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# Causal Factors of Corruption in Construction Project Management: An Overview

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Received: 21 July 2017 / Accepted: 31 October 2017  
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**Abstract** The development of efficient and strategic anti-corruption measures can be better achieved if a deeper understanding and identification of the causes of corruption are established. Over the past years, many studies have been devoted to the research of corruption in construction management (CM). This has resulted in a significant increase in the body of knowledge on the subject matter, including the causative factors triggering these corrupt practices. However, an apropos systematic assessment of both past and current studies on the subject matter which is needful for the future endeavor is lacking. Moreover, there is an absence of unified view of the causative factors of corruption identified in construction project management (CPM). This paper, therefore, presents a comprehensive review of the causes of corruption from selected articles in recognized construction management journals to address the mentioned gaps. A total number of 44 causes of corruption were identified from 37 publications and analyzed in terms of existing causal factors of corruption, annual trend of publications and the thematic categorization of the identified variables. The most identifiable causes were over close relationships, poor professional ethical standards, negative industrial and working conditions, negative role models and inadequate sanctions. A conceptual framework of causes of corruption was established, after categorizing the 44 variables into five unique

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categories. In descending order, the five constructs are Psychosocial-Specific Causes, Organizational-Specific Causes, Regulatory-Specific Causes, Project-Specific Causes and Statutory-Specific Causes. This study extends the current literature of corruption research in construction management and contributes to a deepened understanding of the causal instigators of corruption identified in CPM. The findings from this study provide valuable information and extended knowledge to industry practitioners and policymakers as well as anti-corruption agencies in the formulation and direction of anti-corruption measures. To corruption researchers in CM, this study is vital for further research.

**Keywords** Corruption · Construction · Project management · Cultural dimensions

## Introduction

Corruption in the construction industry can be defined as the misappropriation of delegated authority at the expense of a construction project (Le et al. 2014a, b; Shan et al. 2016a). It occurs when corrupt professionals within the industry effect a negative decision to engage in corruption. The corrupt professionals are classified into the categories of the demand side and the supply side (Boyd and Padilla 2009). However, the authors raised the notion that, aside from the demand side and the supply side of corrupt professionals, there is another class of parties within the industry known as the condoners. The condoners are referred to the class of professionals or workers in the industry who directly or indirectly affect the incidence of corrupt practices by remaining silent or not bothering about it and on other occasions, they feel reluctant to report any incidence or case of corruption. This is evident in the construction industry in the quest to procure construction or other infrastructure projects. And as the result of this and many other reasons, the construction industry is branded as the most corrupt sector in the world (Transparency International 2005, 2012; Krishnan 2010).

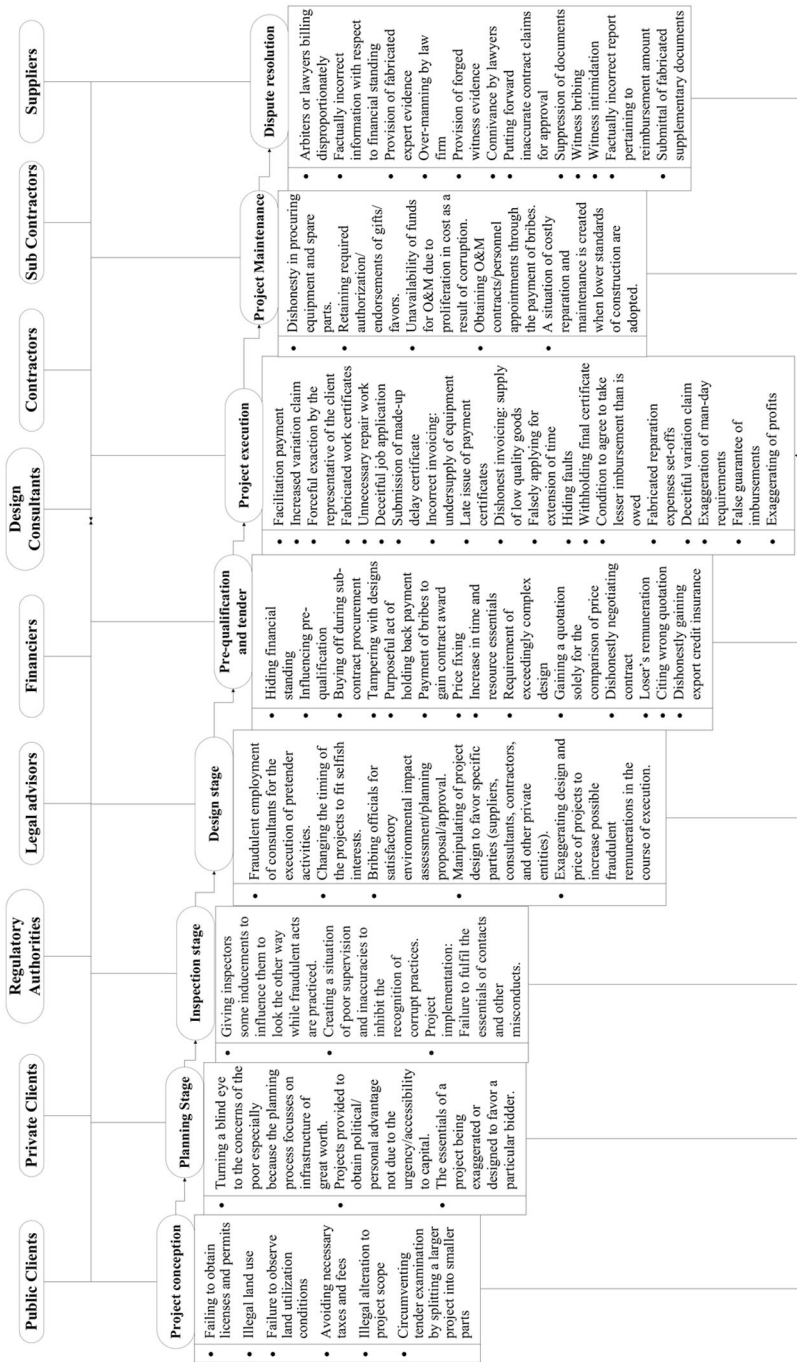
The evolvment of corruption has also led to the discoveries of different forms prevalent in the sector today. They include money laundering, clientelism, ghosting, patronage, bid rigging, etc. (Stansbury 2009a, b; Zhang et al. 2017; Bowen et al. 2012; Waara and Bröchner 2006). These forms exist today due to causative measures that were either not tackled nor thoroughly tackled (Le et al. 2014a, b). Corruption is known for breeding cynicism, dents societal values, demeans those involved, hinders decision making, degrades the quality of projects hence reducing the lifespan of buildings, depriving most inhabitants of quality living and most importantly resulting in the loss of human lives and properties among other devastating and damaging effects (Lewis 2003; Transparency International 2005). It is necessary that all participants of the industry including professionals, clients, and the government except for the corrupt, concur on a cooperative effort to tackle this issue that should not be viewed as a competitive issue (Boyd and Padilla 2009). Researchers and anti-corruption institutions have played active roles in examining some of these negative

drivers which are referred to as the causes of corruption according to this study. The incessant devotion to corruption research in the construction industry over the years has, therefore, revealed several causative factors that contribute to incidences of corruption. However, few efforts have been made to systematically review the causes of corruption in the construction industry on a wider scope, even though they are vastly identified in different studies and contexts. This study, therefore, aims to fill the gap and add on to the existing body of literature by presenting a thorough review of the causative factors of corruption in the construction industry from the project management perspective which is vital and needed for further research.

## Corruption During the Construction Project Process

The literature is not consistent with the etymology of corruption, for instance, while Hodgson and Jiang (2007) attributes the root of the word “corruption” to the Latin adjective ‘*corruptus*’, which means destroyed, broken or spoiled, Johnston (1996) also attributes its derivation from the Latin word ‘*corruptio*’ which signifies a wicked behavior, putridity or a moral decay. However, in all instances, one commonality that exists between the two views is moral decadence, as is evident in the industry today (Henry 2009; Sohail and Cavill 2008; Bowen et al. 2012; Shan et al. 2015b). Jain (2001) purported that corruption has many definitions across diverse contexts but per the suitability of this context, that is the construction industry, corruption is deemed to be the abuse of entrusted power and construction project resources for personal gain (Le et al. 2014a, b). Corruption, which may occur in varying forms as mentioned and can transpire in any construction activity and at any phase of the construction process, that is, from conception to completion (Chan and Owusu 2017; Tabish and Jha 2011; Stansbury 2009b; International Federation of Consulting Engineers (FIDIC) 2016). In the procurement of construction works, International Federation of Consulting Engineers (FIDIC) (2016) opined that corruption might occur in many instances such as decision making on claims, payment certificate issuance to contractors, construction supervision, in tender evaluation, etc. The stages involved in construction process are therefore exposed to these corruption modes and other examples of corrupt practices due to the causative factors identified in this study. Although certain stages of the construction process are deemed to be more prone to corruption than others, no empirical studies show the stage of the construction process that records the highest frequency of corruption cases. Some corrupt practices peculiar to different stages of the construction process that have been captured in the literature over the years have been encapsulated together to develop Fig. 1 which demonstrates the corrupt practices that have been reported in recorded studies (corruption research in construction) over the years.

