DEVOTION
Journal of Research and Community Service
Volume 4, Number 9, September 2023
e-ISSN: 2797-6068 and p-ISSN: 2777-0915

IDENTIFICATION OF QUANTITY SURVEYOR COMPETENCY RISK FOR COST OVERRUN

Reynard Pondaag, Yusuf Latief
Department of Civil Engineering, Universitas Indonesia, Indonesia
Email: reynardpondaag@ui.ac.id

KEYWORDS
cost overrun; quantity surveyor; competency standard

ABSTRACT
Appropriateness of costs in the process of building a high-rise building is one of the success criteria for a construction project. However, the main problem that is often faced by most construction projects is related to the occurrence of cost overruns. Quantity Surveyor has an important role in a construction project. According to IQSI, the role of the Quantity Surveyor consists of 4 main scopes, namely planning and controlling construction costs, documenting the completeness of tender documents, contract administration, and arbitration. This study aims to identify risk factors and risk ratings from the competency of the Quantity Surveyor that have the potential to cause cost overruns. The method used in this study is the Delphi method, to validate the risks obtained from the literature study. From the results of the analysis, 52 variables with a moderate level of risk were obtained, and 3 variables with a high level of risk in the pre-construction and construction stages which could cause cost overruns.

INTRODUCTION

The construction of high-rise buildings is growing very rapidly considering the ever-increasing needs but the available land is getting smaller, so that currently many construction projects are underway to meet these needs. The success of a construction project can be assessed from the suitability of quality, cost, time, and satisfaction from consumers (PMBOK, 2013). while throughout the development process there are risks that can lead to cost *overruns*. The situation of *cost overrun* can be interpreted where there is a possibility that the costs incurred are greater than previously budgeted (Hansen, 2017), so proper supervision is needed by *the Quantity Surveyor*.

Quantity Surveyor Association (IQSI) (2019), *a Quantity Surveyor* is a profession that has expertise in volume calculations, regarding construction work, contract administration, aspects of construction contracts, so that a job can be described, carried out and costs can also be estimated, planned, analyzed, controlled and trusted (Chandramohan et al., 2022). IQSI outlines the role of *a Quantity Surveyor* into 4 main scopes, namely construction cost planning and control, documentation of completeness of tender documents, contract administration, and arbitration (Victar et al., 2022). Thus, *the Quantity Surveyor* has an important role and task in estimating and controlling project costs during a construction project. In the Indonesian National Work Competency Standards (SKKNI), *Quantity Surveyors* are divided into 3 categories of Job Positions, namely Junior Expert, Associate Expert, and Main Expert. Based on their duties in the SKKNI, the Intermediate Expert Work Position has the duties of preparing, making, and carrying out competencies related to the *cost plan* for the design drawings of the schematic stage and the design development stage (*Design Development*), final budget plan (*Owner Estimate*), tender documents, documents contract, *interim valuation*, *cost* *report*, *final account*, development financing (*development appraisal*), fiscal depreciation analysis, and loss assessment (Wanda et al., 2016). Thus, *a Quantity Surveyor* with an intermediate expert work position has an important role and task in estimating and controlling project costs during a construction project.

Quantity Surveyor Association (IQSI) (2019), *Quantity Surveyor* is a profession that has expertise in volume calculations, regarding construction work, contract administration, aspects of construction contracts, so that a job can be described, executed and costs can also be estimated, planned, analyzed, controlled and trusted (Mbachu, 2015). According to Hansen (2017), *Quantity Surveyor* is defined as a person who estimates the type and quantity of material including the wages of the work required in a project, and also measures the materials according to the design and specifications into a project. The New Zealand Institute of Quantity Surveyors (NZIQS, 2014) defines a quantity surveyor as a construction cost professional who measures and estimates the cost of resources for construction projects, and whose role includes keeping the project on budget.

