



# Ranking of Factors Causing Construction Project Changes in UAE Mega Construction Projects

Abdulla AlAmeri<sup>1\*</sup>, Ismail Abdul Rahman<sup>2</sup>, Nur Ain Ngah Nasaruddin<sup>3</sup>

<sup>1</sup>Faculty of Technology Management,  
Universiti Tun Hussein Onn Malaysia (UTHM), 86400 Parit Raja, Batu Pahat, Johor, MALAYSIA

<sup>2,3</sup>Faculty of Civil and Environmental Engineering,  
Universiti Tun Hussein Onn Malaysia (UTHM), 86400 Parit Raja, Batu Pahat, Johor, MALAYSIA

DOI: <https://doi.org/10.30880/ijscet.2020.11.01.001>

Received 14 Mei 2019; Accepted 21 Mac 2020; Available online 24 April 2020

**Abstract:** Many construction projects are facing changes along its life cycle due to different reasons. Once the project faces change, it has a negative impact on the concerned parties. This paper presents a study on identifying main reasons/causes to construction changes in UAE Mega projects. Literature review conducted identified 58 causes of changes which were categorized in three groups which are namely client, consultant and contractor groups. These lists of causes were used to develop questionnaire to uncover the significant causes to the changes from the UAE construction practitioners' perspective. A questionnaire survey was conducted and 218 valid responses were considered for the analysis using mean score index. It was found that lack of coordination is the most significant cause in client group, then poor site management team for consultant group and finally, poor inspection & supervision by contractor in contractor group. It is hope that the result of this study can minimize the potential changes during implementation of the project's construction.

**Keywords:** Changes, causes, UAE construction projects

## 1. Introduction

Construction project is commonly measured as successful when it is accomplished and delivered within the compulsory period, clear defined budget, as per the requisite conditions, standards and specifications, and satisfy the intended stakeholder (ur Rehman, 2015). Takim & Akintoye (2002) stated that project is considered as successful if it is gratifying the functionality, financially beneficial to the contractor, no argues and fit for the intention. But in most cases, and due to the construction projects nature, as well as the risky and unstable environment of construction industry, a number of un-expectable changes happened called the 'Change Causes' and trigger a number of consequences called "Change effects". Effective and innovative change management approaches will transfer the project to a secured status (Wong et al., 2017).

Mirshekarlou (2012) stated that an effective change prediction should be conducted based on a general overview of likely causes and impacts of changes on projects' performance measures; hence establishing a wide-ranging model of "Change Causes" and "Change Effects" is imperative in order to facilitate the systematic management of project change. In other words, construction changes are a common phenomenon in most countries, particularly in the developing ones. Many studies have shown that construction changes have negative effects on the overall project performance (Habibi et al., 2018; Johnson & Babu, 2018). The causes of these change factors in the construction industry vary from country to country, due to different environments and the techniques applied in the overall

construction processes (Alfakhri et al., 2018). In the UAE for instance, the different nationalities, languages, and ethnic backgrounds, causes that project managers to encounter, embrace, adapt, and apply them to affect positively the events they face and to conceive changes as growth (Mirshekarlou, 2012). So that, this study attempts to investigate the major causes of construction project changes specific to UAE, by identifying the different types of construction changes, their causes from different perspectives, in order to determine the impact on the UAE construction project performance.

## 2. Changes in Construction Activity

Changes in construction activity attracted the concern to be investigated due to its important in construction industry (Yap et al., 2018). It is one of the main causes of project failure (Sinesilassie et al., 2018). Subsequently it resulted to cost and time overruns in the form of rework occurrence (Damoah & Kumi, 2018) and may also lead to deficiency in the overall quality of the construction project (Zidane & Andersen, 2018). Sun and Meng (2009) stated that in construction projects a change refers to an alteration to design, building work, project program or other project aspects caused by modifications to preexisting conditions, assumptions or requirements. Al-Nasseri and Aulin (2015) defined the changes as alterations, variations, deductions, extras, or omissions of work. Then, Mirshekarlou (2012) identified that change is defined as any event that results in an adjustment of the original scope, execution time, or cost of work.

There are many forms and practices of changes happened among the construction industry. The emerge of innovative and new technologies parties is one of the forms of changes enter the construction industry. Efficiency-improving and mobile technologies considered one of the positive changes happened in the construction industry all over the world. Such technologies bring many advantages and innovations so that it considered one of the latest construction industry trends. In a recent study conducted by Raza (2019), the researcher affirms that change management is essential to successfully accomplish the construction project with the highest quality outcomes as well as less disputes among the project parties. Commonly, any investment in construction industry is recognized proficient and effective if only the change risk factors, which possibly have negative impacts on the project, are managed competently and on time (Mirshekarlou, 2012). This means that, risk of changes must be recognized, lessened or even eradicated by the project management team at the right time. Consequently, team members, since most of them have been conscious about the likely negative impacts of changes, must pay particular attention to competently deal with the changes.

