries out numerous construction projects in various locations in Malaysia, and most of their projects include private high-rise buildings, such as commercial and residential towers. TMC's primary activities involve coordinating and managing their subcontractors (numbering 10-20 in each project) during project execution. TMC is also responsible for liaising with project clients and consultants to resolve technical issues pertaining to the construction work. In addition, TMC provides site directions for subcontractors, as well as the necessary machinery and space required for the jobs.

Subcon1 is a subcontractor specialising in electrical engineering for construction projects. Their scope of work involves supplying and fixing electrical conduits, and wiring work to energise buildings. Subcon2 is a subcontracting company specialising in architectural trades.

¹ The company names of the main contractor and its subcontractors have been changed to protect the confidentiality of the companies.

Their scope of work includes masonry, wall plastering and flooring. These two subcontractors shared a substantial amount of the total sublet contracts of the project.

A total of ten informants were interviewed. These participants were selected using a purposive sampling method. That is to say, the suitability of the participants was justified as (i) they were executives and managers currently serving in a construction company, (ii) were familiar with construction and subcontracting practices, and (iii) possessed knowledge and experience in managing, and were involved in appraising subcontractors.

Data collection and analysis

Eight participants from TMC and one each from Subcon1 and Subcon2 were interviewed. Those interviewed were one project director, one project manager, two mechanical and electrical department managers, one construction manager, one site supervisor, one site safety and health supervisor, one QAQC officer, and one site supervisor for each subcon. Semi-structured interviewing was used as the primary source of data collection. During the interviews, the participants were given the autonomy to share their experiences and perceptions on the interview questions pertaining to the research objectives. All interview sessions were conducted between December 2020 and April 2021 at the project site office of TMC, and audiotaped (with prior permission from the interviewees).

Data were also collected during site coordination meetings (SCM) held at the project site. A total of eight SCM sessions were attended, and corresponding documents such as meeting minutes and progress reports were reviewed. The SCMs were also attended by TMC's various subcontractors, including Subcon1 and Subcon2, and the project consultants. The minutes of meetings and progress reports prepared by TMC were used to compare against and triangulate the interview results of the participants.

Data analysis began as soon as data were collected. The process of data analysis was concurrent with data collection to form an iterating cycle for the continuous refinement of subsequent interview contents, in order to unravel more elaborate accounts and evidence. Subsequently, using the thematic data analysis method proposed by Attride-Strling (2001), the documented data were read repeatedly to identify meaningful codes (basic themes) and cluster them into organizing themes. After these themes had been identified, it was arranged into a broader theme that could explain or conclude the interpretation of the patterns.

Findings

Measures for evaluating subcontractors' performance

Interview results showed that the measures used by TMC to measure and manage their subcontractors are aligned with traditional performance indicators, such as the cost, and time and quality of Atkinson's (1999) Iron Triangle, as the TMC project manager commented:

For every project, the three major objectives are cost, time and quality ... The industry is still cost- and profit-oriented.

In TMC, time and quality were the most heavily weighted factors in measuring the performance of the contractors. The performance of a subcontractor is rated and heavily influenced by their ability to complete a task according to the work programme². In addition, the work quality of

² In construction terminology, a work programme refers to the timeline by which the contractors are supposed to complete the projects.

subcontractors was also valued; quality issues were among the most frequently discussed matters in the SCMs. Surprisingly, cost factors were not emphasised in evaluating a subcontractor's performance. As explained by the TMC M&E manager, the cost performance of their subcontractors will not influence the overall project performance. This is because the total cost of the project is already estimated and factored into the contract agreement before the commencement of the project, and the affiliated subcontractors include their estimated cost for their service with an added profit margin. In other words, when a subcontractor performs poorly in terms of costing and budgeting, the loss is solely incurred by the subcontracting company, and TMC does not bear any consequences from the loss. The cost factors were fixed before the project had started, and the contract awarded to the subcontractors acted as a control to guarantee TMC performance in terms of cost incurred.

