## MODEL SYSTEM DYNAMICS UNTUK MEMINIMALKAN PENYIMPANGAN BIAYA MATERIAL PROYEK KONSTRUKSI INDUSTRI

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Cost overrun is a very frequent phenomenon and is associated with nearly all projects in the construction industry, especially material as one of the most influencing component in project cost. This trend is more severe in construction projects where is located in areas with difficult accessibility. Various methods of estimation of cost overrun have been introduced, but in general could not describe the dynamic phenomena which is inherent in any construction project. To overcome this gap, it is necessary to make an estimation method closer to the actual conditions of the project. In this study, the survey questionnaire was distributed to construction professionals, and the data were analysed with statistical methods. From 74 factors, which have been identified through a literature review further classified into 13 risk event and 61 sources of risk. Utilizing the Delphi method, it was obtained 10 risk events and 36 risk sources. Furthermore, with the method of factor analysis, obtained 9 risk events and 25 risk sources. The events of these risks are: fluctuations in the price of materials, the cost of distribution of material within the site, material delays, change in specifications and types of material shortages, material damage, re-works, loss of material and the excessive of material. The next stage, prevention and mitigation measures are categorized according to the qualitative and quantitative approaches. Quantitative approach is implemented in the form of allocation of costs and resources which then constitute the components in the process of reduction of material cost overrun. In this case, prevention and mitigation measures are intended to reduce the cost overrun, but at the same time, also required the cost to run the prevention and mitigation measures itself. Therefore, there should be a simulation with system dynamics method which has the advantages, among others: through a process of feedback, both events risks, as well as preventive and mitigation measures can interact with one another and change over time. The simulation result of system dynamics model showed that the material cost overrun can be reduced, if the intervention was held, namely: from 37.72%, decreased to 15.58%. In addition, through inferential statistics was found that the range of material cost overrun is a t 35,77% up to 53,08%.

Keywords: System Dynamics, Industrial Construction Projects, Difficult Accessibility, Material Cost Overrun