

COLLABORATIVE CONTRACT WITH BUILDING INFORMATION MODELLING: COMPARISON BETWEEN USA AND EUROPEAN APPROACH

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At present, contracts are evolving to a collaborative form such as Integrated Project Delivery (IPD) or Multiparty agreements. Some states are using this new way of interaction to reduce fragmentation and self-interest of the AEC sector component. The construction sector's productivity index is the same in the last decreased, on the contrary the one of the mechanic industry increased. Collaborative contracts are the way to improve the sector profitability. Its aim is to enable and develop collaboration between the owner, the designer and the constructors. New technologies evolution imposed a change in the contract type. A comparison between USA type and UK type is presented. This one is becoming a new standard for European contract. This new standard has proven to have demonstrated to generate an increase in productivity and a decrease in waste of time in the design, in construction and in operational phases. The changing of key participant's scope from an individualist perspective to a collaborative one, it allow achieving the building quality. The project requirement is the necessity to better satisfy the owner needs, to clearly identify the contractual and extra-contractual responsibilities of individual operators. These are the reasons why Building Information Model and collaborative contracts are conceived to work on the same project.

Keywords: Collaboration, BIM, Multiparty, IPD, Relational contracts.

1 INTRODUCTION

The research has the aim to understand collaborative process in a worldwide context, defining key points and understanding responsibilities of actors involved in the building process. The reason why "collaborative" processes are so important is that AEC fragmentation is leading its sector to a paralysis (Howard *et al.* 1989). The new tender law (Dlgs 50/2016), enacted in April 19, 2016, has restricted the possibility of collaboration in public tender, but lets a glimmer for complex projects. During these years, many studies, presented in the next chapter, have been made on this theme especially about the explanation of the contract structure and about how AEC operators can use collaborative processes in US or European countries. The authors' point of view is related to the understanding of implication of the collaboration on the Italian tender process and how people involved in the process can change their state of mind. At this moment, there are no contract standards for collaborative processes in Italy, but few ones were developed around Europe (i.e. UK). Analyzing the AEC macroeconomics, one of the main point, which stands out, is the sector productivity that, according to Eastman and Sacks (2008), has not changed in the period between 1964 and 2000. Comparing construction and non-farm labor's

productivity index in the US market, we can infer that the latter has doubled its productivity, but on the contrary, the former remain more or less unvaried. Analyzing ISTAT (Istituto Nazionale di Statistica) value of the last two decades, the 2008 crisis has a stronger effect to Italian AEC sector (-30% productivity) than in manufacturing. A more restrained decrease can be underrun (-20% productivity). Therefore, the gap between these two braches remains huge. Construction sector has surely received a certain innovation amount, but not as much as in other industry sectors. A real issue is to make more competitive Italian construction companies. According to Ashcraft (2014), the IPD's main objectives are to solve the construction industry (i) low rate of productivity, (ii) high rate of inefficiency and (iii) excessive costs caused by the process organization. One of the main reasons is the AEC fragmentation (Levitt and Fisher 2012). Collaborative contract, such as IPD, is the perfect environment to obtain strong development of advanced management methods, including Building Information Modeling (BIM), according to Kent and Becerik-Gerber (2010) and Lahdenperä (2012). Thus, it will provide substantial benefits in efficiency and safety, as well as integration. The statistics on IPD projects under construction confirmed Ashcraft's (2012) studies.

A second main point is the differences in the information sharing of the people involved in the construction chain. People individualism causes information asymmetry, because some of them necessary have more information compared to the others that they do not want (or do not care) to share. The reason behind this can be found in the lack interest towards the project success compered to individual success. The changed perspective from the single objective to the one of the team, trying to reach a better result, is possible only if everyone makes the best both for himself and for the team. We can gather that cooperation is able to sew again the gap between design, construction and maintenance phases. The missing piece, as many studies (El Asmar 2013, Matthews *et al.* 2003, Mesa *et al.* 2016, Jones 2014) demonstrated, is the contractual form that allows the sector to be more competitive. According to the United Kingdom's Office of Government (UKOGC 2007) and AIA Case study (AIA California Council 2010) estimate that Collaborative procurement can introduce saving from 2÷10% in construction cost for a single project. These changes of state of mind, due to the introduction of cooperative contracts, allow the construction sector in achieving what the UK Construction Minister, Brian Wilson, said: "want to see quality projects that deliver excellent whole life value, that excellence in design and that encompass excellence in design and functionality that are safely built and are on time, on budget and defect free".

2 COLLABORATIVE CONTRACT

Due to the technologies and especially the design methodology evolution, BIM requested a new approach to design, traditional contract had adapted to a collaborative form.

