Risk analysis and prevention system to minimize claim and dispute on construction projects

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Abstract. Claims and disputes between the owners and contractors may always occur on construction projects. Thus, sensitivity to the fundamental factors in identifying claims becomes important besides the undoubtedly-effective and proper skills in project management. This research aims to study the causal factors which potentially high in term of its level of risk that leads to the project claims, in order to set a comprehensive risk-based approach that is applicable for an effective claim management system. Six layers of data collection were passed-through. The identified factors examined with such analysis of homogeneity, validity and reliability tests offered in SPSS. In this regard, the risk factors that considered the causes of the claims were set as independent variables, while dispute was designated as dependent variables. The findings were then re-analyzed based on its risk-levels and its causes, thus preventive actions could be measures. As the result, a set of dominant risks and its plausible responses identified. This research finding suggests a preventing system which consists of five guidelines that should be applied in construction projects to minimize the occurrence of claims and disputes; risk management planning; competent project team; detailed and accurate specification and quality; documentation system and record keeping; and precautionary measures during the construction period.

1. Introduction
In binding contract development, contracts are made to resolve conflicts. Therefore, a suitable contract is needed to allocate risk between owners, contractors and consultants. Differences in perceptions among these parties if not managed properly will indeed turn into disputes. In this regard, dispute is one of the main factors of barrier that avoid a successful story of construction projects, which requires a claim process [1]. Disputes in the construction industry arise when claims that are submitted cannot be resolved. While claims emerge due to improper conflict management, the conflicts itself occur for the reason that the project risks are not allocated accordingly as agreed upon. Some of the risks that categorized as high risk and normally rejected by the owner are: in the planning process when the concept of the project is change, delays in reaching an agreement to the project design due to different opinion of the owner and design team. To avoid disputes that occur due to changes, it is very important for the contractor to propose the claim based on specified procedures which was agreed [2]. Claims in construction works is between service users and service providers, which basically related to additional time, costs, or other reimbursement requests. Claims can also be viewed from two different
points of view, the party submitting the claim and the party who rejects the claim. What distinguishes
claims from change is the element of agreement from both parties about what was promised. If the
agreement is reached, the claim will be changed to project amendment. If it is not, then the claim can
escalate into dispute. Construction claims have a large impact on time and costs so that
the service providers must implement an appropriate claim management [3]. The process of claim management
should be accordingly to its identification, quantification, prevention, and resolution [2]. Dispute is a
difference that popped-up in connection with the implementation of a construction agreement among
parties mentioned in a construction contract, or the construction dispute is due to claims that rejected
by the service users. Dispute is something that is inevitable in the construction industry and that can
occur due to small little things between the parties [4] [5]. Performing early identification of the
potential disputes will help the success of project completion [6]. Risks, in every meaning, are also
something that will increase the possibility of a project for not being able to reach its objectives [7].
Project risk management is a systematic process starting from its planning, identification, analysis,
response and risks control stages. While risk management is carried out by identifying, analyzing and
evaluating risks, the preventive or prevention is another path of option for risk response. The
preventive system should be started to compile during the planning period where risks are identified
and hence assumed will disrupt the continuity, or even derail the project. Thus, such preventive actions
can be initially determined and applied, so that the risk does not occur, or it will only have a little
impact to the project [8].

2. Research Methods
The variables to be examined in this study consist of risk factors that cause claims as independent
variables and dispute as dependent variables. There are six stages of data collection applied in this
research, namely literature studies to collect risk factors that cause claims, initial expert validation
related to claims factors that can possibly escalate into dispute, pilot survey, respondent questionnaire,
expert validation related to analysis results, and collection of causes and preventive measures against
dominant risks. Data analysis using the homogeneity, validity and reliability test carried out with the
help of SPSS software, followed by the risks analysis and analysis of the causes of the risks in order to
address for preventive measures.

3. Results and Discussion
Based on the results obtained from the processed data and its analysis, there are 27 variables which
have a high level out of 41 variables examined. Referring to the experts’ judgment, it is argued that
there are only 15 variables as the dominant risk factors that will cause dispute on the project, that are:

| Rank | Score  | Risk Event                                                                 |
|------|--------|---------------------------------------------------------------------------|
| 1    | 14,3150| Delay in the handover of land                                             |
| 2    | 13,8916| Work added/less to the scope of work made by the owner                    |
| 3    | 13,2222| There is a scope of work that must be carried out by the contractor but not mentioned in the tender |
| 4    | 13,1111| Project scope is not clearly defined                                      |
| 5    | 12,0331| There is a request to accelerate the execution time of the owner without compensation |
| 6    | 12,0275| Writing a contract clause that is less clear                               |
| 7    | 11,8751| Changes in the scope of work and specifications by the owner at the time the construction is in progress |
| 8    | 11,5041| Errors in applying design that has been mutually agreed upon              |
| Rank | Score  | Risk Event                                |
|------|--------|-------------------------------------------|
| 9    | 10,7438| The construction team lacks/does not meet the qualifications |
| 10   | 10,5124| The order of work that changes based on orders from the Owner |
| 11   | 10,5124| Weather factor                             |
| 12   | 10,4040| Unclear schedule preparation               |
| 13   | 10,1010| Employee negligence                        |
| 14   | 10,0909| Delayed payment                            |
| 15   | 10,0909| There is a data error given by the owner   |