Despite the focus on traditional measures of time and quality, there was evidence of other measures used to appraise subcontractors. Observation results showed that among these measures were: (1) occupational safety and health (OSH), (2) workforce productivity, (3) subcontractor's commitment, and (4) active and effective communication. Safety performance became an important measure because of the regulations and monitoring from local authorities such as the Malaysian Construction Industry Development Board (CIDB) and the Department of Occupational Safety and Health (DOSH). Workforce productivity, active communication and the commitment of subcontractors are directly linked to the project's time and quality performance. These leading indicators provide early signs of failing to fulfil targets, in addition to the conventional time and quality measurements:

...many tasks are interdependent and in order for the work to operate at full efficiency, we need to have a proper plan or micro-schedule. The managers will come up with a detailed work programme for the subcontractors and this programme would be disrupted if we do not monitor the progress closely. Therefore, we have been actively assessing the productivity of our subcontractors and whether they can communicate with each other to resolve potential issues that could jeopardise the programme.
– TMC M&E manager

While the literature suggested other construction project performance criteria such as wastage, environmental sustainability, and the internal implementation of a Project Quality Plan (PQP), these criteria were not emphasised by TMC. Wastage of subcontractors was not monitored nor controlled by TMC, because the loss generated from high wastage would be incurred by the subcontractors. Even though TMC recognised the implementation of PQP by subcontractors themselves as a sign of social responsibilities and quality management, they did not require the subcontractors to exercise such a practice themselves; instead, TMC viewed the PQP as their own responsibility, as the main contractor managing the project. Furthermore, TMC also did not expect their subcontractors to practise sustainable construction, with the subcontractors being smaller companies, as explained by TMC's project manager:

Most of the subcontractors are smaller companies with a small financial capability. As a result, it is difficult for us to demand for sustainable construction that requires process refinements at a cost. We are aware of the importance of sustainability, and what we can do is, at least for our part, we offer them assistance. For example, in terms of environmental performance, we carry out regular housekeeping to keep air and water pollution at the lowest level at the project site.

Additional Measures due to pandemic

Construction projects are prone to uncertainties, which obscure the successful implementation of project plans. Further to the COVID-19 outbreak in Malaysia in 2020, TMC introduced new additional measures of performance to enable their projects to continue during the pandemic. First, most of the formal communications, such as the periodical SCMs, were replaced by virtual meetings to reduce the risk of contact. Second, they improvised different contextual targets in their subcontractor performance measurement. For instance, in conjunction with the nation’s reopening of the economic sectors during the COVID-19 pandemic, the Malaysian Ministry of Health (MOH) and DOSH have implemented new protocols for safe workplace procedures (SWP). For this reason, TMC instituted the subcontractors’ compliance with the SWP for COVID-19 prevention as one of the performance criteria. Table 3 shows the additional performance measures.

Table 2. New performance measures following the COVID-19 pandemic.

Criteria	Performance measures (Number of violations / non-compliance)	References
Number of violations of SWP	<ul style="list-style-type: none"> • Not wearing / Improperly wearing face-mask. • Enter work site without measuring body temperature. • New workers enter site without submitting viral test results from health facility. • Not complying with social distancing. 	DOSH (2020)

TMC’s project manager also emphasised the importance of having dynamism in performance management and control, whereby performance criteria and measures should be flexible in accordance with the situational factors and operating environment. For example, TMC’s subcontractors were supposed to increase their manpower to improve productivity and accelerate site works. However, the tightening of national borders due to the inflow of expatriates (who make up a majority of the construction site workforce) was greatly increased. In this case, TMC stated that they “*compromised on our (their) expectations towards the subcontractor’s productivity.*” Moreover, TMC included the new performance measures and monitored their subcontractors for compliance with COVID-19 SWP on a regular basis. Their performance in terms of these criteria was also tied to punitive measures.

...We have to adapt to the new norms just like other organisations. Our project is delayed but, at the same time, we also understand that our subcontractors are being constrained by many factors as a result of the pandemic. At this period of tough time, it is very difficult to get resources such as construction workers, which a majority of them are foreign workforce because the Malaysian borders were tightened to the entrance of expatriates. ... All workers including the subcontractors now must wear face masks and go through temperature screening before entering the workplace. Our safety and health department will check their compliance on a regular basis. Any violation would be penalised accordingly.