According to Cho (2011), IPD has the ability, due to its form, to align participant goals and reducing project variability in terms of cost and performances. AIA also underlines how important is to change the way of seeing the construction industry, because now project has a scope of quality and project management team has the scope to drive the parties to the achievement of the agreed objectives. The policy of the age, in which the older rules, undermines the relationship between team members and it takes apart the group. The owner is involved in the project, because, as other actors, he has an interest and he should collaborate to obtain the best result possible. As explained in Ashcraft's study (2012), the owner still has power, but all decisions have to be disputed democratically. This change of mind, especially for the owner, is really hard, due to the tradition in which he has the power, even if his decision are not for the best

operation interest. The involvement of the owner is one of the major advantages of this collaborative contract.

The sharing of profits provides a monetary reason to collaborate (AIA 2010). Even if the monetary remuneration is not the primary driving principle, collaboration is not possible without it (Amabile 1996). One of the main point of this type of contracts is pain and gain sharing (Cleves 2012). It can be possible to an initial agreement which all the people involved in the contract have to sign. It imposes an open book policy (Kenig *et al.* 2010): in other words, it means that all the involved people have to share with the owner their books so he can payback only direct cost. This condition allows transparency in teamwork and also grants to work safely and peacefully, because it is unfair to work under costs and open book rule puts at risks only the profits which are contractualised. Risks are also possible if the project goes in the wrong way: in this case all the stakeholders are responsible for its failure or un-success. The base concept that has to be accepted is that of approach is to choose a good project team based on integrity, character, competency and trust (Matthews *et al.* 2003).

Collaboration in decision-making is one of the key point and it is expressed through the contract. As AIA said: “IPD allow all team members to better realize their highest potentials while expanding the value of the provide throughout the project lifecycle”, hence we can deduce that integration is the key element, according to Azhar *et al.* (2014, 2015). All decisions are based on (i) best quality, (ii) the lowest overall cost and (iii) least impact on the project. After signing the contract, everyone in the team has the same decision power, even the owner. The same logic is used to fill all the available position, using the best person from any of the Primary Team Members (PTM) (Matthews *et al.* 2003). Joint Project Control (JPC) requires collaboration between stakeholders. When problems arise, they have to be explained adequately to all parties. This guarantees that resolution is handled by discussion and agreement between PTM.

One of the best achievements of this contract typology is the alignment of project goals, that has the scope of reducing information asymmetry between all team members. As before stated, stakeholders do not share information, if they do not have an economical or other type interest. This change of vision imposes that everyone in the project has the same aim, so that, to improve the project, there are no excuses not to propose ideas (Matthews *et al.* 2003). One of the main changes of collaborative procurement in terms of ideas is team: in a traditional vision, team is seen as sum of people who have to work together, but with different task. In a collaborative perspective, team is conceived in a different perspective with the goal of an optimized project, the goal is the same. The optimization is possible, as a choice could be seen by different perspectives and each expert could help to understand issues in his field to achieve a shared solution. A collaborative approach has a starting phase in which the main objectives are set, hence all team members know what the final scope is. The objectives chaining and their consequent validation by the team make a grounded and joint teamwork, where everyone acts as a part of a single firm.

3 USA APPROACH TO COLLABORATIVE CONTRACT: IPD

Over the recent decades, some traditional project delivery systems have emerged claiming to fill the gap between the design and construction projects, but they have shown to be not efficient enough (Mihic *et al.* 2014). In this context, a new collaborative contract was developed: it is called Integrated Project Delivery (IPD). The definition of IPD is still not well defined and unique. There are few definitions, just to remind, as AIA California Council (2007, 2010), Kenig *et al.* (2010), Forbes (2011) or Kent and Becerik-Gerber (2010), but they include the same principles. American Institute of Architects, (AIA California Council 2014) defined IPD as “method distinguished by contractual agreement between a minimum of owner, design

professional and builder where risk and reward are shared (Zhang and Chen 2010) and a stakeholder success is dependent on project success”. The transformation from a traditional contract to an IPD agreement impose a mental shift in the fulfilling of the contract (Ashcraft 2012). Due to their structure and composition, traditional contracts unavoidably create a conflict of interest and they impose a rigid division of stakeholders’ works. Two main contracts standards are developed in US, which can help people to establish real collaboration through multi-party integrated project delivery agreement, are AIA C191 and ConsensusDocs 300 series. According to Lichtig (2006), the integrated agreement creates a system of shared risk, with the aim of decreasing total risks of the entire project. In IPD most of the consultant and sub-contractors has to join the agreement. A general rule is to have at least half of the construction cost sitting at the decision table. There are two ways to add new figures to the team: the former is through sub-agreements, as part of the IPD contract but with the same rights, duties and just a limitation in the voting right. The latter is through joining agreement, hence that they are an amendment to the original agreement.

