

# **Sustainable Construction: What must be included in sustainable contractual clauses<sup>1, 2</sup>**

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## **ABSTRACT**

Because of the public pressure and the increase of social and environmental awareness, companies that are creating new projects must include sustainability-related clauses in their contracts. This is true for the construction field that has to respect the Corporate Social Responsibility during the construction process as well as deal with the impact the building will have on the future.

There are several elements that need to be considered in construction contracts in order to respect sustainable principles and be accredited as a green building. We will conduct a study on construction standards contracts (AIA, CSI, FIDIC, EJCDC and Consensus Docs) to determine which one suits the best for sustainability.

We will use the Multi-Attribute Decision Making method to analyze these standards contracts through the scoring attributes of the LEED Certification, which is a green building rating system. The method will show us that in the construction field, the Consensus Docs are the most complete about sustainability, as some clauses in these standards contracts are linked with the LEED.

**Keywords:** Contracts, sustainability, sustainable contractual clauses, project, project management, construction, Multi-Attribute Decision Making.

## **INTRODUCTION**

"In 2011, Apple has been incriminated because of terrible working conditions in one of its factories in China. Indeed, from 2010, many assembly-line workers began committing suicides, sometimes throwing themselves off the dorm building in daylight."<sup>3</sup> This phenomenon caused great scandal worldwide, the international media spread the information and Apple had to respond to its working conditions. The public wanted to know about the causes of such stress and depression at work and also what the multinational company was willing to do to redress the situation and what measures would be applied. This example shows how the access to

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<sup>3</sup> Merchant, B. (2017, June 18). Life and death in Apple's forbidden city. *The Guardian*.

information has a huge impact on what companies do in the “privacy” of their business. Ethics, social and environment are now topics companies must be concerned about because citizens can hear about a scandal in seconds. “Private commercial contracts now cover public dimensions that can’t be ignored, for example, a wood exploitation exists to make profit but also has an impact on biodiversity”<sup>4</sup>. Because of this indirect pressure and the increase of social and environmental awareness, companies that are creating new projects must include these topics in their contracts.

The following fishbone diagram shows why it is now necessary to include sustainability as clear and systematic information in contracts:

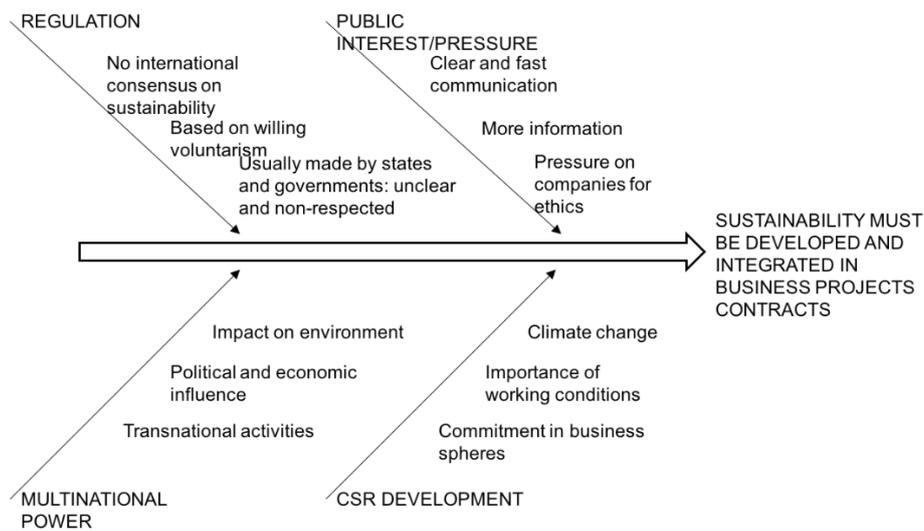


Figure 1. Root-cause analysis concerning the issue of sustainability manners in business projects contracts “Fishbone diagram”.<sup>5</sup>

