

# 1 Overview of Corruption Research in Construction

## 2 **Introduction**

3 The construction industry plays a vital role in shaping the world. However, this  
4 positive social image has been increasingly diminished by corruption issues  
5 (Transparency International 2008). Corruption can ruin multiple levels of the industry  
6 and lead to low performance, including quality defects and increased costs of  
7 construction projects (Charles 2009). This misconduct can also affect the development  
8 of the global construction market (Goldie-Scot 2008). In extreme cases, corruption  
9 results in negative social effects with serious consequences. Uneke (2010) and Tabish  
10 and Jha (2011) stated that corruption violates the rule of law and public trust in  
11 government. Corruption has stirred growing concerns not only from developed  
12 countries such as the US (Sohail and Cavill 2008; Crist 2009), United Kingdom  
13 (Chartered Institute of Building Survey 2006), and Australia (Hartley 2009) but also  
14 from developing countries such as India (Tabish and Jha 2012) and Nigeria (Alutu and  
15 Udhawu 2009). However, studies rarely provide a complete view of corruption in  
16 construction. Therefore, a systematic review of papers in first-tier peer-reviewed  
17 journals in Construction Engineering and Management (CEM) is deemed appropriate  
18 to understand key issues in corruption in construction. Specific questions to be  
19 addressed in this paper include the following:

- 20 1. What is the coverage of corruption-related studies published in first-tier CEM  
21 journals in the period from 1990 to 2012?
- 22 2. What are the future directions for research on corruption in construction?

## 23 **Corruption in Construction**

24 Corruption is recognized as one of the major obstacles to economic and social  
25 development (World Bank 1997). In the construction industry, corruption may occur  
26 in any phase of a project, namely, project initiation, planning and design, bidding and  
27 construction, as well as operation and maintenance (Tabish and Jha 2011a). The  
28 construction sector is often deemed one of the most corrupt industries worldwide  
29 because of much information asymmetry between the client and other participants  
30 (Charles 2009). Sohail and Cavill (2008) reported that the annual estimated loss from  
31 corruption in the global construction market reaches about US \$ 340 billion, which  
32 accounts for 1% of the global construction market value (about US \$ 3.2 trillion). This  
33 figure suggests that considerable enterprise profit is wasted because of corrupt  
34 practices in construction.

35 Sohail and Cavill (2008) revealed that corruption usually occurs for or a number or  
36 a combination of the following reasons: (a) substantial flow of public money, (b)  
37 competitive nature of the tendering process, (c) lack of transparency in the selection  
38 criteria for tenders, (d) political interference in cost decisions, (e) complexity of  
39 institutional roles and functions, and (f) asymmetric information between practitioners.  
40 Tabish and Jha (2011a) emphasized that lack of standardized execution of  
41 construction projects is also a major reason for corrupt practices in the industry. In  
42 addition, this form of misconduct is secretly accomplished and very difficult to detect  
43 because of lack of access to the relevant documents or stakeholders in the project  
44 (Tabish and Jha 2011a).

45 Corruption also impedes the adoption of corresponding prevention measures in  
46 advance. However, considerable effort from industrial associations, non-governmental  
47 organizations (NGOs), and international organizations have provided guidelines on  
48 preventing corrupt conduct and practice. The American Society of Civil Engineers  
49 (ASCE) promoted a “zero tolerance” policy to cultivate an anti-corruption culture in  
50 the construction industry (Crist 2009). In collaboration with the Global Infrastructure  
51 Anti-Corruption Centre (GIACC), Transparency International (TI) developed an  
52 integrated anti-corruption system, the Project Anti-Corruption System (PACS). The  
53 PACS employs a group of anti-corruption measures such as the appointment of an  
54 independent assessor, commitment of all participants, disclosure of project  
55 information, and use of anti-corruption agreements (Transparency International 2013).  
56 The World Economic Forum established a global Partnering Against Corruption  
57 Initiative to provide a platform that helps companies prevent corrupt practices (World  
58 Economic Forum 2013). Despite considerable attempts to prevent corruption in the  
59 construction industry, the practice continues to be a common global phenomenon,  
60 especially in developing countries (Goldie-Scot2008).

