THE PICTURE OF INTEGRITY FROM LEAN MANAGEMENT'S POINT OF VIEW AND THE RELATIONSHIP BETWEEN INTEGRITY MANAGEMENT SYSTEM AND LAST PLANNER SYSTEM

Ahmed Stifi[1], Fritz Gehbauer[2] and Sascha Gentes[3]

ABSTRACT

There is no doubt that all engaged researchers and stakeholders in the field of lean construction agree that transparency is the key factor for the implementation of lean approaches and for the delivery of successful projects. This transparency is required not only at project level but also at an organizational level. This paper bases its two research questions on the term "transparency" that could serve the research approach of lean construction in terms of continual improvement and long-term value added achievement.

The first research question is: Can corruption in the construction industry be regarded and treated as an additional type of waste which should also be eliminated and prevented?

The paper introduces a new framework for corruption in construction; from its narrow definition i.e. bribery and facilitation payments, to the wide definition that includes fraud, collusion, abuse of power, mistrust and concealment of relevant information. Lean construction requires integrity and corruption poses a "lack of integrity".

Furthermore, the relationship between the integrity management system and the last planner system formulates the second research question. It is assumed that there is a mutually beneficial relationship between those two systems which we are currently being investigated within the scope of an ongoing research project.

KEYWORDS

Corruption, integrity management system, lean management, last planner system

[1] Research Fellow, Institute for Technology and Management in Construction, Karlsruhe Institute of Technology (KIT), Am Fasanengarten Geb. 50.31, 76131 Karlsruhe, Germany, Phone +49-721 608-42665, ahmed.stifi@kit.edu

[2] Professor, Institute for Technology and Management in Construction, Karlsruhe Institute of Technology (KIT), Am Fasanengarten Geb. 50.31, 76131 Karlsruhe, Germany, Phone +49-721 608-42168, fritz.gehbauer@kit.edu

[3] Professor, Institute for Technology and Management in Construction, Karlsruhe Institute of Technology (KIT), Am Fasanengarten Geb. 50.31, 76131 Karlsruhe, Germany, Phone +49-721 608-46546, sascha.gentes@kit.edu

INTRODUCTION

In the 1990s, researchers of the construction industry, like Koskela, Ballard, and Howell, concentrated on improving the productivity, efficiency, and quality of construction projects by introducing the concept of "lean construction". This approach had two aims; eliminating waste and maximizing value in continues manner. Other, industries, i.e. banking, finance, etc., have started their own improvement methods trying to fight corruption in their sectors. The reports coming out from those sectors have mentioned and proved that the construction industry is one of the most corrupt sectors worldwide. Starting from this fact, the current research aims to put the phenomena "corruption in construction" on the research table of lean construction and to look at corruption in construction from lean methodology point of view.

This paper will discuss the term of corruption with an emphasis on corruption in the construction industry. Then, it will elaborate on the finding that corruption in construction is per definition a kind of waste which requires both elimination and prevention.

As a solution to the corruption problem, integrity is the key. This paper discusses suitable integrity frameworks which suit the lean approach.

Finally, an integrity management system will be introduced as a tool for the elimination of corruption in the construction industry together with a link to the last planner system. The relationship between those two systems leads to the hypothesis that they are mutually beneficial. This finding is also part of ongoing research projects.

CORRUPTION IN CONSTRUCTION INDUSTRY

"Corruption" has no generally valid international definition (Stansbury, 2008). Elliott (2008) sees that the challenges faced by corruption analysts begin with how to define it. This paper, however, will introduce the most commonly specified definition applied by international institutes dealing with the corruption issue; i.e. the Transparency International (TI), the Organization for Economic Cooperation and Development (OECD), and the World Bank (WB).

TI defines corruption as follows: "Corruption is the abuse of entrusted power for private gain; it hurts everyone who depends on the integrity of people in a position of authority". While the OECD does not define the corruption, instead it establishes the offences for a range of corrupt behaviour (OECD, 2008). And the WB settled on a straightforward definition similar to the one from TI: "The abuse of public office for private gain" (WB, 1999).