– TMC project manager

The limitation of the performance measurement system: Vague contract agreements

The PMS system was not effective due to the vague contract agreements. TMC managers recognised the importance of PMS in managing subcontractor performance, but, at the same time, they also acknowledged the shortcomings of the system, as the system was developed by HQ and did not incorporate in detail the specific nature of the project site. Hence, the contracts, in general, have common features with only slight variations for each specific project

...we have a systematic approach to manage our subcontractors. It (the system) was developed by the headquarters, and all our projects have to conform to the processes of the system. However, we also face difficulties in the system due to contextual factors.
– TMC construction manager

Similarly, interviewees from Subcon1 and Subcon2 agreed that the system being implemented by TMC to measure and manage their performance during the project construction stage was not effective:

They have a very established and good PMS. But when it comes to the execution of this performance management plan, it is rather below their expectation.
– Subcon1's supervisor

Similar to other construction companies, TMC established their expectations of subcontractors using a formal contract, which set forth the obligation between the parties in the collaboration. This form of contract is used to accommodate the complicated nature of construction activities, and the well-defined terms in the contract serve as a medium of delivering the objectives and expectations of the initiator to the members of the collaboration. However, TMC contract agreements with various subcontractors capture mainly the scope of works, as well as the corresponding detailed quantity of work and cost, with only a simple description of performance requirements or expected outcomes determined. For instance, such an agreement includes: a general statement that requires the subcontractor's workforce to adhere to the site safety requirements and policies implemented by the main contractor; the work quality standard applicable; and the construction period allocated for the subcontractor to perform their tasks.

Though a contract acts as an effective control system to guide the subcontractors in multi-organisational collaboration, some interview results revealed the flaws in TMC contract agreements. Interview participants from both TMC and its subcontractors highlighted the unclear terms that rendered the effective implementation of performance management even more challenging, leading to disputes and complications during the project implementation, as noted by TMC's M&E manager:

Our contracts with the subcontractors also included our requirements and expectations such as safety compliance and work quality. But these statements are very vague and the descriptions are unclear. Consequently, it becomes the root cause to most of the disputes and complications during project implementation.

The vague contract agreement, resulting in various enabling mechanisms for project performance, did not encourage cooperation from the subcontractors. For example, during a SCM, TMC requested one of their subcontractors to allocate a full-time supervisor on site to

ease coordination, which is crucial in tackling performance issues. However, the subcontractor was reluctant, and claimed that it was not their obligation to provide this under the terms of the contract, as further explained by TMC's project manager:

There are many items that were either not clearly stated or missed out in the contracts between my organisation and the subcontractors. Because, with the presence of a contract which is assumed to be detailed and legally obligatory for both parties, any variations to the terms may result in either time or cost implications. There is nothing I can do about it but either accept it or amend the terms in the contract with the risks of additional costs incurred to my company.

Thus, the formal contract agreements do not represent an effective control tool, as they focus mainly on communicating the scope of work and costs, without much emphasis on performance requirements. Consequently, many arguments occurred between TMC and its subcontractors regarding the level of performance that the subcontractors were required to achieve, resulting in the confusion and disappointment of the parties involved.

Inter-organisational coordination and performance evaluation

In the complicated network of subcontractors, all parties depend on each other to produce the completed work in a sequential and systematic manner. Highly complex construction activities and work sequences require close coordination between the contractors. Therefore, TMC established operating procedures so as to monitor subcontractors' performance throughout the project period. For example, every task was to be inspected and compared to the predetermined targets, then approved for handing over the work to allow the subsequent process to begin. This was shown in the meeting documents, where the task statuses were constantly monitored and followed up by TMC. Subcon1's site supervisor revealed that they were required to follow TMC's operating procedures as follows: (1) written execution proposal submitted to TMC for review, (2) obtain approval, (3) physical execution of task, (4) call for inspection with relevant person in charge of the acceptance of work, and (5) rectification or rework of unsatisfactory or rejected work. This systematic approach guided the subcontractors in performing their task and setting a benchmark for their performance. However, sometimes the operating procedures were not fully followed so as to save time, which is necessary for them to be highly responsive, especially in the construction environment, which is full of uncertainties that require instantaneous responses, as explained by Subcon1's site supervisor:

As long as the works meet the intended functionalities at an acceptable quality, sometimes we have to opt for shortcuts on minor issues so we do not affect the entire workflow and subsequently the other subcontractor's works in the chain of activities.

There was evidence showing that periodical inspection and test plans were effective in evaluating and monitoring the subcontractors' work and performance, especially in terms of quality and standard practice. A frequent and detailed checking of subcontractors' works using checklists provides useful information on the performance of the subcontractors at different stages during the construction period, as noted by the TMC quality officer:

...what we can do is to repeatedly inspect and check our subcontractors' works so that we can identify the problems at an early stage. Then we will issue warnings and reminders to our subcontractors so that they are reminded of our requirements, and subsequently rectify the unsatisfactory works immediately. So far, our subcontractors

are cooperative and we have been significantly reducing defects in our project.