Indeed, as seen before, “the public has more and more impact on decision-making processes in companies”<sup>6</sup>. Citizens now have instant access to information, which mean they can get news in an instant and have access to them all day long through smartphones. They can react and interact through social networks such as Twitter or Facebook, so they get more involved in a business decision and in the reputation of a company, especially on topics like environment, climate change, pollution. Whereas multinational companies have more and more impact on the political and economic spheres. Their main purpose is to make profit within the legal framework of their country. Nevertheless, these companies become even more international by outsourcing their production. With this system, they sometimes don’t have to respect the social and environmental standards. Indeed, these manners were usually under the responsibility of states

<sup>4</sup> Mitkidis, K. P. (2014, January). Sustainability clauses in international supply chain contracts: regulation, enforceability and effects on ethical requirements. *Nordic Journal of Commercial Law*.

<sup>5</sup> By Author, 2018

<sup>6</sup> Queinnec, Y. (2010, January). *Sustainable Contracts: Concept’s outlines and exploration tracks*.

and governments, but there is no transnational regulation or no clear standards, which leaves sustainability issues under the goodwill of each project's stakeholders.

For a few years now, we have seen the development of Corporate Social Responsibility (CSR) in companies. This new concept can be defined as the "business measures consistent with law and ethical standards under which companies accept the responsibility for the effects their activities have on the environment and society"<sup>7</sup>. But CSR is often seen as too soft, unclear and non-respected, even though the issues under this concept tend to become increasingly important for the society. This new and growing awareness of sustainable manners impacts project management.

A **project** is "an investment that requires a set of logically linked and coordinated activities performed over a finite period of time in order to accomplish a unique result in support of a desired outcome"<sup>8</sup>. By definition, a project usually has an end but its impact might continue over years. That is the reason why projects and projects contracts are in the front line in considering sustainability in their whole process of designing, operating and executing. Indeed, considering the construction of a sustainable building, the whole project must consider the used materials, as well as the process to build (construction machines, energy, construction waste, etc.).

An **asset** is related to projects and sustainability as well as it can be described as being "a tangible or intangible resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide future benefit"<sup>9</sup> and projects aim to deliver such assets. Typically, there are 5 asset classes: human, information, physical, intangible and financial. These classes include everything that will be needed in order to achieve a specified project. If we consider again the construction of a sustainable building, the assets would be transportation machines, sources of energy, materials. To make a long story short, the assets would be everything used during the construction process, if the final building takes into account sustainability, all materials used must at least be sustainable.

A **program** is a group of projects<sup>10</sup> and can be of different nature such as a strategic program or an operational program, so this makes sense that if projects are sustainability-related programs contracts are also concerned with sustainability and must include contents related to social, economic and environmental impacts. In our example, let's consider a corporation specialized in sustainable construction, a program can be series of constructions in a neighborhood. The process and material used for one sustainable construction site will be used for the rest of the program.

In terms of **portfolio**, "Any organization, be it Owner or Contractor has a portfolio of assets (resources) available to dedicate to projects, with the objective being to develop the best "mix" of projects which will generate the most favorable return on those assets"<sup>11</sup>. For sustainable

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<sup>7</sup> Nasrullah, N. M.; Rahim, M. M. (2014). CSR in Private Enterprises in Developing Countries. *Evidences from the Ready-Made Garments Industry in Bangladesh*.

<sup>8</sup> Adapted from a Linked In discussion initiated by William R. Duncan 1/13/2018. Retrieved from <https://www.linkedin.com/feed/update/urn:li:activity:6357416976318558208/>

<sup>9</sup> The Guild, <http://www.planningplanet.com/guild/gpccar/introduction-to-managing-project-controls>

<sup>10</sup> The Guild, <http://www.planningplanet.com/guild/gpccar/introduction-to-managing-project-controls>

<sup>11</sup> The Guild, <http://www.planningplanet.com/guild/gpccar/introduction-to-managing-project-controls>

manner, this means that in a green building portfolio the owner shall dedicate materials that are the best one for each construction site.