## 61 **Research Methodology**

62 To identify major research outputs published in first-tier CEM journals, the  
63 methodology adopted by Ke et al. (2009) and Hong et al. (2012) was replicated in this  
64 study. The research design included two steps, as follows:

65 In Step 1, a list of first-tier peer-reviewed CEM journals was formulated as the  
66 source for identifying relevant papers according to the CEM journal ranking list by

67 Chau (1997). Selected journals included the top six journals in the ranking list of  
68 Chau: *Construction Management and Economics (CME)*, *Journal of Construction*  
69 *Engineering and Management (JCEM)*, *Engineering, Construction and Architectural*  
70 *Management (ECAM)*, *Journal of Management in Engineering (JME)*, *Proceedings of*  
71 *the Institution of Civil Engineers: Civil Engineering (PICE-CE)*, and *International*  
72 *Journal of Project Management (IJPM)*. A full search of relevant papers in each of the  
73 six journals was conducted using databases with a full collection of reports from 1990  
74 to 2012. The common keyword “corruption” was used in the Title/Abstract/Keyword  
75 field of search engines of databases such as ASCE Library, Taylor & Francis Online,  
76 SciVerse ScienceDirect, Emerald, and the ICE Virtual Library. The search results by  
77 relevance were as follows: CME (68), JCEM (67), ECAM (10), JME (27), PICE-CE  
78 (17), and IJPM (38). These identified papers were reviewed to examine their  
79 relevance to the topic. The results were refined, obtaining the following results: CME  
80 (11), JCEM (5), ECAM (2), JME (3), PICE-CE (2), and IJPM (2).

81 In Step 2, a separate research was also conducted to identify more papers on  
82 corruption in construction by using Web of Science (WoS), Compendex and  
83 Engineering Index Backfile (CEIB) on Engineering Village, and the ASCE Library.  
84 These three databases are regarded as major citation sources of high-quality papers in  
85 construction engineering. WoS is the leading peer-reviewed literature web source  
86 worldwide, covering more than 10,000 journals (Lippi et al. 2012). CEIB provides  
87 bibliographic citations and abstracts of over 5,000 engineering journals and  
88 conferences in all fields of engineering (Xue et al. 2010). The ASCE Library is

89 regarded as the largest publisher in the world, providing information on civil  
90 engineering (Fitzgerald 2005). Common keywords, including “corruption” and  
91 “construction” were used in the Subject/Title/Abstract field of search engines in the  
92 three databases. The initial search result was as follows: WoS (95), CEIB (282), and  
93 ASCE Library (52). After excluding papers unrelated to the corruption topic and those  
94 already identified in Step 1, the results of relevant papers cited in these three  
95 databases were refined: WoS (18), CEIB (3), and ASCE Library (10).

96 Finally, 56 papers were identified and validated as papers relevant to corruption in  
97 construction. Information on the 56 papers and their sources are listed in the Appendix.  
98 All searches were conducted in September 2012.

## 99 **Current Research Interests**

100 Based on a review of the 56 relevant papers, three research areas were identified as  
101 categories previous research on corruption in construction: forms of corruption in  
102 construction, impact of corruption in construction, and anti-corruption mechanisms  
103 and measures.

### 104 ***Identification of Forms of Corruption in Construction***

105 Twelve forms of corruption in construction were identified from these 56 papers  
106 (Table 1).

107 (Please insert Table 1 here.)

108 Bribery is the most common and serious form of corruption in the construction  
109 industry, particularly in developing countries (Barco 1994). Bribery is regarded as a  
110 major corrupt practice, given that corruption refers to “*offering, giving, receiving or*

111 *soliciting of anything of value to influence the action of an official in the procurement*  
112 *or selection process or in contract execution”*(Shakantu 2006). With reference to an  
113 empirical survey in South Africa, Bowen et al. (2007a and 2007b) disclosed detailed  
114 information on how bribery is committed, revealing that it comes in the form of *gifts,*  
115 *payments, overseas and holiday trips, special favors/privileges, and affirmative*  
116 *appointments.*

117 Fraud is also a common form of corrupt practice in construction. This practice  
118 mainly comes in the form of *deceit, misinformation, invoiced and paid for materials*  
119 *those were never received, spurious request for a time extension, deliberate intention*  
120 *to mislead and withhold information, alteration of documents, and theft of materials*  
121 (Vee and Skitmore 2003; Heuvel2005; Shakantu2006; Bowen et al. 2007a; Bowen et  
122 al. 2007b; Sohail and Cavill2008; Jong et al. 2009; Tabish and Jha 2011a; Bowen et al.  
123 2012). In two questionnaire surveys conducted in Australia and South Africa (Vee and  
124 Skitmore 2003; Bowen et al. 2007a; Bowen et al. 2007b), *deceit* and *misinformation*  
125 ranked first and second, respectively, as the most fraudulent conduct. As a major area  
126 in corruption research in construction, fraud has aroused significant research concern  
127 in previous studies (Table 1).

128 Collusion is a form of corruption in which a secret agreement is reached between  
129 two or more parties for a fraudulent or deceitful purpose. Collusion may benefit the  
130 involved parties but sacrifice the normal benefits of the project or the public (Bowen  
131 et al. 2007b). Most collusive practices are committed during project biddings and thus  
132 decrease the number of bidders and bid variance (Zarkada-Fraser and Skitmore 2000).

