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Risk Identification in Residential Construction Project: A Systematic Literature Review

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A B S T R A C T

Risk is always present in every construction project. Residential building construction projects have various risks and are likely to be affected due to their difficulty and multiple operations and threats. Purpose of this journal is to understanding risk factors in a residential construction project spread over several countries, with various project size and complexity, and to get up to date research information. Risk factors are divided into three categories, namely internal factors, projects, and external factors. Three categories above is further divided into two technical and non-technical risk. This journal review 40 selected journals that discuss risk identification and risk management in residential construction projects. Risk factors in residential projects are generally very diverse and give us an idea that the interrelationships between the parties with an interest in the project contribute to the risk factors themselves occurring in the course of the project. It has been mentioned that the risk factors that occur in residential projects are something that is commonplace in various countries, in this case contributing to the success of the project. Outline on this journal has succeeded in providing information on the extent to which risk factors are currently occurring and there is a high potential for a change in the percentage of risk factors according to the classifications presented in this journal for other construction projects in the future.

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1. INTRODUCTION

Risk is a measure of the probability and consequence of not achieving a defined project goal (PMBOK in (Kerzner, 2017)). Risk can be distinguished to several types according to the opinion of experts. According to (Petr, 2017) there are three categories of risks:

1. Internal risk
   Internal risk in project construction like resource risk, project member risk, stakeholder's risk, designer risk,

contractor risk, subcontractor risk, supplier risk, team risk, construction site risk and documents and information risk

2. External risk
   External risk are those that risk is beyond the control of project management team like political risk, economic risk, social risk, and weather risk
3. Project Risk
   Project risk construction criteria is time risk, cost risk, work quality, construction risk, and technology risk.

The three categories above are divided into two categories: (a) Technical risk; relates to the assessment of the likelihood that the system embodied in the design when it is built meets the performance requirements, (b) Non-technical risks; is a risk that can affect a particular project directly, the cause of which is an unplanned and unintended event that results in unwanted deviations.

According to PMBOK (Kerzner, 2017), Risk management is the act or practice of dealing with risk. It includes planning for risk, identifying risks, analyzing risks, developing risk response strategies, and monitoring and controlling risks to determine how they have changed.

Risk management has become more vital for the completion of residential building construction projects due to the increased complexity and the use of modern equipment and techniques (Hedaoo & Pawar, 2021).

Purpose of this journal is to understanding risk factors in a residential construction project spread over several countries, with various project size and complexity, and to get up to date research information.

2. RESEARCH METHOD

The methodology used in this journal is a literature review of various studies that discuss risk identification and risk management in residential construction projects. In this journal, a risk assessment was conducted which was divided into 3 (three) categories that is: (a) Internal risk, (b) Project Risk, and (c) External Risk. Three categories above is further divided into two parts: (a) Technical Risk and (b) Non-technical Risk.

This journal will review 40 selected journals from year 2012 to 2022. The study framework carried out in this research are as shown in Fig. 1.

3. RESULTS AND DISCUSSION

Table 1 explain about literature review of 40 journals mentioning about risk factors in residential construction projects. Risk factors are classified into three parts, namely internal factors, projects, and external factors. Each risk factors are further divided into Technical Risk (T) and Non-technical Risk (NT). The result of each journal is shown on the right side.