The literature review showed that the use of the term corruption is interchangeable with the terms bribery and fraud. Stansbury (2008) mentioned two types of definition; the narrow definition which refers to the above mentioned definition as stated by TI and WB, and the broad definition where corruption can be used in another sense.

Table 1 summarizes different senses (offences) of corruption with their respective definition and related examples from the construction industry. However, it should be noted that there is a relationship between different offences where one action often results in more than one offence and that the corruption behaviour can take place through the whole project cycle, namely project selection, planning, design, funding, pre-qualification, tendering, execution, operation and maintenance, and dispute resolution (Stansbury, 2008).

Table1. Definition of corruption behaviours and examples from construction projects

Corruption Behavior	**Definition**	**Form**	**Examples (Execution Phase)**
Bribery	It can be defined as the demanding, receiving, offering or giving of an undue reward by or to any person in order to influence his behavior.	Cash payment Non-cash advantage	Earthwork: Contractor pay for the third party test laboratory to deliver a better compaction test results (e.g. sand cone test)
Extortion	It is the term applied to the process of demanding a bribe where the demander uses some form of physical or financial pressure, and where the person from whom the payment is demanded may feel that he has little choice but to comply.	Blackmail for money	Procurement: The financial officer of the contractor demands from supplier/subcontractor (2%) of the invoice amount as a condition to settle outstanding payment.
Fraud	A representative of one party may try to deceive a representative of another party. The party using the deception will normally be attempting wrongfully to extract payment or advantage from another party, or to deny another party a due payment or advantage.	Seeking for financial gain	Human resource: Construction Manager (CM) who will represent the owner by ensuring the execution of quality works provides the owner with a list of qualified and experienced engineers but when the project starts the CM employs inexperienced engineers for supervision.
Collusion	It occurs when two or more parties cooperate to deceive another party. These arrangements are often described as a "cartel", "anti-trust" or "anti-competitive" offence	Price fixing Bid-rigging Losers fee Cover pricing	Subcontractor: CM proves only tow companies (subcontractors) to carry out the site investigations (geotechnical investigations including borehole drilling, cone penetration test, head falling test, compaction test, etc.). The two companies agree together a price of which neither of them will drop below it.
Embezzlement	It is a form of theft. It occurs where someone dishonestly appropriates money or other assets with which he has been entrusted.	Theft Misappropriation money Misdirecting money	Finance: One of the project team use the money from on-site cash box for his own expenses.

Source: (Stansbury, 2008) & case studies carried out by paper's authors

The Merriam-Webster dictionary, a well-used dictionary by researchers, delivers an important definition of corruption as "impairment of integrity, virtue, or moral principle". Since the main feature of corruption is concealment (TI, Stansbury, 2008) it is in stark contrast to the main principles of lean construction where transparency is key to a project's success.

The importance of transparency has always been emphasized by lean researchers, for example by Womack and Jones (1996). When they introduced the five principles of lean thinking which start with specifying value, identifying it, creates flow of it, based on, pull system to achieve the perfection. They argued that the direct route to perfection is transparency, "the key principle in everything" (Womack, 1996).

Lean Construction also adopts this principle. All engaged researchers and stakeholders in this field agree that transparency is the key factor for the implementation of lean approaches and the delivery of successful projects. This fact can be often seen when lean researchers discuss the main lean construction's tool "Last Planner System" (LPS), in this context, Fauchier (2013) states that "Transparency among Last Planners is essential to making reliable promises".

Therefore, this paper will show that "transparency" is the link between lean construction and the corruption phenomenon.

LEAN CONSTRUCTION AND CORRUPTION IN CONSTRUCTION

CAN WE CONSIDER CORRUPTION IN CONSTRUCTION AS A WASTE?

In the previous section we introduced "transparency" as a link between lean construction and the corruption phenomenon. In order to deal with corruption from the viewpoint of lean construction, it is important to see how to specify and define corruption based on the lean construction philosophy. To achieve this, the same approach as above will be applied by reviewing the definition of lean construction.

The simple definition of Lean construction based on Koskela (2002) "Lean is a way to design production systems to minimize waste of materials, time, and effort in order to generate the maximum possible amount of value".