### Step 1. Problem definition

We shall see that in new projects, sustainability must be integrated into contracts by business units. But as there is no precise regulation and as CSR is often too soft, there isn't any clear process or method to include such issues in project's contracts. This is why we shall study how sustainability manners can be included in international construction contracts. Usually, sustainability must be included in the whole document so that every party taking part in the contract might design-think and operate taking sustainability and CSR into account. But there also might be sustainable contractual clauses (SCCs) specifically dedicated to sustainable manners. The aim of this paper is to analyze the content of those SCCs by comparing the ones of existing standards such as AIA, CSI, FIDIC, EJCDC, and Consensus Docs.

In this study, we will undertake the following question:

- What must be considered in projects contracts in terms of sustainability?
- Which one between the following standards suits the best for sustainability: AIA, CSI, FIDIC, EJCDC or Consensus Docs?

## METHODOLOGY

In order to achieve this paper's analysis, we will use Multi-Attribute Decision Making (MADM) methods. A non-compensatory approach of MADM which is the dominance technique will be our first tool, and then we will use a compensatory approach of MADM which is the additive weighting technique.

Throughout this paper, these two techniques will be very useful to grade and understand which standard is the best. Indeed, we will compare the following standards: AIA, CSI, FIDIC, EJCDC, and Consensus Docs in terms of sustainability. These 2 MADM methods will help us find out the best option and clearly point out which standard support sustainability the best.

### Step 2. Development of the feasible alternatives

There are five feasible alternatives about sustainability in business projects contracts that this paper will examine and the analysis will point out which one suits the best for sustainability:

- AIA sustainable clauses<sup>12</sup>
- CSI sustainable clauses<sup>13</sup>
- FIDIC sustainable clauses<sup>14</sup>

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<sup>12</sup> AIA Contracts. Retrieved from <https://www.aiacontracts.org/contract-documents/>

<sup>13</sup> Construction Specifications Institute. (2005). The project resource manual: CSI manual of practice. New York: McGraw-Hill.

<sup>14</sup> FIDIC Conditions of Contract for Construction (First Ed. 1999). For Building and Engineering Works designed by the Employer. General conditions; Guidance for Preparation of Particular Conditions; Forms of Tender, etc.

- EJCDC sustainable clauses<sup>15</sup>
- Consensus Docs sustainable clauses<sup>16</sup>

All these alternatives must will be examine in order to provide a clear, objective and strong set of rules concerning ethics, social and environmental issues. The **LEED certification**, the Leadership in Energy and Environmental Design is a green building rating system. It gives a clear framework to build healthy, high-efficient and cost-saving sustainable buildings. In order to conduct our study, we will use the scoring attributes as the LEED<sup>17</sup>:

- Integrative process
- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Innovation
- Regional priority

### Step 3. Development of the outcomes and cash flows for each alternative

In the first alternative, the **AIA standard contract**, the clause 4.3.6 is called Sustainability. It says: “one key area of opportunity for improvement from traditional delivery approaches is to set more aggressive goals for sustainability.” It does not provide clear or precise content about sustainability but still, this clause is entirely dedicated to sustainable manners. It does not give precise solutions toward sustainability but it must be taken into account.

Concerning the second alternative, the **CSI contract** contents a clause dedicated to sustainability. Indeed, the clause 4.3.3 called Sustainable Requirements states: “Depletion of natural resources, deteriorating environmental conditions in formerly pristine parts of the world, rising human population, loss of animal and plant species to extinction, and economic competition from developing nations have raised public awareness of facility design, also called green design.” This clause defines what must be understood when talking about sustainability. It gives a clear area and clear subjects that must be considered in this sustainable clause. Sustainable Requirements is then divided into 4 sub-clauses: 4.3.3.1 Sustainable Design Principles, 4.3.3.2 Environmental Design Tools, 4.3.3.3 Assessing Product Sustainability and 4.3.3.4 Assessing Facility Sustainability. We can consider that CSI has a high commitment to sustainability management.