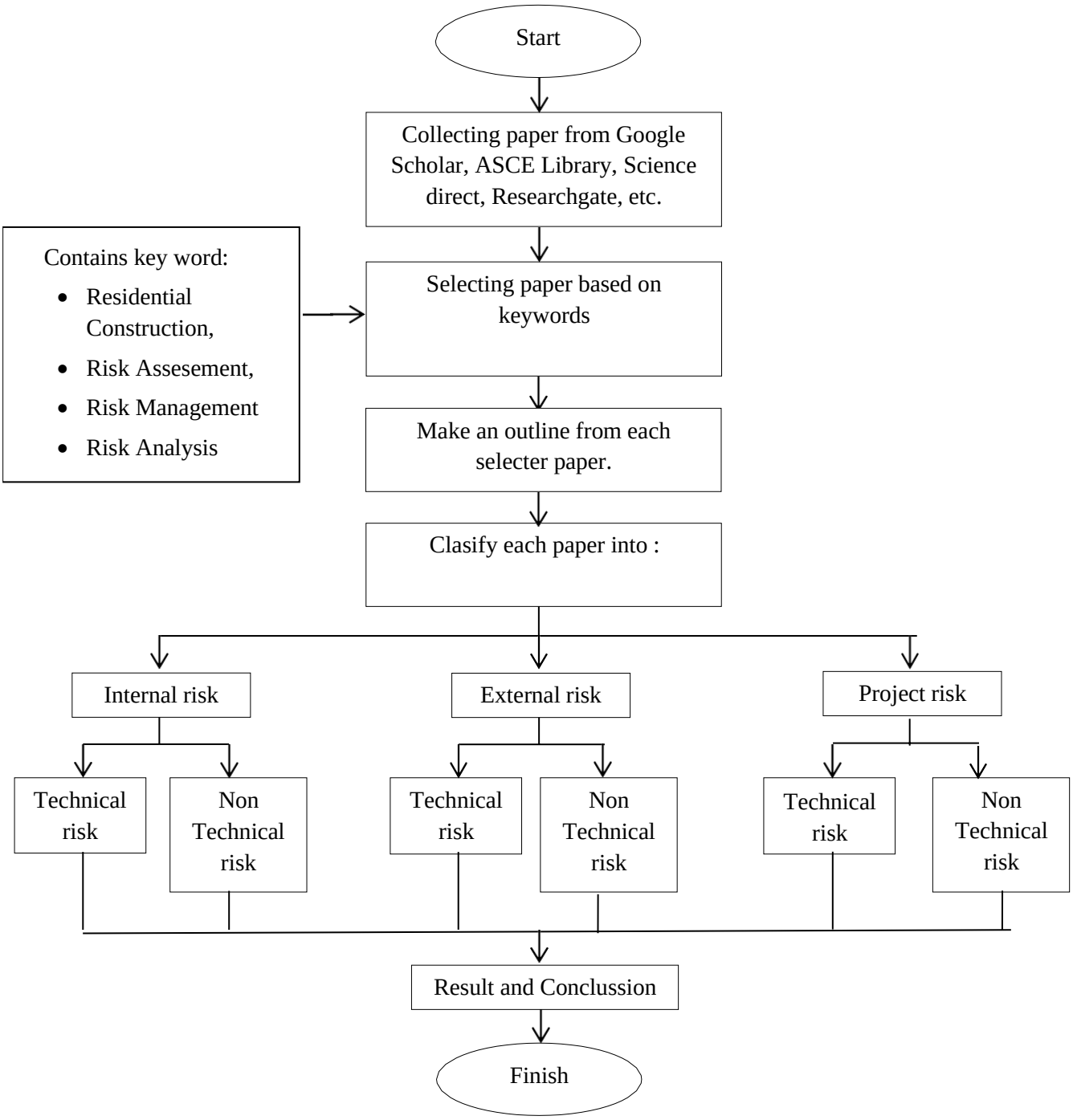

Fig. 1. Research flowchart

Table 1. Summary of literature review of risk analysis in residential construction projects

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
1	(Dusane & Bhangale, 2014). India		√		√	√	√	Financial, Time, Regulatory	According to the survey questionnaire, top four highest risk factor are: • Project completion risk, • Delay in construction project risk, • Financial risk, • Regulatory and administrative risk.
2	(Razali & Manaf, 2014). Malaysia				√	√	√	Financial, Time	• Property development is generally considered to be a high risk business. • Any risk for extended the time of the project had the effect of delaying the income and increasing finance costs.
3	(Fergany et al., 2019). Egypt		√		√	√	√	Financial, Material, Construction, Time	According to the survey questionnaire, the top five most important risk factors in residential projects are: • Exchange rate fluctuation, • Fuel price, • Change of labor cost, • Material delivery delay, • Change in design
4	(Mahendra et al., 2014). India				√	√		Financial, Construction	• 57% respondents says that inadequate site investigation create major impact on construction project. • In case of technical risk, inadequate site investigation and incomplete design is statistically significant. • In case of financial risk, inflation and local taxes are correlated to each other.
5	(Phawchamnan & Nathapindhu, 2018), Thailand.		√		√	√	√	Health and Safety, Construction	Beverages contains alcohol is a diuretic that can cause dehydration which gets worse while working, result in the increase the risk of accidents.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
6	(Fernández-Valderrama et al., 2019), Espanyol.		√		√	√		Financial, Construction	Among the risk variables that are part of the model, it is noteworthy for the indices marked by the experts: • The importance of the finishing materials and construction systems to be used on the building's facades, • Planning subsequent maintenance of the building focused on reducing corrective actions, • Technical suitability of the agents involved in the design, • Direction and execution of the works
7	(Juri & Brajkovi, 2010), Croatia.	√			√	√		Financial, Construction	• This journal presents a model as a solution for financing new housing projects, or refinance existing projects and increase sales with existing and newly built residences, by proposing a model that could better insure investors against underinvestment risk. • Investor are more likely to refinance existing building loans on unsold properties, than to foreclose and sell without loan support, which is based on a long-term lease with the transfer of title to the property to the lessee at the end of the loan contract period.
8	(Ling Jia, Queena K. Qian, Frits Meijer, 2021), China.				√	√		Financial, Construction, Environment	The key risks associated with homeowners and contractors are involving: • Cooperation and Performancer, • Opportunism, • Professional expertise, construction management, • Safety management, and maintenance

