Risk Analysis on the Construction Project of the Basement Building Under Jalan Pemuda-Yos Sudarso, Surabaya

Suntana Sukma Djatnika*, Budi Witjaksana, Wateno Oetomo, Bambang W

Civil Engineering, 17 Agustus 1945 Surabaya University, Surabaya, Indonesia

*suntanadjatnika@gmail.com

Abstract: The basement project that will build under the Pemuda-Yos Sudarso Surabaya road located in the center of Surabaya and the Class A cultural heritage area. The condition is likely to cause many problems during the construction. Such problems could be a risk factor and would affect the completion of the outcome of the work. Therefore the identification of risks to determine how to control risk becomes very important to improve the successful implementation of the project. This study uses questionnaire distributing instruments for respondents and interviews of resource persons deemed competent for risk allocation and risk response. Determination of risk identification variables based on common risk checking where initial risk identification is compiled based on interviews with competent resource persons, previous theoretical and research studies. Data analysis technique is assisted by probability impact matrix and statistical calculation to measure correlation level with Spearman rank followed by an interview with a resource to confirm risk allocation and risk response technique. There identified 28 (twenty-eight) risks; there are 4 (four) risks affecting the cost of completion of the project that is dominant (Unacceptable) and 16 (six) risks including the category of being or not expected (Undesirable). For the risk of impacting project completion time, there are 5 (five) dominant risks and 17 (seventeen) risks including medium or unexpected category. From the analysis, there are 16 (sixteen) risks that correlate to cost and 23 (twenty-three) risks that correlate to the project completion time. There are 9 (nine) risks allocated by Owner, 4 (four) risks allocated by Design Consultant 8 (eight) risks ownership of Contractor, 1 (one) risk allocation of Supervisory Consultant /CM, 4 (four) risks allocated by Service Provider (Designer, Supervisor /CM, & Contractor), 4 (four) risks as joint risks.

Keywords: Basement, Risk Identification, Risk Response, Risk Ownership

1. Introduction

Urban land problems are often faced with problems regarding the limited availability of land, resulting in skyrocketing land prices, because of that an appropriate alternative is needed to overcome these problems. One alternative solution that often done at this time is development with principles that are contrary to the principle of skyscraper buildings, namely by building underground which is known as a landscaper. The form of the landscaper is by building a basement or commonly referred to as a basement. In the construction of high-rise buildings and locations that require a larger area of land for supporting areas (parking areas) and
services (MEP equipment area) is often finally resolved by building additional basement spaces.

Basement construction in a dense area requires good planning, appropriate implementation methods, taking into account the conditions of the project site, limited access, limited possibilities of heavy equipment use, and other conditions and limitations. Problems that arise often occur due to uncertainty from risk sources. So many technical variables that cannot be ascertained and so many other risk sources that cause the possibility of problems that sometimes fail to anticipate[1][2].

The Surabaya City Government currently intends to build and develop the Youth Center area with better and better conditions with limited land, so it is deemed necessary to develop a basement building. The basement building that will be built located in the area of the Youth Hall Building, located inside the area until it is located just below Pemuda-Yos Sudarso road[3][4][5]. Previously in the first phase, the construction of a 1-story parking basement was carried out, located in the center of the Youth Hall and Surabaya Arts Council area.

The implementation of phase 1 development lasted eight months with the top down method successfully implemented well with several construction problems that could largely overcome properly. The next phase that will be built in the parking Basement stage 2-3 and the fourth stage and then in the 5th stage a functional Basement will be built for the needs of the gallery of UMKM activities, arts, youth activities, and parking in the area under Pemuda-Yos Sudarso road[6][7].

1.1. Formulation of the problem
Based on the description above, problems will arise:
1. What risks were identified in the plan to construct a Basement Under Road building project in the Surabaya Pemuda Hall area?
2. What risks correlate with cost and time?
3. What about the allocation of risk ownership (ownership of risk)?
4. What is the control plan or response to the dominant risk that will occur?

1.2. Research objectives
Research objectives are as follows:
1. Knowing what risks are identified in the planned construction of the Lower Road Basement building in the Surabaya Youth Center area.
2. It knows what risks correlate with costs and time.
3. It knows the allocation of risk ownership (ownership of risk).
4. Determine a control plan or response to the dominant risk that will occur.