133 Previous collusion practices mainly involve two key participants in the projects, such  
134 as “*contractor and consultant, contractor and cost consultant, contractor and*  
135 *architect, client and consultant, and architect and suppliers*” (Bowen et al. 2007a;  
136 Bowen et al. 2007b; Heuvel 2005). Zarkada-Fraser (2000) emphasized that collusion  
137 seriously corrodes the foundation of the competitive nature of the construction  
138 industry.

139 Bid rigging is another major form of corruption that occurs mainly between a  
140 tenderee and a tender. In some cases, a tenderee intentionally specifies a very short  
141 time limit for preparing the bidding document to control the number of potential  
142 tenders. Thus, only a small number of tenders who have been informed earlier about  
143 the forthcoming bid can promptly submit the bidding documents. Some tenderes can  
144 also demand for unequal qualification requests to limit the number of tenders and help  
145 their favored tenders (Jong et al. 2009). Bowen et al. (2007a, 2007b) revealed  
146 common forms of bid rigging, including *cover pricing, bid cutting, hidden fees and*  
147 *commissions, and compensating for tendering costs through unsuccessful bidders.*

148 Embezzlement is a crime in which a person fraudulently misappropriates or  
149 misapplies what is legally entrusted to that person for his or her own intent (Green  
150 1993). In the construction industry, a typical example of embezzlement is the  
151 misappropriation of project fund (Tow and Loosemore 2009; Ling and Hoang 2010).  
152 Embezzlement can seriously damage the cost management of construction projects  
153 (Sohail and Cavill 2008). For example, the payment for a contractor may be defaulted  
154 by the client’s embezzlement of the project funds, thereby delaying payment and

155 project delivery or even resulting in project failure.

156 Kickback refers to illegal economic incentives that a person uses to seek a  
157 favorable decision from a person in power (Jong et al. 2009). For instance, a client  
158 staff may help a favored tender win a contract to obtain an economic reward from the  
159 tender. A recent questionnaire survey in Nigeria disclosed that the contractor winning  
160 the contract usually provides a price quotation that includes a kickback in the bidding  
161 (Alutu 2007). Kickbacks occur not only between contractors and owners. This form of  
162 bribery also occurs between architects and suppliers or between consultants and  
163 suppliers/ consultants, especially when the person in power can help suppliers win the  
164 contract by specifying the requirements of certain materials or construction techniques  
165 (Bowen et al. 2012).

166 Conflict of interest refers to a situation in which a professional in a position of trust,  
167 such as a site supervisor, an auditor, or a cost consultant cannot fulfill his or her duty  
168 impartially because of ambivalent professional or personal interests (Bowen et al.  
169 2007a, 2007 b). Despite the lack of proof of improper activity, a conflict of interest  
170 can create an appearance of impropriety and thus undermine confidence in the  
171 professional to act properly in his or her position, which may negatively affect the  
172 public (Bowen et al. 2007a, 2007 b).

173 Dishonesty and unfair conduct occur mostly in bidding, bureaucratic or government  
174 policy making, negotiations on consultancy fees and project costs, as well as contract  
175 negotiation and signing (Vee and Skitmore 2003). Bowen et al. (2007a, 2007 b)  
176 summarized the common complaints on dishonesty and unfairness from different key



177 participants in construction projects, as follows: *“Architects believe that contractors*  
178 *are not always honest in abiding by contractual specifications, and that they*  
179 *commonly use cheaper, inferior alternatives. Contractors believe that the tender*  
180 *adjudication process is unfair, and that professionals act with bias when pressured by*  
181 *clients. Quantity surveyors believe that contractors repeatedly over-claim and that*  
182 *clients pressurize consultants to make savings on projects or cut their fees.”*

183 Extortion refers to corrupt conduct motivated by the desire for gain, usually in the  
184 form of forced extraction of bribes and asking for favors from vulnerable parties  
185 (Sohail and Cavill 2006). Extortion can occur as a requirement (a) from client staff to  
186 contractors or material suppliers, (b) from a major contractor to his subcontractor, (c)  
187 from a potential subcontractor to a material/equipment supplier, and (d) from  
188 regulatory/permitting agencies to clients, contractors, or material/equipment suppliers.  
189 Extortion can result in the misuse of project funds and provide some individuals an  
190 illegal income (Jong et al. 2009). Extortion can also diminish project quality and  
191 reliability. Thus facility managers and users can suffer from extortion.

192 Negligence refers to corrupt conduct characterized by failure to exercise the degree  
193 of care that an ordinarily prudent and careful professional would exercise under  
194 similar circumstances (Richard 1972). Negligence is also a common form of  
195 corruption in construction. Specific forms of negligence include inadequate quality  
196 specifications, poor workmanship, insufficient safety specifications, low-quality  
197 materials, poor process supervision, and lack of project management and skills (Vee  
198 and Skitmore 2003). According to Bowen et al. (2007a, 2007 b), over 90% of

199 architects and cost consultants have committed negligence. Similarly, over 70% of  
200 contractors and consultants have observed professional negligence in construction.