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
9	(Na Ayudhya & Kunishima, 2019), Thailand.				√	√		Time, Quality, Construction.	Ten highest risk factor which have impact to performance of management in residential projects are: • Operational errors, • Payment delays, • Design errors, • Dperating cost fluctuation, • Delay of development process, • Interest rate, • Natural disaster, • Employment fluctuation, • Instability in politics • Changes in legislation
10	(Simanjuntak & Salim, 2020), Indonesia.				√	√		Time, Quality, Construction.	Variable of delay risk identified as: • Design factor; delay of design approval, lack of integration and design coordination, • Construction factor ; poor field management, poor quality of work. • Procurement factor ; financial problems experienced by the owner.
11	(Hosein & Ray, 2020), Trinidad & Tobago				√	√		Financial, Quality, Time, Construction	The most prioritized risk parameters are: • Availability of direct labor, • Engineering designs, • Availability of materials, • Project scheduling, • Project management
12	(Hendradewa, 2019), Indonesia.				√	√		Time, Construction	The possibility of management to finish a construction project (as it estimated by CPM-PERT): • in 197 days is 62.04%, • in 204 days is 95%. While 100% timeliness possibility can be obtained in minimum 209 days.
13	(Pereira et al., 2020), Portugal.				√	√		Quality, Construction	The main causes of risk in real estate projects are: • Government regulations and licensing entities • Inadequate suppliers experience, • Inexperienced project team.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
14	(Eric Cahyadi Halim, Andi, 2021), Indonesia.				√	√		Quality, Construction	Top 5 sub-dominant factors that can cause delays in residential construction projects using metode Interpretive Structural Modeling (ISM); • Design changes during construction • Late delivery of materials • Delay in approval of working drawings • Late payments • Inappropriate work methods
15	(Tiwari et al., 2019), India.				√	√		Quality, Construction	The most common risk factors allocated to contractors and owners (Share Risk Factor) are: • Poor communication between involved parties • Legal disputes during construction among the parties of the contract • Adverse weather conditions • Delayed disputes resolutions. • Actual quantities differ from the contract quantities • No specialized arbitrators to help settle fast • Supplies of defective materials • Fear of political Interference
16	(Badawy et al., 2022), Egypt.				√	√		Financial, Construction.	Four risk factors affecting the overall risk were identified at an early stage: • The implementation of risk management processes, • The contract cost, • Contract type, • The project duration.
17	(Arief & Latief, 2021), Indonesia.				√	√		Quality, Construction .	This study developed 24 indicators of the planning process, resulting in identification of 62 housing planning processes with 94 risk factor.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
18	(Hedaoo & Pawar, 2021), India.				√	√		Quality, Construction	The study using a fuzzy approach with MATLAB software, to identify top ten risk factors affecting construction projects of residential buildings: • Resource management • Payment delays by owner • No clear scope of project at the beginning • Escalation of material prices • Design changes • Inadequate data collection and surveying prior to design • Lack of specialised staff • Improper planning of construction activities • Regulatory approval • Lack of coordinating ability
19	(Murtala et al., 2013), Nigeria.				√	√		Financial, Construction.	The purpose of this research is to develop a Neural Network Econometric Entropy Based Project Adjudication Model for Residential Building Project Procurement.
20	(Khaleel & Flayeh, 2020), Iraq.				√	√		Quality, Construction.	This journal investigated the application of risk management as a systematic methodology in residential complex projects, resulting a total of 57 risk factors.
21	(Wali & Othman, 2019), Iraq.				√	√		Quality, Construction.	The objective of this study is to analyzes the output of a project schedule risk simulation using Monte Carlo. Results of study are: • Low risk project duration equal to 103 days, • Base risks project duration equal to 107 days • High risk project duration equal to 111 days.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
22	(Azarova, 2015), Rusia.	√	√		√	√		Quality, Construction	The results of this study is a suggestion that can be used in the management of construction investment housing construction projects to estimate their values, analysis of stakeholder interests to establish a balance the interest and project risk, related to the difference between the project objectives and the interests of its stakeholders..
