INSTITUTIONAL BARRIERS TO EFFECTIVE OHS MANAGEMENT: A STUDY OF THE HONG KONG CONSTRUCTION INDUSTRY

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Abstract - Drawing upon an institutional perspective, this study aims to identify the institutional barriers to occupational health and safety (OHS) management and to investigate the sources of the institutional barriers in the construction sector of Hong Kong. A qualitative research strategy was adopted. The results show that there exist five institutional barriers to site safety management. These are inconsistent regulatory demands, regulatory uncertainty and rigidity, redundant institutional demands, conflict between safety demands and production efficiency and disparate values and beliefs about safety and how to achieve safety. It is also found that these institutional barriers come out of three interwoven sources. These are multiple institutional demands of site safety, the specificity of institutional rules, and conflicts between organisational legitimacy and efficiency. This study contributes a framework of institutional barriers to OHS management and their relevant sources to the extant literature.

Keywords - Complexity, Institutional Analysis, Occupational Health and Safety

I. INTRODUCTION

Construction industry is one of the most dangerous industries all over the world. According to the International Labour Organisation, about 60,000 fatal accidents occur each year in the construction sector around the world [1]. Traditionally, Occupational Health and Safety (OHS) in the construction industry is regulated by the state through standards setting and enforcement. Since 1970s, OHS legislation approach in many countries has been transformed from prescribing detailed preventive measures to facilitating company self-regulation. Within such a context, a large number of parties, e.g. professional bodies, trade associations and labour unions, are involved in addressing OHS issues and they all aim to influence companies [2]. Thus, in addition to OHS regulations, the structure and practice of OHS management of companies can be influenced by decentralised institutions like industry self-regulatory programmes [3][4], certified management standards [5]-[7] and OHS campaigns [8][9]. The existing literature examines the effectiveness of both OHS regulations and various forms of non-legal interventions but leaves unanswered a key question of whether these different forms of institutional pressures are coordinated.

This question has become especially pressing as decentralised institutions have been widely adopted as a complement to government regulation [7]. This study attempts to shed light on the question drawing on an institutional complexity perspective. Institutional complexity is defined as "incompatible prescriptions from multiple institutional logics" [10]. A complex institutional environment will inevitably generate tensions and challenges for organisations exposed to it [10]. The specific objectives of this research are to investigate whether construction companies face incompatible institutional pressures regarding site safety management and to identify the sources of institutional complexity. We focus on the institutional environment regarding OHS management in the construction sector of Hong Kong.

The paper is structured as follows. The theoretical foundation of this research is laid out in Section II. It is followed by an illustration of the empirical context of the research. Data collection and analysis methods are reported in Section IV. Sections V to VI present the findings of the study, including the sources of institutional complexity and specific institutional barriers to site safety management. Discussion and conclusions are presented in Section VII.

II. THEORETICAL FOUNDATION

Institutional theory is one of the predominant perspectives for explaining the external influences on organisations [11]. Institutional theory suggests that in addition to the economic and market environments, organisations operate within a social framework of rules, norms, values and taken-for-granted assumptions about what constitute appropriate behaviours [12]-[15]. Through conformity to institutional requirements and social expectations, organisations gain legitimacy, resources and survival capabilities [12][16][17].

Workplace safety can be viewed as an institutionally defined issue [18][19]. When the institutional environment is composed of contested or incompatible rules, values, norms and cultural beliefs about appropriate behaviours, organisations encounter institutional complexity [10]. Institutional complexity may bring about ambiguities about what are the appropriate safety practices and how an organisation should adapt [20]. In a complex institutional

environment, institutions that regulate safety practices or facilitate safety management may become barriers to effective site safety management.