Figure 1 illustrates the framework for corrupt practices, formulated for easy identification of the likely incidences of corrupt acts that may transpire during a project process. It was developed from adaptations of the frameworks developed by Sohail and Cavill (2008), Zou (2006), Stansbury and Stansbury (2008), Chan and Owusu (2017), Bowen et al. (2007, 2012), Tabish and Jha (2011), and Shan et al. (2016b), as well as the findings identified by the publications selected for this study. Most of these studies may mention either one or multiple corrupt practices with



**Fig. 1** Corrupt practices framework. (Stansbury and Stansbury 2008, Sohail and Cavill 2008, Zou 2006, Chan and Owusu 2017, Bowen et al. 2012, Tabish and Jha 2011, Shan et al. 2016b)

their associated actors and the stage of construction process where the identified acts are likely to occur. Therefore, after a thorough assessment of the identified acts, the framework was developed to highlight some possible acts of corruption in a construction process. Although the acts identified at each stage are not exhaustive, the framework was developed to inform industry practitioners, policymakers, anti-corruption institutions as well as researchers about the probable examples of corrupt activities identified in construction processes over the years and the need to avoid them.

## **Preventing Corruption**

Several preventive and reactive measures commonly referred to as anti-corruption measures or strategies have been formulated by researchers, anti-corruption institutions, policy makers, etc. They include transparency mechanisms, ethical codes, administrative reforms stringent rules and legislation, rigorous technical auditing systems, whistle-blowing mechanisms, contract monitoring schemes among many others. These measures have been consistent with several empirical studies to be effective anti-corruption strategies formulated to mitigate corruption in the construction sector (Sohail and Cavill 2008; Shan et al. 2015b; Boyd and Padilla 2009; Ho 2012; Bowen et al. 2012; Hartley 2009; Le et al. 2014b; Zou 2006). Also, these are some of the noted anti-corruption measures identified from the literature known to have dealt with the issue of corruption in the industry. For instance, Zou (2006) reported three approaches to deal with corruption in the construction industry. They are stipulated as follows: (1) the development of an ethical and honest construction culture, (2) establishing a policy of regular and random inspections and lastly instituting construction works and processes supervision throughout the lifecycle of a project. He pointed out that the first approach was as a long-term measure while the following two were regarded as short-term strategies. Although substantial efforts to thwart the incidence of corruption have been stipulated by researchers in the construction field, other notable international organizations such as the United Nations, the World Bank, Transparency International, the Organization for Economic Co-operation and Development (OECD) and the Global Infrastructure anti-corruption center (GIACC) among many others have played active roles in helping to fight corruption either directly or indirectly in the construction industry. These efforts are rarely reported in studies, and as part of the identified preventive measures, this study presents the efforts made by the international organizations in the next subsection. This information may guide researchers as a source of reference to develop further anti-corruption measures or enhance the already existing ones to tackle the causes of corruption identified in the construction industry. Due to space/wording limit, some of the contributions of the various organizations to the fight against corruption in the industry are summarized in Table 1.

**Table 1** Overview of selected organizational initiatives to tackle corruption in the construction Industry

Organization	Effort	Origin	Year of effect	References
World Bank	Institutional integrity activity	USA	2001	Henry (2009), World Bank (2008)
United Nations	United Nations Convention against Corruption	Mérida and New York	2005	de Jong et al. (2009).
OECD	Convention on Combating Bribery	France	1997 and 1999	OECD (2016), de Jong et al. (2009)
GIACC	Provides resources to assist in the understanding, identification, and prevention of corruption in the infrastructure, construction, and engineering sectors  GIACC promotes the implementation of the Project Anticorruption System PACS	UK	2008	Stansbury (2009a, b)
Transparency International	Openness of the decision-making processes  TI produced a suite of anticorruption tools and reports in 2005  And in 2007 published a Project Anticorruption System PACS for the construction sector	Germany	2007	Henry (2009)  Krishnan (2009)
International Standard Organization (ISO)	ISO 37001—Anti-bribery management systems	Switzerland	2016	GIACC (2016)
FIDIC	Developed a practical tool, namely a comprehensive Business Integrity Management System BIMS for consulting firms  In recognition of the multifaceted nature of corruption, in 2007 a parallel Government Procurement Integrity Management System GPIMS was developed for organizations that procured consulting services.	Switzerland	1998  2007	Boyd and Padilla (2009), Henry (2009), GIACC (2016)  Boyd and Padilla (2009)
ASCE	Set up of Task Committee on Global Principals for Professional Conduct GPPC	USA	2004	Henry (2009)
World Economic Forum	Partnership against Corruption Initiative	Switzerland		Henry (2009), GIACC (2016)

**Table 1** continued

Organization	Effort	Origin	Year of effect	References
World Federation of Engineering Organizations (WFEO)	Anticorruption Task Group—it has formed an Anti-Corruption Standing Committee which is tasked with promoting anti-corruption actions internationally	France	2005	Henry (2009), GIACC (2016), WFEO (2016)
Union of Pan-American Engineering Societies (UPADI)	Anticorruption task group and anticorruption committee	Brazil	2009	Henry (2009)
The Global Anticorruption Education and Training Project ACET	a training guide, a train-the-trainer kit, and numerous other training materials designed to reduce corruption	USA	2006	Smith (2009)
CIECI—Construction Industry Ethics and Compliance Initiative	The sole purpose of CIECI is the promotion and advancement of ethical conduct and compliance in the construction industry	USA	2008	WFEO (2016)
CoST—Construction Sector Transparency Initiative	Promote increased transparency in international construction projects	South Africa and UK	2012	Krishnan (2009), WFEO (2016)

## Methodology

To identify, retrieve and examine the extensive output in corruption research in construction, this study followed the methodical approach adopted by Al-Sharif and Kaka (2004), Yi and Chan (2013) and Hu et al. (2013). The entire approach was therefore conducted in three distinct phases namely: desktop search, targeted paper search and the examination of targeted papers.

### Stage 1: Desktop Search

Stage one constituted a broad preparatory desktop search carried out using a powerful search engine tool called Scopus. This was done to identify peer-reviewed journal articles on corruption research in construction published in the construction and engineering management field. The database of Scopus was selected as it constitutes a comprehensive academic database that includes a broad coverage of scientific journals, books, conference proceedings, forums, etc. (Hu et al. 2013; Hong and Chan 2014). However, it should be noted that even though Scopus provides all these varieties of academic publications, only publications from peer-reviewed journals were used for the review. First, after identifying the search engine



for Scopus, the following keywords, “corruption,” “construction,” and “project management” were used to commence the search to retrieve the initial papers. This search was not limited with regards to the year of publication because the authors sought to identify and retrieve as much of the literature as possible to date. However, the document types were limited to the articles and reviews and also the language limit was set to English only. After these limitations were applied, the search was conducted, and the number of retrieved documents result was to 299. The specific search code is as follows:

TITLE-ABS-KEY (“corruption” and “construction” or “project management”) AND (LIMIT-TO (DOCTYPE,”ar”) OR LIMIT-TO (DOCTYPE,”re”)) AND (LIMIT-TO (LANGUAGE,”English”)).

