

# Building Information Modelling's impact on claims in construction projects<sup>1</sup>

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## ABSTRACT

With the growth of complex and large projects, claims are a subject more and more discussed in the construction sector. Building information modelling (BIM) is also getting more and more attention since professionals are wondering what are the impacts of such a method on construction projects.

More precisely, we will try to find out in this paper the impact of BIM on claims. To do so, we compared different alternatives based on well-defined attributes in order to assess which one fit the best to the question at hand.

The 5th dimension of BIM which is related both to planning and cost proved to be impacting both on the occurrence and on the support of claims. However, such impact can only be reached by following best practice. That is the reason why organisations should adopt BIM step by step and use it adequately in order to benefits for its many advantages.

**Key words:** BIM, Construction, Delays, Claims, Project.

## INTRODUCTION

A project is a temporary endeavour undertaken to create a unique product, service or result<sup>2</sup>. Such result cannot be reached exactly as planned which means that change is an ineluctable consequence to any construction project. Any form of change will lead to a relatively strong negative financial impact for one or the other partie involved. As a result, a partie is entitled to claim a financial compensation; that is the reason why claims are quite likely to occur, and more particularly in complex projects.

As construction projects are getting more complex, the number of claims occurring in such projects is getting even higher. Many different ways to prevent such claims from arising are

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<sup>2</sup> Project Management Institute. (2017). What is a project. In A guide to the project management body of knowledge (PMBOK guide) Sixth edition: Agile practice guide (6th ed.).

already being used in all kind of projects; we can find tools such as the work breakdown structure (WBS) which gives a better management control by providing pieces of information over the budget, the planning and the scope of a project. However, since no methods have been proven to eradicate claims in a project, researchers are still looking for a solution to this matter.

BIM is the process of creating and developing virtual design and construction illustrating the whole project's life cycle.<sup>3</sup> The difference between BIM and any other project management tool is that BIM solves the scheduling problem. As we know, before issuing a claim for time delay, the party must undertake a delay analysis; since BIM links directly the construction modelling with the construction planning while having a collaborative nature, we can easily assume that it may either reduce the number of claims in a project or be used to support such claims. However, the collaborative nature may also be one of BIM limits or at least its constraints. Indeed, in several organisation, best practices are not always followed and it is unlikely that such organisations will act differently while using BIM. As a result site records might not be kept properly and thus the BIM advantages might inevitably be lost.

Therefore we will try to find out in this paper the effect of BIM on the occurrence of claims and we will also focus our study on how BIM can be used to resolve a common problem in this environment. In other words, we will try to understand to what extent BIM may impact claims and thus disputes in construction projects.

### **Step 1 - Objective statement**

The author in this paper is going to try to answer the following questions:

1. What are the impacts of building information modelling on claims in construction projects?
2. What are the limits of building information modelling?

### **METHODOLOGY**

The research methodology combines qualitative and quantitative research. First, the qualitative research will be used to acquire insight into the question and will help to develop hypotheses for future quantitative research. Then quantitative research will allow quantifying the problem by generating data that can be transformed into usable statistics. Thus, after selecting a hypothesis from the literature review, data will be compared in order to assess such hypothesis. In this paper, the literature review will have a main role since it will provide a theoretical framework for the study and as a consequence, it will be the grounding of such study.

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<sup>3</sup> AlFadha, A. (2014, November). *Can multidimensional WBS be the solution for IT project issues?*. Retrieved from <http://pmworldjournal.net/wp-content/uploads/2014/11/pmwi28-nov2014-AlFadha-multidimensional-wbs-Featured-Paper2.pdf>

The following steps show exactly how the research methodology is adopted for this research:

1. Definition of the topic.
2. Definition of the research question.
3. Literature review.
4. Definition of the hypothesis.
5. Data analysis.
6. Comparison of data with the hypothesis.
7. Conclusion.

In a construction project, a claim may be issued for different reasons; we will focus in this study on the claim caused by delays in the work.

**Step 2 - Alternative solution**

BIM is a methodology which integrates 7 dimensions:

- 3D: Visualisation of the project in an X-Y-Z geometric dimension.
- 4D: Integrates the scheduling aspect of the project.
- 5D: Allows linking the scheduling dimension with a cost estimation of the work.
- 6D: Allows implementing sustainability into the project, energy analysis.
- 7D: Contains information concerning the actual use and maintenance of the work.

**Step3 - Attributes to evaluate alternative and Development of outcomes**

These dimensions are compared in the MADM matrice below. The attributes were chosen in order to assess the impact of each dimensions on reducing claims in a project or supporting such claims. As we are focusing on claims due to delays, the « Time » attributes are obviously very important. Moreover, the « Cost » attributes are also useful to provide information in order to support the claim. Finally, we will focus on the « Complexity » which will directly impact both the cost and the time.