Institutional complexity research has touched on two interactive facets: the number of institutional logics/demands and relationships between logics/demands [10]. Institutional complexity may be attributed to: 1) multiplicity of actors who stipulate the 'rules of games' [21]-[23]; 2) co-existed institutional logics [24][25]; and 3) conflicting goals of legitimacy and efficiency both of which are important for the survival and thriving of organisations [13][26][27]. Institutional uncertainty is a specific pattern of institutional complexity, as it might complicate the choices of organisational practices. There are three conditions under which institutional uncertainty is likely to arise [28]. Firstly, while the institutions indicate goals and their pursuits, the means to achieve the goals are unspecified. Secondly, institutional uncertainty arises when the knowledge base for practices is not clear-cut. Thirdly, institutional values per se may be uncertain, which bring about conflicting or even contradictory beliefs about legitimate purposes.

III. THE HONG KONG CONTEXT

The construction industry records the highest number of industrial fatalities and accident rate among all industries in Hong Kong. Safety and health at work is under the administration the Labour Department (LD). Following the global trend of workplace safety self-regulation, the Hong Kong Special Administration Region (HKSAR) government has shifted its role in industrial safety from focusing on prescriptive rules and enforcement to setting up a legislative framework facilitating company self-regulation since 1995 [29]. In Hong Kong, company self-regulation is to be achieved through the safety management system (SMS), which is mandatory for contractors that employ over 50 workers in one project/contract. It is enforced self-regulation. However, SMS does not bring about better OHS performance automatically. To encourage construction firms and workers to management OHS in a self-regulatory manner, the government also put effort into OHS education, training, the promotion of safety concepts and providing sponsorship. Notably, the government still holds a powerful position in regulating site safety, as the previous prescriptive legislation has still not been repealed. Thus, the legislation is a combination of prescriptive legislation and performance-based legislation.

Under such a legislative framework, part of the regulatory process is delegated from the state to industry stakeholders [30]. These stakeholders, which include Construction Industry Council (CIC), Occupational Safety and Health Council (OSHC), trade associations, labour unions, developers, professional bodies, universities, etc., try to influence the structure and practice of OHS through decentralised institutions. Decentralised institutions, e.g. codes of practice, norms and values, are diffused through a rich variety of voluntary OHS activities, such as conferences, seminars, and campaigns.

In short, contractors face both centralised institutions (e.g. OHS regulations) and decentralised institutions (e.g. OHS guidelines) imposed by multiple actors, which might not be compatible. A detailed examination of how contractors experience institutional requirements of workplace safety will shed light on problems rooted in the institutional environment.

IV. RESEARCH METHODS

Two sources of data were collected comprising relevant documentary data and semi-structured interviews. Documentary data were collected to sort out the institutional requirements on site safety. It provides an overview of the external safety requirements and industry-level safety events that contractors confront. Most safety-related information, such as legislation, statistics, non-statutory rules, safety promotional events, construction site safety handbooks and manuals, and safety seminars, is publicised on websites. Moreover, documentary data has the strength of accuracy, which can be used to corroborate the evidence obtained from interviews.

Semi-structured interviews were carried out to investigate the specific institutional requirements experienced by contractors regarding site safety. Considering that different sizes of organisations may experience institutional pressures differently [10], respondents from both large and small construction companies were targeted. As the ownership of organisations and the role/position of interviewees in an organisation also affect the experience of institutional pressures [10], these factors were also considered in the selection of interview participants.
In the end, 24 semi-structured interviews were carried out. All interviews were tape-recorded, and transcribed verbatim. Interviews involved a wide range of organisation types and nature, covering client (public and private), contractor (local, global, and state-owned), consultant, professional bodies, and statutory bodies. The sample also comprised a wide range of job positions, for example senior management staff in the head office and project, engineers and safety personnel.