TMC's current practice, particularly around evaluation and performance measures, will be effective and sufficient (thus ensuring good subcontractor performance) only when the targets and level of performance are properly communicated to the subcontractors beforehand. However, in practice, there were cases such as those highlighted by TMC's project manager, in which the targets given to the subcontractors did not tally with the terms in the contract agreement, or were simply unrealistic. In this case, conflicts and disputes occurred over the disagreement between TMC and its subcontractors on the performance assessment results. This was also observed from the content and arguments discussed in the SCMs.

Reward and punishment system

The performance of the subcontractors was periodically evaluated by TMC, and the information obtained was then used to decide the corresponding reward or punishment. The key performance compliance was attained through the punitive action for non-compliant work or failure to achieve targets. The punitive action would result in costs and the reduction of a subcontractor's profit margin, as noted by Subcon 1's site supervisor:

the subcontractors were obliged to comply with the requirements (meeting the main contractor's targets), and they had agreed upon a profit margin for doing it. Hence, a reward system is seldom practised, but rather a coercion is common by threatening the subcontractor's profit to ensure high conformance.

– Subcon 1's site supervisor

However, the intensity of punitive measures is also influenced by the power of the subcontractors. The intensity of coercion applied by TMC was generally low, due to the fact that they needed the subcontractors, as the experts in their respective areas – their specialisation cannot be easily replaced. In such contexts, the main contractor does not have much power over their subcontractors because they fear that the subcontractors will withdraw from the projects, as noted by TMC's M&E manager:

... they (the subcontractors) could withdraw from the collaboration and the main contractor would not be able to source for similar contractor in a short period of time to complete the task.

TMC was concerned with the performance of the subcontractors' workers, especially the subcontractors' bottom-line workers, i.e. labourers. TMC provided monetary and non-monetary rewards, such as free meal vouchers and daily goods, which were given to those bottom-line workers who showed outstanding performance. They also rewarded those working overtime, as a motivation. TMC's project manager emphasised that a reward does not necessarily have to be expensive or luxurious, but it must reach the hand of the bottom-line workforce (the labourers) for them to recognise the company's appreciation of their efforts. He further explained that there were occasions on which a reward (a bonus) was given to the subcontracting company, but the management of the subcontractor did not share the reward with its workers accordingly.

Information flow – feedback vs feed-forward

The information flow and system form one of the fundamental aspects of keeping a performance management and control system functioning effectively, especially in the long communication chains of multi-organisational collaboration. Both TMC and its subcontractors

recognised the importance of information flow in securing the mutual goals and objectives of the project. Furthermore, they recognised the weakness in communication and information systems in the huge network of contractors within a single project.

The presence of multiple organisations in a single project environment increases the difficulty and complications of the communication chain. According to TMC's construction manager, the main factor of communication deficiency was the high degree of communication segregation and the lack of a centralised information system between the contractors. Although frequent coordination meetings were held, there was a lack of coordination between the construction trades. For example, architectural coordination meetings were only attended by TMC and its architectural subcontractors, whereas M&E coordination meetings were only attended by TMC and the M&E subcontractors. The importance of integrated meetings was recognised, but very few were held:

We do have regular meetings to discuss about project coordination as well as performance issues. But each department holds their own, and there are only a few integrated meetings. Information is segregated, and it highly depends on the person in charge to disseminate messages to relevant parties, and subsequently their subcontractors. Sometimes information did not reach the end of the communication chain, which is the bottom-line workers' hands, and all the meeting outcomes were worthless.

– TMC's construction manager

TMC expressed that they were doing well in monitoring the performance of their subcontractors against the preset level of performance stated in their contracts. Such activity was justified in their frequent issuance of non-conformance reports (NCR), and was evident in the minutes of meetings. Routine site inspections allowed non-compliant work and activities to be highlighted immediately to the subcontractors for correction. This showed that a feedback system is dominant in TMC's subcontractor control practice, while feed-forward information flow was not observed in their organisation.

...I understand that a feed-forward is able to help us improve our operation effectiveness and efficiency by reducing errors, but we are not exercising ... we have had so many issues yet to solve right now and we are shorthanded to act forward, as it takes effort and time...