23	(Subramanian et al., 2014), US				√			Environment	The results provide new insights for building the next generation of fragility-curve models for accurately predicting hurricane wind damage risk to residential structures at the spatial scale of 1-km^2 blocks.
24	(Li & Ellingwood, 2009). US				√			Environment	Cost effective risk mitigation efforts for wood-frame residential construction should be targeted on those construction practices that are most likely to reduce severe losses under low-probability design events of hurricane and earthquake hazards.
25	(Lopez del Puerto et al., 2014). US		√					Health and safety	The safety culture in the residential sector appears least supportive and effective compared to commercial and heavy civil sectors. Such a culture may lead to decreases in communication and incorrect assumptions that may influence decision making and contribute to disproportionately higher rates of injuries and fatalities in residential construction.
26	(Walsh et al., 2004). US				√		√	Financial, Material	Risk transfer provided a potentially significant revenue stream to the framer/lumber yard, and indicated that the home builder would experience lower costs by maintaining cost transparency.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
27	(Shahapur & Balasaheb, 2016). India		√		√	√	√	Financial, Management, Material, Sosio-politic, Regulatory, Construction, Environment	Risk Management is taken as one of the toughest sector of the construction process and its application has to be encouraged in all the projects to avoid negative consequences in the project.
28	(Abdulrahman, 2019). Iraq				√	√	√	Time, Financial, Regulatory	The majority of construction contractors in Iraq have lack in knowledge or ability about how to employ risk management in their projects and specially what relating to how to identify, analyses and manage risks.
29	(Mehta et al., 2019). India		√		√	√	√	Financial, Time, Quality, Contract, Material, Sosio-politic, People, Construction, Environment	The research journal is aimed at fostering the use of fuzzy logic system in the construction industry.
30	(Aarthipriya et al., 2020). India		√		√	√	√	Time, Material, Management, Construction	The results show that the by the probability of 80%, the original duration is 91 days. By incorporating risks, the pre-mitigation duration increases tremendously to 181 days. After applying post-mitigation plan, the duration is decreased to 161 days.
31	(Mishra & Mallik, 2017). Egypt		√		√	√	√	Time, Financial, Quality, Construction, Contract, Health and Safety, Environment, People, Management	More than 80% of respondents at Kathmandu valley believe that their top management are highly aware regarding the risk management. Generally they are found to be focused on risk of scheduled time and cost.
32	(Bhadane et al., 2021). Nepal		√			√	√	Time, Financial, Quality, Construction	This journal focuses on risk analysis in a residential building construction project. Various methods to perform qualitative risk analysis are stated in detail. Out of which probability-impact matrix method is generally used for housing projects.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
33	(Haq, 2019), India.		√		√	√	√	Financial, Material, Management, People, Construction, Environment	Scope and Financial risks are the top most serious risks. Risks affecting on the scope of the project are the most critical risks affecting budget and schedule of the project.
34	(Phadtare et al., 2018), India.		√				√	Material, Health and Safety	Three types of risk management strategies are found relevant in small construction firms undertaking repairs and modernization of residential houses namely: • Risk retention, • Risk sharing • Risk prevention
35	(Lee et al., 2018), Switzerland.					√		Quality	Loss distributions can be used to create scenarios and corresponding response plans; thus, when a defect dispute occurs, the cost can be assessed.
36	(Na Ayudhya & Kunishima, 2017), Thailand.				√	√	√	Time, Quality, Construction, Environment, Management, Sosio-politic	• This journal examines the list of risks of abandonment of housing development projects caused by sub-contractors in Bangkok and surrounding area • The result show that delays in interim payments, financial difficulties faced by owners, financial difficulties faced by incompetent contractors, contractors or subcontractors, political instability are the most important factors that cause subcontractors to leave housing projects.
37	(Gurcanli et al., 2015), Turkey.		√		√	√		Financial, Construction, Health and Safety	Safety management is one of the most prominent elements of construction management.