The paper discusses, in the first stage, the corruption in term of its effect on value. Based on the Transparency International's Global Corruption Report (2005) and the American Society of Civil Engineer (ASCE) (2004) "The global construction market is worth around $3.2 trillion per year which represents 5-7% of the gross domestics product (GDP) in the developed countries and around 2-3% of the GDP in lower-income developing countries and the corruption accounts for an estimated $340 billion of the worldwide construction costs each year" (Sohail, 2008). However, this value has been increased with time. McLaughlin (2013) states that "the value of global construction industry is $8.6 trillion now, rising to $15 trillion by 2025 and the cost of corruption is $1 trillion now, and if the relevant action is not taken, the cost of corruption will raise to $1.5 trillion by 2025". Therefore, it is estimated, that corruption in construction industry accounts for approximately 5 -10% of the industry's worth.

Kenny (2007) argues that the major impact of corruption is the "poor quality construction and low funding for maintenance" where corruption has a "multiplier effect" among the different stages of the project, like lower quality design, lower

quality of construction which leads to raise price where a very high payments made to cover low quality, up to the theft of materials and equipment (Kenny, 2007).

In general, Kenny (2007) sees corruption as a factor of cost and time overrun "Some of this cost and time escalation, as well as poor quality, are linked to weak governance and corruption".

Literature review shows that corruption impacts negatively on project objectives (cost, time, and quality or scope). When applying this fact to the principles of lean construction, it becomes clear that corruption has a negative impact on value and can therefore be considered a type of waste. Consequently, corruption in construction can be added to the list of wastes developed by Koskela (2013) with the aim to create awareness of the corruption phenomenon and mobilizing actions to stemming, reducing and eliminating it (Koskela, 2013).

Moreover, and as mentioned in the first section, there is a relationship between different offences and actions of corruption where one action often results in more than one offence and the corruption behaviour can take place throughout the entire project cycle. This is where the corruption phenomenon can be linked to Koskela's "Chain of Waste".

An example here (see table1 above) is the collusion behaviour of two geotechnical investigation companies which leads to higher prices. The main reason for this is the bribery behaviour of the construction manager who approved only this two companies from a long-list of suppliers (vendor list), here the bribery is the core waste (corruption) and the collusion is a lead waste (corruption). The main results of these wastes are:

- Increase of the investigation cost (they agree together a higher price which neither of them will drew below it)
- Delay, since the two companies are overloaded with work (they are alone on the ground and there are not sufficient cone penetration test trucks available).

THE CAUSE OF CORRUPTION IN CONSTRUCTION

Lambsdorff (1999) reviewed a large variety of studies on the causes and consequences of corruption. He found that the research on the causes of corruption is focused on political systems, public salaries, and cultural dimensions. However, Kenny (2007) argues that the knowledge about the causes of high corruption in the construction sector is extremely limited. TI, and Stansbury (2005), on the other hand, argue that the reason for corruption in construction is the nature of the construction project itself which facilities corruption. They identify the features of a construction project which facilitate corruption as follows:

- *Contractual structure*: Construction projects normally have a large number of participants linked together. Each link has its own contractual form where every item of work, acceptance of lower quality work extension of time or approval of additional payments provide an opportunity for corruption, indeed every contractual link provides the opportunity for someone to be engaged in corrupt practices.
- *Diversity of skills and integrity standards*: the construction industry is a very diverse industry in terms of:

  - *Profession*: such as architect, structural engineer, civil engineer, mechanical engineer, electrical engineer, electronics engineer, banker, lawyer, e.g. each of these professions may have a different national professional association with different codes of conduct, differing levels of enforcement of these codes and different culture
  - *Trades*: such as machine operator, concrete pourer, steel fixer, formworker, scaffolder, erector, pipe fitter, cladder, brick layer, plasterer, e.g. also each of these trades may have a different national trade association and different culture
  - *Specialist contractors*: such as excavation, foundation, civil, building, erection, insulation, cladding, roofing, turbine, generator, boiler, pipework, pumps, cooling systems, controls and instrumentation