The analytical strategy, i.e. the logic of linking prior theory, empirical evidence, and research findings, is abduction-driven [31]. Abduction is a process of creating a novel type of combination between features

presented in data as well as in extant theory [32]. The sources of institutional complexity presented in Section II serve as a general framework for data analysis. For instance, multiplicity of actors who stipulate safety rules and requirements are one source of institutional complexity. Safety requirements and regulating measures are first categorised according to the actors who stipulate or monitor the implementation of these requirements and measures. It is identified that the LD, project clients, construction firms, industry self-regulatory bodies, OHS professional associations, and trade associations exert a strong influence on how OHS is managed on construction sites. Safety requirements formulated by these actors are grouped into four categories: legal requirements, clients' requirements, internal requirements and voluntary OHS standards and programmes (see Table 1). Safety management logics describe the organising principles of safety management activities and practices. As latent constructs, the underlying logics of safety management are abstracted from formal safety requirements and day-to-day site safety practices (see Table 2). The efficiency and organisational legitimacy brought about by site safety performance are summarised in Table 3.

V. POSSIBLE SOURCES OF INSTITUTIONAL COMPLEXITY

A. Multiple institutional demands

Site management teams face various OHS requirements exerted by the LD, project clients, the head offices, and other industry stakeholders (e.g. CIC, OSHC, trade associations). As shown in Table 1, OHS requirements formulated by these actors are classified into four categories: legal requirements, clients' requirements, internal requirements and voluntary OHS programmes. Each category is further divided into several specific measures. If contradictions exist between these OHS requirements, contractors will face institutional complexity.

Interviewees consistently reported that there is no fundamental conflict between these OHS requirements. The distinctions between OHS requirements raised by different parties lie in the stringencies, by which they mean that the scope of requirements and levels of specificity vary.

Institutional requirements	Specific measures
Legal requirements	◆ OHS related law and regulations ◆ Enforcement actions
Clients' OHS requirements	◆ Prequalification requirements ◆ Contractual OHS requirements ◆ Site supervision ◆ Promotional activities
Internal OHS requirements	◆ Specific OHS initiatives ◆ Safety targets ◆ Company safety culture ◆ Internal safety contest ◆ Project performance monitoring
Voluntary OHS standards and programmes	◆ OHS campaigns ◆ Safety seminars/conferences

Table 1 OHS Requirements Imposed by Different Institutional Actors

The stringencies of OHS requirements are different. Specifically, interviewees identified that different categories of OHS requirements cover distinct scopes. Legislation prescribes basic safety measures, and the responsibility of employers and employees. Industry-level voluntary schemes, OHS promotions and non-statutory guidelines complement legislation and enforcement, aiming at promoting OHS standards. For instance, a recent focus of industry stakeholders is construction workers' well-being. Project clients and construction companies may implement certain safety measures that are beyond the scope of legislative prescriptions and industry-level promotions. For example, leading construction companies explore how to use digital information technology (e.g. Building Information Modelling) to improve OHS management. Interviewees also reported that the level of specificity of OHS requirements raised by different parties varies. Some developers and construction companies develop more specific safety handbooks and manuals guiding site safety operations on the basis of legal requirements.

B. Co-existence of two safety management logics

Institutional logics are latent and cannot be observed directly, but could be inferred from formal rules of site safety, contractors' safety management approaches, and actual site safety practices. As shown in Table 2, two safety management logics, i.e. prescriptive and performance-based logics, are identified. The prescriptive logic attempts to standardise the work process using rules and procedures usually

accompanied by the monitoring of compliance and by sanctions for non-compliance [33]. Performance-based logic describes what has to be achieved leaving the means and methods of doing so decided by the contractor.

Regarding OHS legislation in Hong Kong, the prescriptive legislation clearly lays down safety standards and specific means to achieve the standard. The performance-based legislation stipulates the general duties of employers and employees as well as the implementation of SMS. Contractors shall not only comply with specific legal requirements on site safety, but also take proactive safety measures to fulfil their general duties.

From the client side, the use of specific contractual OHS requirements and site supervision manifest a prescriptive logic of safety management. Some clients encourage contractors to pursue superb OHS performance through a variety of incentive-based measures, which feature the performance-based logic. For example, some clients take account of contractors' past safety performance in tender evaluation. Contractors that achieve satisfactory OHS performance will receive positive returns, e.g. direct economic incentives, higher chance to win new contracts. Poorly performed contractors will suffer from economic losses or damage to the company reputation.