## 3. Causes of Change

“Change Causes” are elements that lead to a change or encourage a change either directly or indirectly (Mirshekarlou, 2012). The varying nature of construction industry and the variety of ambiguity and risk related to this kind of industries stimulate the complication of field (Mirshekarlou, 2012). By conducting a literature review on change causes it can be deliberated that there are several studies on change causes in construction industry because of the huge and vast scope of change causes which comprise a great mixture of factors trigger changes in construction. For example, Sun & Meng (2009) study the change causes using three method of investigation: Questionnaire surveys, Reviews of project records, and Case studies. They define that though questionnaire surveys are effective method for collecting data from a huge number of participants but; their results can be biased and specifies a loose and general knowledge obtained from frequent projects by respondent. Besides, most questionnaire surveys have moderately small sample sizes; consequently, concluding a broad and wide-ranging theory or proposal from the results of these kinds of studies must be more carefully. On the other hand, the projects record and documentations review method is more-unprejudiced than questionnaire survey method. Yet, the results are openly related to the accurateness, truthiness, and completeness of project records which are reserved.

Other studies in the latest past attempted to classify construction project change causes and differentiate based on their originator (Manzoor & Sui Pheng, 2005; Safapour & Kermanshachi, 2019). Based on these studies, construction change causes factors can be grouped into three main categories; Client, Consultant, and Contractor.

**Client related changes:** Client related changes are the causes of changes which are introduced by project owner in order to achieve the project intentions or to recompense the owners’ defects in responsibilities (Mirshekarlou, 2012). Sarhan et al. (2018) found in a recent international study that there were likenesses among the different countries in the visions of the competence of the construction client. Some of their finishes concerned the technical capability, such as engineering, legal and economic ability. Further, they argued that the construction client also needs capability to communicate. They also argue competences that concern how a construction client should perform: be ostensible, be present in the process, and act individually in the process, not through consultants. However, the researchers highlighting on the talent of the construction client in following up preconcert delivery after achievement.

**Consultant related changes:** These are the changes introduced directly by consultant due to project necessities, expectations, or consultants’ failures during project lifecycle (Mirshekarlou, 2012). Enshassi et al., (2010) identify consultants as the second cause of changes in the Gaza Strip construction projects. In contra, change considered one of the main success factors for the construction projects as described by Yong & Mustafa (2011).

Contractor related changes: These are the changes suggested by contractor to be employed in project due to their obligation or in order to shield the contractors' failure in running the project requirements (Mirshekarlou, 2012). On the same study conducted by Enshassi et al., (2010), contractor identified as the third cause of changes in the Gaza Strip construction projects. According to Foo et al., (2013) stated that the most major change causes are: clashes between contact documents, design errors & omissions, unexpected problems, contrary in site condition, inadequate design, change in disclaimers, inadequate working drawings, change in design by consultant, vague design details and lack of coordination.

#### 4. Data Collection

In this study, the data was collected from construction practitioners which include in-person and electronic/ online questionnaires. A total of approximately two hundred and eighteen (218) sets of questionnaires were distributed to practitioners within a period of 10 months. The questionnaires were responded by construction practitioners from different stakeholders in UAE; therefore, it gives confidence to the thorough representation of construction players. The collected data were analyzed quantitatively using Statistical Package for Social Science (SPSS) to determine the factors that contribute to project changes based on respondents' opinions.

The questionnaire is divided into two sections. The first section contains general demographic information about the respondents such as gender, qualification degree, years of experience, and position within the company. The second section contained a list of change causes exposed by responses monitored via a 5-point Likert scale of: Strongly disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; and Strongly agree = 5.

##### 4.1 Demography of Respondents

The questionnaire was sent to the key team players in the construction industry ranging from executive managers or supervisors, senior managers, project managers, technical worker, and site engineers who are expected to be in the construction industry of Dubai with different positions & years of experience, have firsthand knowledge and can provide in-depth references related to the causes of change. Table 1.0 shows the demographic information for the respondents.

