RISK ANALYSIS OF IMPLEMENTATION ODOO SYSTEM AT XYZ CONVECTION SME USING THE HOUSE OF RISK (HOR) METHOD

UNDERGRADUATE THESIS

Submitted to the International Undergraduate Program in Industrial Engineering in Partial Fulfilment of Requirement for the Degree of Sarjana Teknik at the Faculty of Industrial Technology Universitas Islam Indonesia

Name : Rayhan Gymnastiar Hadinata

Student Number : 20522067

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YOGYAKARTA

2024

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Yogyakarta, July 4, 2024

Rayhan Gymnastiar Hadinata

20522067

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DIKAOSKE

Surat Keterangan Penelitian

Nomor : DK0086

Lampiran : -

Yogyakarta, 3 Juli 2024

Kepada,

Dekan Fakultas Teknologi Industri

Universitas Islam Indonesia

Yogyakarta 55584

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No	Nama	NIM
1	Rona Sutra Dewangga Dyah Utami	20522051
2	Rayhan Gymnastiar Hadinata	20522067
3	Azzahra Tiffany Rachmad	20522052
4	Ahmad Rafif Mujaddid	20522371

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Written by:

Name : Rayhan Gymnastiar Hadinata

Student Number : 20522067

Yogyakarta, July 4, 2024

Supervisor,

(Ir. Muhammad Ridwan Andi Purnomo, S.T., M.Sc., Ph.D., IPM)

EXAMINERS' APPROVAL PAGE

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UNDERGRADUATE THESIS

Written by:

Name : Rayhan Gymnastiar Hadinata

Student Number : 20522067

Has been defended before the board of examiners in partial fulfillment of the requirement for a Bachelor's Degree in Industrial Engineering Department at the Faculty of Industrial Technology Universitas Islam Indonesia

Yogyakarta, August 8, 2024

Board of Examiners

Ir. Muhammad Ridwan Andi Purnomo, S.T., M.Sc., Ph.D., IPM	
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Acknowledged by,
Head of Undergraduate Program in Industrial Engineering
Faculty of Industrial Technology
Universitas Islam Indonesia

Ir. Muhammad Ridwan Andi Purnomo, S.T., M.Sc., Ph.D., IPM

DEDICATION PAGE

This undergraduate thesis, which took a lot of time and hard work, is dedicated to my family, especially Father Hengki Setia Adi, my Mother Widya Astuti, and also Rona Sutra Dewangga Dyah Utami, who always support me in any situation.

To all my best friends, Luthfi, Jundi, and Tony, who always share happiness and kindness.

MOTTO

"Knowledge is a treasure, while practice is the key."

– Lao Tzu

PREFACE

Assalamu'alaikum Warahmatullahi Wabarakatuh Alhamdulillah.

All praise is due to Allah SWT, the Richest, with all His secrets. Gratitude is endlessly extended to Allah SWT because of His mercy and grace. The writer completed an undergraduate thesis titled "Risk Analysis of Implementation Odoo System at XYZ Convection SMEs Using House of Risk (HOR) Method". The author conveys the true Murabbi of the Prophet Muhammad SAW, who has brought humans from darkness to a realm full of knowledge. This internship report was completed by the author thanks to the help and support both morally and materially from various parties. For that, with all my heart, the author expresses his gratitude and appreciation to:

1. Prof. Dr. Ir. Hari Purnomo, M.T., as Dean of the Faculty of Industrial Technology, Universitas Islam Indonesia.
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The author realizes this internship proposal still has many shortcomings, so the author expects constructive criticism and suggestions from various parties for future improvements. This undergraduate thesis was prepared to fulfill one of the requirements for completing a bachelor's degree in the Industrial Engineering Study Program at the Faculty of Industrial Technology, Universitas Islam Indonesia.

Wassalamu’alaikum Warahmatullahi Wabarakatuh.

Yogyakarta, July 4, 2024

Rayhan Gymnastiar Hadinata

20522067

ABSTRACT

Operating in small and medium-sized enterprises (SMEs), the XYZ convection industry encounters distinctive challenges regarding effective risk management. This undergraduate thesis offers a detailed overview of the primary risk factors and best practices for risk management in XYZ convection SMEs. By examining academic literature and industry case studies, we identify these businesses' most prevalent operational, financial, and strategic risks. We then assess the appropriateness and effectiveness of different risk management frameworks and tools, emphasizing the significance of a tailored, integrated approach that considers XYZ convection SMEs' resource constraints and organizational culture. Lastly, we explore the role of government support programs and industry associations in bolstering risk management capabilities within this sector. The insights from this research enrich our understanding of the risk landscape and offer practical guidance for XYZ convection SMEs aiming to develop resilience and ensure long-term sustainability.

Keywords: House of Risk, ERP, Risk Mitigation, Odoo, SME

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CHAPTER I
INTRODUCTION

1.1 Background

Small and Medium Enterprises (SMEs) are indispensable for Indonesia's economy, playing a pivotal role in job creation, innovation, and economic expansion. As per data from the Ministry of Cooperation and SMEs, Indonesia is home to 65.5 million SMEs, accounting for 99% of all business units and contributing 61% to the gross domestic product (GDP), equivalent to approximately Rs. 9,580 trillion. During times of crisis, SMEs serve as resilient buffers capable of prompt recovery. Nonetheless, resource constraints, limited information technology (IT) infrastructure, and a dearth of expertise pose significant challenges for SMEs.

In the globalization era, SMEs rely heavily on information technology (IT) systems to extend their marketing reach. Information technology encompasses using electronic system devices to collect, store, manage, transmit, and process data. Information technology has become integral to business planning, with both large and small enterprises leveraging IT to enhance their services. By harnessing information technology, SMEs can streamline business processes, facilitate data-driven decision-making, and enhance overall performance. Among SMEs' most sought-after information technology systems is the Enterprise Resource Planning (ERP) system, which is seamlessly integrated with SMEs' business processes.

Enterprise Resource Planning is designed to help companies manage various business activities in an integrated manner. It connects different company functions, such as finance, manufacturing, inventory, procurement, sales, and human resources, into a single platform. According to Sheik, P.A., & Sulphey, M.M. (2020), ERP provides comprehensive information to the organization, leading to cost reduction, increased productivity, improved service quality, better decision-making, and competitive advantage, especially for small and medium-sized enterprises (SMEs).

XYZ Convection is an SME in the convection industry located in the Bantul area of Yogyakarta. They produce items such as shirts, jackets, work uniforms, and bags and offer custom template services for shirts in large or small quantities. XYZ Convection focuses on client satisfaction, requiring efficiency and precision to meet unique customer needs and maintain high-quality standards. The company has a distribution department responsible for

handling and delivering products to clients, and they face operational risks that may disrupt the business process. Therefore, it is essential to mitigate these risks.

Given the business process, a risk management analysis is necessary, using the House of Risk technique to apply preventive mitigation actions through the Odoo system. According to Rafeek, M.A., Arbain, A.F., & Sudarmila, E. (2019), developing a risk mitigation strategy is crucial for sustainable development, aiming to improve time efficiency, acquire more excellent resources at lower costs, and gain a competitive edge. The House of Risk method involves two phases: Phase 1 prioritizes risk factors, while Phase 2 determines the most impactful preventive mitigation strategies for decision-making (Purnomo et al., & Al-hakim, R. G., 2021).

1.2 Problem Formulation

Based on the background, the problem formulation for this undergraduate research is as follows:

1. What are the risk events that exist in the implementation of the Odoo system at XYZ convection SMEs?
2. What kind of appropriate action should be taken to mitigate and prevent the risk of implementation of the Odoo system at XYZ convection SMEs?

1.3 Research Objective

Based on the problem formulation that has already been identified, the research objectives that must be met by this undergraduate research are as follows:

1. Identifying risk occurrences of implementation Odoo system at XYZ convection SMEs.
2. Identifying risk agents of implementation Odoo system at XYZ convection SMEs.
3. Identifying the strategy plan to mitigate and prevent risk at the implementation of the Odoo system at XYZ convection SMEs.

1.4 Benefits of Research

The benefit of this undergraduate research for student:

1. To prepare for the working world
2. Capable of putting theories learned in lectures into practice
3. Gain more expertise and information for the workplace.

The benefit of this undergraduate research for the University:

1. As a resource for university assessments to raise the caliber of graduates.
2. Capable of fostering partnerships or cooperation between SMEs and universities.

The benefit of this undergraduate research for SMEs:

1. As a tool for companies to improve the quality of their products or services.
2. Assist businesses in resolving difficulties based on predefined qualifications.

1.5 Research Limitations

There are numerous limitations to this undergraduate research, as indicated below:

1. The scope of the research was carried out at XYZ Convection SME, Bantul, Yogyakarta.
2. The research will be carried out from January 2024 - March 2024.
3. The House of Risk approach is the methodology employed in this undergraduate study.

1.6 Systematic Research

The research is structured into several chapters, and each chapter will be described as follows:

CHAPTER I INTRODUCTION

Chapter I contains background, problem formulation, research objective, research benefit, research limitations and systematic research for the undergraduate thesis.

CHAPTER II LITERATURE REVIEW

Chapter II contains the findings of literature that are accumulated from earlier studies and studies that are significant and associated with this research.

CHAPTER III RESEARCH METHODOLOGY

Chapter III comprises the research object, research subject, data collection method, data processing method and the research flowchart to explain a research flow from research start until finish.