Regarding the third alternative, we can find in the **FIDIC standards contract** a clause dedicated to sustainability, it is called Protection of the environment and can be found in section 4 of the contract, The contractor. It is explained that the contractor should “take all reasonable steps to protect the environment and to limit damage and nuisance to people and property resulting from

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<sup>15</sup> EJCDC - Engineers Joint Contract Documents Committee. (n.d.).

<sup>16</sup> ConsensusDocs Construction Contracts. (n.d.). Retrieved from <http://consensusdocs.org>

<sup>17</sup> LEED | Leadership in Energy & Environmental Design. (n.d.). Retrieved from <http://leed.usgbc.org/leed.html>

pollution, noise and other results of his operations.” Just like in the AIA contract, this clause stays really vague and does not give precise rules about sustainability or the environment.

When it comes to the fourth alternative, article 5 in the **EJCDC standards contract** is sustainability-related. This article is called Availability of Lands, Subsurface and Physical Conditions, Hazardous Environmental Conditions. Article 5 explains how the contractor should respect and protect the environment in several clauses. For instance, one clause states: “Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.” This sentence means that every contractor should personally manage everything in the project that must have an impact on the environment.

Finally, our fifth alternative is the clauses in the **Consensus Docs**. In document 240, the clause 3.3.25 states that the owner is responsible for: “coordinating and facilitating the achievement of elected green measures and green status, such as achieving Leadership in Energy and Environmental Design ‘LEED’ certification”. This is not really precise, but still, it indicates the owner must focus on green characteristics for the project. It also cites the LEED certification which gives a clear framework for a sustainable construction project.

After reading this, it seems that CSI is the most complete concerning sustainability, following with EJCDC and then AIA and FIDIC are still vague on the subject. As the Consensus Docs clearly states an official certification regarding sustainability, it seems that this alternative will be the most precise and accurate one. But we still have to examine and score each one of our alternatives.

#### Step 4. Selection of a criterion

We have now a subjective ranking order as a first impression after reading the 5 standards contracts. But in order to evaluate each one of them more precisely, we will use a non-compensatory approach of MADM called the dominance technique<sup>18</sup>.

The following table is our MADM result after a qualitative analysis of our 5 alternatives. The code used in this table is the following:

- **Green**: it indicates that the standard contract fully takes the attribute into account.
- **Yellow**: the attribute is considered but stays really vague, with no precise characteristic.
- **Red**: there is no mention of the attribute in the contract.

|                     | AIA   | CSI    | FIDIC | EJCDC  | Consensus Docs |
|---------------------|-------|--------|-------|--------|----------------|
| Integrative process | Equal | Better | Equal | Better | Better         |
| Sustainable sites   | Equal | Equal  | Worse | Better | Better         |

<sup>18</sup> Sullivan, Wickes & Kroelling (2014) Engineering Economics 15th Edition

|                              |        |        |        |        |        |
|------------------------------|--------|--------|--------|--------|--------|
| Water efficiency             | Worse  | Better | Worse  | Equal  | Better |
| Energy and atmosphere        | Worse  | Worse  | Equal  | Equal  | Equal  |
| Materials and resources      | Better | Equal  | Equal  | Better | Better |
| Indoor environmental quality | Equal  | Better | Worse  | Worse  | Equal  |
| Innovation                   | Equal  | Worse  | Better | Worse  | Better |
| Regional priority            | Equal  | Equal  | Worse  | Worse  | Better |

Figure 2. Table of dominance, quantitative analysis.<sup>19</sup>

Thanks to this table, the last alternative, Consensus Docs, seems to be the best alternative as it mentioned each one of our attributes. On the other hand, FIDIC contract is the worse standard in terms of sustainability.