Competence is a human characteristic that includes knowledge and skills necessary for effective performance in a profession (Adesi et al., 2018). Competence According to O'Brien et al. (2014), observed that the role of the quantity surveyor includes overseeing financial administration and construction project contracts. A competent Quantity Surveyor is a person who is expected to have a wide range of skills, knowledge and understanding and can apply skills and knowledge in various contexts and organizations (Dada, 2014).

The construction of high-rise buildings in Indonesia is increasing rapidly as basic human needs increase. Construction projects have several limitations and objectives which are known as *triple constraints*, namely quality, time and cost. In the development process, there are many unexpected risks that can cause cost *overruns* (O'Brien et al., 2014). According to Mansur, et al (2019) *Cost Overrun* is a calculation of the final cost of a construction project that is higher than the estimated costs prepared at the start of construction. Cost overruns are common in infrastructure, building and technology projects. Realization discrepancies with expectations in construction projects have the potential to cause losses to the owner/ assignor, implementing contractor, or both.

Cost Overrun is caused by several factors both in the pre-construction phase and the construction phase (Tang, 2021). According to Durdyev (2020), cost overruns occur due to several factors, namely inaccurate estimates, bad planning, financial problems/ bad financial management, price fluctuations, and contract management problems. According to Niazi and Painting (2017) cost overrun occurs due to several factors, namely corruption, unrealistic contract durations, poor financial control, inadequate consultant experience, delays in making progress reports, low motivation, change orders, inflation, inadequate material procurement. Improper bidding processes, and errors in document contracts. Meanwhile, according to Susanti and Nurdiana (2020), cost overruns occur due to change orders, budgeting inaccuracies, inflation, late payments, and poor cash flow.

According to Ives et al. (2017) the rapid development of the construction industry has led to a considerable expansion in the number of roles expected of a Quantity Surveyor, making it necessary to upgrade their skills and competencies. Following the development of current construction projects in Indonesia, there are still many ongoing construction projects, but are experiencing *cost overruns* even though *the Quantity Surveyor has been involved* as a planner and supervisor of the costs required during the construction process. To avoid *cost overruns, cost control* by *the Quantity Surveyor* is needed starting from the planning process until the completion of implementation (Rahmayanti & Sihombing, 2020). In each competency element of the quantity surveyor, each has a performance indicator as a guide in carrying out the role as a quantity surveyor. In practice, each performance indicator has risks that can cause cost overruns.

Previous research by Olawumi (2016) discussed the competence of quantity surveyors in assessing the cost of construction projects. This study discusses the competence of quantity surveyors in assessing the cost of construction projects and evaluating the performance of quantity surveyors in assessing the cost of construction projects. Furthermore, Gunduz (2018) discusses the perception of cost overrun risk in construction projects. The study used an online survey method to collect data from construction professionals and analyze cost overrun risk perceptions through important indices and frequencies. Therefore, it is necessary to identify risk factors and risk levels, so that they can be avoided to reduce cost overruns. Based on this, this study will discuss the following problems:

1) What are the risks in the performance indicators that affect *the cost overrun* in the pre-construction and construction stages*?*
2) What is the level of these risk factors in causing cost overrun?

RESEARCH METHOD

In general, research is an attempt to answer questions and solve existing problems (Kurniawan & Puspitaningtyas, 2016). The research method comes from the words method, logos, and research. Method can be interpreted as a way to solve certain problems, logos can be interpreted as science. While research (research) means looking back at the problem to be resolved properly. So, the research method in general has meaning as a problem-solving strategy that is carried out systematically, starting from searching for data, recording, analyzing, to compiling reports. In this study, the Delphi method was used to validate data obtained from literature studies. According to Mansur, et al., (2019) the Delphi method is a well-accepted method, for obtaining expert opinions about a matter in the field of knowledge.