This collaborative form of contract lets team members express their full potential, but it requires an Early Involvement of Key Participants (EIKP) in the projects. The increasing complexity of the projects demand it more and more (Gokhale 2011). This imposes also a change in investment, according to MacLeamy’s curve: there is an anticipation of the choices and therefore an early discovery of possible problems. On the contrary, in a traditional process, decisions are taken in a further stage. The EIKP creates many benefits: one of them is that the project team can work together at the same time, sharing information and filling the traditional lack of communication (Mihic *et al.* 2014, Lancaster and Tobin 2010). This way of work, combined with the use of BIM, removes documents ambiguity and optimizes the project quality (Lichtig 2006). According to Jones (2014), the “Big Room” concept, as a place where all the stakeholders, including the client, can share their knowledge is the key to create a joint team who will pursue the same goals, defined altogether in terms of cost, time and quality.

The primary reasons for limiting liability are to increase communication, foster creativity and reduce excessive contingencies (Ashcraft 2012). Some research work has underlined how liability add hidden costs to the project caused by the self-defense of every participant, and also induces people to use common and tested theory or materials which are - in most of the cases - more expensive. According to AIA California Council (2010), reduced liability forces the participants to take responsibility for the project, instead of blaming other for the errors or the failure of the initiative. In this way, all the parts have benefits or suffer for the result of the project and remove the anxiety in around communication. At the beginning of the project, all the parties agreed to an act, which realizes liability, each other with the exception of negligence (Zhang and Chen 2010).

4 EUROPEAN APPROACH TO COLLABORATIVE CONTRACT

The European approach is relatively new for AEC, United Kingdom is the main developer of this type of collaboration in Europe. A new standard of contract, PPC2000, has been created: used in the last years it has had a deep use in private sector and it was also validated by many companies and by the UK government. A new document was published - to let to the public sector introduce - it is a framework alliancing named FAC-1, which allow to apply the alliance to different contract forms. Its aim is to connect different parts directly, allowing transparency, which fits with BIM and to joint work, which is essential in collaborative system (Burnand 2009). It has to be underline, is that BIM cannot be applied to every form of contract. FAC-1 is the way to link in a single multi-party agreement what was pledged in a two-lateral contract. This means that any

kind of two party agreement, stipulated in a traditional form can bring collaboration to a project. This framework alliance can be defined as an adaptable form. This alliance, as the other collaborative contract, has the aim to achieve target shared between team members. The best practice is the line, which guides the evolution of the project. The Alliance Manager is the impartial figure who has to help in solving problem between the core-group. The success of the project is link to the selected actors: the maintenance of the working relationships can increase the group productivity and their index of productivity. During a recent conference in Milan, LegalBIM, Professor D. Mosey underline the link between collaboration and BIM, which can be seen as the game changer of the AEC sector. This new methodology allows a real collaboration that can express his real potential only through a mutual contractual form. In this scenario, some problems could arise such as intellectual propriety rights and liability.

5 COMPARISON AND CONCLUSION

The aim of this type of contract is to enable and develop collaboration between the owner, the designer and the builders. New technologies evolution and collaborative processes used in USA and UK, have demonstrated to generate an increase in productivity and a decrease in time waste in the design, construction and operational phases. That is the reason why BIM and collaborative contracts are conceived to work on the same project reducing AEC industry fragmentation.

There is a huge difference in the IPD and Framework alliancing conception. One of the principal reason could be found in the legislation type. American law is based on judgments, while European law is based on specific codex.

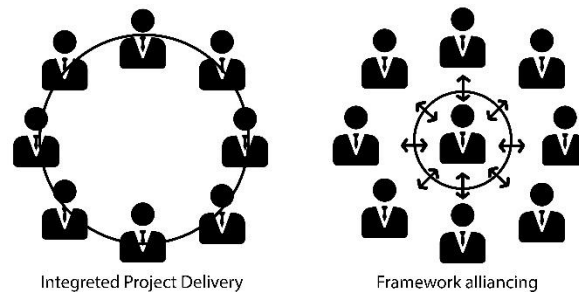


Figure 1. Different collaboration scheme.

IPD is a contract that can work alone without any other agreement (Figure 1). It is designed as a collaboration form defined in any part. On the contrary framework alliancing in an agreement, which is able to like more contract even if they were started in a traditional bilateral contract, it is an alliance which is cross to the individual agreements. Therefore, we can gather that this second approach is more adaptive and can be applied in many cases. Collaboration can be added as a value to contracts that were not thought as collaborative. In the beginning, traditional contracts have a process flowchart which starts from the owner, through the design team and, only at the end, builders get in touch with the project. It is a linear and unidirectional process and they do not have other ways to communicate. In contrast, this contract type demands that participants work altogether when issues arise. Everyone should pursue the same scope. The framework alliancing introduction, in our system, is the way to engage constructor role since the project beginning, hence that all the team members can work to obtain a better building in a cheaper way. In the next years, every Country will have to deal with the problem of introduction of this contract typology to solve construction paralysis.

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