A total of 299 document were obtained from this search from different journals covering various subject matters on corruption. A preliminary screening was first conducted to discard publications that covered different subject areas rather than the keywords used. The screening consisted of a deep scan of the title, abstracts, keywords as well as a scan through the documents. This aided in the selection of the papers that were deemed to be relevant and valid for the review, and papers that were out of the scope of the subject matter were discarded. Lastly, to facilitate the paper selection process, another approach or parameter adopted by Osei-Kyei and Chan (2015) and Hong et al. (2011), was set. The parameter was that only journals with at least two publications on the subject matter were to be selected for further processing. After this exercise, the results revealed that the Building Research and Information (BRI), Construction Management and Economics (CME), Engineering, Construction and Architectural Management (ECAM), International Journal of Project Management. (IJPM), Journal of Construction Engineering and Management (JCEM), Journal of Management in Engineering (JME), Journal of Professional Issues in Engineering Education and Practice (JPIEEP), Science and Engineering Ethics (SEE) and Leadership and Management in Engineering (LME) had at least two publications on the subject matter and therefore were selected as the relevant journals to be considered for analysis. Most of these journals also happen to be top-ranked journals in CM (Chau 1997). Lastly, a document of IMF Staff Papers, identified from the search was included for the analysis based on its relevance for this review and also its high number of citations. After the first search, the detailed results or publications retrieved under the identified journals included: BRI (2); JCEM (6); CME (9); ECAM (4); IJPM (7); JME (4); LME (8); JPIEEP (7); SEE (5); IMF (1). These summed up to 53 publications.

## Stage 2: Targeted Paper Search

After stage one was completed, a more comprehensive and visual examination was conducted of all the 53 selected journals at this level to identify those papers that are highly relevant to the subject matter of this study, namely, ‘causes of corruption.’ Papers from selected journals that belonged to broad classes of briefing sheet, editorial, letter to the editor, foreword, index, seminar report and comments were

excluded from the analysis. Also, publications, that did not fully satisfy the condition of wholly or partly expressing explanations on the subject matter were at searched out again at this stage and discarded. From the previous number of 53 publications, the modified results after stage two per the respective journals included: BRI (2); JCEM (4); CME (7); ECAM (2); IJPM (4); JME (2); LME (5); JPIEEP (7); SEE (3); and IMF (1). At the end of the second and final paper selection stage, the total selected papers that were classified to be valid for the analysis summed up to be 37. Targeted journal papers that were finally selected for the review analysis are presented in Table 2. One limitation that should be noted here is that, despite the comprehensive search conducted to retrieve publications on corruption research in CM, the number of selected journal publications used for this review may not be exhaustive nor include all papers in the area of corruption under study. It must, therefore, be emphasized that the analysis conducted is purely based on the papers (data) obtained from the methodology approach employed in this study. Content analysis technique was adopted to analyze the retrieved papers, regarding the number of yearly publications, explanations of the identified variables, development of the constructs and lastly the formulation of the framework. The rest of the paper discusses stage three or the last stage of the methodology of the study, that is, the examination and reporting of the findings.

## Results and Discussion

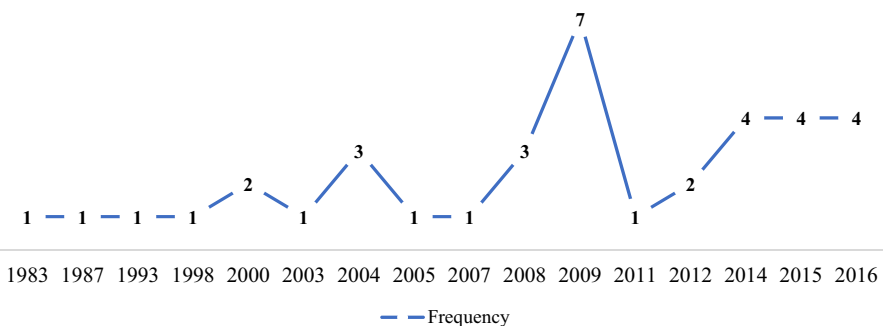
The main aim of this study is to review the body of literature dedicated to the causes of corruption in the construction industry regarding the existing causal factors of corruption, annual trend of publications and the thematic categorization of the variables. However, in the quest to realize the set aim, 37 carefully identified

**Table 2** Search results of relevant publications within the selected journals

No.	Name of journal	Number of 2nd initial searches	Number of final searches
1	Building Research and Information (BRI)	2	2
2	Journal of construction engineering and management (JCEM)	6	4
3	Construction Management and Economics (CME)	9	7
4	Engineering, Construction and Architectural Management (ECAM)	4	2
5	International Journal of Project Management. (IJPM)	7	4
6	Journal of Management in Engineering (JME)	4	2
7	Leadership and Management in Engineering (LME)	8	5
8	Journal of Professional Issues in Engineering Education and Practice (JPIEEP)	7	7
9	Science and Engineering Ethics	5	3
10	International Monetary Fund (IMF) paper	1	1
	Total	53	37

publications were consulted as highlighted in the preceding section, and 44 distinct causes of corruption were identified. After the identification of the variables, the authors recognized the similarities and the identical relationships among some of the variables. This led to the categorization of the variables under five newly developed constructs forming the basis for the conceptual framework for the causes of corruption in the construction industry. The succeeding sections explicate the annual trend and the developed categories into details.

Corruption has lived with humans for such a long time Noonan (1984). This is evident as well in the construction and engineering sectors. Figure 2 illustrates the annual trend of publications dedicated to the identification of causal factors that instigate corruption in the industry. The annual trend of the publications reporting on the causal factors had been quite sporadic until 2008 and 2009 which recorded a successive row of multiple publications. One of the main reasons why 2009 had quite a substantial number of publications resulted from a special issue of the Journal of Leadership and Management in Engineering (American Society of Civil Engineers, ASCE). This journal raised a special issue to address corruption in the global construction and engineering sectors. Afterwards, publications on corruption in CPM have reduced as they were before 2009, although there have been improvements in the last 2 years. However, even with the low trend, numerous causative factors have been identified. Although the limit for the year of publications was not set, the first identified paper to address the subject matter considered for this review was in 1983, and after that, there have been some loopholes with regards to yearly publications till this date. The causal factors identified as at 1983 included negative role models, over close relationships, and poor professional ethical standards. From these factors, it can be deduced that the early causes of corruption in the construction industry were more attributed to the adverse behaviors of the professionals within the industry rather than the systems that were put in place. Within that same decade, the causative factors had developed from the negative behaviors of the professionals to weaken the systems in place thence Stuckenbruck and Zomorrodian (1987) recorded the absence of efficient and responsible administrative systems and the influence of government as the causes of corruption that existed. These causes have overtime plagued the construction



**Fig. 2** Annual trend of CC publications

industry so much so that diverse forms of corrupt practice exist within the industry. The causative factors that exist in the industry are presented in Table 3. Following the trend discovered from this review, it is expedient that research into corruption should be encouraged for the following reasons: (1) Corruption tarnishes the construction industry on a recurrent timeframe (Zou 2006; Dorée 2004; Tabish and Jha 2011; Tanzi 1998; Shan et al. 2015a), (2) the construction industry is regarded as the most corrupt among other private and public sectors (Krishnan 2010; Transparency International, 2005), (3) the capital flows (inflow and outflow) in global construction is extremely high representing over 13.4% of the world's total output (Global Construction 2015), (4) not only does the negative side affect the productivity and efficiency of the industry but also innocent lives are lost, new forms of corruption evolve as a result of the presence of these causative measures (Lewis 2003; Transparency International 2005; Ambraseys 2010). These are just a few of other reasons why research in construction should be given a critical look on a recurrent basis in the construction industry.

### **Overview of the Methodological Approaches**

The reviewed papers adopted all sorts of methodological approaches that were deemed best and fitting to carry out the objectives of investigations in each study. Per the review, no single approach was found to be repetitive in all the cases, except in the case of the data collection methods. However, the respondents selected in the cases presented in the papers included a full range of professionals from the construction, engineering and procurement sectors, including scholars from academia except studies that conducted literature reviews only. Also, data collection techniques predominantly ranged from questionnaire surveys, Delphi technique surveys, and experts' interviews to ensure adequate and reliable data. Analytical tools, ranging from multi-criteria decision-making tools to modeling tools such as Partial Least Squares structural equation modeling and Interpretative Structural Modeling as well as descriptive analysis such as frequencies, mean score ranking and other sorts of tools such as correlation analysis were employed to effectively carry out each study under review. Notwithstanding these explications, other publications were also literature review studies which researched past studies, as in the case of this paper.

### **Findings from Studies on the Analysis of Corruption Causative Factors**

Following a comprehensive review of selected 37 publications, all the identified causative factors of corruption are presented in Table 3. In short, 44 distinct factors were identified as causative factors of corruption in the construction industry. The references for the identified factors are presented in the third row of Table 3, and the full details of the references are captured in "Appendix". The relationship considered between the second column from the left representing the causes of corruption and the third column labeled publications is the frequency or the number of publications that cited a particular causal factor. For instance, 'lack of rigorous supervision' was identified by six different publications (2, 7, 17, 18, 24 and 37).

