

CAUSES OF DEVIATIONS IN PROJECT EXECUTION AND THEIR EFFECTS

FLORIAN MÜLLER¹, ALEXANDER TUPI², and DETLEF HECK¹

¹*Institute of Construction Management and Economics, University of Technology, Graz, Austria*

²*Granit GmbH, Graz, Austria*

Over the past few years the German and Austrian construction industries have been confronted with increasing complexity in projects, a situation, which has resulted in a significantly higher number of construction claims. The lack of an effective documentation system and a standardized claim management system has led to a growing number of disputes and legal cases. To develop a standardized claim management system, it is essential to understand and analyze deviations in the as-planned vs. the as-built occurring during project execution. A standardized system may assist in the quantification of impacts of different deviations and change procedures in future projects. This paper focuses on deviations and their effects occurring during project execution, as well as possible disputes arising from them. Further research is necessary in order to develop an effective standardized claim management system.

Keywords: Claim management, Claim process, Dispute resolution, Conflict management, Standardized processes.

1 INTRODUCTION

Rapidly changing social demands have a major impact on the technical and legal requirements for construction projects. The complexity of construction projects has been continually rising over the past few years. A precise definition of the owner and user objectives has become a major challenge. Projects suffer more and more from insufficient design (Mueller and Stempkowski 2015). Shortage of time and cost efficiency put additional pressure on them (Burr 2016). In Austria, the design and execution phase are traditionally separated. Recently, a shift towards planning during project execution has been observed. This is making the preliminary work preparation and cost calculations inaccurate. The Austrian construction industry has experienced a considerable increase in claims as a result. Contractors often lack sufficient time and human resources to prepare a proper claim. Additionally, a substantial documentation and claim examination is considered a secondary activity, which aggravates the situation (Kangari 1995). The increase of claims and inadequate claim documentation can cause a loss of confidence between the owner and contractors (Zaghloul *et al.* 2002). Specific knowledge, obtained through previous successful claim processes, is rarely used in following claims. This leads to an uncontrolled development of numerous documentations and claim process systems. A legal opinion of an Austrian high court judge (Kodek *et al.* 2017) regarding requirements on documentation for construction claims shows that the construction industry in Austria is facing a change of heart regarding claim management. Based upon this legal opinion, a stringent causal evidence for each single event linked to its effects is required, making documentation for large

scale and complex projects exceptionally difficult. Global claims with generic cost calculation models, based on few specific documented events, should be avoided. The idea is to eliminate the possibility of *cum hoc ergo propter hoc* (correlation does not imply causation). The objectives of this research are to identify the most common deviations causing a claim during execution and their effects on the workflow, as well as problems occurring during the claim process. Understanding them may be beneficial for an optimization of the organization processes and for a possible standardization of the documentation and claim process system in Austria.

2 OBJECTIVE AND METHODOLOGY

A research project on the subject of claim management, conflict management and settlement of disputes has been carried out in order to investigate in detail relevant deviations during execution, which are the cause of a claim and their effects on the workflow. Based on the findings (Bakhary *et al.* 2015, Jaffar *et al.* 2011, Mohamed *et al.* 2014, Odeh and Battaineh 2002, Werkl and Heck 2013, Zaneldin 2006) a questionnaire was prepared in consultation with claim experts from the Austrian construction industry. The questionnaire is divided into five sections.

- (i) The first section of the questionnaire contains questions regarding the background of participants.
- (ii) The second section of the questionnaire contains questions related to common causes of deviation during work execution.
- (iii) The third section of the questionnaire contains questions related to the effects on the construction process caused by disruptions.
- (iv) The fourth section of the questionnaire contains questions related to problems occurring during different stages of the claim process.
- (v) The fifth section of the questionnaire contains questions related to conflicts arising from claims.

Experts that took part in the questionnaire were selected by (1) background, (2) work experience in construction industry and (3) work experience with claim management. The survey consisted of closed-ended questions with a Likert scale from 0 (likelihood = never respectively no effect) to 10 (likelihood = always respectively severe effect). They could add extra options or contribute opinions.

3 RESULTS

3.1 Expert's Profile

Data of 55 claim experts from the Austrian construction industry was obtained. Due to diverging interests of stakeholders of a construction project, it is necessary to obtain data from the main parties dealing with a claim. This is why the experts are divided into three groups: owner, contractor and consultant. Table 1 shows the profile of the experts in terms of profession and experience.

Table 1. Expert's profile.

Characteristics	Owner	Contractor	Consultant
Number of experts	27.16%	34.57%	38.27%
Years of experience in the construction industry	21.65	20.07	18.71
Years of experience in claim management	17.06	15.89	12.76

The share of different groups is well balanced. Multiple answers were possible regarding the profession group. Most of the experts have 20 years of experience in the construction industry and 15 years in claims management. Information gathered is to be considered reliable.