Attributes	3D	4D	5D	6D	7D
Cost	Not represented	Not represented	Represented	Represented	Represented
Time	Not included	Included	Included	Included	Included
Utility	Low	Medium	High	Medium	Medium
Complexity	Low	Medium	Medium	High	High

Figure 1. Multi-attribute decision making

#### **Step 4 - Selection of the acceptance criteria-**

After reviewing the MADM matrice, the 3D modelling is clearly to be eliminated since it does not implement the « Time » attribute. In term of complexity, the 6D and 7D are too high; indeed such dimensions which are specific to a particular project and need to be implemented only under precise circumstances. Moreover, these dimensions are not relevant to the problem at hand. Finally, the 5D dimension integrates cost in the project; since it can be very useful to access such information for supporting a claim it is interesting to focus on it as well as the 4D dimension.

#### **FINDINGS**

##### **Delay-**

Construction delays are considered as time lags in completion of activities from specified time as per contract or can be defined as late completion or late start of activities to the baseline schedule, directly affecting specified cost<sup>4</sup>. As a consequence, the process of delay analysis is the study of an issue which resulted in a time overrun causing inevitably a request for time extension. Since the contract is directly impacted by such a process as it will be modified from its original version; this process on its own will then lead to a financial overrun. In order to solve this financial issue between two parties, both of them will start to exchange on the subject and try to find a compromise. To do so, the delay analysis shall clearly define the reasons for which the delay occurred in the first place; evidence of such reasons shall be produced. If an agreement cannot be reached a claim will arise from one or the other party which will possibly result in a dispute.

We can assume that in order reduce the number of claims or at least avoid the step of going into a dispute, we have two possibilities:

- Prevent the event that caused the delay.
- Provide a great level of detail to support the claim.

In order to assess the impact of BIM on a claim in construction projects, we will try in this paper to evaluate how BIM can affect the two points made above.

#### **Step 5 - Analysis and comparison of the alternatives**

##### **The effect of the 4Ds' BIM on claims caused by delays in the work-**

BIM can be defined as a rich information model, consisting of potentially multiple data sources, elements of which can be shared across all stakeholders and be maintained across the life of a

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<sup>4</sup> Dashore, A. (2016, September 22). *Delays in Construction Projects, Its Types, Effects and Management*. Retrieved from <https://theconstructor.org/construction/delays-construction-projects/13465/>

building from inception to recycling (cradle to cradle). The information model can include contract and specification properties, personnel, programming, quantities, cost, spaces and geometry (NBS, 2011)<sup>5</sup>.

In other words, BIM allows the coordination of all the pieces of information within a project throughout its lifecycle. This means that if used correctly BIM would stock all these informations in a unique database which would be available for all parties at every moment. Moreover, such pieces of information are directly linked to a 3D model and to real-time planning.

In a study analysing the effect of BIM on construction claims, a questionnaire survey was developed; the questions were focusing on 14 reasons that caused claims in a project. Professionals aware of BIM technology were selected to answer such questions. The study concluded that delays in work were both the main reasons for claims to occur and the aspect the most impacted by the BIM methodology<sup>6</sup>.

As discussed above BIM must be used following best practice, it is strongly advised to use such methodology from the inception of the project and adequate site records must be kept at all time. As a consequence, a company lacking organisation is unlikely to follow BIM best practice and will thus fail to benefit from its methodology.

**The added value of the 5th dimension-**

The main difference between the dimension is that the 5D implements a « cost » data.; it provides a way to associate the geometrical elements and the time constraint with a specific cost. As a consequence, it can be used to estimate the construction costs or to obtain an overview of the financial status of a project at a given time. As a claim is directly linked to a financial compensation, such detail of information can obviously support such a claim.

In order to assess each alternative we are using the tables below:

Attributes	Cost	Time	Complexity	Utility
High	1	1	0	1
Medium	0,5	0,5	0,5	0,5
Low	0	0	1	0

Figure 2. Quantitative representation of the attributes

<sup>5</sup> Burr, A. (2016). *Delay and Disruption in Construction Contracts: Supplement 1* (1st ed.).

<sup>6</sup> El Hawary, A. N., & Nassar, A. H. (2016, December 12). *The effect of building information modeling (BIM) on construction claims*. Retrieved from <http://www.ijstr.org/final-print/dec2016/The-Effect-Of-Building-Information-Modeling-bim-On-Construction-Claims.pdf>

We are using the table above to create the « Relative weighting »

Attributes	4D	5D
Cost	0	1
Time	1	1
Complexity	0,5	0,5
Utility	0,5	1
<b>Total</b>	<b>3</b>	<b>3,5</b>

Figure 3. Relative weighting

Finally, we are using the « Additive weighting technique ».