CHAPTER IV DATA PROCESSING AND RESEARCH RESULTS or SYSTEM DEVELOPMENT

Chapter IV describe the data detail that has been collected with the visualization including risk events, and risk probabilities that will be further analyzed utilizing the House of Risk approach.

CHAPTER V DISCUSSION or SYSTEM TESTING AND DISCUSSION

Chapter V describes the outcome of the data that was acquired from data research processing that has been analyzed subjectively using theoretical explanations that were supported by the research findings and studies that were associated with the problem.

CHAPTER VI CONCLUSIONS AND RECOMMENDATIONS

Chapter VI consists of certain results and suggestions for this undergraduate research. The conclusion was created based on the result and discussion that was acquired from the research that could resolve the research purpose.

CHAPTER II
LITERATURE REVIEW

2.1 Literature Review

2.1.1 Small and Medium Enterprises

Small and Medium-sized Enterprises, refer to enterprises that fit within a specified size range depending on characteristics like annual revenue and employee count. The definition of SMEs might vary per country. Small and medium-sized firms, while a vital element of the global economy, frequently confront unique obstacles such as limited resources, they also benefit from stronger customer relationships and speedier decision-making (Johnsen, 2021). Governments and organizations provide support to SMEs through money, initiatives, training, and networking opportunities.

2.1.2 Enterprise Resource Planning (ERP)

Enterprise Resource Planning is a software system that integrates and handles numerous essential business activities within an organization. ERP systems often comprise modules for tasks like finance, personnel resources, supply chain management, manufacturing, sales, and customer relationship management (CRM). The use of ERP systems is to streamline and automate business processes, enhance efficiency, and offer real-time visibility into many elements of an organization's operations. By merging diverse departments and functions into a single system, ERP enables greater collaboration and communication across the enterprise. According to Srivastava, D., & Batra, A. (2020), ERP is an industry term used for integrated multiple-modules application software packages, especially, designed to give support to specific business processes of any organization.

2.1.3 Odoo

An Odoo is an open-source enterprise resource planning (ERP) software system. It includes a suite of integrated business tools meant to manage and automate different parts of a company's operations, including finance, human resources, inventories, manufacturing, sales, customer relationship management (CRM), and more (Harman, 2019). It is intended to improve communication and coordination processes and can be expanded to enable sustainable and dynamic business ecosystems through the use of open data. Additionally, Odoo can be utilized

to improve optoelectronic oscillators, notably in terms of mode control and selection approaches. Below are the benefits offered by Odoo software:

1. User Friendly

Odoo employs a user-friendly reporting system that is designed to be easily comprehensible in terms of both visual presentation and functionality. In addition, this program offers export, import, and data transfer functionalities tailored to the specific requirements of each department within a corporation.

2. Free

Odoo software is open source, meaning it may be freely accessed and used without any license payments.

3. Community

Odoo software benefits from a collaborative community that supports one another in enhancing product quality. The developers will consistently investigate and rectify any existing bugs in order to mitigate any undesired occurrences inside the security system and program bugs.

4. Custom Software

Odoo gives its users the option to design the software they want to make themselves. Through this functionality, software engineers can be innovative in building apps according to company demands.

2.1.4 Open-Source Software

Open-source software (OSS) is a type of computer software that allows users to study, alter, and distribute the source code for any purpose (Fortunato 2020, Segall 2020). The phrase "open source" stresses the freedom and transparency of the program, enabling users to access and modify it according to their needs. The open-source paradigm has fostered innovation and collaboration within the software development community, encouraging the sharing of information, code, and best practices. It has played a vital role in improving technology and allowing individuals and businesses to harness and contribute to software solutions.

2.1.5 Risk

According to López, F. (2020), A risk is the sum of the likelihood of an event and its consequence. Risk pertains to the potential for experiencing loss, damage, or adverse outcomes linked to a specific activity, choice, or circumstance. Risk is frequently evaluated and controlled

in diverse settings, including business, finance, and daily life, to reduce potential adverse effects and maximize potential advantages. It entails assessing the occurence of an event happening and estimating the possible scale of its repercussions.

2.1.6 Risk Management

Risk management is a methodical approach to identifying, assessing, and prioritizing risks to minimize or eliminate their potential negative impact on an organization or project. This process involves identifying potential risks or uncertainties, evaluating their likelihood and possible consequences, and developing strategies to address them effectively. According to Peterson, K.E. (2020), risk management is a crucial process that covers all aspects of protecting organizational assets and the duties of professional security officers.

2.1.7 House of Risk (HOR)

The House of Risk is an evolution of the QFD (Quality et al.) and FMEA (Failure Modes and Effects Analysis) methodologies, designed to provide a comprehensive framework for managing risk effectively. According to Paillin, D.B., & Tupan, J. (2021), the House of Risk (HOR) offers a paradigm for controlling and managing risk from risk agents. In HOR Phase 1, the severity of risk events, assessment of risk agents, and the relationship between risk events and agents are evaluated. The formula for the ARP (Absolute et al.) value is provided by equation (1) below:

$$\mathrm{ARP_j} = \mathrm{O_j} \sum \mathrm{S_i R_{ij}} \quad (1)$$

Description:

ARP_j = Aggregate risk potential

O_j = Occurance of risk agents

S_i = Severity of a risk

R_{ij} = Degree of correlation between risks

The application steps for implementing House of Risk Phase 1 are as follows:

1. Identifying risk events (Ei) and also risk agents (Aj)
2. Performing calculations severity levels on risk events (Ei), risk agents (Aj)
3. Creating a correlation matrix
4. Using equation (1), determine the ARP value
5. Categorizing ARPs by rating (Aj)

6. Carrying out priority selection (Aj)

Phase 2 of House of Risk focuses on developing strategies to mitigate high-priority risk factors. This includes assessing the sources of risk and the level of complexity involved in implementing the plans. The management of risk factors is determined using equation (2) as follows:

$$TE_k = \sum_j ARP_i E_{jk} \quad (2)$$

Description:

TE = Total effectiveness

ARP = Aggregate risk potential

E = Correlation between risk agent 'j' and mitigation strategy 'k'

The application steps for implementing House of Risk Phase 2 are as follows:

1. Planning mitigation and prevention measures.
2. Linking risk and mitigation agents.
3. Calculate the total effectiveness of the mitigation plan.
4. Measuring the level of difficulty for implementing mitigation at scale.
5. Calculating the Effectiveness to Difficulty (ETD) ratio to determine the ranking in order of priority for mitigation strategies.
6. Categorizing the mitigation priority scale ranking based on the ETD value.

2.1.8 Pareto Principle

The Pareto Principle, commonly called the 80/20 rule, is named after the Italian economist Vilfredo Pareto. It suggests that approximately 80% of effects or outcomes stem from 20% of causes or inputs. The principle is a guiding principle regarding preferences that align with universal choice (Sher, I., 2020). Although the ratio may not always be exactly 80/20, the concept illustrates the unequal distribution of inputs and outputs in many scenarios. It underscores the importance of identifying and concentrating on the critical elements that wield the most significant impact rather than evenly allocating resources across all elements.

2.2 Theoretical Basis

Theoretical basis is a research method that entails formulating ideas or generalizations by analyzing specific facts or patterns. Qualitative research is commonly employed to investigate

novel occurrences or derive theories from collected data, which will subsequently serve as the theoretical basis for further research. The inductive investigation, as described by Kyngäs, H.A. (2019), is a prevalent analytical approach employed in qualitative research for data analysis. This approach applies to both unstructured and semi-structured data. Inductive content analysis employs the method of abstraction to condense and categorize data, enabling researchers to address study questions through the use of concepts, categories, or themes.

On the other hand, a research gap refers to a region in the existing literature where there is a lack of knowledge or comprehension. It reflects the unanswered problems or unresolved issues within a given field of study. According to Ajemba, M.N., & Arene, E.C. (2022), a research gap emerges as a result of the design of the study's constraints, the use of inferior tools, or external variables that the study could or could not control. Research needs can be considered as gaps in information, which will help grow the subject of research. By finding these gaps, researchers might contribute to the existing body of knowledge by answering unanswered questions or providing new insights and viewpoints. Research gaps can be found through a thorough examination of existing literature, discussions with experts in the field, and critical analysis of past findings.

The research gap for this undergraduate research comprises three indications that are different from other previous literature research. There are SMEs, service companies, and big companies. The research technique also included a comparison of the methods employed in each investigation. This indicator will compare this research to past SME studies. The SME indicator is defined as a company with a net value of more than IDR 50.000.000 and a maximum of IDR 500.000.000 every year. The net worth calculation excludes the ownership of assets such as land and buildings for company use. As a result, those three signs might be the gap for this research to show that this undergraduate research is unique and different from past research that was used for inductive study.

Table 2.1 Inductive Study and Research GAP

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
1	Hendayani, R., Rahmadina, E., Anggadwita, G., & Pasaribu, R.D. (2021). Analysis of the House of Risk (HOR) Model for Risk Mitigation of the Supply Chain Management Process (Case Study: KPBS Pangalengan Bandung, Indonesia).	Population and sample	Following the assessment using the HOR method, it was determined that there are 23 potential risk events in PT's material procurement supply chain. SRA. Specifically, seven risk events were identified in the planning activity related to delivery strategy and material ordering planning, including planning and area preparation. Additionally, six risk events were associated with supplier evaluation and development in the source activity, four risk events were identified in the making activity concerning execution and production control, and six risk events were found in the delivery activity associated with delays, breakdown of delivery units, severe weather, and natural calamities.		✓	
2	Stewart, T. (2019). University of Oregon	SWOT and six frameworks	Small and medium enterprises often find traditional ERP systems costly and complex. Unlike large	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
	Libraries. Risk Mitigation for SMEs Implementing ERPs.		enterprises, SMEs operate within constrained budgets and resources. There are six major challenges that SMEs encounter when implementing ERPs: 1. Limited awareness of ERP vendors and their capabilities 2. The misconception that ERPs are designed solely for large enterprises and are unnecessary for SMEs 3. The prominence of high-profile ERP failures 4. The potential for disruptive change during implementation 5. High implementation costs 6. Insufficient change management across the organization Despite these challenges, SMEs possess advantages, such as organizational simplicity and flexibility, that can facilitate ERP implementation.			