**Table 3** Causative drivers of corruption in construction

No.	Causes of corruption	Publications
1	Poor professional ethical standard	[2]; [16]; [17]; [19]; [20]; [21]; [24]; [25]; [26]; [27]; [30]; [34]
2	Over close relationships	[1]; [2]; [5]; [6]; [7]; [8]; [9]; [15]; [18]; [25]; [26]; [31]
3	Negative industrial and working conditions	[2]; [7]; [12]; [16]; [17]; [30]; [33]
4	Negative role models	[2]; [7]; [12]; [18]; [25]; [32]; [35]
5	Lack of rigorous supervision	[2]; [7]; [17]; [18]; [24]; [37]
6	Inadequate sanctions	[2]; [7]; [12]; [18]; [33]; [36]
7	Personal greed	[11]; [12]; [16]; [17]; [24]
8	Flawed regulation system	[2]; [12]; [16]; [17]
9	Deficiencies in rules and laws	[2]; [3]; [14]; [18]
10	The nature of infrastructure projects	[18]; [32]; [34]
11	Over competition in tendering process	[11]; [16]; [24]
12	Weak procurement/contractual structures	[12]; [16]; [36]
13	Low wage level	[2]; [18]; [29]
14	Great project complexity	[2]; [32]; [34]
15	Multifarious licenses or permits	[2]; [7]; [18]
16	Lack of pro-active steps by funders to limit corruption on projects	[18]; [33]
17	Absence of efficient and responsible administrative systems	[10]; [28]
18	Government influence	[10]; [34]
19	Insufficient legal punishments and penalties	[14]; [33]
20	Fierce competition	[16]; [17]
21	Absence of control mechanism	[12]; [33]
22	Transition of governments or economies	[22]; [28]
23	The nature of corruption being a secret activity	[16]; [34]
24	Complex contractual structure	[18]; [34]
25	Appointment of a local representative who acts on behalf of the firm to obtain contracts	[29]; [34]
26	Economic Survival	[16]; [34]
27	Insufficient transparency in the selection criteria for tenderers	[11]; [37]
28	Inappropriate political interference	[2]; [11]
29	Delaying the payment of workers' salaries	[22]
30	Lack of legal awareness	[4]
31	Lack of coordination among Government departments	[4]
32	Poor documentation of records	[4]
33	Complexities of institutional roles and functions	[11]
34	Asymmetric information amongst project parties	[11]
35	Lack of standardized execution in construction projects	[13]
36	Negative encouragement	[16]
37	The influence of <i>guanxi</i>	[16]

**Table 3** continued

No.	Causes of corruption	Publications
38	Absence of project anti-corruption systems	[18]
39	Subjecting workers to job insecurity	[22]
40	Feeble semblance of public interest	[23]
41	Misrepresentation of qualification certificates	[24]
42	Monopoly	[25]
43	Lack of frequency of projects	[34]
44	Deregulation in the public construction	[2]

1 = Dorée (2004); 2 = Le et al. (2014a, b); 3 = Zhang (2005); 4 = Iyer and Sagheer (2009); 5 = Ling and Tran. (2012); 6 = Yow Thim and Zonggui (2004); 7 = Brown and Loosemore (2015); 8 = Ning (2014); 9 = Ling et al. (2014); 10 = Stuckenbruck and Zomorrodian (1987); 11 = Sohail and Cavill (2008); 12 = Bowen et al. (2012); 13 = Tabish and Jha (2011); 14 = Bologna and Del Nord (2000); 15 = Chan et al.(2003); 16 = Zhang et al.(2017); 17 = Le et al. (2014a, b); 18 = Tanzi (1998); 19 = Liu et al.(2004); 20 = Moodley et al.(2008); 21 = Zarkada-Fraser and Skitmore (2000); 22 = Alutu (2007); 23 = Porter (1993); 24 = Shan et al.(2016a); 25 = Damit (1983); 26 = King et al.(2008); 27 = Fan and Fox (2009); 28 = Shan et al.(2015b); 29 = Boyd and Padilla(2009); 30 = Hartley (2009); 31 = De Jong et al.(2009); 32 = Krishnan (2009); 33 = Stansbury (2009a, b); 34 = Locatelli et al. (2016); 35 = Shan et al. (2015b); 36 = Shan et al. (2016b) 37 = Gunduz and Önder (2013)

This same was done for each factor to highlight the number of factors from resulting publication. Also, the sum of the frequency or the number of appearance of each factor is presented in Table 4 together with their respective constructs. After the identification of the variables, they were categorized into five constructs namely Psychosocial-Specific Causes, Organizational-Specific Causes, Regulatory-Specific Causes, Project-Specific Causes and Statutory-Specific Causes which are discussed in the next section.

### Categorization of Variables

Following the studies of Zhang et al. (2017), Le et al. (2014a, b), Tabish and Jha (2011) and Zou (2006), and with the help of the thematic analysis approach, the 44 variables causes of corruption identified from the review were categorized into five primary constructs. Le et al. (2014a, b) identified ten causes of corruption in the Chinese public construction sector and categorized them into two main constructs namely a flawed regulation system and lack of a positive industrial climate. Similarly, Zhang et al. (2017) also identified 24 causes of corruption in the Chinese tendering process and classified them into six unique categories. Other studies as well have developed similar constructs which are mostly regulatory-specific causes, industrial-specific causes, project-specific causes, etc. This study followed the same approach of construct categorization. However, since the review process included a vast range of CM publications, a high number of variables (44 in number) were identified, and the thematic analysis approach was employed to factorize the newly

**Table 4** Causes of corruption categories' rank

No.	Factors	Variables	Code	Freq	Mean	Rank
<i>PSC</i>					2.00	4
1		Lack of rigorous supervision during project execution	PSC1	6		4
2		Great project complexity	PSC2	3		7
3		The nature of infrastructure projects	PSC3	3		7
4		Complex contractual structure	PSC4	2		8
5		Lack of pro-active steps by funders to limit corruption on projects	PSC5	2		8
6		Lack of standardized execution in construction projects	PSC6	1		9
7		Inadequate frequency of projects	PSC7	1		9
8		Asymmetric information amongst project parties	PSC8	1		9
9		Misrepresentation of qualification certificates	PSC9	1		9
10		Insufficient transparency in the selection criteria for tenderers	PSC10	1		9
11		Monopoly or sole control over supply of good or services	PSC11	1		9
<i>RSC</i>					2.33	3
12		Flawed regulation system	RSC1	4		6
13		Deficiencies in rules and laws	RSC2	4		6
14		Multifarious licenses or permits	RSC3	3		7
15		Weak procurement/contractual structures	RSC5	3		7
16		Insufficient legal punishments and penalties	RSC4	2		8
17		Absence of control mechanism	RSC6	2		8
18		Lack of legal awareness	RSC7	1		9
19		Absence of project anti-corruption systems	RSC8	1		9
20		Deregulation in the public construction	RSC9	1		9
<i>SSC</i>					1.67	5
21		Inappropriate political interference	SSC1	2		8
22		Appointment of a local representative who acts on behalf of the firm to obtain contracts	SSC2	2		8
23		Government influence	SSC3	2		8
24		Transition of governments or economies	SSC4	2		8
25		Lack of coordination among Government departments	SSC5	1		9
26		Subjecting workers to job insecurity, especially in government and public enterprises	SSC6	1		9
<i>OSC</i>					2.82	2
27		Negative industrial and working conditions	OSC1	8		2
28		Inadequate sanctions	OSC2	6		4
29		Over-competition in tendering process	OSC3	3		7
30		Low wage level	OSC4	3		7
31		Economic Survival	OSC5	2		8
32		Fierce competition	OSC6	2		8
33		Absence of effective and responsible administrative systems	OSC7	2		8

**Table 4** continued

No.	Factors	Variables	Code	Freq	Mean	Rank
34		The nature of corruption being a secret activity	OSC8	2		8
35		Complexities of institutional roles and functions	OSC9	1		9
36		Delaying the payment of workers' salaries	OSC10	1		9
37		Poor documentation of records	OSC11	1		9
	<i>PSSC</i>				5.57	1
38		Poor professional ethical standard	PSSC1	12		1
39		Over close relationships	PSSC2	12		1
40		Negative role models	PSSC3	7		3
41		Personal greed	PSSC4	5		5
42		Negative encouragement	PSSC5	1		9
43		Feeble semblance of public interest	PSSC6	1		9
44		The influence of guanxi	PSSC7	1		9

identified variables. A thorough reading of each of the variables was made to draw out their main themes to aid in the categorization process. At the end of the process, the five different categories that were developed are Project-Specific Causes, Regulatory or Legal-Specific Causes, Statutory-Specific Causes, Organizational-Specific Causes and Psychosocial-Specific Causes. These categories serve as the extension of the body of knowledge devoted to corruption research in the construction industry. After the formulation of the categories, a conceptual framework (Fig. 3) of the causes of corruption in the sector was developed. This framework enlisted all the five newly formulated categories.