## FINDINGS

### Step 5. Analysis and comparison of the alternatives.

Our Figure 2 gives a preliminary conclusion. It shows that FIDIC standards contract is the worst alternative to choose if we want to build a sustainable building. But in order to confirm this first finding and also to conclude about the best alternative, we will conduct a quantitative analysis.

We will conduct this analysis by scoring each of our alternatives following a precise rule:

- Green = 1
- Yellow = 0.5
- Red = 0

|                              | AIA | CSI | FIDIC | EJCDC | Consensus Docs |
|------------------------------|-----|-----|-------|-------|----------------|
| Integrative process          | 0.5 | 1   | 0.5   | 1     | 1              |
| Sustainable sites            | 0.5 | 0.5 | 0     | 1     | 1              |
| Water efficiency             | 0   | 1   | 0     | 0.5   | 1              |
| Energy and atmosphere        | 0   | 0   | 0.5   | 0.5   | 0.5            |
| Materials and resources      | 1   | 0.5 | 0.5   | 1     | 1              |
| Indoor environmental quality | 0.5 | 1   | 0     | 0     | 0.5            |

<sup>19</sup> by Author, 2018.

|                   |            |          |            |          |          |
|-------------------|------------|----------|------------|----------|----------|
| Innovation        | 0.5        | 0        | 1          | 0        | 1        |
| Regional priority | 0.5        | 0.5      | 0          | 0        | 1        |
| <b>SUM</b>        | <b>3.5</b> | <b>4</b> | <b>2.5</b> | <b>4</b> | <b>7</b> |

Figure 3. Quantitative analysis.<sup>20</sup>

Thanks to this new scored ranking, we can conduct a compensatory approach of MADM which is the additive weighting technique.

| Attributes                   | Step1         | Step2                 |          | AIA |              | CSI |              | FIDIC |              | EJCDC |              | Consensus Docs |              |
|------------------------------|---------------|-----------------------|----------|-----|--------------|-----|--------------|-------|--------------|-------|--------------|----------------|--------------|
|                              | Relative rank | Normalized weight (A) |          | (B) | (A)x(B)      | (C) | (A)x(C)      | (D)   | (A)x(D)      | (E)   | (A)x(E)      | (F)            | (A)x(F)      |
| Integrative process          | 3             | 3/36                  | = 0.083  | 0.5 | 0.0415       | 1   | 0.083        | 0.5   | 0.0415       | 1     | 0.083        | 1              | 0.083        |
| Sustainable sites            | 7             | 7/36                  | = 0.194  | 0.5 | 0.097        | 0.5 | 0.097        | 0     | 0            | 1     | 0.194        | 1              | 0.194        |
| Water efficiency             | 6             | 6/36                  | = 0.167  | 0   | 0            | 1   | 0.167        | 0     | 0            | 0.5   | 0.084        | 1              | 0.167        |
| Energy and atmosphere        | 5             | 5/36                  | = 0.139  | 0   | 0            | 0   | 0            | 0.5   | 0.07         | 0.5   | 0.07         | 0.5            | 0.07         |
| Materials and resources      | 8             | 8/36                  | = 0.222  | 1   | 0.22         | 0.5 | 0.111        | 0.5   | 0.111        | 1     | 0.222        | 1              | 0.222        |
| Indoor environmental quality | 2             | 2/36                  | = 0.056  | 0.5 | 0.28         | 1   | 0.056        | 0     | 0            | 0     | 0            | 0.5            | 0.028        |
| Innovation                   | 4             | 4/36                  | = 0.111  | 0.5 | 0.056        | 0   | 0            | 1     | 0.111        | 0     | 0            | 1              | 0.111        |
| Regional priority            | 1             | 1/36                  | = 0.028  | 0.5 | 0.014        | 0.5 | 0.014        | 0     | 0            | 0     | 0            | 1              | 0.028        |
| <b>SUM</b>                   | <b>36</b>     |                       | <b>1</b> |     | <b>0.709</b> |     | <b>0.528</b> |       | <b>0.334</b> |       | <b>0,653</b> |                | <b>0.903</b> |

Figure 4. Additive weighting model.<sup>21</sup>

We know have a strong and powerful ranking order for our 5 feasible alternatives.