3.2 Causes of Deviation

In the questionnaire, experts scaled in total 23 different deviations during project execution causing a claim according to their frequency. Table 2 shows the five most frequent deviations during project execution causing a claim. According to owners and consultants, “inadequate definition and or specification of scope of work” is the most common deviation causing a claim. Consultants rank “lack of decision-making by the owner” as an equally frequent deviation. Contractors consider a “delay of deployment of plans by the owner” to be the most frequent deviation.

Table 2. Deviations causing a claim.

Deviations causing a claim	Total		Owner		Contractor		Consultant	
	Ranking	Mean Score	Ranking	Mean Score	Ranking	Mean Score	Ranking	
Incomplete and/or inadequate design	1	6.12	2	7.33	3	6.88	3	
Inadequate definition and/or specification of scope of work	2	6.53	1	7.11	5	7.12	1	
Delay of deployment of plans by owner	3	5.24	4	7.52	1	6.35	5	
Lack of decision-making by owner	4	4.94	7	7.26	4	7.12	1	
Changes of owner requirements (quantity)	5	5.47	3	6.22	6	6.47	4	

3.3 Effects on the Workflow

Deviations occurring during project execution may have a negative impact on the workflow. To develop a standardized claim management system, it is essential to understand similarities of effects on the workflow caused by deviations during project execution. In collaboration with claim experts, 16 recurring effects were detected. Table 3 shows the five most frequent effects on the workflow. According to the results of all participating groups a “productivity loss due to cumulative effects” is the most common effect.

Table 3. Effects on execution.

Effects on execution	Total		Owner		Contractor		Consultant	
	Ranking	Mean Score	Ranking	Mean Score	Ranking	Mean Score	Ranking	
<i>Table 3 (Continued)</i>								
Cumulating effects	1	5.81	1	7.04	1	7.21	1	
Change of conditions	2	5.35	3	6.81	2	6.44	2	
Change of quantities	3	5.59	2	6.78	3	6.38	3	
Disruption of workflow	4	3.94	8	6.30	4	5.87	5	
Acceleration of work	5	5.00	4	5.37	8	5.25	6	

3.4 Problems Related to Claim Process

Austrian Standards define a two-stage model for the claim process. The first stage is the notification of an event causing a possible increase of cost and an extension of time. The second stage is the submission of claim documents. Several steps are required to successfully settle a claim. Several claim process models for the achievement of this exist in the German-speaking area (e.g. Mueller and Stempkowski 2015, Duve 2008). A five-stage model was defined for this questionnaire, starting with the identification of a claim-causing event, followed by notification, documentation, quantification and negotiation. Table 4 shows the three most common issues related to each stage of the claim process.

Table 4. Identification of a claim-causing event.

		Total	Owner		Contractor		Consultant	
		Ranking	Mean Score	Ranking	Mean Score	Ranking	Mean Score	Ranking
Identification	Insufficient documentation to identify a claim event	1	6.27	1	7.00	2	7.71	2
	Poor communication between site and head office	2	6.07	3	7.12	1	7.71	2
	Insuf. contract knowledge to identify a claim event	3	5.75	4	6.38	5	7.76	1
Notification	Ambiguity of legal basis	1	6.00	1	4.73	1	6.71	3
	Poor communication on site	2	5.50	4	4.46	3	7.29	1
	Insufficient documentation for notification	3	6.00	1	4.19	4	6.76	2
Documentation	Incomplete documentation	1	6.88	1	7.22	1	7.82	1
	Lack of time for sufficient documentation	2	6.60	2	6.85	2	7.35	2
	Insufficient documentation due to verbal instructions	3	5.56	6	6.67	3	7.24	3
Quantification	Unrealistic idea about losses	1	7.25	1	5.19	2	7.88	1
	Lack of time to prepare claim	2	6.56	2	5.63	1	7.29	2
	Unclear legal and contractual basis to prepare a claim	3	5.20	3	5.15	3	7.18	3
Negotiation	Disagreement regarding costs increased by claim event	1	7.88	1	7.93	1	8.76	1
	Insufficient documentation of claim event	2	6.94	2	6.56	5	6.47	2
	Insufficient owner knowledge about constr. processes	3	4.06	6	6.93	2	5.71	5

3.5 Reasons for Conflicts During Claim Process

In the last section of the questionnaire, experts ranked conflicts arising during the claim process. They were grouped into three categories: contractual, behavioral and operational conflicts. Table 5 shows the five most common reasons for conflicts arising during the claim process. Three out of five most common conflicts come from the group of contractual conflicts.

Table 5. Reasons for conflicts during claim process.