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
3	Aditya, A., & Efendi, H. F. (2022). Business Process Analysis and Implementation of Odoo Open-Source ERP System in Inventory, Purchasing and Sales Activities: Analisis Proses Bisnis dan Penerapan Sistem ERP Odoo Open Source Pada Aktivitas Persediaan, Pembelian dan Penjualan.	User acceptance test and BPMN	Based on research conducted using the Odoo ERP Application to support the business processes of goods management, sales, and purchases at Captain Gadget, it has been found that the ERP system configuration at Captain Gadget facilitates several processes. These include mapping the business processes using value chain analysis to distinguish main and supporting activities in the company's processes and comparing each business process using gap analysis.			✓
4	Zahra, S. L., Teddy Siswanto, & Syaifudin. (2023). Implementation of Odoo-based ERP in the case study of micro, small, and	The researcher conducted interviews and direct observations with	By implementing an Odoo-based Enterprise Resource Planning (ERP) system, businesses can enhance operational efficiency through seamless integration with Inventory, Accounting, Sales, Purchasing, Website, Contact, and Manufacturing modules.	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
	Medium Enterprises (MSME) "Woody Moody Jakarta."	the owner of Woody Moody through discussions and question-and-answer sessions.				
5	Limantara, N., & Jingga, F. (2017). Open-source ERP: ODOO implementation at micro small medium enterprises: (A case study approach at CV. XYZ in module purchasing and production).	Qualitative method by conduction interview and survey	The deployment of Odoo open-source ERP at CV.XYZ has brought about various benefits for manufacturing processes and purchasing procedures, including the following: a. Production outcomes are recorded in a sequence and can be audited. Automatic generation of documents is a convenient feature. b. Purchase orders are recorded in the system and can be validated with proper receipt and invoice. The connection between purchase orders and invoices reduces the error rate in payment processing.	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
			c. Journal entries for production and purchasing operations are made. d. The management can use the financial report generated for company appraisal purposes.			
6	Hidayat, M. D., & Kusumo, D. S. (2023). Manajemen Resiko dalam Pengembangan Aplikasi Berbasis Agile Scrum (Studi Kasus: Proyek ERP CV. Shankara Prima Indonesia).	Waterfall method	Risk poker has been effectively used to document risk activities with the Kanban risk log based on field observations. This approach does not slow down the Agile process, but it cannot capture potential risks that arise outside of the task list or sprint backlog. During Sprint 0, there were eight occurrences, and in Sprint 1, one unexpected incident took the team by surprise. The effectiveness of managing these incidents increased from Sprint 0 to Sprint 2, with effectiveness percentages of 0.2941, 0.7667, and 1 in the respective sprints. While incident handling was relatively quick, the effectiveness during Sprint 0 was low due to many incidents originating from outside the task list.	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
7	Terminanto, A., Hidayanto, A. N., & Utomo, F. B. (2020). Implementation open-source system resource planning in sustainable supply chain management of small and medium enterprise.	Using a database by applying prototypes using cloud, open source Odoo software	The results obtained from the Supply Chain Management (SCM) in our enterprise system are as follows: Previously, one of the challenges faced by our company was the inability to access documents in real-time. However, implementing the Enterprise Resource Planning (ERP) concept using the Odoo application allows us to access real-time data on products, supplier lists, and total stock levels. The integration process between warehouse components and purchasing begins when the warehouse runs low on service stock. Subsequently, the purchasing module generates a purchase order based on the required items. Once the purchase order is received, the direct purchasing department procures the items. When the raw materials are purchased and delivered through SCM, the warehouse supplies the raw materials to the workshop, enabling the service to be carried out according to the	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
			created work order.			
8	Turgay, S., & Aydın, A. (2023). Risk Mitigation for SMEs: A Step-by-Step Guide to Implementing an Effective Framework.	Risk management and mathematical model	Small and medium-sized organizations (SMEs) must establish an effective risk mitigation framework to ensure long-term success and sustainability. This comprehensive tutorial delved into the essential components and strategies to help SMEs proactively identify, assess, and manage potential risks. The tutorial underscored the importance of risk management for SMEs and its direct impact on their growth and survival. Emphasizing the need for a proactive approach to address existing risks and prepare for future challenges, we drew insights from extensive literature surveys, real-world case studies, expert interviews, and data analysis across varied industries. Leveraging these insights, the tutorial offers practical, tailored solutions designed to meet SMEs' unique characteristics and requirements.	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
9	Zai, I., Laulita, N. B., Ng, W., Lee, J., Yanto, A., Michael, M., & Jacky, J. (2023). ANALISIS IMPLEMENTASI ERP PADA UMKM MYBEAUTYSHOP TOKO KECANTIKAN.	The method utilized is a qualitative method with a descriptive approach, in which the author performs an analysis of the ERP ACCURATE POS by explaining in detail the object (ERP Accurate POS) to be analyzed and	The integration of ERP systems in the enterprise of SME owners can improve integrity. This is evidenced by the existence of modules on the ERP system that operate as recording, tracking, computation and more. Besides, the ERP also delivers real-time data. Although, the author has not used an ERP system and has not yet had knowledge of ERP systems, the writer here has previously examined and encouraged the owner to utilize the POS system.	✓		

No	Author, Year, and Tittle	Method	Main Result	Research GAP		
				SMEs	Service Company	Big Enterprises
		presents a thorough image through the data collected from various available sources.				
10	W.Octavia, C., Magdalena, R., & Prasetya, W. (2019). Implementasi House of Risk dalam Strategi Mitigasi Penyebab Risiko pada Aktivitas di Bagian Produksi PT. XYZ.	House of risk method	The House of Risk approach does not cover certain aspects, such as addressing the correlation of correlations between different risks. Alternative methods like ANP or ISM can be utilized to establish such a relationship.			✓

CHAPTER III
RESEARCH METHOD

3.1 Research Objective

This research focuses on the process of implementing an ERP system using the Odoo system at XYZ convection SMEs, which is carried out by going through several implementation stages. First, find the company's business processes in the ERP system, and second, carry out standard system configurations. All actions related to the implementation of a system oriented towards risk prevention are carried out simultaneously with the implementation of the ERP system. House of Risk (HoR) is used to manage and handle risks that may occur in the future.

3.2 Research Subject

In this research, the subjects employed in installing the Odoo system were personnel in the sales and purchasing departments as resource individuals to determine the company's business needs for the system. The staff in the sales and purchasing departments were chosen as research subjects because the adoption of the Odoo system in business operations was carried out in the sales and purchasing departments.

3.3 Data Collection Method

The research is supported by two categories of data: primary and secondary data. The primary research data and secondary research data are outlined below.

3.3.1 Primary Data

Primary data refers to data that is obtained personally for a specific research aim. It is actual data that is directly acquired from the source. This data is often gathered through methods such as observation, interviews, and questionnaires (Mazhar, 2021). The primary data for this study was collected by implementing the Odoo system in the business process of XYZ convection SMEs, in accordance with their specific business requirements. The data was acquired through conducting interviews with employees from the distribution and sales departments. Data on risk management is collected by distributing questionnaires to distribution and sales workers, who then subjectively assess risk events and causes on a predetermined scale.

3.3.2 Secondary Data

Secondary data refers to data that has been previously acquired by someone else for a reason other than the current study activity. It is data that already exists and has been gathered by other scholars, organizations, or government bodies. Secondary data can be acquired from public sources such as published research papers, government reports, corporate records, surveys done by other organizations, and publicly available datasets (Näher, A., et al., 2022). For this study, secondary data was gathered from a variety of sources, including books, papers, journals, and the internet, all of which can both support and assist the research process.

3.4 Data Processing Method

The data processing method that utilized this research was carried out when the data needed was sufficient for the research to be carried out. Once the data is sufficient, it is carried out House of Risk method Phase 1 to acquire the priority risk events which will be given the suggestions of risk mitigation after passing through the selection based on the Pareto model that has been created. At this point, the priority risk event data that has been gathered will continue to the House of Risk Phase 2 regarding what mitigation will be suitable to be sent to the risk event according to the real field situations that occur. When the risk mitigation choices are found, those options will be reprocessed to achieve priority mitigation actions by assessing how difficult it is to realize these mitigations in the future.

3.5 Research Flowchart

Below are the steps in the research flow that will be carried out.