  This diversity leads to varied standards of qualification, integrity, and oversight.
- *Project phases*: Projects normally have several different phases, each involving different management teams and each requiring handovers of the completed phase to the contractors undertaking the next phase. Even if one main contractor undertakes all the phases, he will normally sub-contract the different phases to different sub-contractors. This leads to difficulties in control and oversight.
- *Size of the projects*: Some projects can be very large in scale like nuclear power plants, airport projects, and major infrastructure projects which cost significant amounts of money. It is easier to hide large bribes and inflated claims in large projects than in smaller projects.
- *Uniqueness of projects*: Many construction projects, especially the larger one, are unique, subsequently the costs are often difficult to compare and this make it easier to inflate costs and hide corruption.
- *Complexity of projects*: Large construction projects are complex where people working in the project appear not to know, or to disagree on, the reason why something has gone wrong, or why costs have been overrun. This makes it easier to blame others for a problem, and to claim payment for this problem, even if such claims are unjustified. It also creates a reason to pay a bribe, as decisions on cause and effect and their cost consequences can have enormous impact.
- *Concealed work*: Most components in a construction project end up being concealed by other components. For example, structural steel may be concealed by concrete. As a result, enormous dependence is placed by the industry on individuals certifying the correctness of the work before it is concealed. This provides opportunities for fraudulent claims, and the payment of bribes to these individuals to certify too much work, or to approve defective or non-existent work.
- *Lack of transparency*: There is little transparency in the construction industry and without such transparency it is more difficult to detect corruption. The greater the transparency, the more difficult it will be to concealed corruption (TI, Stansbury, 2008).
- *The extent of government involvement*: The extent of government involvement in construction projects is significant. Many major international construction

> projects are government owned. Even private sector projects normally require government approvals, such as planning permission, or agreements to pay for the use of the end product of the development. The power wielded by government officials in this regard, when combined with the structural and financial complexity of the industry as referred to above, makes it relatively easy for uncontrolled government officials to extract large bribes from construction projects.

Stansbury (2008) sees the above listed factors related to the nature of the construction industry as "existing circumvents" within construction projects facilities corruption. However Stansbury argues that corruption is usually done by the "one-willing" to do it. "Corruption usually occurs because some individuals are willing to use illicit means to maximise personal or corporate profit. However, in order for these individuals to become involved in a corrupt activity, circumstances must exist which do not prevent or discourage them from doing so".

On the other hand, Kiltgaard (1988) went beyond the cause of corruption by investigating the ingredients of basic components of corruption. He called his model "basic ingredient of corruption" where he states that "illicit behaviour flourishes when agents have monopoly-like power over clients, when agents have great discretion, and when accountability of agents to the principle is weak. He summed up his model as per the following equation:

$$\text{Corruption} = \text{Monopoly} + \text{Discretion} - \text{Accountability}$$

SOLVING THE PROBLEM OF CORRUPTION IN CONSTRUCTION WITH LEAN CONSTRUCTION APPROACH

This section discussed first how to "solve the problem" since the "corruption phenomenon" is being characterized as a problem and the concept of problem solving is an important concept in lean methodology.

Womack (1996) argues that problem solving is the first critical management task of any business; information management and the physical transformation task are the second and third concept. Womack (1996) states "the problem-solving task running from the concept through detailed design and engineering to production launch". And as mentioned in the first section of this paper, the corruption behaviour can occur throughout the whole project cycle (Stansbury, 2008).

Characterizing the corruption phenomenon as a problem which needs to be solved and identifying corruption itself as waste which should be eliminated are the first steps to put the corruption phenomenon on the research desk of lean construction.

In order to solve the problem of corruption while applying a lean approach, it is necessary to determine its root cause and then to apply effective countermeasures (Koskela, 2013).

However, researchers argue that the knowledge about the causes of corruption in the construction industry is extremely limited. Most of them link the causes to the nature of construction projects. Based on the corruption definition by TI, the occurrence of corruption due to the "one-willing" (Stansbury, 2008), and Kiltgaard's model (Kiltgaard, 1988) the root causes of corruption in construction can be determined as follows:

1. Lack of a person's or organization's integrity

2. Lack of accountability

In this context, lean construction can eliminate the waste of corruption by maintaining a person's and organization's integrity and by increasing accountability.