### Explanation of the Categories

Figure 3 represents the framework developed for the identified variables within their respective categories. They include Project-Specific Causes (PSC), Regulatory or Legal-Specific Causes (RSC), Statutory-Specific Causes (SSC), Organizational-Specific Causes (OSC) and Psychosocial-Specific Causes (PSSC). It should be noted that the generated categories are not independent of each other since they can all directly or indirectly affect the construction processes and projects. For instance, regulatory specific matters can apply to projects as well, although, from the categorization, there could be an assumption that project-specific causes are only related to construction projects. Explanations to each one of the categories are discussed in the succeeding section. The intensity of their occurrences based on the number of times mentioned in the literature is determined using the mean score approach to indicate the severity and attention needed to give to each category. Therefore, in determining the mean score for each category, the total frequency of



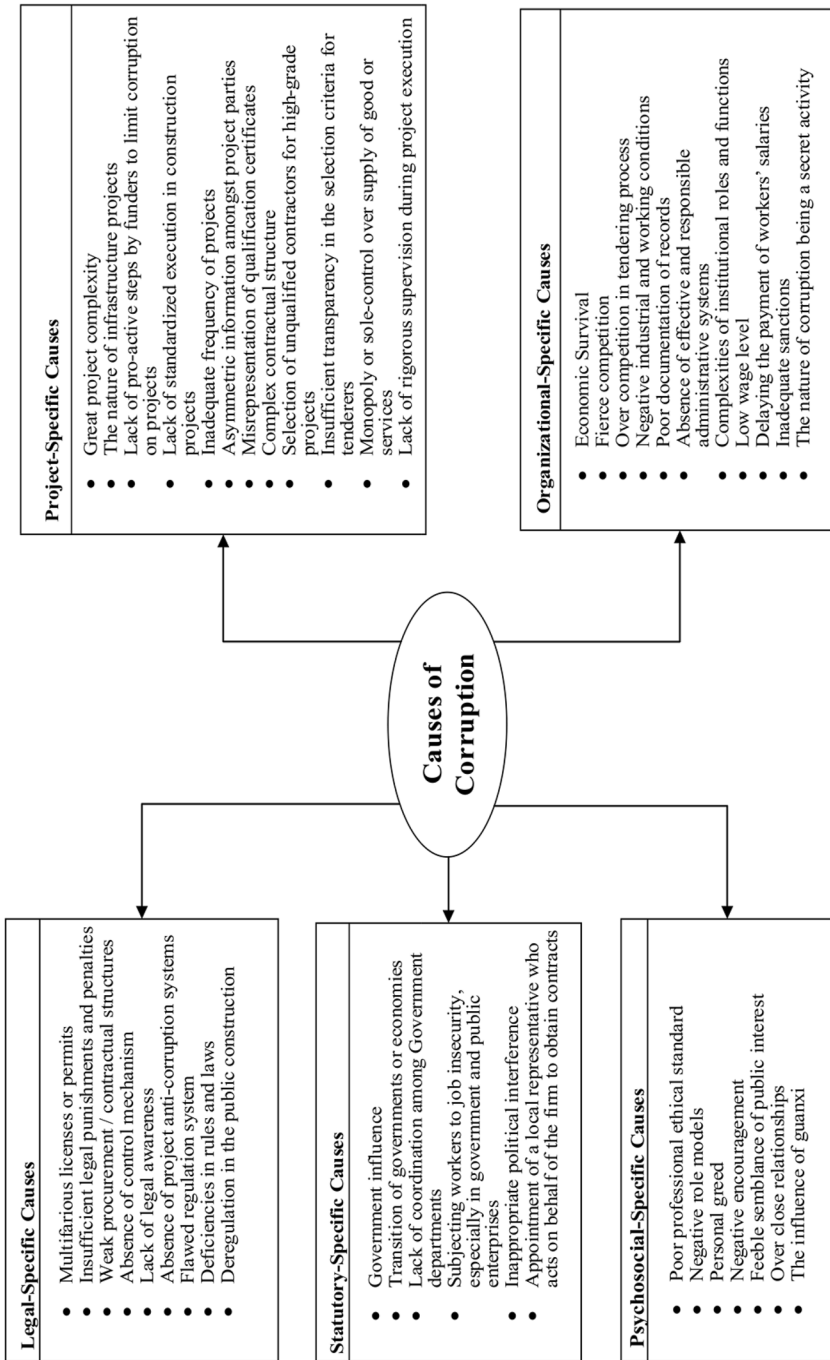


Fig. 3 Conceptual framework for causes of corruption

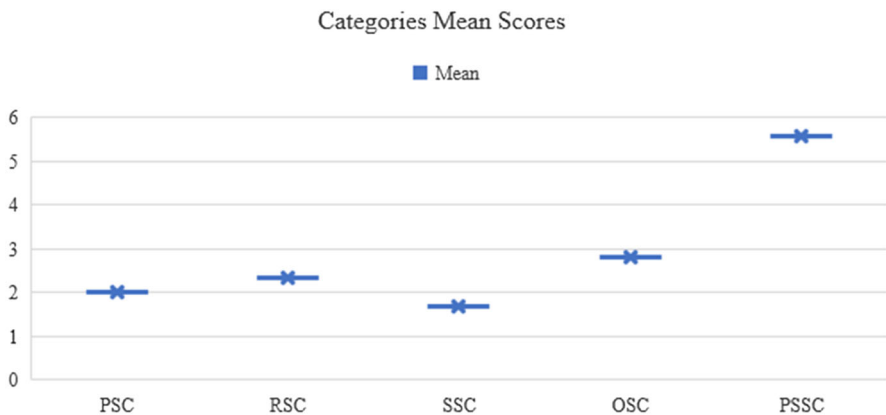
the forms within a category was summed up together and divided by their corresponding number of the variables 'n'. The category with the highest mean was ranked first and follows in that order. For instance, PSSC was calculated using the mean score formula below:

$$\frac{\sum (PSSC1 + PSSC2 + PSSC3 \dots + PSSC7)/n}{= \sum (12 + 12 + 7 + 5 + 1 + 1 + 1)/7 = 5.57}$$

where  $\Sigma$  represents the sum of individual frequencies and  $n$  is the number of variables within that particular category. The mean score for each category is shown in Table 4 and graphically presented in Fig. 4.

### Psychosocial-Specific Causes (PSSC)

The PSSC category was developed out of thematic analysis approach, and it represents the psychological and relational or social causes of corruption in CM. Psychosocial relates to the interconnections of social factors such as relationships and psychological attributes and their influence on the environment, workplace or the process of work execution, etc. (Heiser 2001; Greitzer et al. 2013). And per the definition and its theoretical underpinning, a total of 7 causal variables were classified under this category. As compared to the other categories, PSSC was ranked the first category with a mean score of 5.57 per the frequency of the individual factor citations recorded in this review and was also rated the second category with the least variables of seven. However, the top three variables under this construct were revealed to have very high scores as compared to the other causal measures. Moreover, the mean score obtained by the PSSC construct demonstrate that the psychological issue or causative factors of corruption in the CPM are critical and require psychological or ethical interventions since these causal factors are human-oriented. Examples of PSSC include a poor professional ethical standard, over close relationships, negative role models, personal greed and



**Fig. 4** Graphical presentation of the categories mean score

negative encouragement (Moodley et al. 2008; Shan et al. 2016a; Dorée, 2004; Le et al. 2014a, b; Brown and Loosemore 2015; Bowen et al. 2012; Tanzi 1998). Other PSSC variables include a weak impression of public interest or what may be termed as the lack of public interest in corruption issues and the influence of ‘guanxi’, which is a Chinese word for nepotism or favoritism (Sohail and Cavill 2008; Bowen et al. 2012; Zhang et al. 2017).