– TMC's M&E manager

Discussion and Conclusion

In the complex construction project environment, subcontracting practice is commonly used to ensure high efficiency. However, at the same time, such practice often complicates the inter-organisation performance management for construction organisations. The long-chain of inter-organisational communications and segregated information networks is among the barriers to and challenges for achieving outstanding construction project performance. The findings from this study have shown that performance management and control systems are used in the construction organisation to evaluate and control the performance of their subcontractors, however, the systems are somewhat incapable of ensuring the decent performance of the subcontractors, and consequently the project performance. To ensure effective use of PMS, the top management of construction organisations should consider the enhancement of the processes of their PMS.

An important practice in the construction industry to set forth expectations and objectives with subcontractors is the use of formal contract agreements. Such written documents outline detailed descriptions of the job scope and the relevant requirements subcontractors are expected to fulfil. As is consistent with the study of Lu et al. (2019), this study has shown that the shortcomings of contract agreements between construction companies and their subcontractors have significantly impacted the strategic implementation of performance management and control in managing subcontractors. Saukko et al. (2020), in their study, also found that contracts are usually limited to how the organisations collaborate. According to Lu et al. (2019), proper contract governance nourishes effective quality management practice, which enhances the performance of inter-organisational projects. In other words, the effectiveness of the PMS used by a construction organisation would be greatly influenced by their spurious contract system. Unclear expectations will result in a subcontractor's resistance to comply; disputes occur over punishments received for failing to achieve a generally-stated target in the contract agreement. Such ambiguities in communicating important information were regarded to be due to the inadequacy of the control system, with a more robust approach being necessary (Ferreira & Otley, 2009). Ferreira and Otley (2009) stated that the level of performance expected from the entities being assessed should be clearly defined in the PMS to ensure coherent processes within the system. In practice, the information, especially on the level of performance, needs to be adequately communicated before the project has begun to reduce the conflicts between the construction organisation and its subcontractors.

The mixed results of the incorporation of both reward and coercion in subcontractor performance management practice reflected the dependence of the construction organisations on their subcontractors. This behaviour is consistent with the findings of Huo et al. (2019) that the use of power, such as offering rewards or using coercion, is implied from the dependence of the inter-organisational relationships between the buyer and its suppliers. Organisations in the dominant position in the multiple buyer–supplier relationships dictate the use of power in managing their partners' performance. Similarly, when a construction organisation desperately needs a specialised service from its subcontractor, a non-coercive power would be used. For example, when the project is delayed due to the low productivity of a key subcontractor, the manager may, in contrast, offer a reward or assistance, representing incentives and motivation for the subcontractor to improve their performance. This is because they realise that if their subcontractor terminates their contract and withdraws from the collaboration, due to the excessive coercion and pressure exerted on them, the project would experience an immediate deterioration, because the abandoned work may require expertise that is not possessed by other contractors currently in the collaboration. Furthermore, the unattended work could also be required in order to enable another subcontractor's work. Vice versa, when the construction organisation dominates their subcontractors, a punishment is anticipated as the consequence of having a poor performance. Hence, the tension between the partnership of the main contractor and its subcontractors remains a threat to the effective implementation of a reward system for the performance outcome of the subcontractors. Therefore, this study provides hindsight for construction organisations, which should compare the capability of their subcontractors with their own during the hiring process, so as to achieve an equilibrium of power in the collaboration.

Information flow is described as the enabler for improvements through continuous learning from past experience. It fosters an organisation to transform into a “learning organisation” by using: feedback to compare the actual performance information with the preset targets to obtain early signs of deviation; and feed-forward information to enable learning from experience to

anticipate adversarial events and devise prevention strategies (Ferreira & Otley, 2009; Otley, 1999). However, the findings showed that the information practice in construction organisations for management control was predominantly feedback information. The results, on the other hand, suggested that the lack of managerial capability was one of the reasons for nullifying the use of feed-forward controls to realise their strategic objectives. This finding is aligned with the results of Meutia and Bukhori (2017), which emphasised that managers play a major role in influencing management control systems to validate positive outcomes in organisational performance from the simultaneous use of feedback and feed-forward control systems. According to Meutia and Bukhori's (2017) study, managers need to incorporate both feedback and feed-forward information flows, which complement each other, to obtain knowledge from the issues experienced and make decisions to undertake corrective actions. Then, managers learn from mistakes and devise strategies to prevent similar errors of the same cause from happening again. As suggested by one of the interviewees, the culture of management is best introduced at the beginning of a project rather than later, and maintained throughout the entire project. Evidently, a construction organisation should also recognise the resources required to implement the information systems.