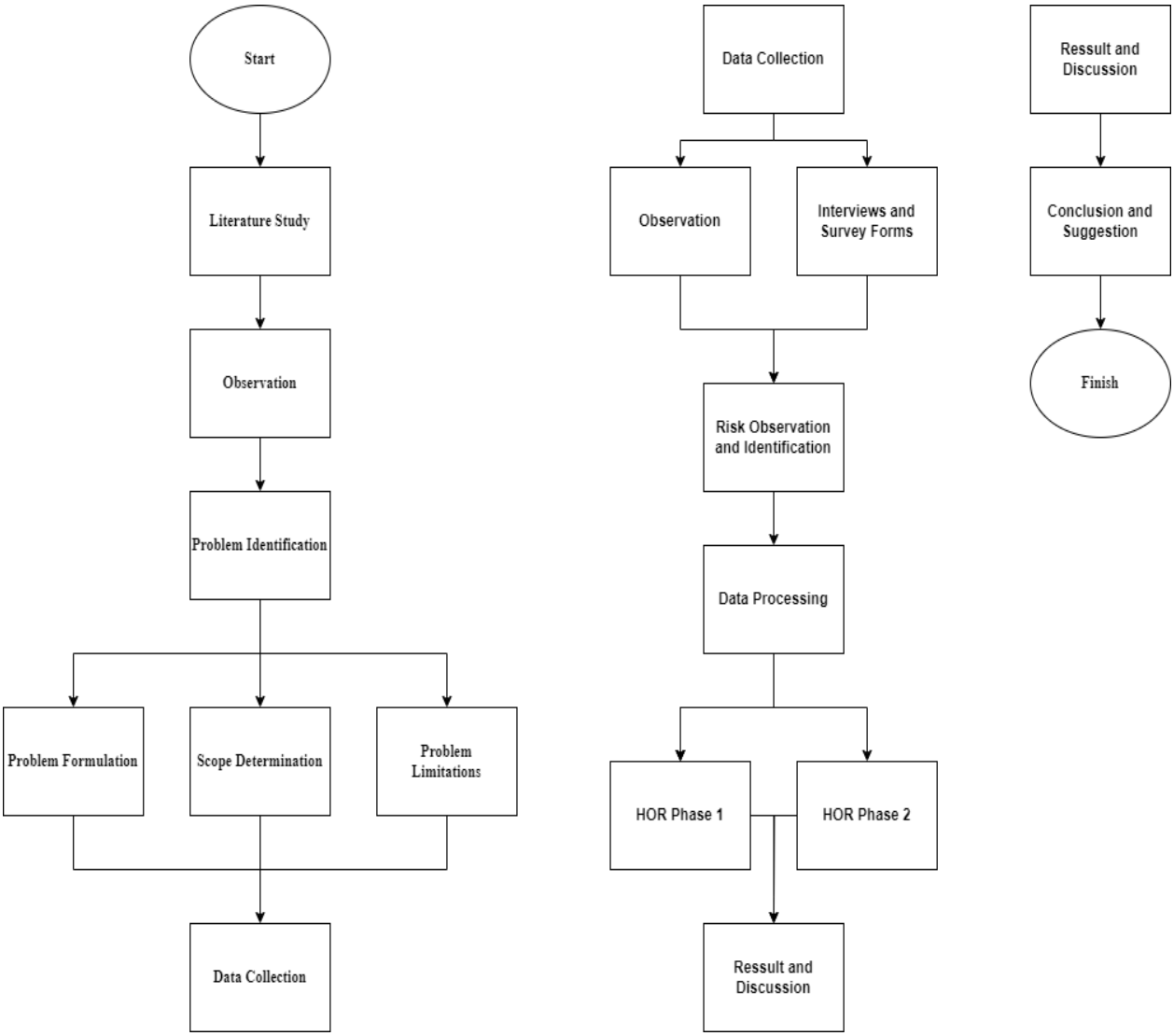

Figure 3.1 Research Flowchart

Based on the chart in Figure 3 above, contains information about the course of research that will be described in the explanation below:

1. Start

   At the start step the researcher will prepare and start the undergraduate thesis research to be undertaken.

2. Literature Study

   During the literature review phase, researchers will analyze and ascertain the most appropriate methodologies for our research observation.

3. Observation

At the observation stage, researchers will begin to identify problems associated with previously obtained literature studies and proceed to the next step of problem identification.

4. Problem Identification

IN the problem identification process, the researcher is looking for prospective problems that might arise at the company which later will be examined to look for the approach to solve the problem and in process problem identification is divided into three processes: problem formulation, scope determination, and problem limitations.

5. Data Collection

The data collection, it will be divided into place observation and also interviews as well as conducting survey forms. Place observation will be conducted in XYZ convection SMEs to identify the data to be conducted research. while interviews are conducted with employees from XYZ convection SMEs to obtain information and data limits that could be obtained for the researcher.

6. Risk Observation and Identification

In this step, the researchers will identify the risk event and the risk agent where the data will be used in the processing of the research data.

7. Data Processing

The data processing phase starts with the analysis of interview results, which includes identifying risk events, their causes, the frequency of occurrence of these causes, the potential impact of the risks, and the correlation between risk events and their causes. Once the data is complete, the House of Risk method is used in phase 1 to prioritize risk events. Subsequently, the selected risk events undergo risk mitigation suggestion selection based on a Pareto diagram. In phase 2 of the House of Risk methodology, the priority risk events data is used to determine the most suitable risk mitigation strategies in line with actual field conditions. These mitigation options are further analyzed to prioritize actions, considering the feasibility of future implementation.

8. Result and Discussion

At this step, discussion and analysis will be carried out on the result of the data that has already been out. The study then will be used to develop adjustments for the company to boost its risk management and risk mitigation to prevent the risk.

9. Conclusion and Suggestion

After carrying out all the step above, there will be a conclusion and suggestions as the findings of the research analysis that has been carried out to answer the problem formulation that has been defined.

10. Finish

The researcher completed the undergraduate research thesis that had been done.

CHAPTER IV
DATA COLLECTION AND PROCESSING of SYSTEM DEVELOPMENT

4.1 Data Collection

4.1.1 SMES Profiles

XYZ Convection SMEs, established in early 2020 in Bantul, Yogyakarta, specializes in manufacturing custom shirts, jackets, work uniforms, and bags. Initially starting with just two employees, the company has established a foothold in the Yogyakarta market and has secured partnerships with fabric suppliers, sewing machine vendors, and distribution stores.

The COVID-19 pandemic reduces production due to fabric shortages and decreased market demand. However, at the beginning of 2021, the company expanded its workforce to 10 employees in response to increased external demand. Despite the earlier challenges, XYZ Convection SME has now experienced a surge in demand and expanded its market reach to encompass most Yogyakarta area and even political parties. The company continues to thrive, standing tall with its competitive brand in the Yogyakarta convention market. Below is the organizational structure of XYZ Convection SMEs:

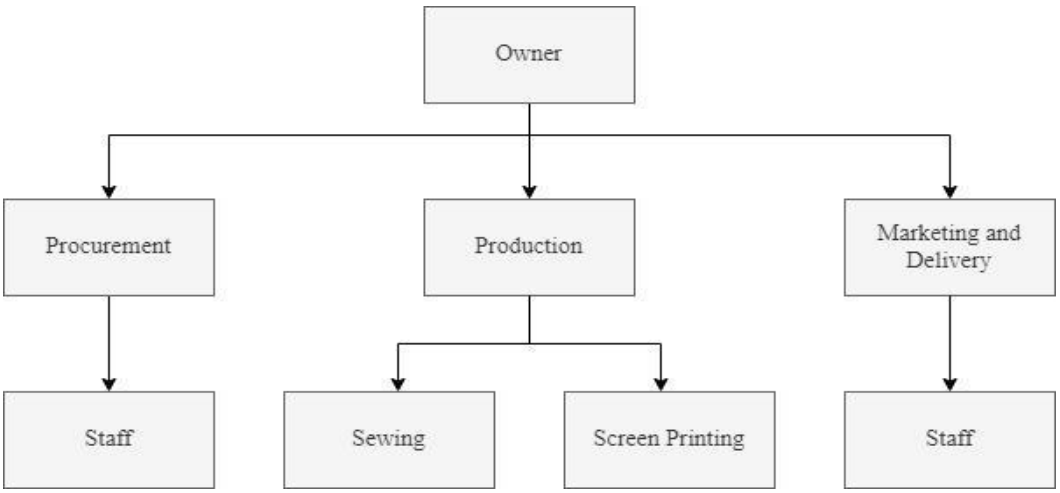

Figure 4.1 XYZ Convection SMEs Organizational Structure

4.2 Risk Identification

4.2.1 Risk Event Identification

According to Soroka-Potrebna H. (2020), risk event detection plays a role in several aspects of corporate operations, particularly during project execution, for multiple reasons. Firstly, each

project is distinct, entailing a considerably elevated risk compared to other facets of the company's activities. Furthermore, projects, such as the one directed by Hanna Soroka-Potrzebna, are often characterized by a limited understanding of future periods, directly associated with uncertainty and risk. Furthermore, the execution of projects typically necessitates substantial capital expenditures. The enterprise can suffer severe consequences due to making erroneous judgments and failing to identify project risks. By implementing the Odoo System on the XYZ Convection distribution process, SMEs will pose some risks in each of its processes that can threaten success in implementation. On risk event identification, the information to be included in the risk event table is risk code, risk event, and risk severity. Risk event identification will be divided according to severity on a scale of 1 up to 5. The scale of risk severity parameters ranging from 1 to 5 are minor, significant, moderate, severe, and catastrophic. Below are the risk event identification severity level parameters in XYZ Convection SMEs:

Table 4.1 Severity Level

Weight	Criteria	Effect
1	Relatively have a low impact or consequence on the organization or project. The impact typically localized and does not have significant implications for the overall objectives or goals of the organization.	Minor
2	Relatively in the middle low and high impact or consequence on the organization or project. The impact typically have far reaching impicationsfor the goals of the organization.	Significant
3	Characterized by its moderate impact or consequence on the organization or project. The impact typically significant enough to require attention and mitigation but its not as severe as a significant effect.	Moderate
4	Relatively have a highly significant impact or consequence on the organization or project. The impact of a severe risk has the potential to significantly hinder or jeopardize the goals of organization.	Severe
5	Characterized by its extremely severe and devastating impact or consequence on the organization or project. The impact of catastrophic has the potential to significantly threaten the survival of the organization.	Catastrophic

According to the table above, if the risk has a relatively minimal impact or consequence on the company or project, the severity rating will be 1. If the risk has a medium-low to high impact

or consequence on the company or project, the severity score will be 2. If the risk has a substantial impact or consequence on the company or project, the severity level will be 3. If the risk has a significant impact or consequence on the company or project, the severity number will be 4. If the risk is defined as having an exceptionally severe and devastating impact or consequence on the organization or project, the severity number is 5. Therefore, details on the risk event identification at XYZ convection SMEs are shown as follows:

Table 4.2 Risk Events

No	Module	Activity	Code	Risk Event	Impact
1	Purchasing	Operators integrate purchasing data from old systems with Odoo software	E1	Insufficient user adoption	Moderate
		Operators apply purchasing modules to business processes	E2	Inadequate training	Significant
		The operators performs accounting on the purchase data and is stored in the Odoo software database	E3	Data loss or corruption	Catastrophic

No	Module	Activity	Code	Risk Event	Impact
2	Inventory	Operators access material available in the Odoo software database	E4	System Downtime	Catastrophic
		Addition of business process modules to Odoo software	E5	Budget overruns	Moderate
		Operator performs input of material to the Odoo software database	E6	Data inaccuracies	Severe
3	Sales	Create sales history	E7	Performance issues	Severe
		Create an invoice to be sent to the costumer	E8	Customization complexity	Significant
		Operators integrate sales data from old systems with Odoo software	E9	Integration challenges	Moderate
		Expanding sales connections to the costumers	E10	Inadequate scalability	Significant

4.2.2 Risk Agent Identification

Risk agents are a process to identify and define entities or circumstances that may have the possibility for anything that has the potential to occur or be true to create hazards or threats in an established system, organizational structure, or situation. This involves systematically identifying and evaluating many variables that can impact the risk and understanding their characteristics, behavior, or potential effects. According to Huang (2019), Identifying risk agents, particularly in the context of projects and undertakings, is an essential part of risk management.

The possibility of achieving a score will be subdivided according to the XYZ convection SME identification. 1 up to 5 depending on the occurrence of the risk in 3 months. The occurrence parameter is divided into five categories based on potential risk. The higher the occurrence, the more likely the risk is to occur. On the other hand, a lower occurrence value means less likelihood of occurrence. The following will describe the level table, which includes its weight and criteria:

Table 4.3 Occurrence Level

Weight	Criteria	Effect
1	< 2 times in 3 months	Slight
2	3-4 times in 3 months	Low
3	5-6 times in 3 months	Moderate
4	7-8 times in 3 months	Frequent
5	> 9 times in 3 months	Certain

The Occurrence Level measures the risk agent's probability. For example, if it occurs less than once per three months, the number is 1. If it happens three or four times in three months, the incidence will be valued as two. If it happens 5-6 times in three months, the occurrence has a value of 3. If it happens 7-8 times in three months, the occurrence has a rating of 4. If it occurs more than nine times in three months, the event will be valued at five. The following are the risk agents at XYZ convective SMEs and their frequency of occurrence:

Table 4.4 Risk Agents

No	Module	Activity	Code	Risk Agent	Occurrence
1	Purchasing	Operators integrate purchasing data from old systems with Odoo software	A1	Employees are unfamiliar with the new system	4
		Operators apply purchasing modules to business processes	A2	Limited or ineffective training programs	2
		The operators performs accounting on the purchase data and is stored in the Odoo software database	A3	Technical issues during the data transfer process or corruption file	1
2	Inventory	Operators access material available in the Odoo software database	A4	Hardware or software system failure	1
		Addition of business process modules to Odoo software	A5	Underestimation of implementation costs	1
		Operator performs input of material to the Odoo software database	A6	Data synchronization issues between different modules or databases	2
3	Sales	Create sales history	A7	Inadequate hardware or network resources	4

No	Module	Activity	Code	Risk Agent	Occurrence
		Create an invoice to be sent to the costumer	A8	Inadequate expertise in configuring and customizing the Odoo system	2
		Operators integrate sales data from old systems with Odoo software	A9	Incompatibility between Odoo and the existing system	1
		Expanding sales connections to the costumers	A10	Leading to performance issues or the need for costly system upgrades	1

4.2.3 Risk Register

The risk register is a tool for the identification, assessment, and monitoring of possible risks that may have an impact on the achievement of organizational objectives or targets. It provides a systematic way of gathering and managing risk information throughout the project lifecycle. Therefore, the detail of the risk register of XYZ convection SME will be described as shown below:

Table 4.5 Risk Register

No	Risk Event	Risk Agent	Risk Identification			Rank
			O	S	RPN	
1	Insufficient user adoption	Employees are unfamiliar with the new system	4	3	12	1
2	Inadequate training	Limited or ineffective training programs	2	2	4	5
3	Data loss or corruption	Technical issues during the data transfer process or corruption file	1	5	5	4
4	System downtime	Hardware or software system failure	1	5	5	4
5	Budget overruns	Underestimation of implementation costs	1	3	3	6

6	Data inaccuracies	Data synchronization issues between different modules or databases	2	4	8	2
7	Performance issues	Inadequate hardware or network resources	4	4	12	1
8	Customization complexity	Inadequate expertise in configuring and customizing the Odoo system	2	2	4	5
9	Integration challenges	Incompatibility between Odoo and existing system	1	3	3	6
10	Inadequate scalability	Leading to performance issues or the need for costly system upgrades	1	2	6	3

4.2.4 Risk Mitigation Matrix

The risk matrix is a visual tool to assess and prioritize risks systematically and in detail. This is a way to assess the probability impact of different risks within an organization or project. According to Garvey, P.R. (2019), A risk matrix identifies cells according to their position in the order list. As a result, the management is able to determine which risk matrix cells have more priority concerning risks acquired in each other. Nevertheless, it is necessary to define them from their original scale into an interval scale if a decision requires the measurement of relative differences among pairs of cells at each rank position. Therefore, the risk mitigation matrix will be shown below:

Table 4.6 Risk Matrix

Severity	**Occurrence**				
	Slight	**Low**	**Moderate**	**Frequent**	**Certain**
Minor					
Significant	E10	E2, E8			
Moderate	E5, E9			E1	
Severe		E6		E7	
Catastrophic	E3, E4				

4.3 House of Risk Phase 1

To identify which risk agents will be prioritized for precautionary measures and ANP in advance so that the best possible alternatives can be identified, House of Risk Phase 1 is used.

4.3.1 Correlation Level

According to Da Costa Lewis, N. (2020), Another way to evaluate the relationship between variables is by correlation. It measures the extent of correspondence between the ordering of two or more random variables, to be more precise. The correlation level will be described as follows:

Table 4.7 Correlation Level

Weight	Criteria
0	No correlation (no impact)
1	Weak correlation (minimal impact
3	Moderate correlation (moderate impact)
5	High correlation (significant impact)

After deciding the correlation weight and criteria the next step is to find the result of the correlation level on each risk event and risk agent to identify the correlation risk that has an impact on implementation of Odoo system at XYZ convection SMEs. The result will be described as shown below:

Table 4.8 Correlation Identification

Risk Event	Correlation	Risk Agent
E1 (Insufficient user adoption)	0	A3, A4, A5, A6, A7, A10
	1	
	3	A8, A9
	5	A1, A2
E2 (Inadequate training)	0	A3, A4, A5, A7, A10
	1	A6
	3	A8, A9
	5	A2, A1
E3 (Data loss or corruption)	0	A1, A5, A6, A8, A9, A10
	1	A2
	3	
	5	A3, A4, A7
E4 (System downtime)	0	A1, A2, A3, A6, A8, A9
	1	A5
	3	
	5	A4, A7, A10
E5 (Budget overruns)	0	A1, A2, A3, A6, A8, A9
	1	A4
	3	A7, A10
	5	A5
E6 (Data inaccuracies)	0	A3, A4, A5, A7, A10
	1	A1, A8, A9
	3	A2
	5	A6
E7 (Performance issues)	0	A1, A2, A6, A8, A9
	1	A3
	3	A5, A4
	5	A7, A10
E8 (Customization complexity)	0	A3, A4, A5, A6, A7, A10
	1	A9

	3	A1, A2
	5	A8
E9 (Integration challenges)	0	A3, A4, A5, A6, A7, A10
	1	
	3	A1, A2
	5	A8, A9
E10 (Inadequate scalability)	0	A1, A2, A3, A6, A8, A9
	1	A5
	3	A4
	5	A7, A10

4.3.2 Aggregate Risk Potential

After correlation identification is conducted then the next step is calculating the aggregate risk potential based on the correlation identification multiplication above between risk occurrence and correlation. The following table shows the calculation results of the aggregate risk potential:

Table 4.9 Aggregate Risk Potential

Aggregate Risk Potential	Calculation
	$= O_1(\sum Si\ Ri_1)$
ARP_1	= 4 x [(2x3)+(1x3)+(4x5)+(2x5)]
	= 156
	$= O_2(\sum Si\ Ri_2)$
ARP_2	= 2 x [(2x1)+(2x3)+(1x3)+(2x5)+(4x5)]
	= 82
	$= O_3(\sum Si\ Ri_3)$
ARP_3	= 1 x [(2x1)+(1x5)+(1x5)+(4x5)]
	= 32
	$= O_4(\sum Si\ Ri_4)$
ARP_4	= 1 x [(1x1)+(1x5)+(4x5)+(1x5)]
	= 31
ARP_5	$= O_5(\sum Si\ Ri_5)$

Aggregate Risk Potential	Calculation
	= 1 x [(1x1)+(4x3)+(1x3)+(1x5)]
	= 21
	= $O_6(\sum Si\ Ri_6)$
ARP_6	= 2 x [(4x1)+(2x1)+(1x1)+(2x3)+(2x5)]
	= 46
	= $O_7(\sum Si\ Ri_7)$
ARP_7	= 4 x [(1x1)+(1x3)+(1x3)+(4x5)+(1x5)]
	= 128
	= $O_8(\sum Si\ Ri_8)$
ARP_8	= 2 x [(1x1)+(4x3)+(2x3)+(2x5)]
	= 29
	= $O_9(\sum Si\ Ri_9)$
ARP_9	= 1 x [(4x3)+(2x3)+(2x5)+(1x5)]
	= 33
	= $O_{10}(\sum Si\ Ri_{10})$
ARP_{10}	= 1 x [(1x1)+(1x3)+(4x5)+(1x5)]
	= 29

After obtaining the results of the aggregate risk potential calculation, the next step is to reduce the value from the largest to the smallest. The following is the result of the calculation of the value of the aggregate risk potential that has been obtained:

Table 4.10 Aggregate Risk Potential Rank

Rank	Risk Agent	ARP Result
1	A1	156
2	A7	128
3	A2	82
4	A6	46
5	A9	33
6	A3	32

Rank	Risk Agent	ARP Result
7	A4	31
8	A8	29
9	A10	29
10	A5	21

4.4 House of Risk Phase 2

In the house of risk phase 2, the efficiency and complexity of the mitigation solutions implementation are assessed by computing the Total Effectiveness Value (TEk) and the Efficiency complexity Ratio (ETDk).

4.4.1 Risk Evaluation

Risk prioritization analysis, generally conducted using a Pareto chart, is an effective technique for identifying and prioritizing risks based on their significance and potential impact. The Pareto chart provides a clear visual depiction of the hazards, with the largest bars signifying the highest-priority issues. This prioritizing assists in successfully allocating resources, executing targeted risk mitigation techniques, and making educated decisions to limit the overall risk exposure. Below is an explanation of the rank aggregate risk potential of ten risk agents that have already been filtered based on occurring risk:

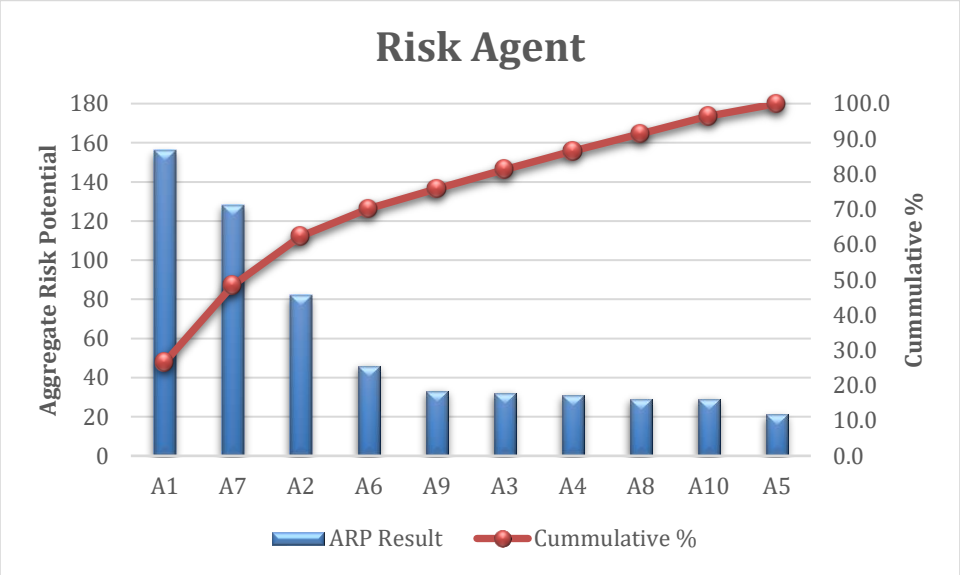

Figure 4.2 Risk Agent Pareto Chart

Following the analysis conducted with the Pareto chart, the subsequent step involves categorizing the risks that should be emphasized and those that should not, based on the 20/80 principle. The outcome of conducting risk prioritization is as follows:

Table 4.11 Risk Agent Priority

Risk Agent	ARP Result	Cumulative	Cumulative (%)	Priority
A1	156	156	26,6	Priority
A7	128	284	48,4	
A2	82	366	62,4	Non-priority
A6	46	412	70,2	
A9	33	445	75,8	
A3	32	477	81,3	
A4	31	508	86,5	
A8	29	537	91,5	
A10	29	566	96,4	
A5	21	587	100	

Based on the the result of pareto chart above, the risk that need to be prioritized are is risk agents A1 and A7 with Aggregate Risk Potential values is 156 and 128. After risk priority has been decided, risk will be determined using risk response strategy as table shown below:

Table 4.12 Risk Response Strategy

Risk Response	Explanation
Reduction	Take measures to reduce the likelihood or severity of the risk, such as including redundancies or improving processes
Sharing	Allocate the risk between the project team and a third party, such as a vendor or supplier, in order to distribute the impact
Retention	Voluntarily embrace the potential hazards and establish a comprehensive strategy to effectively handle the repercussions in the event that the risk materializes
Exploitation	Seize the opportunity to exploit a potential danger that could have a favorable outcome if it occurs

Avoidance	Minimize the risk by modifying the project design or scope to prevent the occurrence of the risk

Table 4.13 Risk Response Strategy Matrix

Risk Event	Risk Strategy	Plan
E1	Retention	Conduct monitoring and feedback and evaluation
E7	Exploitation	Update an outdated system
E2	Sharing	Conducting instructional training to users
E6	Exploitation	Familiarize the user with the verification and validation of the data
E9	Reduction	Changing habits and leaving an outdated old system.
E3	Exploitation	Routine backups and evaluations
E4	Retention	Perform backup and actively monitor the system
E8	Sharing	Make the interface appearance easier to understand
E10	Retention	Planning and capacity-building
E5	Reduction	Make a budget plan

After determining the risk response strategy matrix, the next stage will be to construct the fishbone diagram and the mitigation strategy to take preventive action against the prioritized risk agent.

4.4.2 Fishbone Diagram

A fishbone diagram, also known as a cause-and-effect diagram or an Ishikawa diagram, is a visual tool for analyzing and displaying the various reasons for a given problem or issue. Dr. Kaoru Ishikawa, a Japanese quality control specialist, created it. According to Coccia, M. (2020), the fishbone diagram is an appropriate and general graphical representation approach for technological study and forecasting of socially significant innovation. The fishbone diagram based on the prioritized risk agent will be shown as follows:

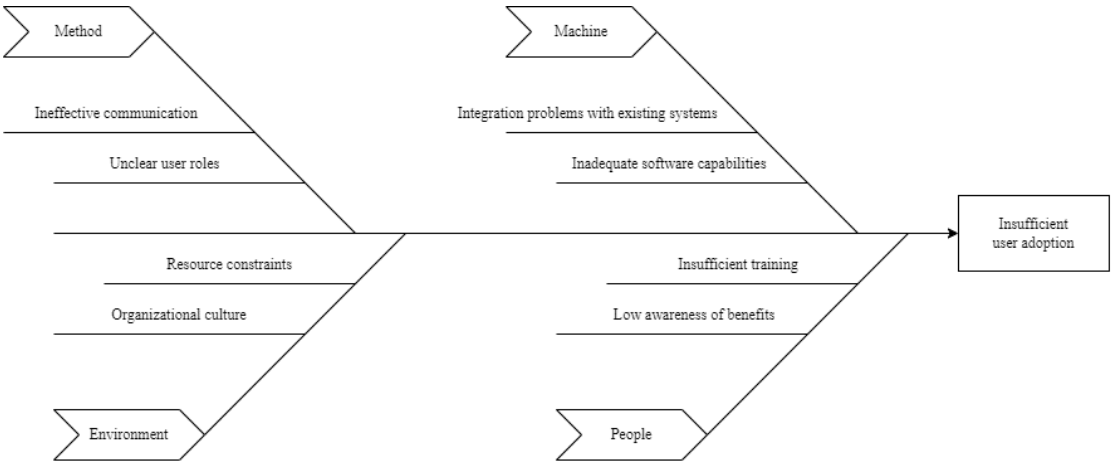

Figure 4.3 Fishbone Diagram Risk A1

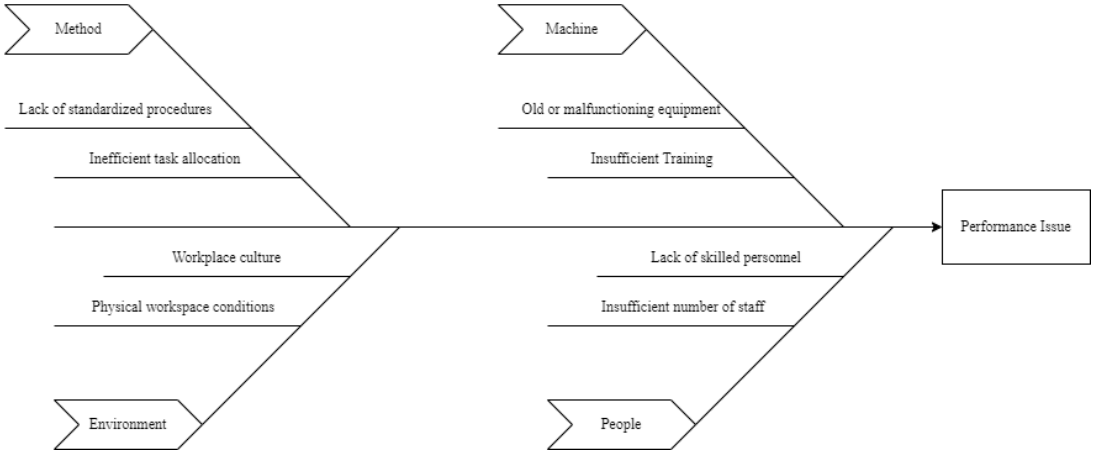

Figure 4.4 Fishbone Diagram Risk A7

4.4.3 Mitigation Strategy

A risk mitigation strategy is a plan or series of steps intended to reduce or eliminate risks and the possible harm they could do to an organization's goals. A risk mitigation strategy's objectives are to recognize, evaluate, and proactively handle risks in order to lessen the possibility of them occurring or lessen their effects. To implement the alternative mitigation strategies determined by the priority risk agent is to set up preventative measures, as indicated in the following table:

Table 4.14 Preventive Action

No	Preventive Action	Code
1	Conduct monitoring, feedback, and evaluation: • Enhanced Communication and Training	PA1
2	Update an outdated system: • Use appropriate tools and equipment • Performing routine server maintenance	PA2
3	Familiarize the user with the verification and validation of the data: • Monitoring work and also auditing on users	PA3
4	Routine backups and evaluations: • Insulation and Security • Storing data on a cloud server	PA4
5	Conducting instructional training to users: • Analyze, socialize, and monitor the needs of users	PA5

Based on the table above, we were able to identify and determine six preventive mitigation actions that may be used to overcome the selected risk agent. After developing the preventive action outcome, the following stage will be to determine the correlation of preventive action.

4.4.4 Correlation Identification

The table below will describe the association between the priority risk agent and the previously established preventive action agent based on the correlation scale.

Table 4.15 Correlation of Preventive Action

Risk Agent	Correlation	Preventive Action Code
A1	0	
	1	PA3, PA2, PA4
	3	
	5	PA1, PA5
A7	0	
	1	PA5, PA3
	3	PA4, PA1
	5	PA2

Based on the table above, we can conclude that the low correlation at

4.4.5 Difficulty Measurement

The goal of the difficulty measurement process is to gauge how difficult it will be to implement the preventative measures that have already been decided upon to reduce the risk. The following table will provide an explanation of how the difficulty measurement at XYZ Convection Store was determined:

Table 4.16 Difficulty Level

Weight	Criteria
1	Easy to be implement
3	Medium to be implement
5	Difficult to be implement

Table 4.17 Preventive Action Difficulty Measurement

Preventive Action Code	Weight
PA1	3
PA2	3
PA3	3
PA4	3
PA5	1

Based on the table above, we can conclude that the low correlation at preventive action difficulty measurement is PA5 with a weight of 1, followed by PA1, PA2, PA3, and PA4 with are weight of 3. After measuring the difficulty of preventive action, the overall effectiveness will be calculated to determine the most effective preventive action to be done.

4.4.6 Total Effectiveness Measurement

The total effective measurement can be determined by multiplying each ARP risk value by the correlation value of the preventative measure, as shown in the table below:

1. Total Effectiveness A1

Table 4.18 Calculation of Total Effectiveness A1

A1	$= \sum j \; ARP_1 \; Ejk_1$ = 156 x 5 = 780
A2	$= \sum j \; ARP_1 \; Ejk_2$ = 156 x 1 = 156
A3	$= \sum j \; ARP_1 \; Ejk_3$ = 156 x 1 = 156
A4	$= \sum j \; ARP_1 \; Ejk_4$ =156 x 1 = 156
A5	$= \sum j \; ARP_1 \; Ejk_5$ = 156 x 5 = 780

According to the total effectiveness calculation for risk agent A1, the corresponding results for total effectiveness are 780, 156, 156, 156, and 780.

2. Total Effectiveness A7

Table 4.19 Calculation of Total Effectiveness A7

A1	$= \sum j \; ARP_7 \; Ejk_1$ = 128 x 3 = 384
A2	$= \sum j \; ARP_7 \; Ejk_2$ = 128 x 5 = 640
A3	$= \sum j \; ARP_7 \; Ejk_3$ = 128 x 1 = 128
A4	$= \sum j \; ARP_7 \; Ejk_4$ = 128 x 3

	= 384
A5	= $\sum j\ ARP_7\ Ejk_5$ = 128 x 1 = 128

According to the total effectiveness calculation for risk agent A7, the corresponding results for total effectiveness are 384, 640, 128, 384, 128.

Table 4.20 Total Effectiveness Value

ED1	= $\mathrm{A1}_1 + \mathrm{A7}_1$
	= 780 + 384
	= 1164
ED2	= $\mathrm{A1}_2 + \mathrm{A7}_2$
	= 156 + 640
	= 796
ED3	= $\mathrm{A1}_3 + \mathrm{A7}_3$
	= 156 + 128
	= 284
ED4	= $\mathrm{A1}_4 + \mathrm{A7}_4$
	= 156 + 384
	= 540
ED5	= $\mathrm{A1}_5 + \mathrm{A7}_5$
	= 780 + 128
	= 908

4.4.7 Effectiveness Difficulty Measurement

The Effectiveness Difficulty (ED) was determined by dividing the total effectiveness of all mitigation action strategies by the difficulty value of each preventative mitigation activity. The effectiveness difficulty calculation is shown below:

Table 4.21 Calculation of Effectiveness Difficulty

ED1	= $TE_1 + D_1$
	= 1164/3
	= 388
ED2	= $TE_2 + \mathrm{D7}_2$
	= 796/3
	= 265.3
ED3	= $TE_3 + D_3$
	= 284/3
	= 94.6
ED4	= $TE_4 + D_4$
	= 540/3
	= 180

ED5	$= TE_5 + D_5$
	= 908/1
	= 908

After arranging the House of Risk Phase 2 Table, the next step is determining the rank of preventive action to be prioritized as table shown below:

Table 4.22 Priority Rank of Mitigation Action

Code	Preventive Action	Effectiveness Difficulty	Priority Rank
PA5	Conducting instructional training to users	908	1
PA1	Conduct monitoring and feedback and evaluation	388	2
PA2	Update an outdated system	265.3	3
PA4	Routine backups and evaluations	180	4
PA3	Familiarize the user with the verification and validation of the data	94.6	5

In order of priority based on the results of preventive mitigation action strategies, it has been determined that conducting instructional training for users (PA5) is the top priority with an effectiveness difficulty value of 908. Following closely is conducting monitoring, evaluation, and feedback (PA1) in second place with an effectiveness difficulty value of 388 and updating outdated systems (PA2) in third place with an effectiveness difficulty value of 265.3. In fourth place is routine backups and evaluations (PA4) with an effectiveness difficulty value of 180, and lastly, familiarizing the user with verifying and validating the data (PA3) is in fifth place with an effectiveness difficulty value of 94.6.

CHAPTER V
DISCUSSION

5.1 Discussion

In this study, we will explore various approaches to mitigating the risks identified in risk management, including proactive measures to minimize the impact of risk events and agents. A total of 10 risk events and 10 risk agents have been identified in this research. As a result, the conclusions derived from the analysis using the House of Risk method will be presented as follows:

1. Risk Event

By analyzing the research results utilizing the House of Risk technique, we have unequivocally identified ten risk events. These events will be thoroughly detailed as follows:

1. Insufficient user adoption (E1)
2. Inadequate training (E2)
3. Data loss or corruption (E3)
4. System downtime (E4)
5. Budget overruns (E5)
6. Data inaccuracies(E6)
7. Performance issues (E7)
8. Customization complexity (E8)
9. Integration challenges (E9)
10. Inadequate scalability (E10)

2. Risk Agent

By analyzing the research results utilizing the House of Risk technique, we have unequivocally identified ten risk events. These events will be thoroughly detailed as follows:

1. Employees are unfamiliar with the new system (A1)
2. Limited or ineffective training programs (A2)
3. Technical issues during the data transfer process or corruption file (A3)
4. Hardware or software system failure (A4)
5. Underestimation of implementation costs (A5)
6. Data synchronization issues between different modules or databases (A6)
7. Inadequate hardware or network resources (A7)

8. Inadequate expertise in configuring and customizing the Odoo system (A8)
9. Incompatibility between Odoo and the existing system (A9)
10. Leading to performance issues or the need for costly system upgrades (A10)

3. Risk Management Strategy

The risk management strategy has been established based on the identified risk events and potential risk agents. Based on the result of the Pareto chart, two risks that need to be prioritized. They are risk agents employees unfamiliar with the new system (A1) and have inadequate hardware or network resources (A7), with Aggregate Risk Potential values of 156 and 128. Also, eight risk agents that are non-priority. They are limited or ineffective training programs (A2), technical issues during the data transfer process or corruption file (A3), hardware or software system failure (A4), underestimation of implementation costs (A5), data synchronization issues between different modules or databases (A6), inadequate expertise in configuring and customizing the Odoo system (A8), incompatibility between Odoo and the existing system (A9), Leading to performance issues or the need for costly system upgrades (A10), with Aggregate Potential Risk values in a sequence of 82, 32, 31, 21, 46, 29, 33, and 29.