In this study, using a literature study of related research documents as primary data, namely the Indonesian National Work Competency Standards (SKKNI) for quantity surveyor positions and the Australian Institute of Quantity Surveyors (AIQS). Based on the SKKNI, there are 8 competency units for the position of intermediate expert quantity surveyor. Meanwhile, based on AIQS, there are 12 main competencies for the position of quantity surveyor. So, based on the literature study, there are 12 competency gaps, and each competency has performance indicators. Following are the competency gaps obtained from literature studies:

Table 1. SKKNI Competency Gap Table with AIQS

No	Competency Gaps
1	Government Regulations and Laws
2	Processing Budget
3	Planning Costs
4	Providing General Procurement Advice
5	Counting, Measuring, and Documenting
6	Planning Strategy
7	Estimating Costs
8	Processing Tenders
9	Account Management

10	Construction Change Management
11	Computer Service
12	Construction Technology

Source: AIQS 2012

The risk factors that cause cost overrun are obtained from each performance indicator, which is obtained as many as 109 performance indicator risk factor variables. Then these risk factors were validated by 5 experts who were educated and experienced in construction, especially as quantity surveyors. After the risk factors have been validated by experts, they will then be included in a questionnaire and distributed to 30 respondents. The questionnaire aims to assess the frequency and impact of the occurrence of these risks using a Likert scale with a value of 1 to 5 for each variable. After the risk factor variables are validated by experts, the risk level values will be calculated using risk level analysis based on PMBOK 5th Edition, 2013, namely:

Risk (R) = Impact (D) x Frequency (F)

With the provisions of the risk rating as follows:

Probability and Impact Matrix

Probability	Threats					Opportunities				
0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01
	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05

Impact (ratio scale) on an objective (e.g., cost, time, scope or quality)

Each risk is rated on its probability of occurring and impact on an objective if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

Figure 1. Probability and Impact Matrix

Source : Project Management Body of Knowledge

RESULTS AND DISCUSSION

After obtaining the results of data collection from 30 respondents, then the data is processed to the next stage, namely testing the validity and reliability, to find out whether the data used is valid or not. Validation testing uses SPSS software, using the corrected item-total correlation ($r_{arithmetic}$) compared to r_{table}. The r_{table} value is determined by means of a significance of 0.05 with a 2-sided test and the number of respondent data (N) = 30 is 0.361. The results of this test found that 12 variables were declared invalid, while the other variables were declared valid. The next test is the reliability test using the Alpha Cronbach formula with the following conditions:

1) Cronbach Alpha value > 0.9 indicates that the research questionnaire has a perfect reliability factor.
2) The Cronbach Alpha value of 0.7 – 0.9 indicates that the research questionnaire has a high reliability factor.

3) The Cronbach Alpha value <0.6 indicates that the research questionnaire is declared unreliable or inconsistent.

In this study, the results of the reliability test are listed in the following table:

Table 2. Reliability Test

Cronbach's Alpha	N of Items
.961	109

Source: Processed Results of SPSS

From the results of the reliability statistics test, it can be seen that the value of Cronbach's Alpha is 0.961 with a total of 109 items of variable. According to the table the level of reliability based on the alpha value is between 0.8 to 1.00 so that the level of reliability is very reliable. The results of the reliability test on the data used were 0.961 with a total of 109 variables, so the result was that the data used had a very reliable level of reliability. After testing the validity and reliability, the next step is to analyze the risk rating of 109 variables by calculating the frequency and impact values. The frequency and impact values obtained will then be used for the analysis of the risk rating of each variable for the occurrence of cost overrun using risk level analysis based on PMBOK 5th Edition, 2013. Of the 109 risk variables, 52 variables were obtained with a moderate risk level, and 3 variables with a moderate risk level. high risk during the pre-construction and construction stages.