Key performance measures, which are derived from the objectives of a construction organisation, are used as indicators to evaluate subcontractors' performance. These dictate the criteria and level of performance a subcontractor is expected to accomplish. The results of this study showed that performance measurement in the construction industry is oriented around cost, time and quality. During the project implementation stage, the cost performance of subcontractors was not monitored, because the selection and appointment of subcontractors, and the use of contract agreements before the commencement of the project, had transferred the risk of loss of the construction organisation to its subcontractors for a margin. Therefore, time and quality became the focus of the construction organisation. While new intangible measures were observed in the performance measurement to evaluate subcontractors' performance, a majority of the performance criteria, such as workforce productivity, effective communication and commitment, were ultimately connected to their quality and time performance outcomes. These measures provide performance assurance for construction organisations to monitor the real-time progress of the project, rather than looking back at the outcome at the end of a project which lagged. On the other hand, the sustainability performance of subcontractors was not measured nor emphasised. This outcome was a result of the lax environmental regulation by the local authority. Tam et al., (2006) concluded that construction companies show a positive reaction towards regulatory compliance when it comes to managing project environmental performance. In other words, it may be expected that subcontractors will be subject to higher controls over sustainability performance under the pressure of strict enforcing laws and compliance requirements from the governing parties.

While construction organisations have prescribed additional preventive measures in the construction sites to minimise the risk of COVID-19 spread, the success of such prevention measures requires the cooperation of all members in the collaborative network. The results of this case study show that the construction organisation instituted these new measures into their existing PMS to ensure their subcontractors would comply with protocols. First, they adopted various measures from the SWP suggested by MOH and DOSH guidelines on operating amid the COVID-19 pandemic. In this case, the SWP were used as the indicators of subcontractor performance, and this performance measure was tied to the punitive actions of the main contractor. Such a positive reaction of the PMS to uncertainties provided a window of

opportunity regarding the study of how construction organisations may use a PMS for many purposes, such as tightening or instituting controls.

Conclusion

This study has shown how a construction organisation uses a performance management and control system to evaluate and manage its subcontractors, which then contribute to strong project performance. The complex nature of construction projects warrants the contributions of multiple subcontractors, which complicates the operation and communication process; hence, it is inevitable that construction organisations will evaluate and manage the performance of the multi-organisational project. While the strategic use of management control systems was supposed to improve inter-organisational performance in such a complex project environment, this study has indicated that the flaws and inadequacy in the fundamental processes of PMS contributed to the long unresolved unsatisfactory performance of the Malaysian construction sector. Various insights have been generated for managers, with the intention of developing a PMS for evaluating and monitoring subcontractors.

The present use of a formal contract agreement as a definite governing mechanism is often lax in defining the project objectives for subcontractors; the ambiguities in the contract terms lead to disagreement on target settings and subsequently result in recurring disputes between members. Additionally, the single-loop feedback seems to be the sole information flow supporting the management control system. Such an information system is deficient because it does not provide the opportunity and space for organisational learning. These erroneous components led to the failure of the performance management and control system as an enabler for the control function. It has also been concluded that the use of a reward and punishment system was somewhat ineffective, because it was dictated by the power positions of the construction organisation and its subcontractors.

Traditional performance measures remain dominant in the construction sector. Although there is evidence of new measures such as productivity, communication and commitment, these goals were determined to be contributing to the ultimate goals of excellent time and quality performance in the project. While other criteria such as environmental sustainability, implementation of PQP, and OSH have gained popularity, construction organisations showed no interest in following these criteria; nor they were motivated to comply. The findings do, however, suggest that the application of relevant local regulations and governing standards may enforce a broader practice of performance measures in construction projects, at least, at the project level.

Despite the practical contribution of this study, there are several limitations that indicate a window for future research. First, the data were solely collected from a single construction organisation to increase the comprehensiveness and homogeneity of findings. Therefore, the results do not represent the entire industry as a whole, which suggests that further studies may be conducted for other cases with similar contexts. Second, the research focused on how the performance management and control system process was being used to control the subcontractors, which provided an overall perspective of a PMS used in a construction organisation to evaluate subcontractors. It does not provide interpretation of the quantitative findings of the PMS, such as the percentage and weighting of the processes, as well as the indicators for performance measurement. Future studies may explore the statistical results of using such systems.

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