In-house safety rules and site inspections/safety audit conducted by the head offices are prescriptive in nature. Meanwhile, many construction companies employ performance-based safety management approaches. For instance, several interviewees mentioned that project leaders' annual bonuses are linked to project safety performance. Such a measure is likely to motivate the project teams to achieve better site safety.

Voluntary OHS standards, guidelines and codes of practice complement prescriptive OHS regulations. They are developed in the light of the performance-based safety management logic. Whether companies conform to voluntary nature of OHS standards depends on the diffuse action of social and economic actors. Interviewees mentioned that OHS guidelines published by CIC were widely accepted by the industry. This is because CIC co-opt the LD and several key developers to promote its OHS guidelines. Specifically, the LD would refer to CIC guidelines in their enforcement actions, and those developers require their contractors to follow CIC guidelines through contractual provisions.

It seems that the two safety management logics although involve competing organising principles, are coordinated. They work together to improve OHS performance in the construction industry.

Institutional requirements	Prescriptive logics	Performance-based logics
Legal requirements	Specific safety standards and requirements	The general duties of employers and employees
Clients' OHS requirements	Specific contractual OHS requirements Site supervision	Pre-contract selection Performance monitoring Safety targets OHS promotional activities
Internal OHS requirements	In-house safety rules Safety inspections/internal safety audit	Safety targets Internal safety contest Safety performance-based compensation OHS promotional events
Voluntary OHS standards and programmes		Codes of OHS practices OHS guidelines OHS promotional events

Table 2 Safety Management Logics

C. Efficiency and legitimacy of site safety performance

From an institutional perspective, construction safety carries social values, and affects company image and reputation. Construction companies with good safety performance gain legitimacy. With respect to the relationship between efficiency and safety, interviewees gave conflicting views. The majority of interviewees (i.e., 19 subjects) expressed that progress and safety measures are in conflict. Only two interviewees believed that conformity to safety requirements will not affect project progress. Interviewees mentioned that it is quite common that contractors face great progress pressure in Hong Kong. For example, interviewee 24 revealed that "Basically, every client wants the building done yesterday. They want the project to be done as fast as possible… they pressurise contractor to finish in a very tight time frame… the time laid out in the contract is not sufficient." As the inherent conflicts exist between safety targets and other project management goals, some mechanisms are devised to encourage

contractors to pursue good safety performance. The consequences of safety performance as reported by interviewees are summarised in Table 3.

Consequences		Company	Project
Positive aspects	Legitimacy	Image ↑ Reputation ↑ Honour ↑	Recognition ↑ Status ↑
	Efficiency	Chance of contract winning ↑ Insurance premium ↓	Direct economic incentive Turnover ↓ Loyalty↑ Harmony ↑ Productivity ↑
Negative aspects	Legitimacy	Image ↓ Reputation ↓ Morale ↓	Morale ↓
	Efficiency	Suspension from tendering Chance of contract winning ↓ Insurance premium ↑	Legal sanctions Client intervention ↑ Internal intervention ↑

Table 3 Consequences of Safety Performance

It is found that good safety performance gives rise to a higher level of organisational legitimacy and efficiency. Interviewees associate good safety performance/safety awards with "recognition", "image", "reputation", "status" and "honour". This suggests that site safety has socially constructed values or meanings. 18 interviewees reported that good safety performance (including safety awards) helps to improve the company's image and reputation. Superb site safety helps contractors to get recognition from their clients, company top management and peers. Good safety performance also enhances company business prospects and project delivery efficiency. 14 interviewees reported that excellent safety performance contributes to contract wining. Another aspect of business prospect is related to insurance premiums. 10 interviewees reported that the insurance premium will decrease as the number of accidents goes down. At the project level, contractors might receive monetary rewards if they achieve the performance standards raised by clients. Excellent safety boosts the level of productivity and the harmony.