No	Journal Identify	Risk Category						Type of Risk	Result
		Internal		External		Project			
		T	NT	T	NT	T	NT		
38	(Isaza-Restrepo et al., 2016), Columbia.				√	√		Environment, Construction	• This journal provides a quantitative assessment of hazards, vulnerabilities and risks using the methodology and numerical with the FOSM technique and Rosenblueth point estimation. • It is recommended to reduce the probability of annual erosion failure to 0.001% when the associated risk is 100 deaths. Projects that present a risk above this value will not be accepted.
39	(Rumimper, 2015). Indonesia		√		√	√		Management, People, Construction,	Risk Analysis using measurement standard AS/NSZ 4360:2004.
40	(Prakash et al., 2017). India.		√		√	√		Management, Construction.	This journal describes the step by step process involved in risk management and analyzing the various identified risk factors using the fuzzy logic tool box in the MATLAB software.

Based on Table 1 above, there are some information that can be extracted. Fig. 2 shows publication by the country of researcher (India, Indonesia, Thailand, Iraq, China, Turkey, Malaysia, Russia, Nepal, Switzerland, Trinidad & Tobago, Portugal, Croatia, United States and Colombia). Research journals from India are the first to rank the most risk assessments on residential projects, then Indonesia, the United States ranks third.

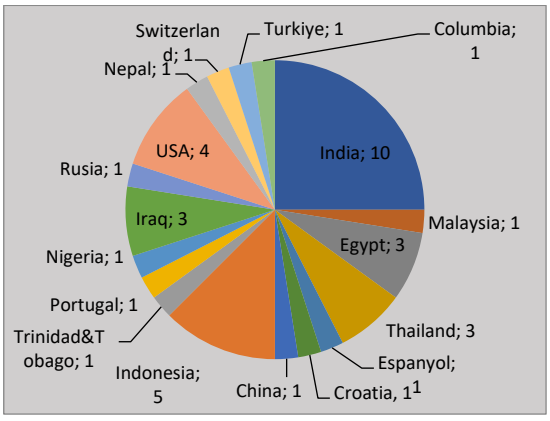

Fig. 2. Research by country

Based from the table 1 above, six risk categories have been classified as illustrated in Fig. 3, where External Non-Technical Factors ranks first risk factors in residential projects, followed by Internal-Technical in second place and Internal Non-Technical in third.

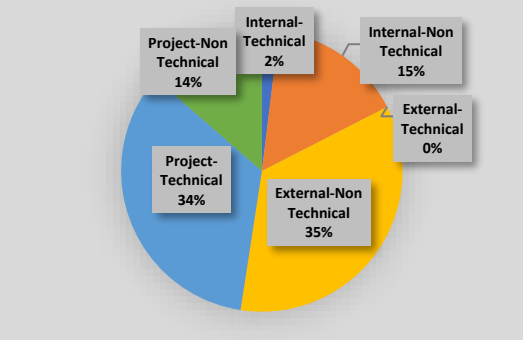

Fig. 3. Risk category

Also from the table 1 above, types of risks in the construction of different residential project buildings are summarized. As shown in Figure. 4, all these types of risk are classified into 10 categories, of which 4 categories of risk types account for the highest percentage:

1. Construction: the construction management plan a major role in the risk of residential projects. Poor project management is the first major contributor to project risk. According to Wang et al., (2014) in the conclusion of his journal stated that safety evaluation of the construction management plan is an important part of the construction safety review. If the safety result of the construction management plan is "ineligible", the unit supervisor is asked to disapprove the construction management plan, so the Construction Safety Review will not be accepted. That means a good construction management plan is needed to get a better construction management system.
2. Financial: Residential projects and other projects in general, require accurate and precise financial planning and management. If this factor is not carried out, this factor contributes as a significant project risk
3. Quality: The quality of work is something that reflects the success of the project. The risk of work quality is influenced by the type of material or materials used, labor, and a limited schedule.
4. Time: The percentage of time analysis is basically influenced by several factors such as delays in material delivery, inaccuracy in ordering materials, delays in the payment process by the owner, labor shortages, equipment shortages, design changes and a weak schedule control system.