INTEGRITY MANAGEMENT SYSTEM AND LAST PLANNER SYSTEM

INTEGRITY MANAGEMENT SYSTEM AS ANTI-CORRUPTION TOOL – FIDIC'S BIMS

Solving the corruption problem after determining the root causes requires a next step, i.e. the implementation of effective countermeasures (Womack, 1996).

Countermeasures are related tools and techniques which should be developed and implemented or as a best practice benchmarked and applied. According to Koskela, lean construction has evolved and developed based on concepts and practices that origin from the Toyota Production System (TPS) (Biton and Howell, 2013).

International institutes like Transparency International (TI), the Organization for Economic Cooperation and Development (OECD), and the World Bank (WB) have developed tools and policies to fight corruption. The current description for such tools is "Anti-Corruption" tools where the corruption is often characterized as an "incident".

As a matter of fact, the financial industry and international institutes have preceded the construction industry in the fight against corruption. In 1998, the International Federation of Consulting Engineers (FIDIC) made a first formal effort to prevent corruption directly originating from the construction industry.

The FIDIC developed a practical tool called "Business Integrity Management System" (BIMS) for engineering consulting firms. The federation has identified seven principles for BIMS and states "each of these principals is comprehensive and fundamental belief for operating an organization, aimed at preventing corruption in any of its forms, be it bribery, extortion, fraud or collusion". FIDIC identified the following principles:

- *Leadership*: the top management should lead in the initial step in formulation of the code of conduct and in the allocation of needed resources. There should be no misunderstanding that the top management demands compliance with integrity values, and is prepared to take the necessary actions for achieving integrity
- *Involvement of staff*: involvement of all staff is critical to the successful of implementation of BIMS. The synergy, effective communication, and understanding of the business activities are important,
- *Systematic process approach*: the all-encompassing nature of business integrity implies that each of the processes performed by consulting firms to provide a service must be accomplished with integrity
- *Documented process*: business integrity must be documented for it to be managed. Documenting should be a continuous process. Documents should be available on an "on-request" basis
- *Review and improvement*: it needs to ensure that BIMS is reviewed and audited; results are reported and followed by steps to improve procedures and processes aiming to continued improvement and sustainability of the system.
- *Training*: is a key issue for the success of BIMS

- *Relation to quality assurance*: to link the BIMS to the firm's quality management system.

In fact, FIDIC's Integrity Management System as a tool to prevent corruption is designed for consulting firms. Such a tool could be re-designed, developed and implemented for projects developed on the basis of the lean construction approach.

However most of integrity management system principles are related to lean construction principles and its main tool, namely the Last Planner System, like management and staff involvement, training and continues improvement. There will be further research to investigate the relationship between the integrity management system and the last planner system, since it is assumed that there is a mutually beneficial relationship between those two systems.

INTEGRITY MODEL FROM LEAN CONSTRUCTION POINT OF VIEW

In this paper, corruption has been introduced as waste and that one of the main causes of corruption in construction is the lack of integrity. Benchmarking shows that an integrity management system is a tool to fight corruption, with respect to the lean methodology, however, it serves to eliminate corruption.

The remaining question, what is integrity from lean construction point of view? The Merriam-Webster dictionary defines integrity as "the quality of being honest and fair, and the state of being complete or whole".

Cox (2005) sees that integrity is one of the most important and often-cited of virtue terms and when it used as virtue term it refers to a quality of a person character and when it is applied to objects it refers to the wholeness.

Erhard and Jensen (2013) argue that there is overlap, confusion and confounding amongst the phenomena of integrity, morality, ethics and legality which are commonly understood to provide standards of "correct behaviour". Erhard and Jensen (2013) in their long research paper present a positive model for integrity. The new model of integrity is "Honoring One's Word" where they define "honoring your word" as "It, means you either keep your word (do what you said you would do and by the time you said you would do it); or, as soon as you know that you will not, you say that you will not and clean up any mess caused for those who were counting on your word". Our use of the word "honoring" is not meant in its virtue sense; rather it is meant in the "being good for one's word" sense.)."

