

Is change in Construction contracts a risk? Analysis of causes and impacts^{1, 2}

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ABSTRACT

Changes in construction projects are very common and usually generate cost and time overruns. The purpose of management of change is to reduce the bad impacts of changes that are necessary to the project and not to eliminate them. Changes should be well-managed through a formalized change management process and if not, it will generate serious impacts on the schedule and the productivity of a project.

At this time, there is an insufficiency of standards for the methods used in project change management and the cause is that the changes are sometimes not well-managed. Some projects are adaptable to changes since the contractors succeed in managing and predicting the change but there are some cases that they fail in saving the project from these different changes. To explain this, we used the Compensatory Model of Additive Weighting Technique to help us analyze different situations and different impacts of change within a construction projects.

Keywords: Change, Management, Impacts, Causes, Contractors, Construction projects, Risk, Organizational changes, Project changes.

INTRODUCTION

A construction project goes through several stages from planning, cost estimation, ordering, contracting, designing and engineering to the construction of the building and the delivery of the final project. In construction processes, decisions are taken based on the professionals' personal experience and incomplete information that possibly lead to rework and change.

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Construction rework is generally related to the destruction of what has been already built, and this usually has a higher influence on the performance of the construction than the change option.

Managing the change is considered as an essential part of project management and it turns out to be very important to the success and the achievement of construction projects since project changes are unavoidable at all stages.

There are many sources for change which are inevitable but these changes generally refers to design or change orders, they have been called the biggest cause of disputes between the clients and the contractors and it can also be the cause of continuous delays in project schedule, requiring extra materials, added time, labor and cost to an already complex project. Changes should be managed to reduce the bad impacts and to maintain quality at its best level.

Change Management arises in construction at two levels which are project and organizational level. Managing how to introduce the change in an organization effectively and efficiently is the main purpose at the organizational level. On the other hand, the focus on trying to handle the changes that occur in the project due to external and internal reasons is the main aim at the project level.

Changes in construction projects can be the cause of many problems such as delays, claims and disputes and in some cases, it can be the cause of the end of a project if they are not resolved following a change management process.

To summarize, what this research has been designed to address are the following questions:

- What are the main causes of change in construction contracts?
- What are the impacts?

METHODOLOGY

2.1 Feasible Alternatives

Since change is inevitable for all kinds of projects, this paper will analyze and discuss how to manage different types of change and for that it will be feasible to identify three possible alternatives about the impact of change in the constructions projects:

- Change is risky for all the construction contracts
- Change is risky for some construction contracts
- Change is not risky for any construction contracts

2.2 Development of the outcomes

In order to select the most relevant alternative we will define each one and for that the research will be based on information gathered from books and reports related to the management of change in construction projects.

- **Change is risky for all construction contracts:** Since changes are an expected aspect of any project, we can say that it is risky for all kinds of projects. Change is generally due to uncertainties within construction projects and since we cannot manage uncertainty, the risk will always be predictable.
- **Change is risky for some construction contracts:** Since there is not a common contract used in construction industries, there will not be a common baseline to examine the change. Change can be also good for construction it can be an opportunity not only a threat it depends on how the contractor manages the changes within a construction project and here a lot of questions can be asked in terms of a good or bad management of the change that lead the construction projects to be risky or not.
- **Change is not risky for any construction contracts:** Change is not necessary a bad thing so it can be not risky in the sense that a contractor has already predicted the change and considers it as part of the method he is using, in that way the contractor can manage the change without taking any risk and without facing any issue.

2.3 Selection of a criterion

According to the previous analysis, we will select the following criteria to understand which criteria affect the selection of our different alternatives:

- Time
- Cost
- Design
- Implementation of change
- Complexity of the project

Attribute	Time	Cost	Design	Implementation	Complexity
Time	0	1	0	0	1
Cost	0	0	0	0	0
Design	1	1	0	1	1
Implementation of	1	1	0	0	1

change					
Complexity	0	1	0	0	
Score	2	4	0	1	3

FINDINGS

3.1 Analysis and Comparison of the Alternatives

With using the below ranking scale we will show the performance of each alternative based on the ranking of each criteria so that we can understand and analyze what makes a construction project risky.

QUALITY	
Excellent	3
Good	2
Fair	1
Poor	0

CRITERIA	RELATIVE RANK	NORMALIZED WEIGHT (A)			Risky for all construction projects		Risky for some construction projects		Not risky for any construction project	
					B	A*B	C	A*C	D	A*D
Time	2	2/10	=	0.2	3	0.6	3	0.6	1	0.2
Cost	4	4/10	=	0.4	3	1.2	2	0.8	2	0.8
Design	0	0/10	=	0	0	0	2	0	0	0
Implementation	1	1/10	=	0.1	0	0	3	0.3	2	0.2
Complexity	3	3/10	=	0.3	2	0.6	3	0.9	2	0.6
SUM	10	SUM		1.2	SUM	2.4	SUM	2.6	SUM	1.8

According to the analysis of different alternatives, we will use the **Multi-Attribute Decision Making (MADM)** analysis by using the Compensatory Model of Additive Weighting Technique.

As we can see the risk of change on the construction projects depends on many attributes and we can notice that time and cost are the attributes that have more impact after change appears and it is the most important criteria that should be taken into consideration while facing a changing in a construction project.

3.2 Selection of the Preferred Alternative

As we can see it seems that the second alternative which is change is risky for some constructions projects is the right one depending on the way to manage the change while the fact that change is not risky for any construction project has to be refused.

3.3 Performance Monitoring and Post Evaluation Results

As this paper showed, change can be risky for some construction projects, not all of them and not none of them either. We can say that change never disappears and its impact vary according to the type of change and there are many sources for change. In some construction projects change can be risky when contractors don't predict or don't know how to handle this change. Otherwise, change can be successfully managed by the contractors and ensure that not only benefits are maximized but also penalties are minimized.

Depending on the nature of change we can consider if change is risky or not for a construction projects. External reasons that occur outside the organization and which are difficult to control are riskier since the contractor didn't predict it. Internal reasons occur inside the organization and are easier to handle.

That's why we are saying that the change is always predictable but not always risky. To handle change and to improve and eliminate the maximum of risk that can affect the project, the project team should improve the communication and reorganize and update their work methods, take into consideration additional time and cost that implementation of change requires.

CONCLUSIONS

Within a construction projects, there is a higher risk, direct or indirect, on the good management of the project. When the team including contractors, architects, consultants, engineers, knows how to manage well the project, the changes that are inevitable can have a good impact on the project but if the team doesn't follow a formalized change management process it can lead to bad impacts and sometimes to the obligation of cancelling the project.

I. What are the causes of changes?

There are many causes that lead to change and here we can say that the most important cause within a construction project is that coordination between the consultant and the contractor is missing or not very good. We can also perceive that errors in design often lead to changes so that the client wouldn't be unhappy with the result. Owners also have a responsibility since they can change plans in the middle of the project not at the beginning.

II. What are the impacts?

The impacts of change vary according to the nature and the source of change and also according to the way that we are going to manage this change. Changes that are not managed properly generate negative impacts that are mostly an overrun in both time with a delay in completion schedule and cost with an additive one. Disputes will also appear between parties to the contract and the quality standards will be affected. There are also good impacts that result from changes after good implementation of them.

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