201 Front companies refer to corporate entities that are established by client staff to  
202 obtain illegal income from corrupt conduct (Jong et al. 2009). These companies are  
203 usually unknown to the public; however, their controllers usually hold senior positions  
204 in the government and may have influence on awarding public projects. The  
205 controllers may receive a very large share of bonuses from these companies, and this  
206 form mostly occurs in public projects (Jong et al. 2009).

207 Nepotism refers to corrupt conduct by which a client staff may favor participants  
208 who have a closer relationship with him or her in terms of race, origins, and private  
209 relationships, among others (Kadembo 2008). Nepotism, also referred to as the “good  
210 old boys’ network,” (Singh and Shoura 1999) can have multiple negative effects on  
211 the success of construction projects, such as a decrease in construction productivity,  
212 deficiency in managerial ability, and lack of contribution to project success (Kale and  
213 Arditi1998).

#### 214 ***Impact of Corruption in Construction***

215 Based on 56 identified papers, previous studies on the impact of corruption on the  
216 construction industry focused on three areas: corruption risks in construction projects,  
217 expansion strategies of global companies in the international construction market, as  
218 well as social and economic effects.

219 Corruption is an extremely significant risk in managing construction projects,  
220 particularly in managing project costs in developing countries, which usually lack

221 transparent and effective legislative and administrative system (Ofori 1999). Wang et  
222 al. (1999 and 2000) indicated that corruption is one major risk in managing  
223 build-operate-transfer (BOT) projects, adding that the major forms of corruption in  
224 BOT projects in China is the expenditure of corrupt officials. Similarly, public-private  
225 partnership projects of China also face a high risk in preventing corruption, which  
226 affects project success (Xu et al. 2010; Chan et al. 2011; Ke et al. 2011). Ling and  
227 Hoang (2010) obtained similar findings in Vietnam. Meduri and Annamalai (2011)  
228 added that corruption can lead to an increase in the cost of construction projects and a  
229 waste of public funds in India because of extra bribe payments.

230 Corruption largely affects the expansion strategies of global companies in the  
231 international construction market (Ling and Hoang 2010). Barco (1994) viewed  
232 bribery as a common strategy taken by global companies to gain competitive  
233 advantage in foreign trade in the construction market. According to Tang et al. (2012),  
234 corruption combined with political and physical factors is critical for a company to  
235 enter successfully the international market. Despite large construction demand and  
236 enormous latent benefits in some developing countries, the level of corruption in a  
237 country may be one main consideration of global companies, particularly those based  
238 in developed countries, in deciding whether to enter a new construction market  
239 (Crosthwaite 1998). Therefore, corruption can obstruct global construction companies  
240 from entering new construction markets.

241 Finally, corruption can affect the social and economic development of human  
242 societies worldwide. Empirical studies have revealed that corruption causes economic

243 problems and worsen economic crises in some European and Asian countries. Jimenez  
244 (2009) noted that corruption contributed to the speculative bubble in Spain. Romero et  
245 al. (2012) identified specific forms of corruption in town planning and urban  
246 expansion in Spain, such as blurring land lines between the public and private sectors,  
247 illegal use of insider information, and lack of transparency. Green (2005) emphasized  
248 that widespread corrupt practices in Turkish construction industry can worsen the  
249 catastrophe because these practices lead to a lack of adequate quality inspection and  
250 assurance. Badun (2011) affirmed that the low quality of infrastructure in Croatia is  
251 due to common corrupt practices in the construction industry. Corruption also hinders  
252 the development of society and economy in developing countries. For instance, most  
253 global contractors abandoned water and irrigation projects in Nigeria (Sonuga et al.  
254 2002) and road projects in Afghanistan (Unruh and Shalaby 2012) because of serious  
255 corruption in these two countries.

### 256 ***Anti-corruption Mechanism and Measures***

257 Anti-corruption strategy is another research area on corruption in construction.  
258 Previous studies mainly involve four strategies: transparency mechanism, ethical code,  
259 project governance, and audit and information technology.

260 Transparency mechanism is an effective strategy for preventing corrupt conduct in  
261 construction projects. Sohail and Cavill (2008) observed that transparency  
262 mechanisms can provide the public with access to information on construction  
263 projects so that project processes can be monitored by stakeholders, and decision  
264 makers can be held accountable for their decisions. Kenny (2012) indicated that

265 regular exposure of contract and implementation details is a common form of  
266 transparency mechanism. Goldie-Scot (2008) noted that some developing countries  
267 such as Tanzania, Zambia, the Philippines, and Vietnam have exerted considerable  
268 effort in introducing transparency initiatives to prevent corruption in construction  
269 projects.