Table 3. Performance Indicator Risk

	Performance Indicator Risk	Means
X5	The risk of errors in creating a cost estimation and reporting system	0.06
X6	The risk of not creating a variation control system and being maintained	0.33
X7	Risk of error in compiling data related to client cash flow	0.05
X10	Advice on necessary changes and adjustments was not provided	0.08
X12	Risk of error in validating and verifying project cost parameters and constraints	0.09
X14	Risk of error in establishing appropriate data collection structures and relevant timelines	0.05
X15	Risk of error in compiling and evaluating indicative cost/cost estimates	0.09
X16	Risk of error in making documentation inputs to the indicative cost/estimate process	0.08
X19	Risk of error in making clear implementation and procurement plans	0.12
X20	The risk of error in evaluating the stages of the project with the specified results	0.07
X25	Risk of error in providing advice on cost plans based on data analysis to clients	0.08
X27	Risk of error in interpreting and setting client procurement-related objectives	0.07
X28	Risk of error in deciding the objectives of the procurement process	0.06
X29	Risk of error in evaluating market conditions and reviewing options	0.08
X30	The risk of error in evaluating the project delivery system	0.07
X31	The risk of error in evaluating the project delivery system	0.07
X40	Risk of error in quantifying appropriate resources and their allocation	0.08
X50	Risk of not checking final input documents for bill completeness	0.09
X52	The risk of not checking the significant cost of items and "overwhelming" quantities	0.06

	Performance Indicator Risk	Means
X53	Risk of error in creating and implementing various techniques for value optimization	0.07
X54	Risk does not advise on various courses of action	0.07
X55	Risk of error in compiling relevant financial and economic data	0.06
X62	The risk of error in evaluating the cost factor and its development	0.06
X64	Risk of error in developing unit prices	0.07
X65	Risk of error in establishing procedures to estimate accordingly	0.10
X66	Risk of error in evaluating estimates according to accepted professional principles and practice	0.09
X67	Risk of error in deciding criteria for bidders	0.05
X73	Risk of error in providing advice to clients regarding the selection of bidders	0.06
X74	Risk of errors in compiling data using appropriate structures and procedures in evaluating tenders	0.06
X77	Risk of error in deciding parameters related to cash flows	0.06
X79	Risk of error in evaluating and reconstructing cash flow forecasts progressively based on information flow	0.06
X80	Risk of error in recommending results to Client and management team	0.06
X82	Risk of error in developing procedures for handling progress payments	0.12
X83	Risk of error in evaluating reports from specialist consultants	0.07
X84	Risk of error in organizing negotiations with contractors and ensuring compliance with contracts	0.15
X85	Risk of error in evaluating work in progress and information not being poured into project reports	0.06
X86	Risk of error in managing negotiations based on careful preparation and accurate data	0.21
X87	Risk of error in setting up professional negotiations	0.17
X88	Risk of error in providing information to clients at all stages of the process	0.06
X89	Risk of error in providing technically accurate and factually accurate advice to Clients	0.09
X90	Risk of error in providing advice and guidance about processes and results to clients	0.11
X91	Risk of error in compiling and presenting final results to clients	0.10
X92	Risk of wrongdoing in organizing negotiations based on adequate preparation and following sound principles	0.06
X93	Risk of error in managing negotiations in a professional manner to achieve acceptable results	0.12
X94	Risk of error in developing and implementing cost claim handling procedures	0.14
X95	Risk of error in negotiating costs claims based on data collected	0.17
X100	Risk of error in operating Electronic spreadsheets to prepare schedules	0.08
X101	Risk of errors in operating statistical software to manage and process statistical data	0.07
X102	Risk of errors in operating computer software for planning and cost management	0.09
X103	Risk of error in interpreting construction processes and technology as applied to construction activities and the sequence of activities	0.06
X104	The risk of error in interpreting the source and use of building materials applied in construction activities includes engineering testing and assessment	0.07

	Performance Indicator Risk	Means
X105	Risk of error in interpreting the design and installation of building services	0.07
X107	The risk of error in formulating science development principles is related to the structure demonstrated including analysis, design, and stability	0.07
X108	Risk of error in formulating construction principles including demolition methods, formwork design, erection techniques, fabrication and plant and equipment and site surveys	0.14
X109	Risk of error in interpreting building plans, specifications, construction codes and regulations	0.11