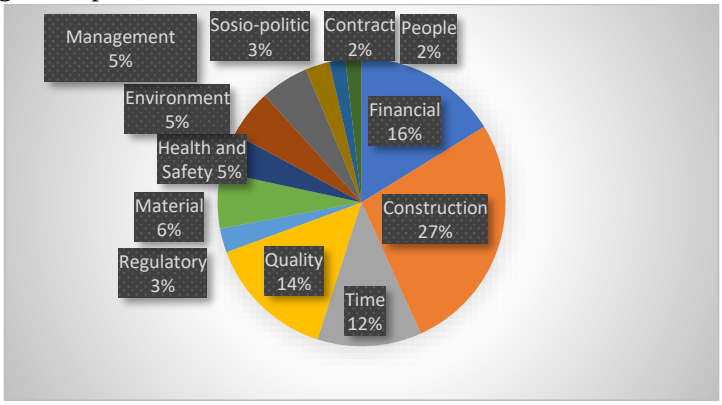

Figure. 4. Types of risk

4. CONCLUSION

From the results of the reviews of several journals that have been described previously, the risk factors in residential projects are generally very diverse and give us an idea that the interrelationships between the parties with an interest in the project contribute to the risk factors themselves occurring in the course of the

project. Reliable construction management is needed in overcoming and minimizing the risks that occur in this project and is the key. Furthermore, no less important is good financial support, so that the project can run according to the plan that has been made.

From several journals that we have researched, it has been mentioned that the risk factors that occur in residential projects are something that is commonplace in various countries, in this case contributing to the success of the project. Certainly with considering that there is still a lot of literature that discusses risks in projects, this needs to be a concern in planning and implementing projects in the future.

We find a success story in the residential construction project after identifying and mitigating risks factor, that risk management as an important component of the project to avoid the probability for project success in good turn.

5. SUGGESTION

Research using the literature review method related to risk factors in a residential construction project is recommended further using case studies on actual project so that the effectiveness of risk management can be analyzed. This is to obtain information about actualization on site related to the risks identification and mitigation that will be carried out on the project.

REFERENCES

Aarthipriya, V., Chitra, G., & Poomozhi, J. S. (2020). Risk and its impacts on time and cost in construction projects. *Journal of Project Management*, *5*, 245–254. https://doi.org/10.5267/j.jpm.2020.6.002

Abdulrahman, M. (2019). Risk Analysis and Control in Construction Industry (Residential Complexes in Iraq). *International Journal of Civil Engineering and Technology*, *10*(07), 153–161. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3451007

Arief, M., & Latief, Y. (2021). Project planning system improvement in residential development project: A risk analysis. *IOP Conference Series: Materials Science and Engineering*, *1098*(2), 022032. https://doi.org/10.1088/1757-899x/1098/2/022032

Azarova, I. (2015). The main aspects of the value-oriented management of investment and construction housing projects. *Magazine of Civil Engineering*, *59*(7), 18–29. https://doi.org/10.5862/MCE.59.2

Badawy, M., Alqahtani, F., & Hafez, H. (2022). Identifying the risk factors affecting the overall cost risk in residential projects at the early stage. *Ain Shams Engineering Journal*, *13*(2), 101586. https://doi.org/10.1016/j.asej.2021.09.013

Bhadane, N., Kunte, B., Manure, J., & Salunkhe, K. (2021). A Study on Qualitative Risk Analysis in Residential Building Construction Project. *International Research Journal of Engineering and Technology (IRJET)*, *8*(6), 3413–3418. www.irjet.net

Dusane, P. M. M., & Bhangale, P. P. P. (2014). Assessment of Risk and Its Application for Residential Construction Projects : A Case Study. *Department of Civil Engineering, MET's IOT-Polytechnic, Nashik, India*, *3*(9), 1067–1072.

Eric Cahyadi Halim, Andi, J. R. (2021). Aplikasi Interpretive Structural Modeling (ISM) Pada Faktor-Faktor Penyebab Keterlambatan Proyek Konstruksi Di Surabaya. *Dimensi Utama Teknik Sipil*, *8*(1), 60–77. https://doi.org/10.9744/duts.8.1.60-77

Fergany, M., Badawy, M., & El-Nawawy, O. (2019). Risk assessment Model for Residential Construction Projects. *Al-Azhar University Civil Engineering Research Magazine*, *41*(3), 328–337.