As for person Erhard and Jensen argue that the integrity of a group or organization is a matter of group or organization word where the word of organisation is the word of its authorized persons like board of directors and management. The word of the group is the word of appointed spokesperson. Honoring one's word is the route to creating whole and complete social and working relationships and it provides an actionable pathway to earning the trust of others (Erhard and Jensen, 2013).

In addition, the new model of integrity explains the relationship between integrity and performance "integrity is a precondition (that is, a necessary condition) for maximum performance. When integrity is broken, the opportunity for a person, group, or entity to perform is broken" (Erhard and Jensen, 2013)

We argue that adopting integrity in lean construction based on Erhard and Jensen's model "Honoring One's Word" will support making reliable promises which is the inherent characteristic of LPS, at the same time the LPS promotes transparency and accountability week after week (Fauchier, 2013).

Therefore, an integrity management system and the last planner system should be the lean construction tools to eliminate the corruption waste by maintaining integrity and increasing accountability among the project and the organization. Looking at the last planner system as a tool to eliminate corruption waste in construction projects, it serves the theory of extended potentials of the Last Planner System. On the other hand, an integrity management system as a new lean tool serves the road map to a lean enterprise where the integrity management system works as top-down system and the last planner system works as bottom-up system (Gehbauer, 2008). Lean behaviour is behaviour of integrity.

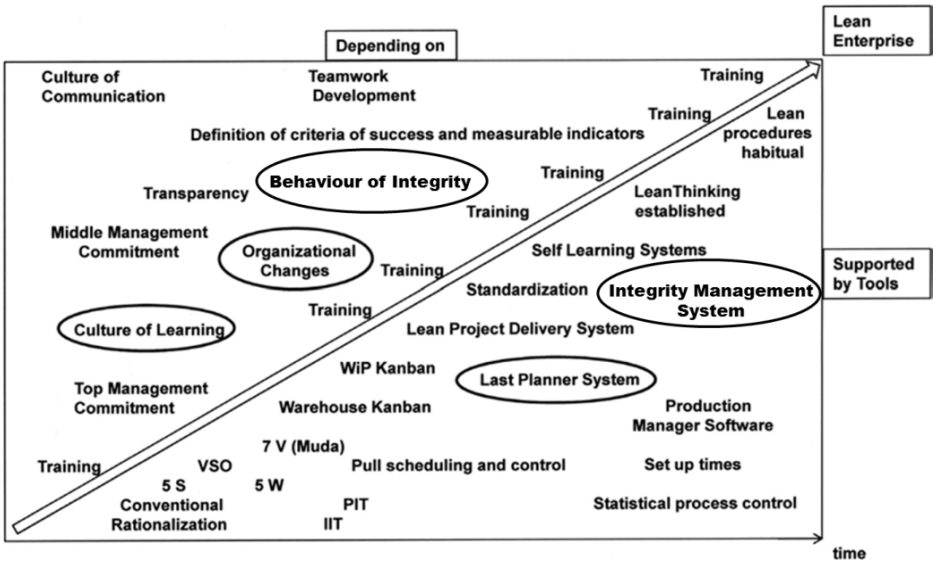

Figure 1: The road map to a Lean Enterprise based on Gehbauer (2008) including the Integrity Management System as a new tool and Behaviour of Integrity as a new feature

CONCLUSION

Corruption in the construction industry has significant negative impacts. It takes place through all project phases. The authors examined this problem from the lean construction's perspective and applied lean methodology to deal with the problem of corruption. It has been identified as a type of waste in construction. The main causes for corruption from a lean construction's point of view are (1) lack of integrity of person or organisation (2) lack in accountability. Integrity in lean construction is "Honoring One's Word".

The 'Last planner system" and integrity management systems are the tools to solve the corruption problem by maintaining integrity and increasing accountability. Both systems create the top-down and bottom-up strategy to achieve a lean enterprise that is always honoring its word.

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