<sup>20</sup> by Author, 2018.

<sup>21</sup> By Author, 2018

### Step 6. Selection of the preferred alternative.

The previous table clearly shows and confirms the first assumption of this paper. Indeed, the **Consensus Docs contract** is by far the best standard in order to take into account sustainability in the construction field. It was shown both with the qualitative analysis as well as with the quantitative analysis.

It contains all the required clauses to pass the LEED certification for building projects.

On the other hands, the AIA standards contract and the EJCDC standards contain interesting clauses and have the starting baggage to be efficient in sustainability. But both of them lack some very important domains and precisions.

We can conclude this selection with a **ratio scale** between the first better alternative, the Consensus Docs and the second one, the AIA standards contract:

$$((7/3.5)-1) \times 100 = 100\%$$

This ratio means that the Consensus Docs are 100% better in terms of sustainability than the AIA contract. We can also say that it is twice as good.

### Step 7. Performance monitoring and post-evaluation of results.

All the methodology and the 6 previous steps brought us to this final conclusion that the best alternative is the Consensus Docs if someone wants to construct a building and follow sustainable characteristics. This alternative is the best one as it mentions and follows all the requirements expected by the LEED certification. It gives a precise framework for taking care of the planet, the environment, the well-being of the workers, the used materials, etc.

Moreover, some other contracts are on the right path to integrating more sustainable aspects in their construction contracts, but they still lack some precisions and sometimes even omit some critical aspects. These examples are the following:

- AIA contract
- EJCDC contract
- CSI contract

## CONCLUSIONS

Nowadays, one can't ignore the environmental and ecological issues. This is the case in the construction field as well. Indeed, people must consider their future impact when they create and build new infrastructures and it starts with the construction contract. But what must be considered in projects contracts in terms of sustainability?

The root-cause analysis showed why it is now necessary to include sustainability as clear and systematic information in construction contracts. This gave us the link between project management, sustainability and construction contracts. This is why we choose, five construction standards contracts: AIA, CSI, FIDIC, EJCDC, and Consensus Docs, which became our five feasible alternatives. The aim of that paper was to find which one of these contracts was best-suited for sustainable buildings.

First, the qualitative analysis enables us to eliminate one of them, the FIDIC standards contract, which was the worst of our ranking order in dominance. Then, using the following steps in a MADM (Multi-Attribute Decision Making) process, we showed the superiority of the Consensus Docs in terms of sustainability. The additive weighting model gave us a clear and strong vision of the quantitative analysis and highlighted the undisputable governance of the Consensus Docs as it includes all the required characteristics for the construction of a sustainable building and it does not just mention them it gives a clear framework of what should be done during the construction process and afterward.

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**Céleste Gonnon** is a French student at SKEMA Business School. She studied one year and a half in Lille before doing an academic semester in Raleigh, North Carolina (United States of America). This is where she discovered the power of Project Management through efficient teamwork with international students.

Coming back to France, Céleste specialized in Project and Programme Management and Business Development. In 2019, she will write a Master's thesis about Project Management in order to graduate with an MSc in that branch. She is also certified Prince2 and Agile PM.

Passionate about Project Management, she had several experiences in companies such as the bank ING Luxembourg, where she did a 6-month internship. She was in charge of launching new campaigns and dealing with the entire production process from brainstorming concept to implementing it with internal communication to all branches.

With the increasing awareness about climate issues, she has a keen interest in sustainability and wants to dedicate the rest of her carrier to green and social projects.

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