Unsatisfactory safety performance might impair organisational legitimacy. For instance, interviewee 17 described that "if we don't do well in safety, the whole industry will know. People may blame why we don't have a good management system. The company image is influenced." 11 interviewees reported that those construction companies that have unsatisfactory safety performance would suffer economic losses, such as being suspended from tendering and having lower chance of winning new contracts. Moreover, the insurers will charge construction companies with bad safety records a higher insurance premium. At the project level, 12 interviewees mentioned that poor performance in safety would inhibit the productivity.

Although efficiency can be closely aligned with organisational legitimacy in the design of OHS-related institutions, the real situation is much more complex. Site safety is also influenced by structural and situational factors, such as multi-layered subcontracting, shortage of construction labour force, piece-rate pay of sole-trades, congested construction sites and pressed project schedule. For instance, interviewees mentioned that small contractors lack the motivation to maintain company image. For them, conform to OHS requirements is in conflict with the pursue of efficiency. Therefore, whether organisational legitimacy is in conflict with efficiency is contingent.

VI. INSTITUTIONAL BARRIERS TO SITE SAFETY MANAGEMENT

A. Inconsistent regulatory demands

Interviewees revealed that regulatory infrastructure lagged behind the increasingly stringent OHS standards used by inspectors in their enforcement actions. Specifically, some OHS training courses provided by the LD or accredited organisations are too elementary, such as the training for rigging and work in confined space, and the mandatory basic safety training. Since workers do not receive adequate trainings, they would be more likely to suffer from industrial injuries on sites. However, when inspectors of the LD spot any unsafe operations conducted by poorly trained riggers, contractors will be accused. Interviewee 15 commented that despite the inadequacies in training courses, contractors are required to be perfect. In his words, the LD is implementing "double standard." Thus, contractors confront inconsistent safety demands from the LD.

B. Regulatory uncertainty and rigidity

Regulatory rigidity reveals the gaps between formal rules and situational conditions. Interviewees reported that some safety rules lack flexibility to cope with the ever-changing site situations. One repeatedly mentioned case is related to prevention of falls. Interviewee 19 delineated that "in many occasions, the congested site environments do not allow us to establish a proper working platform for workers who need to work at height." A common practice in construction sites is to use ladders substituting for a working platform.

When rules are generally stated, contractors will have the discretion to choose specific safety measures. For instance, contractors can choose to use a cherry-picker or mobile work platform; to establish wood or metal guard-rails; to use battery-operated hand tools that are safer and expensive or electric ones that are cheaper, yet more dangerous. Under the circumstances of institutional uncertainty, contractors may be confused about what are the appropriate safety measures.

C. Redundant institutional demands

The institutional requirements are uncoordinated, at best, since multiple actors are involved in stipulating safety requirements and different actors are in possession of distinct interests, management approaches and enforcement actions. It is found that some safety requirements are repeatedly imposed by different parties, indicating the existence of safety requirement redundancy.

Typical examples include safety auditing, site inspections, and safety training. Interviewee 9 revealed that contractors are overwhelmed by safety audits and site inspections. He stated that "the client of this project is composed of three developers. Two of them have their own safety management systems. We have an internal management system developed by our company. We also need to satisfy the legal requirements." Interviewee 9 thus had to cope with safety requirements of four SMSs. One important element of SMSs is continuous performance review. Interviewee 9 expressed that "every week or month, we have so many safety auditing and inspections on sites."

Safety training is also reported as redundant. Construction workers have to attend many safety training sessions arranged by the government, contractors, and other players. There is a high mobility of workforce in the construction industry. Whenever they switch their job from one site to another one, they need to receive safety induction training programmes. However, the training materials and courses are quite similar. Interviewee 13 reported that one of the feedback they get from workers or subcontractors is that there is too much training. He depicted that "really, they have already known. They have already been through it three weeks previously in Company X. Now they must go through it again."