Analysis of this cause is then use to find out the root causes of the occurrence of these risks that have an impact on the possible dispute of each of the dominant risks and determined preventive actions that come from expert input:

Table 2. Risk causes code

| Code | Risk Causes                                      |
|------|-------------------------------------------------|
| P1   | Land is not ready to use                        |
| P2   | Administration is not finished                  |
| P3   | Additional requests                             |
| P4   | There are items that have not been covered in the contract |
| P5   | Lack of precision                               |
| P6   | Different perceptions between users and service providers |
| P7   | Not experienced in working on projects          |
| P8   | High expectations                               |
| P9   | Estimated error                                 |
| P10  | Do not do risk analysis and response            |
| P11  | Change of plan                                  |
| P12  | Site conditions change                          |
| P13  | Faulty design                                   |
| P14  | The contractor is not qualified                 |
| P15  | Supervision of service users is not effective   |
| P16  | Do not have certain skills                      |
| P17  | Service users experience financial / funding difficulties |
| P18  | Service users deliberately delay payment        |
| P19  | Error compiling work methods                    |
Table 3. Preventive action code

| Code | Preventive Action |
|------|-------------------|
| TP1  | Make sure more carefully about the handover of land |
| TP2  | Resolving matters of licensing and land acquisition from the beginning of the project |
| TP3  | Minimize the gap between design and Bill of Quantity |
| TP4  | Prepare a change order procedure that is included in the contract on mutual agreement |
| TP5  | Study the tender doc carefully |
| TP6  | Check and crosscheck to make sure the contents of the document are correct |
| TP7  | Perform prequalification of design consultant tenders strictly |
| TP8  | Careful in preparing work methods |
| TP9  | Breakdown work to the appropriate level |
| TP10 | Do strict PQ for prospective service providers |
| TP11 | Careful in studying the scope of work in tenders and carefully planning work methods |
| TP12 | Conduct training & certification of worker expertise |
| TP13 | In the bidding proposal, the work method must be agreed by the parties |
| TP14 | Prepare special documents that must exist regarding the risks and responses |
| TP15 | Make a detailed checklist for checking |
| TP16 | Make communication flowcharts and responsibility matrices |
| TP17 | Make sure there are provisions in the contract that determine compensation for costs due to delayed payments |

Based on the evaluation results of the dominant risk preventive measures, it is acknowledged that there are preventive actions that have been taken to prevent the causes of risk. However, there are still also preventive measures which rarely carried out and there are preventive measures which have not taken. As for the risk grouping, a risk response in the form of mitigation is proposed. Figure below suggests steps that should be applied, hence mapping the dominant risks associated with preventive actions.
The risks-level that potentially leads to disputes and its possible responses identified. Based on this, it will be explained about the development of claims guidelines from the results of the analysis that has been done previously, by emphasizing preventive or preventive actions. Based on the results of the risk rating, this section will try to develop an improvement to avoid dispute on the project in the form of claim preventive guidelines. This system is expecting to help prevent dispute by studying the causes and implementing preventive measures. Furthermore, based on references from previous studies, namely the research of Mohamed, Ibrahim, and Soliman (2014), it will be compile in a simple risk register to help formulate preventive guidelines. Levels of claims can be reduced from high risk to medium risk or low risk by making the right response. So as the help service providers in order to prevent claims from developing into dispute, a preventive guidelines are implemented, namely:

1. Carry out Risk Management Planning
   A good program is a program that has careful planning. Developing an effective risk management plan can prevent small problems from developing big. If this risk management plan is doing well, it will be able to anticipate the possibility of these risk factors occurring.

2. Selecting Competent Project Teams

Figure 1. Mapping the variables, causes, and preventive actions
The project team has an important role to play in preventing claims. Whereas the competent team members certainly are less risky than the new members that might be lack of experience. So that the selection of the right project team is one of the preventive actions that claims to develop into dispute

3. Making Detailed and Accurate Quality Planning and Specifications
Quality planning and specifications aim to ensure the accuracy and quality of the project as expected. In quality, planning and specifications, there are several aspects that need to consider so that the product of the project matches the expectations of service users.

4. Creating a Documentation System for Record Keeping Needs
Good documentation can help as an input or reference in analyzing. The Documents that needed documented and stored in a well-organized manner.

5. Continue to take precautionary measures during the construction period
In addition to the planning period, during the construction period preventive measures must be implemented to ensure that potential claims are addressed properly so that they do not develop into dispute.

4. Conclusion
From the results of data collection and analysis, the conclusions can be used to identify the dominant risk factors that cause claims escalate into disputes. The dominant risk factor is delay in land handover, work added / less to the scope of work made by the owner, there is a scope of work that must be carried out by the contractor, but not stated in the tender, project scope is not clearly defined. There is a request for acceleration from the owner without compensation, unclear contract clauses, changes in the scope of work and specifications of the owner at the time the construction is in progress, errors in the design agreement that have been agreed upon, the construction team is not/does not meet the qualifications to handle the project, the order of work is changed based on orders from the owner, weather factors, improper schedule preparation, negligence of workers, delayed payments, and data errors given by the owner. To be able to minimize these claims developing into dispute, it is necessary to have a preventive guideline, which must be applied before the claim occurs. With the existence of this guideline, the possibility of claims that develop into dispute will decrease.

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