2. Literature Review

2.1. Risk
The risk is a danger, the consequences or consequences that can occur as a result of an ongoing process or future event. [8][9]. Risk can be interpreted briefly as a condition of uncertainty, where if an undesirable situation occurs, it can cause a loss in the future[10]. Dominant risks (major risk) are risks that fall into the Unacceptable category (risks that cannot be accepted) and risks that are categorized as Undesirable (risks that are not expected). The existence of dominant risks (major risk) will have a major effect on the project[11][12][13].
Risk Response is an activity to determine prevention or solutions when an event risk occurs. Risk Response consists of 4, namely: Accept, Reduce, Divert and Avoid. Ownership of risk responsibility (ownership of risk) is allocated to the principles developed by [14][15] including (a) Which parties have the best control over events that pose a risk; (b) Which party can handle when the risk arises; (c) Which party takes responsibility if risk is not controlled. If the risk is outside the control of all parties, it is assumed to be a joint risk.

2.2. Risk management
Project risk (project risk) is an event (event) or an uncertain condition (uncertainty), if it occurs has influence, and brings consequences or impacts[16][17]. For an event, it can be seen regarding probability (likelihood) and the impact of the event. An event can have a small probability with a significant impact or a substantial probability with a small impact. From this, we can calculate which events are more dangerous or riskier, so the risk is expressed as Risk = f (probability, effect)[18][19][20]. In general, risk management defines it as a process, identifying, measuring and ensuring risks and developing strategies to manage these risks. In this case, risk management will involve processes, methods, and techniques that help project managers maximize the probability and consequences of positive events and the minimum probability and consequences of opposite events[21][22][23].

3. Data Analysis and Discussion
The Regional Youth Center project is a regional development project which consists of several stages, while the project stages are as follows:
Construction of the Parking Basement (2016 to 2019)[24][25]
The 1-story parking basement project is carried out in three steps according to the budget capabilities of the Surabaya City Government which include the following:
1. Phase I 2016: It has been completed with the construction of a parking basement to access ramp in and out; capacity of 18 cars and 50 motorbikes. The budget of Rp. 20 Billion.
2. Phase II 2017: Will build a basement that accommodates 36 cars and 27 motorbikes, a budget of Rp. 20 billion.
3. Phase III 2018-2019: will be built for an additional capacity of 33 cars will be accommodated. So the total parking capacity can provide 87 vehicles and 77 motorbikes.
4. Construction of Surabaya City DPRD Tower Building (2017-2018): development of the Surabaya City DPRD Tower building which is planned to be prepared for seven floors to be built which will include the functions of the DPRD workspace, Library, Limited Meeting Room and made with the financing of multi-year systems. Functional Basement Development (2020-2022): Functional basements are basements intended for MSME galleries; Youth activities; Art and other functions and parking. The basement position is below Jl. Pemuda-Yos Sudarso. This stage requires traffic engineering in the form of flow switching because there is a development that causes no crossing from Jl. Governor Suryo to Jl. Yos Sudarso (Bambu Runcing) and Jl. Youth to Jl. Yos Sudarso (City Hall)[26][27].
Figure 1. The Phasing Plan District Youth Hall (in Indonesia)

Figure 2. Piece Concept (Elongated North-South) (in Indonesia)
4. Conclusion

4.1. Conclusion

From the results of the analysis of risk identification on the construction of a basement building down the road on Jl. Pemuda-YosSudarso Surabaya is identified as follows. There were 28 (twenty-eight) risks identified. These risks come from several risk sources as follows:

a. 7 (seven) Management risks
b. 3 (three) contractual risks
c. 3 (three) Social and Political risks
d. 3 (three) design and technology risks
e. 5 (five) risks of Construction Implementation
f. 1 (five) Material & Equipment risks
g. 1 (five) resource risks
h. 4 (four) Force Mayeur

Of the risks identified and risk acceptance level analysis, the cost of project completion is impacted:

a. There are 4 (four) dominant risks including dominant/high or unacceptable categories.
b. 16 (sixteen) risks are categorized as undesirable.
c. 8 (eight) risks are categorized as low or acceptable (Acceptable).

Of the risks identified and carried out an analysis of the level of acceptance of the risk impact on the project completion time are:

a. There are 5 (five) principal risks including dominant/high or unacceptable categories.
b. 17 (seventeen) risks are categorized as undesirable.
c. 6 (six) risks are categorized as low or acceptable (Acceptable).

From the results of the above conclusions, recommendations that we can convey so that this research is useful and as expected are:

1. The existence of risks that belong to the dominant or high risk category (Unacceptable) must get special attention to be able to reduce the negative impacts caused such as
mitigation measures for the risk of natural disasters (force majeure) which is also a joint risk because it is outside the control of all parties to make risk reduction by making initial preparations to anticipate the implementation of construction that is more ready, and risk transfer can also be done by ensuring work. While the risks included in the medium (not expected-unwanted) category should also receive attention by taking preventive measures to reduce the negative impacts, they cause.