D. Conflict between safety demands and production efficiency

Construction companies in Hong Kong confront multiple institutional requirements of site safety as well as strong production pressure. Given that production and safety are tightly inter-related, conforming to institutional demands on site safety may contradict with pursuing production efficiency. Interviewees suggest that contractors have different perceptions towards the nexus between conformity to safety requirements and production efficiency.

A first type of interpretation delineates that conforming to safety requirements will not reduce production efficiency. These people believe that excellent safety is conducive to speedier construction. If contractors can achieve excellent safety, the productivity will go up. Some contractors seek for passive acquiescence to various safety requirements. Ostensibly they conform to prescribed safety requirements, but they do not embrace safety from their heart. The values of site safety are not internalised. A third type of interpretation is that production or efficiency is the first priority. As reported by interviewees, many subcontractors embrace such a belief. For example, interviewee 15 delineated that, "Subcontractors think that if they do safety, they spend money, and they lose money and it takes longer. That's their mentality."

Five interviewees argued that the nexus between conformity to safety requirements and production efficiency is not straightforward, depending on a set of contextual factors: the quality of project planning; the level of safety requirements; the source of safety requirements (based on formal rules or experience); and construction stages.

If the work plan is well prepared, a majority of hazards will be identified before the construction stage. With the implementation of proper safety measures, the construction will proceed smoothly. Higher safety requirements intensify the conflict between conformity to safety requirements and construction efficiency. Contractors have to make more effort to complete their job if they strictly follow these requirements. The sources of safety requirements also matter. Some interviewees stated that formal rules would complicate safety management, and thus increase the tension between safety and other goals. They prefer to make decisions based on experience and common practices. The nexus of safety and production pressures varies at the project life cycle. Usually at the early construction stage, safety pressure is not very strong because very few trades are involved.

E. Disparate values and beliefs about safety and how to achieve safety

Disparate values and beliefs about safety are evident in construction safety. The disparate safety beliefs and management approaches reflect the complex nature of underlying logics. Interviewees reported that many contractors are passively involved in site safety management, and only a few large construction companies really commit to safety management. Large construction companies tend to see safety as an integral part of project management. For many contractors, safety management is resource-consuming, and rarely

bring about positive effects. Interviewees reported that there is one type of companies that have realised the importance of safety, but they hesitate to take further actions. Most subcontractors have inactive beliefs about site safety. They insist that main contractors should be responsible for site safety.

Interests and cognitive belief of small contractors seem locked in the current institutional arrangements. This first salient institution is the procurement system. Due to the prevalence of the price-leading contract awarding arrangement and the intensive use of the multi-level subcontracting system in Hong Kong, the profit margin of small contractors is very low. Meanwhile, small contractors prefer to adopt piece rate pay method, which may induce them to prioritise progress at the expenses of safety. The second institution feature is that small contractors are normally located at the peripheral position of the industry. Thus, they would care less about organisational legitimacy, and self-interests may dominate their behaviours.

At the individual level, safety awareness of frontline supervisors is very weak. Some supervisors may keep silent when they spot unsafe operations. Project schedule and production efficiency are their topmost concerns. Some supervisors consider the safety requirements as burden. For example, interviewee 16 shared a case of filling in a checklist by frontline supervisors before using machinery, plant and some hand tools. He depicted that, "some supervisors think it is too trouble. They think what we want is just a completed form. So they tick the form without carefully checking the site conditions," as described by interviewee 16.

Safety awareness of construction workers is also low. Interviewees suggest that few workers would like to comply with safety rules. Instead, they prefer to take shortcuts, prioritise production efficiency, and ignore necessary protective measures. Interviewees also reflected that young workers are more cooperative in comparison with the older generations. Some of them complained that they could not find an appropriate way to persuade or regulate those older workers to follow safety rules.