Fernández-Valderrama, P., Moyano, J. J., & Chaza, M. R. (2019). Risk management of post-construction costs in residential rental buildings. *Informes de La Construccion*, *71*(555). https://doi.org/10.3989/ic.63759

Gurcanli, G. E., Bilir, S., & Sevim, M. (2015). Activity based risk assessment and safety cost estimation for residential building construction projects. *Safety Science*, *80*(112), 1–12. https://doi.org/10.1016/j.ssci.2015.07.002

Haq, R. U. (2019). Proposed Method for Risk

Management of Small Size Residential Housing Construction Projects – A Case Study. *National University of Science and Technology, Islamabad, Pakistan.*, 1–9.

Hedaoo, N., & Pawar, A. (2021). Risk Assessment Model Based on Fuzzy Logic for Residential Buildings. *Slovak Journal of Civil Engineering*, *29*(4), 37–48. https://doi.org/10.2478/sjce-2021-0026

Hendradewa, A. P. (2019). Schedule Risk Analysis by Different Phases of Construction Project Using CPM-PERT and Monte-Carlo Simulation. *IOP Conference Series: Materials Science and Engineering*, *528*(1). https://doi.org/10.1088/1757-899X/528/1/012035

Hosein, G., & Ray, I. (2020). Priority Analysis of pre-Investment Risks. *Cogent Engineering*, *7*(1). https://doi.org/10.1080/23311916.2020.1757183

Isaza-Restrepo, P. A., Martínez Carvajal, H. E., & Hidalgo Montoya, C. A. (2016). Methodology for quantitative landslide risk analysis in residential projects. *Habitat International*, *53*, 403–412. https://doi.org/10.1016/j.habitatint.2015.12.012

Juri, D., & Brajkovi, D. (2010). THE PROJECT FINANCE MODEL IN THE SUPPLY OF RESIDENTIAL AND COMMERCIAL PREMISES. *Centre for Business Finance Management d.o.o., Rijeka*, 181–206.

Kerzner, H. (2017). *Project management : a systems approach to planning, scheduling, and controlling* (Twelfth ed). John Wiley & Sons, Inc.

Khaleel, T. A., & Flayeh, M. A. (2020). Evaluation of risk factors affecting the implementation time for residential complex projects in Iraq. *IOP Conference Series: Materials Science and Engineering*, *671*(1). https://doi.org/10.1088/1757-899X/671/1/012002

Lee, S., Lee, S., & Kim, J. (2018). Evaluating the impact of defect risks in residential buildings at the occupancy phase. *Switzerland*, *10*(12), 8–11. https://doi.org/10.3390/su10124466

Li, Y., & Ellingwood, B. R. (2009). Framework for Multihazard Risk Assessment and Mitigation for Wood-Frame Residential Construction. *Journal of Structural Engineering*, *135*(2), 159–168. https://doi.org/10.1061/(asce)0733-9445(2009)135:2(159)

Ling Jia, Queena K. Qian, Frits Meijer, H. V. (2021). Exploring key risks of energy retrofit of residential buildings in China with transaction cost considerations. *Elsevier Ltd.*

Lopez del Puerto, C., Clevenger, C. M., Boremann, K., & Gilkey, D. P. (2014). Exploratory Study to Identify Perceptions of Safety and Risk among Residential Latino Construction Workers as Distinct from Commercial and Heavy Civil Construction Workers. *Journal of Construction Engineering and Management*, *140*(2), 04013048. https://doi.org/10.1061/(asce)co.1943-7862.0000794

Mahendra, P. A., Pitroda, P. J., & Bhavsar, P. J. J. (2014). Risk Assessment in Residential Construction Projects by SPSS. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY*, *3*(5). http://www.ijesrt.com/issues%2520pdf%2520file/Archives-2014/May-2014/82.pdf

Mehta, S., Shah, K., Mishra, A., Mehta, S., & Pawar, A. (2019). Risk Assessment of a Residential Complex using Fuzzy Logic Approach. *Thakur College of Engineering &Technology, Mumbai, India*, *6*(3), 21–27.

Mishra, A., & Mallik, K. (2017). Factors and Impact of Risk Management Practice on Success of Construction Projects of Housing Developers, Kathmandu. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, *4531*(December), 206–232.