Poor professional ethical standards, negative role models, and negative encouragement are all inherently psychological issues that directly or indirectly affect not only junior staff within the industry or working environment but other senior professionals as well. For instance, a corrupt leader can create a league of corrupt followers, and the cycle continues till most if not all the followers become corrupt. It is sometimes difficult to bring a check to a senior professional who has tasted the benefits of corruption since his/her early beginnings as junior member. Setting a negative standard as a role model as well as offering negative encouragement, in the authors’ opinion, can be termed as the *mother of all forms of corruption*. The statement is based on the postulation that all forms of corruption have to commence with parties with negative intentions to engage in corruption (Henry 2009), and the topic of corruption is as well skewed towards the concept of negative human ethics. Although this argument may be posited, it is psychologically indicated that positive leadership or role models, as well as positive encouragement, are likely to create a positive working atmosphere (Bass 1985; Jung and Sosik 2002). Also, personal greed which is another psychological aspect of human ethics refers to the extremely selfish desire of a person to acquire wealth which is often presented in the form of money or other valuable resources (Dhiman 2008). And the desire to want more causes professionals to engage in corruption (Sohail and Cavill 2008; Bowen et al. 2012). On the side of relational instigators, over close relationships have contributed immensely to the evolution of varying forms of corrupt or discriminatory acts in the CPM such as favoritism, nepotism, cronyism and patronage and *guanxi* as described in the Chinese context (Wang et al. 2000; Ling and Tran 2012; Wibowo and Wilhelm Alfen 2014; Weisheng et al. 2013; Ke et al. 2011; Xu et al. 2005). Moreover, according to Wang et al. (2000), this is of the leading causes of corruption in the Chinese construction industry, hence the generic name, ‘guanxi.’ This causative measure has also led to the emergence of other forms of corruption identified in tendering processes such as collusion acts which may include cartels, bid rigging and price fixing (Dorée 2004; Bowen et al. 2012; Brown and Loosemore 2015; Sichombo et al. 2009; Stansbury 2009a, b). And deep research is needed especially in the area of corruption in CM to ascertain practical measures on how to effectively deal with the high rate of overclose relationships in the industry. Lastly, in a general setting or public domain, where there is a feeble semblance of public interest, or where the large percentage of the population fail to report corrupt practices of any form, there is a high possibility of corruption to flourish in that particular environment.

## Organizational-Specific Causes (OSC)

OSC are causal factors that emanate from organizational structures or institutions. In other words, they are corrupt institutional influences from both the public and private construction sectors that negatively affect the entire industry and create room for corruption to occur. They include negative industrial and working conditions, fierce competition in the tendering process which encourages some contractors or construction firms to engage in corruption in order to be awarded the contract (Brown and Loosemore 2015; Bowen et al. 2012; Zhang et al. 2017; Hartley 2009). Others, which include inadequate sanctions, low wage levels, economic survival of institutions and the absence of efficient and responsible administrative systems, among others are briefly discussed in the succeeding section (Le et al. 2014a, b; Brown and Loosemore 2015; Bowen et al. 2012; Tanzi 1998; Stansbury 2009a, b; Sohail and Cavill 2008). OSC construct is ranked second highest among the constructs with a mean score of 2.82, and the construct is as well made up of 11 out of 44 variables, just as observed in the case of PSC construct, making it also one of the leading categories with most the variables. Therefore, as encountered in the situation of the causal factors associated with project initiation, execution, and completion, organizational causal factors also tend to have adverse effects on the commencement and completion of a project. For instance, bidders representing their various construction institutions may be pushed to ask for a favor from the contract awarding body due to the excessive numbers of bidders who have tendered in for a project (Zhang et al. 2017; Shan et al. 2016b). This in turn places the contract-awarding body in a position to accept bribery from capable contractors and at the end rigs the entire bidding process. This variable, fierce competition in the tendering process, is also regarded as one of the leading causes of bid rigging in the infrastructure procurement process (Le et al. 2014a, b; Stansbury 2009a).

Also, the struggle for economic survival forces some construction and consulting firms to engage in corruption (Zhang et al. 2017; Locatelli et al. 2016). Resorting to corruption in situations like this can sometimes remain the only or last option for some industries, to survive and stay competitive in declining economies. Such firms would do whatever possible to enable them to survive rather than to get out of business. On other occasions, when there is fierce competition in the construction market or over competition in tendering process, unethical professionals from both the contracting or bidding firms (often the ‘briber’) and contract awarding body may manipulate or rig the entire process to favor the ‘briber’ (Sohail and Cavill 2008; Le et al. 2014a, b; Shan et al. 2016a). This action from the two corrupt parties or institutions most often succeeds because of the nature of corruption is a secret activity (Zhang et al. 2017). In the instance of negative industrial and working conditions such as a low wage level, underpaid staff may also supplement their remuneration earnings with petty facilitation payments and see either little or no need to refrain from such acts. Also, when they realize that their leaders are misappropriating monies or resources that could have been used to increase their wages, or better, their living condition, they tend to help themselves out through corruption (Tanzi 1998; Boyd and Padilla 2009). Moreover, delaying the payment of workers’ salaries can result in the same condition described above (Alutu 2007).

Poor documentation of records and complexities of institutional roles and functions are other problematic subjects encountered in other organizations that create the condition for corruption to thrive (Iyer and Sagheer 2009).

On the issue of the absence of efficient and responsible administrative systems and inadequate sanctions as OSC variables, Bowen et al. (2012) revealed that in the situation where no policing strategies and adequate sanctions are put in place to check dishonest or corrupt practices in awarding government contracts to the contracting parties, the whole process is likely to be rigged. The authors opined that these were some of the cases recorded in the South Africa (SA) construction industry. The absence of the political will to combat the incidence of corrupt practices in SA poses a difficulty in imposing discipline or adequate sanctions to corrupt parties in the SA construction sector. This therefore creates more room for the frequent occurrence of corrupt practices since those involved are occupied with the notion that they will go unpunished even when caught in the act (Krishnan 2009; Bowen et al. 2012; Stansbury 2009a).

### **Regulatory or Legal-Specific Causes (RSC)**

The RSC category consists of causal factors that are skewed towards regulations, norms or principles guiding *modus operandi* and the activities of the CPM or to an extent legal matters associated with the CPM. The composing variables of this construct are critical in every project management in construction because all projects and activities within the industry are guided by contracts, regulations, principles, bonds, and other rules. Per the assessment of this review, the RSC construct is ranked 3rd with a mean score of 2.33 with nine causative variables. The leading variables within RSC are flawed regulation system (FRS) of most public-sector construction projects, (Le et al. 2014a, b; Bowen et al. 2012; Zhang et al. 2017), deficiencies in rules and laws and multifarious licenses or permits (Zhang 2005; Bologna and Del Nord 2000; Tanzi 1998). FRS was identified by Le et al. (2014a, b) as one of the leading causes of corruption the Chinese construction public sector. In any setting, whether the private sector or public or even in the execution of a project, when the entire regulatory system intended to guide the efficient execution of activities is flawed, corruption can happen. The departments within the public construction sector as well that of the private are expected to ensure a sound set of regulations or principles governing every single activity and behavior of professionals are in place and active. Insufficient legal punishments and penalties, weak procurement/contractual structures, the absence of effective control mechanism, lack of legal awareness on the part of professional or construction workers, the lack of project anti-corruption systems and deregulation in public construction are other prominent causes of corruption under the RSC category that invariably tarnish the industry and the efficient delivery of construction projects including the procurement of goods and services (Le et al. 2014a, b; Brown and Loosemore 2015; Tanzi 1998). Right from the conception of a project to its realization, the identified RSC variables may lead to adverse consequences that can either halt the execution of a project or terminate it entirely. Compromising on any of the set laws or regulations guiding the industry or project execution may lead to adverse

consequences in the industry, and it is necessary that industry practitioners and project executioners conform to laws, principles, and regulations guiding a project. Conforming to rules and regulations is critical, not only in the CM but other sectors as well and most importantly in the public sectors (Brown and Loosemore 2015; Bologna and Del Nord 2000).

### **Project-Specific Causes (PSC)**

PSC refers to the causal factors or instigators that lead to corrupt activities in a construction project. Although the list within this category may apply to other situations as well, the specifically attributed to construction projects. In other words, without construction projects, some of the causes within the PSC construct, would not be in existence. Transparency International (2005) identifies two forms of construction projects namely minor and major projects as well as two primary types of corruption namely petty and grand corruption and argue out that whereas minor projects are susceptible to petty corruption, large projects or contracts are liable to grand corruption. The principal variables noted under this category include lack of rigorous supervision during project execution, great project or infrastructure complexity as well as the complex contractual structure involved in projects (Le et al. 2014a, b; Brown and Loosemore 2015; Tanzi 1998; Shan et al. 2016a). Other notable variables include the lack of pro-active steps by funders to limit corruption on projects and also the lack of standardized execution in construction projects (Krishnan 2009; Locatelli et al. 2016; Krishnan 2009; Locatelli et al. 2016). In all, 12 causal factors were classified under the PSC construct. As indicated in the previous section, other variables under the four other categories may directly or indirectly affect a construction project although the PSC category is specifically made up of related variables. Per the review, PSC category is ranked 4th with a mean score of 2.00, due to the low-frequency rate of the citations of its variables in the retrieved papers, it is regarded as a highly important category because it recorded the highest number of 11 out of 44 variables, the same with the OSC construct. This depicts how the nature of construction projects tend to record a high number of corruption cases.