Conflicts during claim process	Total		Owner		Contractor		Consultant	
	Ranking	Mean Score	Ranking	Mean Score	Ranking	Mean Score	Ranking	Mean Score
Incomplete design	1	8.22	1	5.75	3	7.35	2	
Diverging interests of project partners	2	7.67	3	5.75	3	7.88	1	
Inadequate design	3	7.78	2	5.81	2	6.71	3	
Insufficient description of scope of work	4	6.52	4	6.00	1	6.65	4	
Change of quantities	5	6.37	5	5.06	5	5.59	5	

4 DISCUSSION

Most deviations during project execution and conflicts during claim process arise due to inadequate design. This indicates that the owner is unable to define his project goals, which leads to an insufficient definition of the scope of work for the contractor. Design amendments during execution are necessary and result in multiple workflow disruptions. Contractors suffer from productivity losses due to numerous disruptions and are unable to document the increasing number of claim events effectively. Consequently, claim quantification is based on insufficient documentation. Inaccurate quantification, paired with the (frequent) over-optimistic idea about losses on the part of the contractor, finally results in a conflict with the owner. The results suggest that several factors can effectively decrease the occurrence of claim events during execution. A high planning standard avoids later changes in the design. Sufficient time for work preparation allows the contractor to plan their workflow effectively and to cope with changes. A systematization of processes prevents errors and makes it easier to introduce workflow amendments due to changes. A standardized documentation and claim process makes a claim more accurate and comprehensible.

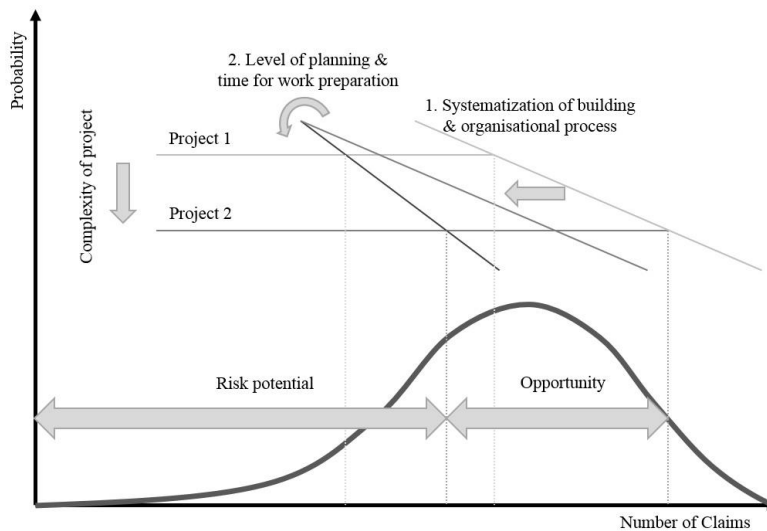


Figure 1. Assessment of risk due to good project organization.

Figure 1 shows the decrease of risk regarding the occurrence of claims. A project is more or less likely to face claims according to its complexity. The horizontal line defines the complexity of a project. The inclined line defines the level of planning and the time for work preparation. The steeper the line, the more accurate the project design and the more time a contractor has for work preparation. The line can be shifted to the left if processes are standardized. The intersection of the two lines defines the probability of the occurrence of a claim.

5 CONCLUSION

The results of the questionnaire indicate that there is a strong need for a project delivery model that allows the design and execution phases to merge. Traditional contracts and claim management cannot accommodate such a project delivery model. The recommendations given in this paper may reduce the risk of claims during project execution. Further research is necessary to propose a standardized claim management system customized for the Austrian construction market.

References

- Bakhary, N. A., Adnan, H., and Ibrahim, A., A Study of Construction Claim Management Problems in Malaysia, *Procedia Economics and Finance*, Elsevier, 23, 63-70, 2015.
- Burr, A., *Delay and Disruption in Construction Contracts*, 5th Edition, Informa Law from Routledge, Abingdon, 2016.
- Duve, H., Nachweis von Bauablaufstörungen, *Baubetriebs- & Baurechtsseminar*, TU Graz, 2008.
- Jaffar, N., Tharim, A. H. A., and Shuib, M. N., Factors of Conflict in Construction Industry: A Literature Review, *Procedia Engineering*, Elsevier, 20, 193-202, 2011.
- Kangari, R., Construction Documentation in Arbitration, *Journal of Construction Engineering and Management*, 121(2), 201-208, 1995.
- Kodek, G., Plettenbacher W., Draskovits A., Kolm R., Mehrkosten Beim Bauvertrag, Linde, Vienna, 2017.
- Mohamed, H. H., Ibrahim, A. H., and Soliman, A. A., Reducing Construction Disputes Through Effective Claims Management, *American Journal of Civil Engineering and Architecture*, Science and Education Publishing, 2(6), 186-196, 2014.
- Mueller, K., and Stempkowski, R., *Handbuch Claim-Management*, 2nd Edition, Linde, Vienna, 2015.
- Odeh, A. M., and Battaineh, H. T., Causes of Construction Delay: Traditional Contracts, *International Journal of Project Management*, Pergamon, 20, 67-73, 2002.
- Werkl, M., and Heck, D., Risiko- und Nutzenverhalten in der Bauwirtschaft, TU Graz, Graz, 2013.
- Zaghloul, R., and Hartman, F. Construction Contracts: The Cost of Mistrust, *International Journal of Project Management*, Elsevier, 21, 419-424, 2003.
- Zaneldin, E. K., Construction Claims in United Arab Emirates: Types, Causes, and Frequency, *International Journal of Project Management*, Elsevier, 24, 453-459, 2006.