**Table 1 - Respondents' demographic.**

Demographic items	Frequency	Percentage
Male	180	82.6
Female	38	17.4
<b>Total</b>	<b>218</b>	<b>100</b>
Less than bachelor degree	13	6
Bachelor degree	146	67
Postgraduate	59	27
<b>Total</b>	<b>218</b>	<b>100</b>
Less than 5 years	124	56.9
11 to 15 years	61	28
More than 15 Years	33	15.1
<b>Total</b>	<b>218</b>	<b>100</b>
Technical worker	156	71.6
Executive management (or supervisor)	33	15.1
Senior manager	29	13.3
<b>Total</b>	<b>218</b>	<b>100</b>

The respondent's majority are males, their percentage out of the 218 respondents were 82.6%. The majority of the respondents were carrying bachelor degree which adds more value to the responds as they own high qualification degree. In term of construction project experience, the majority of respondents have up to five years of experience because Dubai's mega projects increased in the last five years only. About 71.6% of the respondents are from technical worker, since the researcher found that they actually experience the real causes of change among the construction projects they are working on.

Reliability test was conducted on the collected data to ensure the consistency of the instrument used in the questionnaire survey. Cronbach's alpha is a common criterion to check the internal consistency of scale and data

collected (Tavakol & Dennick, 2011). According to Yahaya et al. (2007), if Cronbach's alpha is less than 0.6 then the internal consistency is poor and certain measures should be engaged to improve the dataset. Cronbach's alpha was calculated using SPSS with the overall value for cause factors is 0.892, therefore, it showed good internal consistency and reliability of the collected data.

## 5. Ranking of Causes of Changes

From the review of previous literature, 58 factors responsible for causing the change were identified. The mean rank scores were computed for each cause from the perspective of the respondents score. The change causes as illustrated in Table 2.0 were categorized under three categories based on the cause originator which are Clients, Consultants, and Contractors.

**Table 2 - Results of causes factors.**

<b>Change factors: Clients group</b>	<b>Mean</b>	<b>Std. deviation</b>	<b>Rank</b>
Lack of coordination	3.63	1.228	1
Inadequate understanding of clients need	3.60	1.181	2
Delay in order issuance by clients	3.59	1.0746	3
Replacement of key personnel by clients	3.59	1.129	4
Multiple contractors	3.50	1.259	5
<b>Change factors: Consultants group</b>			
Poor site management team	3.62	1.196	1
Poor consultant coordination	3.60	1.155	2
Poor estimations of cost and quantity	3.57	1.166	3
Absence of consultant's site staff	3.52	1.114	4
Lack of scheduling and planning	3.49	1.235	5
<b>Change factors: Contractors group</b>			
Poor inspection and supervision	3.57	1.130	1
Unavailability of technical professionals in the contractor's organization	3.49	1.096	2
Subcontractors financial problems	3.49	1.267	3
Poor programming of material procurement	3.45	1.140	4
Poor programming of material procurement	3.44	1.343	5

By reviewing Table 2.0, the groups of change causes ranking differ based on the change originator. Safapour & Kermanshachi (2019) stated that "The causes of change in construction projects can be specified based on its originator" whereas other studies has proven that project characteristics may even be region-specific and that none of the studies is similar to any other and each study has dissimilar rankings for the causes. The following subsections rank the causes factors based on their categories or groups:

### **Clients Cause of Change:**

The first rank among the client group was the *Lack of coordination* which identified as the greatest cause of change. *Inadequate understanding of clients' needs* comes second under the ranking while both *Delay in order issuance by clients* and *Replacement of key personnel by clients* jointly take the third and fourth position in the order of the causes of change under this group. *Multiple contractors* occupy the fifth rank cause of change.

### **Consultant Cause of Change:**

While among the consultant group, the "Poor site management team" occupy the first rank among causes of change caused by the consultant with mean value of 3.62. "Poor consultant coordination" considered the second ranked factor, while "Poor estimations of cost and quantity" engage the third rank. Finally, among the causes originated by consultant, "Absence of consultant's site staff" and "Lack of scheduling and planning" reside in the fourth and fifth rank with mean values of 3.52 and 3.49 respectively.

### **Contractor Cause of Change:**

Referring to the final group in Table 2.0, the factors originated by the contractor were ordered in mean descending values. In this group, the *Poor inspection and supervision* considered the highest ranked factor. Both *Subcontractors*

*financial problems* and *Unavailability of technical professionals in the contractor's organization* occupies the second and third position in the order of the causes of change under this group. The fourth rank factor is *Poor programming of Material Procurement*. Finally, *Design errors* considered the factor placed in the fifth position.

## 6. Conclusion

This paper presented the ranking causes of construction changes in UAE Mega projects. Changes in construction projects are very communal and expected to occur by numerous causes, at any phase of a project, and may have substantial negative effects. The causes change in construction in the questionnaire was assessed by 100 in different UAE projects. The study found that the most significant causes of change from 3 groups are the *Lack of coordination* in client group which means, *Poor site management team* for consultant group and *Poor inspection and supervision* in contractor group.