According to the review, the lack of rigorous supervision during project execution happens to be the leading variable under this construct. This variable has been regarded not only as a causative factor of corruption in project works but also threat to timely execution of projects, increases the overall intended cost and affect the quality of projects which represents (the three main objectives of any construction project). Failing to ensure adequate and rigorous supervision of construction projects from the side of the client's representatives tends to create a loose end for the contractor or suppliers to make use of inferior materials or misappropriate the quality materials provided by the client (Brown and Loosemore 2015; Tanzi 1998). The situation, in either the short or long term, could lead to early deterioration of the projects and reduce the lifespan as well (Le et al. 2014a, b). The following three which include great project complexity, complex contractual structure and the nature of infrastructure projects are all complications that evolve as a result of the inability of some of the key members of a construction project to

appreciate the whole nature of both projects and contracts. This inability, therefore, creates a space for corruption to flourish. Whereas simple projects tend to yield fewer complications and difficulties with regards to the project itself and its associated contracts, complex projects and contracts not only need to make use of professional experts who understand the nitty-gritty of the entire project, but must also involve other skilled professionals outside the project team such as a professional audit team that understand the project and contracts. Therefore, awarding contracts for bidders who find it tough to appreciate the nature of the project, as well as the contract and the requirements involved, could be a possible cause of corruption. This is just one out of the many examples of the how the complexities of project and contracts may lead to corruption in either a construction process or other industrial activities in general.

### **Statutory-Specific Causes (SSC)**

SSC category is attributed to government or state-driven factors that propel corrupt practices in the public construction sector. The definition of corruption lends itself to public ventures as compared to that of the private sector (Chan and Owusu 2017). Also, the public officers are often reported to be the perpetrators of any possible corrupt incident in the construction industry Tabish and Jha (2011). The noted causative variables under the SCC construct include inappropriate political interference and government influence in contract awards, appointment of a local representative who acts on behalf of the firm to obtain contracts, the transition of governments or economies, lack of coordination among government departments and subjecting workers to job insecurity, especially in government and public enterprises (Le et al. 2014a, b; Sohail and Cavill 2008; Boyd and Padilla 2009; Stuckenbruck and Zomorrodian 1987; Locatelli et al. 2016). Even though the SSC factor is the least rated category in terms the frequency of citation (used as the yardstick for construct measurement in this study) and the least number of individual constituting variables, with a mean score of 1.67, the variables within this construct are critical in the developing countries and may even represent the leading causal initiators of corruption in the public construction sectors of some developing countries (Osei-Tutu et al. 2010; Tabish and Jha 2011).

The influence of government in contract awards can either be regarded a positive act or a corrupt act. In the case of the positive view, a government representative may choose to award a contract to a contractor or supplier firm due to their long-standing reputation in executing quality projects. On the other hand, government representatives may choose to award a contract to a firm based on either political affiliation or any relationship which depicts a typical example of corruption such as favoritism, nepotism or cronyism. This, to an extent, can be likened to inappropriate political interference (Sohail and Cavill 2008). Also, the transition of governments or economies does not only create enough room for corrupt practices to occur but also serve as a common leading cause of project abandonment in the developing world. An outgoing government may choose to abandon ongoing projects and embezzle public funds in economies that do not have adequate systems to detect such practices. Osei-Tutu et al. (2010) reported that an outgoing government could

be subjected to a strict audit and accountability process in the case of any hint of corruption. However, the audit process is required to be executed by a highly qualified independent auditor or an anti-corruption institution with such expertise. Lastly, lack of coordination among government departments and workers subjected to job insecurity, especially in the government and public domains just as in the case subjecting workers to low-level salary in OSC construct, puts employees in the position to abscond with as much as possible and through any means, whatever financial needs needed to secure a healthy future (Alutu 2007). This then puts the public worker in a position to embezzle public funds through any possible and vulnerable medium.

## Cultural Dimensions

Explicitly, there are disparities across different cultures when we consider the happenings and outcomes of the variables identified and the underlying categories developed. Whereas many European countries have stricter anti-corruption measures with corresponding enforcing strategies to deal with the causative factors identified, other regions such as the Middle East, some parts of Asia and Africa still struggle to enforce strict ACMs to deal with these factors.

Hence, these causative variables are still reported to be pressing in the regions mentioned. For instance, Le et al. (2014b) conducted a study investigating the causal relationships between the instigation of corruption and the risk indicators of corruption in the Chinese public construction sector. They reported that the most pressing causal construct that fuels corrupt practices in the Chinese region has to do with regulatory-specific causes. Nguyen and Chileshe (2015), also that corruption (basically PSC) was one of the leading factors of project failures in Vietnam. In Africa, Bowen et al. (2012) reported the leading causes of corruption in the South African construction industry are lack of transparency in the award of public contracts and also lack of a positive operating environment. Other leading forces that the authors reported had to do with the barriers that impeded the effective reporting of corruption cases. This factor is reported by other studies focused on developing countries such as Ghana Osei-Tutu et al. (2010), Zambia Sichombo et al. (2009) and other investigations. Although according to the findings, the variables under the PSSC category were mostly identified in publications selected for this review as compared to the variables under the other categories, it should be emphasized that different cultures reveal different patterns of causative mappings as well as measures adopted to tackle these issues.

In developed countries or economies such as Singapore, The USA, UK and cities like Hong Kong, corruption in CPM is somewhat checked by measures or systems such as e-procurement, raising awareness, rigorous technical auditing system, contract monitoring, comprehensive rules and regulations, education, access to information, stringent supervision among others (de Jong et al. 2009; Le et al. 2014a, b; Tabish and Jha 2012; Zou 2006; Vaidya et al. 2006; Neupane et al., 2014). Particularly, Hong Kong, one of the world's finest cities, has gone a long way in dealing with corruption and has made tremendous efforts in its fight against corruption in CPM. The establishment of ICAC in 1974 revealed that Hong Kong



had experienced similar challenges of corruption in the past. However, the case has overturned with time (Yeung 2000). These analogies are to indicate that the identified causative measures vary across different cultural settings and therefore different measures are implemented to tackle them. Future studies with the aim to investigate the issue of causes of corruption in CPM in different geographical contexts are encouraged to address them in line with the developed constructs to reveal how pressing these factors are.

Lastly, despite the case that corruption concerns have stimulated the development of a diversity of indicators by different kinds of methods employed by institutions such as the World Economic Forum, the TI, the World Bank and other ratings used by other institutions, it is difficult to adopt same models or indicators used by the institutions mentioned to assess construction projects due to different causative instigators and the forms of corruption that are identified in the industry.

Table 4 represents an overview of the impact or pervasiveness of the categories with their respective variables according to the papers selected for the review. From the deductions of Zhang (2005), research on PPP in infrastructure development, variables within the categories of both PSSC and OSC were found to be some of the principal risks or probable factors that could hinder the adoption and application of PPP in infrastructure development. The author reviewed the PPP cases from different backgrounds, ranging from Built-Operate-Transfer (BOT)-type tunnel projects in Hong Kong, toll roads in the US and Australia. Ling and Tran (2012) identified some causative factors under the PSSC construct as some prominent or leading factors in Vietnam's construction contracts in the public sector. Iyer and Sagheer (2009) also identified PSC in project risk management in PPP projects in India and variables under the OSC category were noted under the study of Dorée (2004) as causes of collusive practices in the Dutch construction industry. In the study of Brown and Loosemore, PSSC factors were again seen to be the driving instigators of corruption in the Australian construction sector. These publications included studies from diverse cultural backgrounds, ranging from developing countries to the developed. Whereas it may be expedient to present the pervasiveness of each causative category under the cultural diversities, the deductions from literature reviews may not be exhaustive enough to give an explicit overview in under each category. Future studies are therefore recommended to present empirical studies highlighting the pervasiveness of each category under different cultural backgrounds.