There exist gaps between trade practice and the contractor's safety requirements, which also explain why supervisors and workers would not like to follow prescribed safety requirements. Trade workers have their own understanding of site safety based on their years' experience. However, this fact is not well recognised by contractor's management systems, which still focuses on the traditional risk management approaches. Interviewee 15 admitted that "so much of the work is embedded in the trade knowledge. There is so much you cannot put on the paper."

VII. DISCUSSION AND CONCLUSIONS

Drawing upon an institutional complexity approach, this study aims to identify the institutional barriers to site safety management and to investigate the sources of the institutional barriers. A qualitative research strategy was adopted. Relevant documentary data and semi-structured interviews were collected and analysed.

The results show that multiplicity of actors who stipulate the rules of safety practices is one source of institutional complexity. This result is concurred with the studies about environmental protection [34], U.S. community banking [35], and social enterprises that cope with competing expectations from multiple actors in the field [21]. Institutional actors, including LD, project clients, construction firms and industry stakeholders, impose various institutions (e.g. laws, regulations, and professional norms) and expectations on site management teams. Contractors are found to face four categories of safety related institutional demands. These are legislations and enforcement, clients' requirements, construction companies' internal requirements and a series of field-level voluntary safety programmes. Some management measures are found to be repeatedly implemented, which calls for communication and coordination among relevant actors.

Two safety management logics are found to coexist (i.e., logics of prescriptive and performance-based safety management). It is contended that the coexisted safety management logics do not necessarily cause institutional complexity, although they involve competing organising principles. This result may complement prior studies which advocate that multiple institutional logics tend to be competing by proposing a view of multiple complementary logics. That is, a combination of both logics works more effectively. The industry is empowered by the government to initiate, promote, and enact safety initiatives in order to raise workplace safety standards. Meanwhile the regulatory surveillance and enforcement serve as an essential instrument of ensuring the minimum safety and health standards on construction sites. Logics without competing issues would induce organisational decision makers to focus on a delimited set of issues and solutions [36].

Conflict between legitimacy and efficiency demands is identified as another source of institutional complexity. The conflict between progress pressure and safety requirements is salient in the context of the Hong Kong construction industry. Good project planning, positive safety culture and sufficient provision of resources can help to mitigate the tension between them.

Two of the institutional barriers of site safety management result from inherent deficiencies of regulatory institutions and the specificity of legal requirements. They are: 1) inconsistent regulatory demands; 2) regulatory uncertainty and rigidity. Three forms of institutional barriers of site safety management are generated from the interactions of multiple institutional demands or logics, and conflict between production efficiency and organisational legitimacy. They are: 3) redundant institutional demands; 4) conflicts between safety demands and production efficiency; and 5) disparate values and beliefs about safety. These five forms of institutional barriers will bring about direct impacts on site safety practices, and increase the difficulties of site safety management.

This study complemented the extant literature by presenting a framework of institutional barriers to site safety management and their relevant causes. Apart from the organisational and managerial issues contributing to the poor site safety performance in Hong Kong, institutional level issues deserve more attention.

To overcome the institutional barriers, the Labour Department is suggested to enhance the quality of training programmes and revise the inappropriately documented safety regulations. As the existence of regulatory uncertainty and rigidity, the Labour Department should carry out a review of present enforcement approach. A two-way communication between inspectors and operatives should be established. With respect to redundant safety requirements, effective communication between field-level actors and construction companies would be helpful. This might help to remove the negative impact of overloaded safety requirements.

One of the limitations is the explanation of the complementary role of two safety management logics. The findings show that the prescriptive and performance-based logics, albeit ostensibly competing, could work together to improve site safety. However, the underlying mechanism remains unclear. Thus, a future study on the patterns of combination of two logics is suggested.

Another limitation is that the influence of the contemporary society-level values, norms and conventions on the construction safety is not examined. Hong Kong, a former British colony, is part of China but operates a disparate political regime. The unique history of Hong Kong fosters its distinct culture. The study of societal values involves the understanding of Hong Kong's history, political and economic environments. Thus, the influence of societal level values and norms on construction safety can be an independent research topic and deserves further study.

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