270 Ethical codes represent another important strategy to prevent corrupt practices by  
271 improving ethics and self-discipline in professionals. For instance, Australia  
272 developed a National Code of Practice for the Construction Industry to discipline all  
273 industry professionals and prevent corrupt transactions in construction projects  
274 (Hartley 2009). Goldie-Scot (2008) added that ethical behavior should be rewarded  
275 for constructing a positive industry atmosphere. Sohail and Cavill (2008) noted that  
276 ethical training may improve the implementation of a national ethical code and that  
277 developing an ethical code for a particular organization may be more useful because  
278 the industry ethical code cannot include exhaustive guidelines for all situations that  
279 different practitioners face in their work.

280 Several measures for improving project governance can also prevent corrupt  
281 activities in construction projects. Kenny (2009) argued that separation of the  
282 ownership and regulatory functions of government in construction projects can  
283 effectively mitigate corruption because it can restore the competitive nature of the  
284 construction sector. Tabish and Jha (2012) proposed that the selection of qualified  
285 leaders can facilitate cleaning up of corruption, thereby contributing to project success.  
286 Harsh punishment should also be considered in the design of corruption prevention to

287 provoke real fear in practitioners (Tabish and Jha 2012).

288       Audit and information technology also play an increasingly important role in  
289 corruption prevention in the construction industry worldwide. Sichombo et al. (2009)  
290 indicated that technical auditing in the pre-contract state of a construction project can  
291 minimize or prevent unethical practices in construction projects. Sohail and Cavill  
292 (2008) suggested that the Integrity Pact and information technologies widely applied  
293 worldwide can also positively affect corruption prevention. A debarment, which  
294 records companies and individuals found guilty of corruption, has been implemented  
295 by European Union (EU) member countries to prevent the corrupt companies and  
296 individuals from participating in EU projects (Jong et al. 2009).

297       Some international and industry associations have exerted substantial efforts in  
298 promoting a combination of anti-corruption mechanism and measures to prevent  
299 corrupt conduct in the construction industry. For instance, TI attempted to address  
300 corruption across the construction industry by producing a set of tools and reports in  
301 2005 and subsequently developed PACS in 2007 to assist project participants  
302 (Krishnan 2009). The International Federation of Consulting Engineers proposed a  
303 comprehensive Business Integrity Management System and a parallel Government  
304 Procurement Integrity Management System for consulting firms (Boyd and Padilla  
305 2009). The Global Infrastructure Anti-corruption Center (GIACC) established the  
306 GIACC Resource Centre to provide free access to information, advice, and tools  
307 designed to help stakeholders understand, prevent, and identify corruption. The ASCE  
308 has adopted a series of corruption prevention measures such as organizing a

309 Committee of Global Principles for Professional Conduct and an Engineer’s Charter,  
310 including anti-corruption topics in annual meeting programs and making a policy  
311 statement 510 entitled “Combating Corruption” (Crist 2009). In the UK, an  
312 Anti-Corruption Forum that comprises nearly all key local industry associations such  
313 as the Institution of Civil Engineers, Chartered Institute of Building, Royal Institution  
314 of Chartered Surveyors, and Association of Consulting Engineers has been held  
315 annually since 2003 and provided various publications on practical measures for  
316 combating corruption in construction (Goldie-Scot 2008).

### 317 **Future Research Directions**

318 Based on the review of 56 papers, three areas are identified to provide main directions  
319 with a rich domain for future research: corruption in developing countries, corruption  
320 risk identification, and evaluation of the effectiveness of anti-corruption strategies.

#### 321 ***Corruption in developing countries***

322 The construction industry in developing countries faces a greater challenge in  
323 corruption prevention because of its lack of mature legislative and administrative  
324 system. Goldie-Scot (2008) evaluated the impact of corruption on developing  
325 countries as more devastating than that on developed countries. Thus, this topic has  
326 aroused increasing research concern worldwide. For instance, identification of forms  
327 of corruption in construction has been investigated with growing frequency in South  
328 Africa, Nigeria, and India (Alutu2007; Bowen et al. 2007a and b; Alutu and  
329 Udhawuve 2009; Ameh and Odusamj 2010; Tabish and Jha 2011a; Bowen et al. 2012).  
330 This area is predicted to be a significant research opportunity.

### 331 ***Identification of Corruption Risk***

332 Corruption risk identification is another emerging research area on corruption in  
333 construction. According to Zou (2006) and Sichombo et al. (2009), auditing  
334 techniques can detect corrupt practices in construction projects. However, these  
335 techniques cannot predict corruption risks, thereby preventing the adoption of proper  
336 measures against these risks. A systematic technique should be developed to identify  
337 corruption risks in managing construction projects. This area deserves further research.