CONCLUSION

After distributing the questionnaires to the experts, and after testing the validity, reliability, and risk rating analysis, it was concluded that out of the 109 risk variables obtained from the literature study, there were 52 variables with moderate risk levels, and 3 variables with high risk levels. Of the 109 risk variables, there are 3 variables with a high risk rating that cause *cost overrun*, namely the risk of performance indicator X6, namely the risk of not having a variation control system implemented and maintained. X86 performance indicator risk, namely the risk of mistakes in managing negotiations based on careful preparation and accurate data. Performance indicator risk X95, namely the risk of errors in negotiating costs claims based on the data collected.

REFERENCES

Adesi, M., Owusu-Manu, D.-G., & Murphy, R. (2018). Strategic competences for pricing quantity surveying consultancy services. *Engineering, Construction and Architectural Management*, *25*(3), 458–474.

Chandramohan, A., Perera, B., & Dewagoda, K. G. (2022). Diversification of professional quantity surveyors' roles in the construction industry: the skills and competencies required. *International Journal of Construction Management*, *22*(7), 1374–1381.

Dada, J. O. (2014). A principal component analysis of skills and competencies required of quantity surveyors: Nigerian perspective. *Organization, Technology & Management in Construction: An International Journal*, *6*(2), 0.

Durdyev, S., & Hosseini, M. R. (2020). Causes of delays on construction projects: a comprehensive list. *International Journal of Managing Projects in Business*, *13*(1), 20–46.

Hansen, S. (2017). *Quantity Surveying: Pengantar Manajemen Biaya dan Kontrak Konstruksi*. Gramedia Pustaka Utama.

Ives, C. D., Oke, C., Hehir, A., Gordon, A., Wang, Y., & Bekessy, S. A. (2017). Capturing residents' values for urban green space: Mapping, analysis and guidance for practice. *Landscape and Urban Planning*, *161*, 32–43.

Kurniawan, A. W., & Puspitaningtyas, Z. (2016). Quantitative research methods. *Philosophy of Science. Yogyakarta, Indonesia: Pandiva Book.*

Mansur, S. A., Zin, R. M., & Linbo, L. (2019). Components of cost overrun in China construction projects. *IOP Conference Series: Materials Science and Engineering*, *620*(1), 12081.

Mbachu, J. (2015). Quantity Surveyors‟ Role in the Delivery of Construction Projects: A

Review. *Quantity Surveyors (NZIQS)*, *25*(1), 1–21.

Niazi, G. A., & Painting, N. (2017). Significant factors causing cost overruns in the construction industry in Afghanistan. *Procedia Engineering*, *182*, 510–517.

O'Brien, P., Mbachu, J., & Lomax, S. (2014). current and future challenges facing New Zealand quantity surveyors: Priority issues and potential solutions. *Proceedings of the 4th New Zealand Built Environment Research Symposium*, 272–286.

Rahmayanti, Y., & Sihombing, L. (2020). *Peran Quantity Surveyor untuk Mengurangi Risiko Cost Overrun pada Proyek Gedug Tinggi di DKI Jakarta*.

Susanti, R., & Nurdiana, A. (2020). Cost overrun in construction projects in Indonesia. *IOP Conference Series: Earth and Environmental Science*, *506*(1), 12039.

Tang, Q. (2021). Research and application of gas overrun prevention technology by hydraulic reaming. *IOP Conference Series: Earth and Environmental Science*, *634*(1), 12123.

Victar, H. C., Perera, B., & Palihakkara, A. D. (2022). *The role of the quantity surveyor in achieving circular built environment at the design stage*.

Wanda, M. M., Tramontin, V., & Haupt, T. (2016). The evolving competencies of quantity surveyors. *Proceedings: Association of Schools of Construction of Southern Africa, 10th Built Environ Ment C Onference*, *31*.