## Acknowledgment

Authors would like to extend gratitude and thanks to UTHM and BP Renal Care Sdn. Bhd. for making this publication a reality and also to those who have contributed towards this study.

## References

- Takim, R., & Akintoye, A. (2002, September). Performance indicators for successful construction project performance. In 18th Annual ARCOM Conference (Vol. 2, pp. 545-555).
- Wong, P. S., Zwar, C., & Gharaie, E. (2017). Examining the drivers and states of organizational change for greater use of prefabrication in construction projects. *Journal of Construction Engineering and Management*, 143(7), 04017020.
- Habibi, M., Kermanshachi, S., & Safapour, E. (2018, April). Engineering, procurement and construction cost and schedule performance leading indicators: state-of-the-art review. In *Proceedings of Construction Research Congress* (pp. 2-4). New Orleans, Louisiana: ASCE.
- Johnson, R. M., & Babu, R. I. I. (2018). Time and cost overruns in the UAE construction industry: a critical analysis. *International Journal of Construction Management*, 1-10.
- Yap, J. B. H., Abdul-Rahman, H., Wang, C., & Skitmore, M. (2018). Exploring the underlying factors inducing design changes during building production. *Production Planning & Control*, 29(7), 586-601.
- Sinesilassie, E. G., Tabish, S. Z. S., & Jha, K. N. (2018). Critical factors affecting cost performance: a case of Ethiopian public construction projects. *International Journal of Construction Management*, 18(2), 108-119.
- Damoah, I. S., & Kumi, D. K. (2018). Causes of government construction projects failure in an emerging economy: evidence from Ghana. *International Journal of Managing Projects in Business*, 11(3), 558-582.
- Zidane, Y. J. T., & Andersen, B. (2018). The top 10 universal delay factors in construction projects. *International Journal of Managing Projects in Business*, 11(3), 650-672.
- Sun, M., & Meng, X. (2009). Taxonomy for change causes and effects in construction projects. *International journal of project management*, 27(6), 560-572.
- AlNasser, H., & Aulin, R. (2015). Assessing understanding of planning and scheduling theory and practice on construction projects. *Engineering Management Journal*, 27(2), 58-72.
- Raza, M. A. (2019). Analysis of Project Scope Change Management as a Tool for Project Success in Karachi Thatta Dual Carriageway (Doctoral dissertation, CAPITAL UNIVERSITY).
- Manzoor Arain, F., & Sui Pheng, L. (2005). The potential effects of variation orders on institutional building projects. *Facilities*, 23(11/12), 496-510.
- Safapour, E., & Kermanshachi, S. (2019, June). Investigation and analysis of human, organizational, and project based rework indicators in construction projects. In *Proceedings of the ASCE International Conference on Computing in Civil Engineering*, Atlanta, GA, USA (pp. 17-19).

- Sarhan, J., Xia, B., Fawzia, S., Karim, A., & Olanipekun, A. (2018). Barriers to implementing lean construction practices in the Kingdom of Saudi Arabia (KSA) construction industry. *Construction Innovation*, 18(2), 246-272.
- Enshassi, A., Arain, F., & Al-Raei, S. (2010). Causes of variation orders in construction projects in the Gaza Strip. *Journal of Civil Engineering and Management*, 16(4), 540-551.
- Yong, Y. C., & Mustafa, N. E. (2011). Clients, consultants and contractors' perception of critical success factors for construction projects in Malaysia". *Management*, 735, 744.
- Foo, L. C., Rahman, I. A., Asmi, A., Nagapan, S., & Khalid, K. I. (2013). Classification and quantification of construction waste at housing project site. *International Journal of Zero Waste Generation*, 1(1), 1-4.
- ur Rehman, G. (2015). Causes of Delay in Construction Projects In Abu Dhabi *بابسأ ريخأت معيراشم عاشنلا في بيظوبأ*.
- Mirshekarlou, B.R. (2012). A Taxonomy for causes of changes in construction (Master's thesis).
- Alfakhri, A. Y., Ismail, A., Khoiry, M. A., Albrka, S. I., Alshetwi, A. B., & Alghadi, M. S. (2018). A Study of Identifying Significant Variables of Delays in Road Construction Via Structural Equation Modelling (SEM). *International Journal of Engineering & Technology*, 7(2.29), 893-898.
- Tavakol, M. & Dennick, R. (2011). Making sense of cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.
- Yahaya, A., Hashim, S., Ramli, J., Boon, Y., & Hamdan, A.R. (2007). *Mengusai Penyelidikan dalam Pendidikan*. Kuala Lumpur: PTS Publication..