### 338 ***Evaluation of the effectiveness of anti-corruption strategies***

339 Corruption prevention is a complex issue. Thus, no one-fits-all strategy can address  
340 all forms of corrupt conduct in construction projects. Wang et al. (2000) evaluated the  
341 effectiveness of some anti-corruption strategies such as maintaining a close  
342 relationship with government agencies, establishing joint ventures with local partners,  
343 and writing anti-corruption requirements into contracts by an empirical survey. None  
344 of these strategies received high evaluation from industrial practitioners. Therefore,  
345 the effectiveness of strategies proposed by governments, NGOs, and industry  
346 associations should be evaluated, and the fit between the specific forms of corruption  
347 and their solution strategies should be examined further.

### 348 **Conclusions**

349 This paper represents a critical review of 56 papers on corruption in construction  
350 within the 1990 to 2012 period. These papers were selected from six top construction  
351 journals (CME, JCEM, ECAM, JME, PICE-CE, and IJPM) and three influential and  
352 reliable academic search engines (WoS, CEIB, and ASCE Library)., Three categories



353 were identified to summarize current research interests in corruption research in the  
354 construction industry: identification of forms of corruption, impact of corruption on  
355 construction, and anti-corruption mechanisms and measures. These papers fully  
356 reflect the development and different perspectives of this field, thereby establishing a  
357 platform for future research by providing a general view of corruption research in  
358 construction in the past two decades.

359 Three areas for future research on corruption in construction were identified and  
360 proposed for future inquiry and development: corruption in developing countries,  
361 corruption risk identification, and evaluation of the effectiveness of anti-corruption  
362 strategies. Corruption in construction is an emerging field with global concerns. Thus,  
363 more advanced and significant endeavors should be focused on this area for advanced  
364 knowledge and informed practice in the future.

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419 DC.<<http://www.worldbank.org/publicsector/anti-corrupt/corruption/coridx.htm>> (October 1,  
420 2012)

421 World Economic Forum. (2013). *Partnering Against Corruption Initiative*,  
422 <<http://www.weforum.org/issues/partnering-against-corruption-initiative>> (January 16, 2013)

423 Xue, X., Shen, Q., and Ren, Z. (2010). "Critical review of collaborative working in construction  
424 projects: Business environment and human behaviors." *J. Manage. Eng.*, 26(4), 196-208.

425 **A list of Tables**

426 **Table1.** Corruption forms summarized from collected articles

No.	Categories	References	Frequency in papers
1	Bribery	Barco1994; Vee and Skitmore 2003;Shakantu 2006;Alutu2007;Bowen et al. 2007a; Bowen et al. 2007b;Goldie-Scot 2008;Sohail and Cavill 2008; Sichombo et al. 2009; Krishnan 2009; Stansbury 2009; Hartley 2009; Jong et al. 2009; Ameh and Odusami 2010;Ke et al. 2011; Bowen et al. 2012; Meduri and Annamalai 2012;Tabish and Jha 2012	18
2	Fraud	Vee and Skitmore 2003;Heuvel 2005;Shakantu 2006; Bowen et al. 2007a; Bowen et al. 2007b; Goldie-Scot 2008;Sohail and Cavill 2008;Sichomboet al. 2009; Stansbury 2009; Jong et al. 2009; Tabish and Jha 2011a; Bowen et al. 2012	12
3	Collusion	Heuvel 2005; Shakantu 2006;Bowen et al. 2007a; Bowen et al. 2007b; Sichombo et al. 2009; Jong et al. 2009; Tabish and Jha 2011a; Chotibhongs and Arditi 2012a; Chotibhongs and Arditi 2012b	9
4	Bid Rigging	Vee and Skitmore2003;Bowen et al. 2007a; Bowen et al. 2007b; Sichombo et al. 2009; Krishnan 2009;Hartley	8

No.	Categories	References	Frequency in papers
		2009;Jonget al. 2009; Bowen et al. 2012	
5	Embezzlement	Sohail and Cavill 2008;Hartley 2009;Jong et al. 2009; Stansbury 2009; Ling and Hoang 2010	5
6	Kickbacks	Barco1994; Alutu 2007; Sohail and Cavill 2008; Jong et al. 2009; Bowen et al. 2012	5
7	Conflict of Interest	Bowen et al. 2007a; Bowen et al. 2007b; Hartley2009;Jong et al. 2009	4
8	Dishonesty and Unfair Conduct	Vee and Skitmore2003; Bowen et al. 2007a; Bowen et al. 2007b; Alutu 2007	4
9	Extortion	Sichombo et al. 2009; Stansbury 2009;Bowen et al. 2012; Tabish and Jha 2011a	4
10	Negligence	Vee and Skitmore 2003;Shakantu 2006; Bowen et al. 2007a; Bowen et al. 2007b	4
11	Front Companies	Hartley 2009; Jong et al. 2009	2
12	Nepotism	Hartley 2009; Bowen et al. 2012	2