4. Preventive Action Strategy

The House of Risk study effectively identifies solutions to minimize the impact of risk agents and events by implementing proactive measures. These actions are meticulously categorized based on specified priorities and will be detailed as follows:

a) Conducting instructional training to users (PA5)

The most successful risk prevention measure is providing instructional training to users (PA5), with a total effectiveness difficulty value of 908. The preventive action difficulty measurement is one, indicating that it is straightforward to implement in small and medium-sized enterprises (SMEs).

b) Conduct monitoring, feedback, and evaluation (PA1)

The second risk prevention measure is providing instructional training to users (PA5), with a total effectiveness difficulty value of 388. The preventive action difficulty measurement is three, indicating that it is medium to implement in small and medium-sized enterprises (SMEs).

c) Update an outdated system (PA2)

The third risk prevention measure is providing instructional training to users (PA5), with a total effectiveness difficulty value of 265.3. The preventive action difficulty measurement is three, indicating that it is medium to implement in small and medium-sized enterprises (SMEs).

d) Routine backups and evaluations (PA4)

The fourth risk prevention measure is providing instructional training to users (PA5), with a total effectiveness difficulty value of 180. The preventive action difficulty measurement is three, indicating that it is medium to implement in small and medium-sized enterprises (SMEs).

e) Familiarize the user with the verification and validation of the data (PA3)

The second fifth prevention measure is providing instructional training to users (PA5), with a total effectiveness difficulty value of 94.6. The preventive action difficulty measurement is three, indicating that it is medium to implement in small and medium-sized enterprises (SMEs).

CHAPTER VI
CLOSING

6.1 Conclusion

Previous data processing has identified ten potential risk events that could impact the success of XYZ convection SMEs in achieving their goals. These risks include insufficient user adoption (E1), inadequate training (E2), data loss or corruption (E3), system downtime (E4), budget overruns (E5), data inaccuracies (E6), performance issues (E7), customization complexity (E8), integration challenges (E9), and inadequate scalability (E10).

Also, at XYZ Convection SMEs, considerable attention should be directed towards identifying various risk agents that can precipitate a range of adverse outcomes. These risk agents encompass employees' lack of familiarity with the new system (A1), inadequacy or inefficacy of training programs (A2), occurrences of technical complications during the data transfer process or file corruption (A3), hardware or software system failure (A4), underestimation of implementation costs (A5), data synchronization issues between diverse modules or databases (A6), insufficiency of hardware or network resources (A7), inadequate proficiency in configuring and customizing the Odoo system (A8), as well as incompatibility between Odoo and the existing system (A9), potentially leading to performance issues or necessitating costly system upgrades (A10).

Upon completion of the identification of risk events and agents, the subsequent phase entails the evaluation of the correlation of each risk event and agent through the computation of the Aggregate Risk Potential. Subsequently, the primary risks will be ascertained using a Pareto Chart and ranking analysis. Following risk prioritization, the next step involves identifying preventive actions. There are five potential preventive actions based on the prioritized risks, including conducting monitoring, feedback, and evaluation (PA1), updating outdated systems (PA2), familiarizing users with data verification and validation (PA3), performing routine backups and evaluations (PA4), and providing instructional training to users (PA5).

The determination of these preventive actions is rooted in the difficulty measurement and is anticipated to be supported by research on the risk analysis of implementing the Odoo system within XYZ Convection SMEs. Implementation of these preventive actions by XYZ Convection SMEs aims to enable the organization to proactively address risks that may emerge

in its business processes. This strategic approach is poised to enable the identification and evaluation of risks and ultimately mitigate or eliminate potentially detrimental threats, offering substantial benefits to the company.

6.2 Suggestion

After conducting extensive research, it is strongly advised that XYZ Convection SMEs take proactive measures to meticulously devise comprehensive strategies aimed at mitigating potential risks. These strategies are crucial for ensuring the seamless integration of the Odoo system and sustaining uninterrupted business operations. Additionally, the findings of this study catalyze prompting the owners of XYZ Convection SMEs to explore and promptly implement highly effective risk management measures.

The actionable insights gleaned from this research constitute invaluable recommendations for the undergraduate community. It is strongly recommended that XYZ Convection SMEs take into account the implementation of robust strategies to address potential risks, thereby preventing any disruptions to the Odoo system integration and the continuity of crucial business processes. Furthermore, this research underscores the urgent need for owners of XYZ Convection SMEs to promptly engage in the exploration and implementation of highly efficient risk management mitigation methods. The research findings suggest that XYZ Convection SMEs should proactively develop strategies to mitigate potential risks and ensure the smooth integration of the Odoo system while maintaining uninterrupted business operations. This study aims to encourage owners of XYZ Convection SMEs to explore and promptly implement effective risk management measures. The actionable suggestions provided by the research offer valuable insights for this undergraduate research. It is recommended that XYZ Convection SMEs consider implementing strategies to address potential risks in order to prevent disruptions to the Odoo system implementation and business processes. Additionally, the research emphasizes the importance of promptly exploring effective risk management mitigation methods for owners of XYZ Convection SMEs.

REFERENCE

Dorong UMKM Naik Kelas Dan go export, Pemerintah Siapkan Ekosistem Pembiayaan Yang Terintegrasi - Kementerian Koordinator Bidang perekonomian Republik Indonesia. https://ekon.go.id/publikasi/detail/5318/dorong-umkm-naik-kelas-dan-go-export-pemerintah-siapkan-ekosistem-pembiayaan-yang-terintegrasi

Veronika, L.Y. (2021). Peran penting Teknologi Informasi.

Sheik, P.A., & Sulphey, M.M. (2020). Enterprise Resource Planning (ERP) As a Potential Tool for Organizational Effectiveness. *Webology, 17*, 317-327.

Peterson, K.E. (2020). What Is Risk Management? *The Professional Protection Officer*.

Rafeek, M.A., Arbain, A.F., & Sudarmila, E. (2019). Risk Mitigation Techniques in Agile Development Processes. *International Journal of Supply Chain Management, 8*, 1123-1129

Purnomo, B. H., Suryadharma, B., & Al-hakim, R. G. (2021). Risk mitigation analysis in a supply chain of coffee using House of Risk Method. *Industria: Jurnal Teknologi Dan Manajemen Agroindustri*, *10*(2), 111–124. https://doi.org/10.21776/ub.industria.2021.010.02.3

Johnsen, C., Thegler, A., Skovhede, K., & Vinter, B. (2021). SME: A High Productivity FPGA Tool for Software Programmers. *ArXiv, abs/2104.09768*.

Srivastava, D., & Batra, A. (2020). ERP Systems.

Harman, G. (2019). Object-Oriented Ontology (OOO). *Oxford Research Encyclopedia of Literature*.

Segall, R.S. (2020). What Is Open Source Software (OSS) and What Is Big Data? *Research Anthology on Usage and Development of Open Source Software*.

Parenreng, S. M., Rusman, M., Nilda, Darmawan, A., Bakri, I., & Nurhidayat. (2019). The supply chain risk analysis using house of risk method: Seaweed Commodity in Jeneponto case study. *IOP Conference Series: Earth and Environmental Science*, *343*(1), 012011. https://doi.org/10.1088/1755-1315/343/1/012011

López, F. (2020). Risk. *Journal Economic Development Technological Chance and Growth*.

Paillin, D.B., & Tupan, J. (2021). The supply chain risk assessment for tuna during the Covid-19 pandemic in Ambon by using the House of Risk Method. *IOP Conference Series: Earth and Environmental Science, 797*.

Kyngäs, H.A. (2019). Inductive Content Analysis. *The Application of Content Analysis in Nursing Science Research*.

Ajemba, M.N., & Arene, E.C. (2022). Research gaps for future research and their identification. *World Journal of Advanced Research and Reviews*.

Sher, I. (2020). How perspective-based aggregation undermines the Pareto principle. *Politics, Philosophy & Economics*, *19*, 182 - 205.

Mazhar, S.A. (2021). Methods of Data Collection: A Fundamental Tool of Research. *Journal of Integrated Community Health*.

Soroka-Potrzebna, H. (2020). RISK IDENTIFICATION AS A BASIC STAGE OF THE PROJECT RISK MANAGEMENT.

Huang, P., Di, P., & Li, J. (2019, March 30). Project Risk Identification Based on the Interaction of Risks from the Approach of Multi-agent Simulation. *IOP Conference Series: Earth and Environmental Science*, *242*, 052053. https://doi.org/10.1088/1755-1315/242/5/052053

Garvey, P.R. (2019). Scoring the risk matrix. *Int. J. Syst. Syst. Eng.*, *9*, 28-43.

Da Costa Lewis, N. (2020). Correlation Analysis.

Liperda, R. I., & Salsabila, D. T. (2023, June 12). ANALISIS RISIKO DALAM PROSES PENGADAAN JASA DI RU III MENGGUNAKAN PENDEKATAN HOUSE OF RISK (HOR). *INFOTECH Journal*, *9*(1), 270–278. https://doi.org/10.31949/infotech.v9i1.5494

Coccia, M. (2020). Fishbone Diagram for Technological Analysis and Foresight. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3719084