Attributes	Ranking	Weighting	4D		5D	
Cost	3	0,3	0	0	1	0,3
Time	2	0,2	1	0,2	1	0,2
Complexity	4	0,4	0,5	0,2	0,5	0,2
Utility	1	0,1	0,5	0,05	1	0,1
<b>Total</b>	<b>10</b>	<b>3,5</b>	<b>SUM</b>	<b>0,45</b>	<b>SUM</b>	<b>0,8</b>

Figure 4. Additive weighting technique

### **Step 6 - Ranking of the alternatives**

The relative weighting shows that only a little difference exists between the two dimensions. However, once we rank the attribute by importance, the additive weighting technique highlight the 5th dimension thanks to its « Cost » attribute.

### **Step 7- Performance analysis**

The analysis performed in this paper was performed in order to assess the impact of BIM on claims. Since such method is only starting to grow in the construction sector we shall assume that the future will tell if the number of claims is getting lower and lower in any project in which such methodology is used; and more precisely, if the 5th dimension is fully

implemented. Finally, in order to evaluate correctly this number, we have to bear in mind that the organisation must follow best practice. As a consequence, to measure if the conclusion reached is in fact working accordingly, we shall wait for such organisations to develop a good expertise in BIM.

## **CONCLUSION**

In this paper, we focused on the impact of building information modelling on the occurrence of claims; we also assessed to what extent may support such claims.

We clearly identified that the 5th dimension of such method is well suited for both of the questions at hand. Indeed, the schedule dimension allows better tracking of the project and thus a reduction of claims while the cost dimension brings a way of quantifying every aspect of the project and thus supporting the claim. We also highlighted the importance for the organisation to follow the best practices in order to fully benefits from the BIM implementation.

## **BIBLIOGRAPHY**

Andrew, B. (2016, May 18). *How BIM models will be used to support claims and disputes / BIM+*. Retrieved from <http://www.bimplus.co.uk/people/how-bim-models-will-be-used-support-claims-and-dis/>

El Hawary, A. N., & Nassar, A. H. (2016, December 12). *The effect of building information modeling (BIM) on construction claims*. Retrieved from <http://www.ijstr.org/final-print/dec2016/The-Effect-Of-Building-Information-Modeling-bim-On-Construction-Claims.pdf>

Project Management Institute. (2017). What is a project. In *A guide to the project management body of knowledge (PMBOK guide) Sixth edition: Agile practice guide* (6th ed.).

AlFadha, A. (2014, November). *Can multidimensional WBS be the solution for IT project issues?* Retrieved from <http://pmworldjournal.net/wp-content/uploads/2014/11/pmwj28-nov2014-AlFadha-multidimensional-wbs-Featured-Paper2.pdf>

Dashore, A. (2016, September 22). *Delays in Construction Projects, Its Types, Effects and Management*. Retrieved from <https://theconstructor.org/construction/delays-construction-projects/13465/>

Gerbert, P., Castagnino, S., Rothballer, C., Renz, A., & Filitz, R. (2016, March 8). *The transformative power of building information modeling*. Retrieved from <https://www.bcg.com/publications/2016/engineered-products-infrastructure-digital-transformative-power-building-information-modeling.aspx>

Burr, A. (2016). *Delay and Disruption in Construction Contracts: Supplement 1* (1st ed.)

Fierstein, D. E. (2011, June 22). *World's first BIM claim - Construction law now*. Retrieved from <https://www.constructionlawnowblog.com/design-and-technology/worlds-first-bim-claim/>

Dougherty, J. M. (2015). *Claims, disputes and litigation involving BIM*

International Federation of Consulting Engineers. (2011). *FIDIC procurement procedures guide*.

## About the Author



### **Maxime Béquin**

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**Maxime Béquin** is a student in 5th year at ITEEM a school of engineers, managers, contractors. Soon graduated from an « Entreprise architecture » master at Central Lille and a master of « Project and Programme Management and Business Development » at the Skema Business School. Versatile, self-motivated and adaptable student in the fields of engineering and management with 10 years of international experience, including in China, North Africa and Central America. Provided with strong interpersonal skills, an ease to communicate and values such as reliability, productivity and social intelligence.

Having moved many times in France and abroad, he spent 7 years in France before moving to Tunisia for 7 years. Then, he moved to Shanghai for 4 years where he graduated from high school. Finally, He came back to France in order to follow an engineering and business formation. During his studies he was also competing as a professional in horse riding; Maxime was ranked first of Tunisia and won multiples international competitions in Shanghai.

In the school framework he did several internships. He worked in Panama for 8 months in the legal sector where he was in charge of contractual communication with clients and subcontractors resolving conflicts up to 1 million dollars; he also participated in contract negotiations and in the study of claims. He also worked as a seller in Boulanger which is a French brand in the multimedia sector; he was ranked in the top 10 of best sellers on a national level.