Murtala, A. L., Opeyemi, J., Korede, A. C., Owoicho, O. I., & Jide, A. (2013). ECONOMETRIC ENTROPY- NEURAL NETWORK-BASED MODEL FOR PROJECT COST ADJUDICATION SYSTEM IN RESIDENTIAL BUILDING. *International Journal of Education and Research*, *1*(2).

Na Ayudhya, B. I., & Kunishima, M. (2017).

Risks of Abandonment in Residential Projects Caused by Subcontractors. *Procedia Computer Science*, *121*, 232–237. https://doi.org/10.1016/j.procs.2017.11.032

Na Ayudhya, B. I., & Kunishima, M. (2019). Assessment of Risk Management for Small Residential Projects in Thailand. *Procedia Computer Science*, *164*, 407–413. https://doi.org/10.1016/j.procs.2019.12.200

Pereira, L., Ferreira, S., & Santos, J. (2020). The main causes of risk in residential real estate projects. *Journal of General Management*, *45*(3), 152–162. https://doi.org/10.1177/0306307019890095

Petr, R. (2017). Risk Management in Construction Projects. *Journal of Engineering and Applied Sciences*, *5347–5352*.

Phadtare, M. T., Gosavi, A. D., & Ganguli, T. K. (2018). Risk management in small and micro construction firms undertaking repairs and modernisation of residential houses: A case of India. *International Journal of Risk Assessment and Management*, *21*(3), 184–204. https://doi.org/10.1504/IJRAM.2018.093742

Phawchamnan, P., & Nathapindhu, G. (2018). Factors associated with accidents among residential construction workers in Udon Thani Province, Thailand. *Journal of Public Health and Development*, *16*(2), 29–39.

Prakash, A. A., Manikanta, D. K. N., & Prabhu, S. M. (2017). Risk assessment of residential buildings in indian construction industry by application of fuzzy. *International Journal of Civil Engineering and Technology*, *8*(4), 884–894.

Razali, M. N., & Manaf, Z. (2014). the Management of Property Development Risks in Malaysia - Risk Management and the Property Development Process: a Review. *Department of Construction and Real Estate Management Kolej University Teknologi Tun Hussein Onn, Johor Malaysia*, *June*. https://doi.org/10.15396/eres2006_183

Rumimper, R. R. (2015). Analisis Resiko Pada Proyek Konstruksi Perumahan Di Kabupaten Minahasa Utara. *Jurnal Ilmiah Media Engineering*, *5*(2), 381–389.

Shahapur, R. N., & Balasaheb, P. (2016). Risk management practices in real estate projects. *International Journal for Scientific Research & Development*, *4*(06), 556–558.

Simanjuntak, M., & Salim, A. (2020). ANALISIS PILOT PROJECT RISIKO KETERLAMBATAN PROYEK PADA BANGUNAN GEDUNG TINGGI HUNIAN. *SNITT- Politeknik Negeri Balikpapan*, 401–410.

Subramanian, D., Salazar, J., Duenas-Osorio, L., & Stein, R. (2014). Building and Validating Geographically Refined Hurricane Wind Risk Models for Residential Structures. *Natural Hazards Review*, *15*(3), 04014002. https://doi.org/10.1061/(asce)nh.1527-6996.0000130

Tiwari, S., Sakale, R., & Singh, H. P. (2019). Experimental Study on: "Risk Management in Residential Building Project." *International Journal of Trend in Scientific Research and Development*, *Volume-3*(Issue-2), 815–821. https://doi.org/10.31142/ijtsrd21500

Wali, K. I., & Othman, S. A. (2019). Schedule Risk Analysis Using Monte Carlo Simulation for Residential Projects. *Zanco Journal of Pure and Applied Sciences*, *31*(5). https://doi.org/10.21271/zjpas.31.5.11

Walsh, K. D., Bashford, H. H., Sawhney, A., & Witjakso, A. (2004). Cost of Risk Transfer: Pricing Agreements in Residential Supply Chains. *Journal of Architectural Engineering*, *10*(3), 112–118. https://doi.org/10.1061/(asce)1076-0431(2004)10:3(112)

Wang, Y. Q., Bian, G. Y., & Li, Y. (2014). Risk assessment of construction organization plans for bridge projects. *Advanced Materials Research*, *831*, 370–375. https://doi.org/10.4028/www.scientific.net/AMR.831.370