## Future Research Directions

Several causal factors have been determined and presented in this review. However, it should be stated that despite the pragmatic efforts taken to conduct this review, there is more work that needs to be reported for further research following the findings of this study. The identification of the causal factors and the development of the categories in this review is only a stepping stone to further extensive research. Determining the cause of a problem can always be regarded as a proactive step in dealing with that problem. In the same manner, identifying the causative factors in CM corruption research can be regarded as a practical step in creating a more

accurate and suitable solution in each case. First, the categories developed may need further empirical undergirding regarding both contextual and geographical scopes. For instance, the categories can further be tested empirically on a given project and in a specific country or community to determine the precise intensity or severity of each category to help establish effective means or develop strategic anti-corruption measures in dealing with the causes. Also, due to the dynamic nature of corrupt practices, it is believed that the variables identified or classified under each category may not be exhaustive enough. Further research is therefore recommended to empirically and deeply investigate the developed categories across diverse contexts. A palpable investigation can also be conducted to map out how these causative factors lead to specific forms of corruption in CM with regards to different cultural settings. For instance, during the tendering stage of construction procurement, it has been noticed that an overclose relationship which is one of the variables identified in this study is a leading cause favoritism and bid rigging which are all forms of corruption. This statement cannot be generalized since causative measures vary from institution to institution and from country to country. Therefore, conducting further research to reveal how the identified categories vary across diverse cultural setting is vital since it can inform foreign investors and policymakers on what strategies to adopt to stay either immune or less vulnerable to corrupt practices on overseas projects. Further developments can be extended to examine the relationships between the causes of corruption and the forms of corruption, also with the similar aim of developing or coming up with strategic anti-corruption measures to annul the corrupt aspects of the situation. In this case, the benefits would be that, in the process of helping combat a particular cause, there would be a direct or indirect solution to combating their related forms. Lastly, more research work needs to be conducted to explicate the causative factors and the possible conditions that enable these identified factors to flourish. This may also aid in drawing or developing anti-corruption measures and frameworks, the possibility of dealing directly with these causative measures, hence, contribute to the fight and reduction of corruption in the construction industry.

## **Limitations**

This is a review study, restricted to CM journals and with no empirical justifications except as reported in the papers selected for the review. Therefore, the results highlighting the impact of the thematic categories cannot be generalized or applied to other sectors other than construction project management and delivery. Also, to a large extent, the results cannot be applied to every cultural, institutional or geographical background but they are provided to give a general overview of the pressing categories in CPM. The levels of categories intensity developed in this review are not based on any empirical justifications, hence cannot be generalized. They are constructed just to depict the general overview of the categories severity with their related variables in CM.

## Conclusion

Identifying the causative factors of corruption in the CM forms one of the crucial branches in CM research. Analogous to the treatment of any disease, the causative agents of corruption need to be rightly diagnosed to help direct specific medications (anti-corruption measures) towards its treatment. Over the past years, research studies on corruption in CM have increased, and this has led to the identification of the causes that give rise to corruption. However, these works are diversified in terms of content and context without any review of the causes of corruption to the present date. This study, therefore, presented a systematic review of the different causes of corruption in the CM over the years. The entire approach was therefore conducted in three separate phases namely: desktop search, targeted paper search and the examination of retrieved papers. At the end of the final search, 37 publications were selected for the review based on the methodology adopted. The selected papers were thoroughly examined and analyzed in terms of existing causal factors of corruption, the annual trend of publications and the thematic categorization of the variables. An initial framework, demonstrating some acts of corrupt practices during the execution of a construction project was developed to illustrate the flow of some recorded and reported examples these acts. Also, a summary table of some enormous contributions from top global institutions in the identification of the causes and forms of corruption as well as their contributions to the development of different innovative and strategic measures and frameworks to help combat corruption in CM across the world was presented. They include but are not limited to the World Bank, the United Nations, the OECD, the GIACC, Transparency International, the International Standard Organization (ISO), FIDIC and ASCE.

In assessing the annual trend of publications, 2009 recorded the year with the highest number of publications with seven publications followed by 2014 with four publications. From the 37 publications that were selected for this review, 44 different causative measures were identified as causes of corruption in CM. Among the 44 causative factors, the top five mentioned were over close relationships, poor professional ethical standard, negative industrial and working conditions, negative role models and inadequate sanctions. However, after the identification of the variables, the authors developed a conceptual framework for categorizing the identified variables into five separate but related categories namely: Psychosocial-Specific Causes, Organizational-Specific Causes, Regulatory-Specific Causes, Project-Specific Causes and Statutory-Specific Causes. The categories were developed by using the thematic analysis approach and past studies. With the tremendous involvement and engagement in corruption research in the CM, this study, however, advocates for more research to be conducted to keep unearthing the other clandestine causes of corruption that have not yet been identified and specific anti-corruption measures can be formulated and directed towards the five areas of categorizations under which the variables have been factorized. The checklist of the causes provided in this study and the developed framework are vital to anti-corruption institutions, policymakers and industry professionals in the formulation of anti-corruption measures. It also constitutes part of the most crucial information

needed by academic and industry researchers to instigate further research works and the development and proposition of innovative anti-corruption measures to help thwart the incidence of corruption in the short term, and hopefully, expunge its existence in the long term.

**Acknowledgements** The authors are thankful to the Research Grants Council of Hong Kong (Hong Kong Ph.D. Fellowship Scheme) and to the Department of Building and Real Estate of the Hong Kong Polytechnic University for funding this research. The authors are very grateful to the anonymous reviewers for providing constructive comments to enhance the quality of this paper.

**Funding** The authors are very thankful to the Research Grants Council of Hong Kong through the Hong Kong Ph.D. Fellowship Scheme and to the Department of Building and Real Estate of the Hong Kong Polytechnic University for funding this research.

### Compliance with Ethical Standards

**Conflict of interest** The authors confirm that the authors of this paper have no conflicts of interest.

## Appendix

See Table 5.

**Table 5** Selected papers with associated journals

No.	Journal	Year	Authors	Citation
1	JCEM	2005	Zhang, X	134
2	JCEM	2009	Iyer, K. C., & Sagheer, M	117
3	JCEM	2014	Le, Y., Shan, M., Chan, A. P., & Hu, Y	26
4	CME	2012	Ling, F. Y. Y., & Tran, P. Q	24
5	CME	2004	Yow Thim, L. A. M., & Zonggui, C	47
6	ECAM	2015	Brown, J., & Loosemore, M	6
7	IJPM	2014	Ning, Y	16
8	IJPM	2014	Ling, F. Y. Y., Ong, S. Y., Ke, Y., Wang, S., & Zou, P	38
9	IJPM	1987	Stuckenbruck, L. C., & Zomorrodian, A	39
10	CME	2008	Sohail, M., & Cavill, S	90
11	CME	2012	Bowen, P. A., Edwards, P. J., & Cattell, K	46
12	CME	2011	Tabish, S. Z. S., & Jha, K. N	39
13	BRI	2000	Bologna, R., & Del Nord, R	20
14	BRI	2004	Dorée, A. G	132
15	JME	2003	Chan, A. P., Chan, D. W., & Ho, K. S	146
16	JME	2017	Zhang, B., Le, Y., Xia, B., & Skitmore, M	4
17	JME	2014	Le, Y., Shan, M., Chan, A. P., & Hu, Y	26
18	IMF*	1998	Tanzi, V	2293
19	ECAM	2004	Liu, A. M., Fellows, R., & Ng, J	43
20	CME	2008	Moodley, K., Smith, N., & Preece, C. N	56

**Table 5** continued

No.	Journal	Year	Authors	Citation
21	CME	2000	Zarkada-Fraser, A., & Skitmore, M	79
22	PIEEP	2007	Alutu, O. E	14
23	PIEEP	1993	Porter, J. C	1
24	PIEEP	2016a	Shan, M., Chan, A. P., Le, Y., Hu, Y., & Xia, B	6
25	PIEEP	1983	Damit, A. P	–
26	PIEEP	2008	King, W. S., Duan, L., Chen, W. F., & Pan, C. L	6
27	PIEEP	2009	Fan, L. C., & Fox, P. W	21
28	PIEEP	2015a	Shan, M., Chan, A. P., Le, Y., Xia, B., & Hu, Y	13
29	LME	2009	Boyd, J. M., & Padilla, J. D	4
30	LME	2009	Hartley, R	10
31	LME	2009	de Jong, M., Henry, W. P., & Stansbury, N	30
32	LME	2009	Krishnan, C	10
33	LME	2009	Stansbury, N	1
34	IJPM	2016	Locatelli, G., Mariani, G., Sainati, T., & Greco, M	8
35	SEE	2015b	Shan, M., Chan, A. P., Le, Y., & Hu, Y	10
36	SEE	2016b	Shan, M., Le, Y., Yiu, K. T., Chan, A. P., & Hu, Y	1
37	SEE	2013	Gunduz, M., & Önder, O	8

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