2. Construction implementation activities with the most identified risks must be given special attention to Unacceptable risks including risks that are common risks and should also pay attention to dangers of Undesirable.

3. The source of force majeure risk which is included in the dominant and moderate risks should be anticipated by the Service Provider with a technical response so that the force major risk allocation is the full allocation of the Service Provider.

References
[1] A. Guide, “Project management body of knowledge (pmbok® guide),” in Project Management Institute, 2001.
[2] Ali Hasmy, “Analysis Data,” 2012. [Online]. Available: http://omegahat-statserv.blogspot.co.id.
[3] Anonim, “Manajemen Risiko dan Fungsi Pengawasan,” 2008.
[4] Anonim, “Manajemen Risiko,” 2008. [Online]. Available: http://www.wikipedia.com.
[5] A. Ilham et al., “Market Basket Analysis Using Apriori and FP-Growth for Analysis Consumer Expenditure Patterns at Berkah Mart in Pekanbaru Riau,” in Journal of Physics: Conference Series, 2018, vol. 1114, no. 1, p. 12131.
[6] I. W. Muka, “Analisis Risiko pada Proyek Pembangunan Parkir Basement Jalan Sulawesi Denpasar,” MEDIA Komun. Tek. SIPIL, vol. 19, no. 2, pp. 155–165, 2015.
[7] Imam Soeharto, Manajemen Proyek Dari Konsepsual Sampai Operasional. Jakarta, 1997.
[8] Anonim, “Penelitian Kualitatif,” 2016. [Online]. Available: http://www.wikipedia.com.
[9] M. Hanafi, “Manajemen risiko,” 2014.
[10] C. Dinu, “Risk Governance: Creating a Risk Superstructure for Projects,” 2011.
[11] I. Gunawan, “Metode penelitian kualitatif,” Jakarta Bumi Aksara, 2013.
[12] P. S. Godfrey, Control of risk a guide to the systematic management of risk from construction. CIRIA, 1996.
[13] J. M. Guarte and E. B. Barrios, “Estimation under purposive sampling,” Commun. Stat. Comput., vol. 35, no. 2, pp. 277–284, 2006.
[14] T. L. Saaty, “Analytic hierarchy process,” Wiley statsRef Stat. Ref. online, 2014.
[15] B. Y. Kurniawan, “Analisa Risiko Konstruksi Pada Proyek Pembangunan Apartemen Petra Square Surabaya,” Skripsi. Tek. Sipil Inst. Teknol. Sepuluh Nop. Surabaya, 2011.
[16] B. Santosa, “Manajemen Proyek Konsep dan Implementasi,” Yogyakarta Graha Ilmu, 2009.
[17] H. Saniatusilma and N. Suprayogi, “Manajemen Risiko Dana Tabarru’PT. Asuransi Jiwa Syariah Al Amin,” J. Ekon. Syariah Teor. dan Terap., vol. 2, no. 12, 2015.
[18] D. Soesinno, “Prinsip-Prinsip Manajemen Risiko Asuransi,” Jakarta: Pustaka Binawan, 2003.
[19] C. Duffield and B. Trigunarsyah, “Project Management-Conception to Completion,” Eng. Educ. Aust. Aust., 1999.
[20] H. Iqbal, “Pokok-pokok materi statistik 2 (statistik inferensif),” Cet VI, 2010.
[21] A.-M. Alquier and M.-H. Tignol, “Project management technique to estimate and manage risk of innovative projects,” in *IPMA International Symposium and NORDNET*, 2001, vol. 31.

[22] Galih Satriya Prayoga, “House of Risk,” 2012. [Online]. Available: http://statistiser.blogspot.co.id/2015/03/house-of-risk-hor.html.

[23] M. Tanubrata, “PELAKSANAAN KONSTRUKSI DENGAN SISTEM TOP-DOWN,” 2015.

[24] J. Sarwono, “Metode penelitian kuantitatif dan kualitatif.” Graha Ilmu, 2006.

[25] J. B. Ayers, *Supply chain project management*. CRC press, 2009.

[26] N. Indriantoro and B. Supomo, “Metodologi penelitian bisnis,” *Yogyakarta Bpfe*, 2002.

[27] R. C. I. Prahmana, “Design research (Teori dan implementasinya: Suatu pengantar).” Rajawali Pers, 2017.