427 Appendix Table Corruption papers identified from selected journals between 1990 and 2012

No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
1.	Constr. Manage. Econ.	*TFO	2012	30(10)	Bowen,P.A., Edwards, P. J., and Cattell, K.	<sup>c</sup> Ant
2.	Constr. Manage. Econ.	*TFO	2012	30(1)	Tabish, S.Z.S., and Jha, K. N.	<sup>a</sup> Ide
3.	Constr. Manage. Econ.	*TFO	2011a	29(3)	Tabish, S.Z.S., and Jha, K. N.	<sup>a</sup> Ide
4.	Constr. Manage. Econ.	*TFO	2007b	25(6)	Bowen,P.A., Akintoye, A., Pearl,R., and Edwards, P. J.	<sup>b</sup> Imp
5.	Constr. Manage. Econ.	*TFO	2011b	29(8)	Tabish, S.Z.S., and Jha, K. N.	<sup>b</sup> Imp
6.	Constr. Manage. Econ.	*TFO	1998	16(4)	Crosthwaite, D.	<sup>b</sup> Imp
7.	Constr. Manage. Econ.	*TFO	2012	30(10)	Tang, L.C.M., Atkinson, B., and Zou, R.R.	<sup>a</sup> Ide
8.	Constr. Manage. Econ.	*TFO	2000	18(1)	Zarkada-Fraser,A., and Skitmore M.	<sup>a</sup> Ide
9.	Constr. Manage. Econ.	*TFO	2001	19(1)	Fan,L., Ho, C., and Ng, V.	<sup>c</sup> Ant

No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
10.	Constr. Manage. Econ.	*TFO	2012a	30(3)	Chotibhongs, R.,and Arditi, D.	<sup>a</sup> Ide
11.	Constr. Manage. Econ.	*TFO	2008	26(6)	Moodley,K., Smith, N., and Preece, C.N.	<sup>c</sup> Ant
12.	J. Constr. Eng. Manage.	ASCE Library	2008	134(9)	Sohail, M., and Cavill, S.	<sup>b</sup> Imp
13.	J. Constr. Eng. Manage.	ASCE Library	2013	139(1)	Meduri, S.S., and Annamalai, T.R.	<sup>b</sup> Imp
14.	J. Constr. Eng. Manage.	ASCE Library	2000	126(3)	Wang, S.Q., Tiong, R.L.K., Ting,S.K., and Ashley, D.	<sup>b</sup> Imp
15.	J. Constr. Eng. Manage.	ASCE Library	1999	125(3)	Wang, S.Q., Tiong, R.L.K., Ting,S.K., and Ashley, D.	<sup>c</sup> Ant
16.	J. Constr. Eng. Manage.	ASCE Library	2012b	138(11)	Chotibhongs, R.,and Arditi, D.	<sup>a</sup> Ide
17.	Eng. Constr. Archit. Manage.	Emerald	2011	18(5)	Ke, Y., Wang, S.Q., Chan, A.P.C., and Cheung, E.	<sup>a</sup> Ide
18.	Eng. Constr. Archit. Manage.	Emerald	2003	10(2)	Vee, C., and Skitmore, M.	<sup>b</sup> Imp
19.	J. Manage. Eng.	ASCE Library	2009	25(1)	Alutu, O.E., andUdhawuve, M. L.	<sup>b</sup> Imp
20.	J. Manage. Eng.	ASCE Library	2011	27(3)	Chan, A.P. C., Yeung, J.F. Y., Yu, C.C. P., Wang, S.Q., and	<sup>b</sup> Imp



No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
					Ke, Y.	
21.	J. Manage. Eng.	ASCE Library	1994	10(5)	Barco, A. L.	<sup>b</sup> Imp
22.	Proc. Inst. Civil Engineer-Civil Eng.	ICE Virtual Library	2012	29(1)	Kenny, C.	<sup>b</sup> Imp
23.	Proc. Inst. Civil Engineer-Civil Eng.	ICE Virtual Library	2011	164(1)	Amaee, R.	<sup>a</sup> Ide
24.	Int. J. Proj. Manage.	SciVerseScienceDirect	2002	20(8)	Sonuga, F., Aliboh, O., and Oloke, D.	<sup>c</sup> Ant
25.	Int. J. Proj. Manage.	SciVerseScienceDirect	2009	27(8)	Sichombo, B., Muya, M., Shakantu, W., and Kaliba, C.	<sup>a</sup> Ide
26.	Proc. Inst. Civil Engineer-Municipal Engineer	Web of Science	2008	161(4)	Goldie-Scot, H.	<sup>b</sup> Imp
27.	Proc. Inst. Civil Engineer-Transport	Web of Science	2008	161(4)	Snaith, M.S., and Khan, M.U.	<sup>a</sup> Ide
28.	Build. Res. Inf.	Web of Science	2004	32(2)	Dorée, A.G.	<sup>a</sup> Ide
29.	Build. Res. Inf.	Web of Science	2007a	35(2)	Bowen,P.A., Pearl,R., and Akintoye, A.	<sup>b</sup> Imp

No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
30.	Automat. Constr.	Web of Science	2010	19(7)	Xu, Y., Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M., Wang, S.Q., and Ke, Y.	<sup>a</sup> Ide
31.	Bus. Ethics Eur. Rev.	Web of Science	2004	13(2-3)	Graafland, J.J.	<sup>b</sup> Imp
32.	British J. Crim.	Web of Science	2005	45(4)	Green, P.	<sup>a</sup> Ide
33.	Crime Law Social Ch.	Web of Science	2005	44(2)	Heuvel, G.V.D.	<sup>b</sup> Imp
34.	Drustvena Istrazivanja	Web of Science	2011	20(2)	Badun, M.	<sup>b</sup> Imp
35.	Environ. Plan. C Gov. Policy	Web of Science	2012	30(3)	Romero, J., Jimenez, F., and Villoria, M.	<sup>a</sup> Ide
36.	Int. Econ. Rev.	Web of Science	2004	45(4)	Besfamille, M.	<sup>a</sup> Ide
37.	J. Bus. Ethics	Web of Science	2000	23(3)	Zarkada-Fraser, A.	<sup>b</sup> Imp
38.	Prog. Dev. Stud.	Web of Science	2012	12(1)	Unruh, J., and Shalaby, M.	<sup>b</sup> Imp
39.	Public Money Manage.	Web of Science	2003	23(3)	Deng, X., Tian, Q., Ding, S., and Boase, B.	<sup>a</sup> Ide

No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
40.	Rev. Econ. Stat.	Web of Science	2003	85(4)	Bajari, P., and Ye, L.	<sup>a</sup> Ide
41.	Rev. Ind. Organ.	Web of Science	2005	26(2)	Porter, R.H.	<sup>b</sup> Imp
42.	S. Eur. Soc. Polit.	Web of Science	2009	14(3)	Jimenez, F.	<sup>b</sup> Imp
43.	Transport Rev.	Web of Science	2009	29(1)	Kenny, C.	<sup>a</sup> Ide
44.	Organ. Technol. Manage. Constr. Int. J.	*CEIB	2009	1(2)	Brockmann, C.	<sup>a</sup> Ide
45.	J. Pan. Afr. Stud.	*CEIB	2010	3(6)	Uneke, O.	<sup>a</sup> Ide
46.	Civil Eng.	*CEIB	2006	14(7)	Shakantu, W.	<sup>a</sup> Ide
47.	J. Prof. Issues Eng. Educ. Pract.	ASCE Library	2007	133(2)	Teo, E. A. L., and Aibinu, A. A.	<sup>c</sup> Ant
48.	J. Prof. Issues Eng. Educ. Pract.	ASCE Library	2007	133(2)	Alutu, O.E.	<sup>b</sup> Imp
49.	J. Prof. Issues Eng. Educ. Pract.	ASCE Library	2010	136(1)	Ameh, O.J., and Odusami, K.T.	<sup>b</sup> Imp
50.	J. Prof. Issues Eng. Educ. Pract.	ASCE Library	2010	136(3)	Ling, F.Y.Y., and Hoang, V.T.P.	<sup>c</sup> Ant

No.	Journal	Database	Year	Volume (Issue)	Authors	Topic
51.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Boyd, J.M., and Padilla, J. D.	<sup>a</sup> Ide
52.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Jong, M.D., Henry, W.P., and Stansbury, N.	<sup>c</sup> Ant
53.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Krishnan, C.	<sup>c</sup> Ant
54.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Stansbury, C.	<sup>c</sup> Ant
55.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Hartley, R.	<sup>c</sup> Ant
56.	Leadership Manage. Eng.	ASCE Library	2009	9(3)	Crist, R.A.	<sup>a</sup> Ide

428 Notes: <sup>a</sup>Ide represents Identification of forms of corruption in construction

429 <sup>b</sup>Imp represents Impacts of corruption in construction

430 <sup>c</sup>Ant represents Anti-corruption mechanism and measures

431 \*TFO represents Taylor & Francis Online

432 \*CEIB represents Compendex and Engineering Index Backfile