Risk assessment user interface design’s by using object orientation programming approximation in Wooden Toys Industry

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Risk Assessment User Interface Design's by using Object Orientation Programming Approximation in Wooden Toys Industry

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Abstract - Supply chain is a group of companies that work together to create and deliver products to end users [7]. Whereas supply chain risk is defined as an imbalance between demand and supply. Supply chain disruptions can cause various problems such as length of waiting time, out of stock, inability to meet customer demand, and rising costs [1]. If supply chain risk occurs, it will certainly cause material and non-material losses. To anticipate this loss, proper supply chain risk management is essential. In this study, the author developed [11] research entitled "Risk Management Analysis Using FMECA and ANP Methods in the Supply Chain of Wooden Toy Industry", IOP Conference Series: Materials Science and Engineering, 2019 "The development carried out by the author is" Risk Assessment User Interface Design's by using Object Orientation Programming Approximation in Wooden Toys Industry" aims to build information systems so that users more easily determine the greatest risk in the company and can minimize the impact of risks that may occur so that it is more effective and efficient . There are 6 risk factors with 25 risk variables from the data questionnaire results [11] and the biggest risk factor is eviroment with marcoeconomic variable risk of 518,778.
Keywords: supply chain, risk management, Failure Mode Effects and Criticality Analysis (FMECA), User Interface, Object Oriented programming.

1. INTRODUCTION

Companies in the small and medium industry sector are companies that are vulnerable to supply chain risks. So that the need for SCRM, SCRM is the implementation of strategies to manage every day through continuous risk assessment with the aim of reducing vulnerability or risk [8]. Therefore, with the development of existing computer technology, especially in business and information systems can be designed to minimize this loss. The information system is designed based on object oriented FMECA method. This information system serves to determine priority risks that occur in a company, so that the risks that exist in the company can be minimized and can facilitate the user in determining risks effectively and efficiently.

2. LITERATURE REVIEW

2.1 Supply Chain Risk Management

In improving supply chain efficiency and performance, one way is to estimate and manage the possible risks that can arise and disrupt the system so that the company can avoid negative adverse impacts on the company. Supply Chain Risk Management (SCRM) is a potential source of risk and implements appropriate strategies through coordinated among members who need supply chains, to reduce supply chain needs [12]. According to [5] risk assessment covers the stages of risk identification that aims to identify risks that can affect the achievement of organizational goals.

2.2 Failure Mode Effects and Criticality Analysis (FMECA)

Risk identification and determination of risks that have a major effect on company performance can be assessed using the FMECA method. FMECA is an evolutionary method from FMEA which consists of two separate analyzes, namely FMEA and Criticality Analysis (CA). The FMEA (Failure Mode Effects Analysis) method is a method used to identify potential failure modes, determine their effect on product or system operations, and identify actions to reduce these failures. While FMEA must be completed before conducting criticality analysis [6]. By doing CA means providing additional benefits by showing a quantitative ranking of the system and / or subsystem failure mode [4]. Criticality analysis is performed using a statistical approach that is the frequency distribution to determine classes and intervals only. Frequency distribution table is the arrangement of data in a table that has been classified according to certain classes or certain categories [9]. In FMECA, a failure or risk assessment is represented in a value named Risk Priority Number (RPN). RPN is an assessment resulting from the multiplication of three factors and is a value that is an indication of the seriousness of a potential failure or risk, if the RPN value is higher the higher the level of seriousness of a potential failure or risk. These factors are severity, occurrence, and detection (SOD). According to [1] AHP for weighting risk sources and risk variables and FMECA to determine the priority level of risk.

2.3 User Interface

Designing the interface is the most important part of designing the system. an interface must be simple, an interface must be complete, and an interface must have fast performance. The interface describes a collection of objects and operations that can be used to manipulate objects [2]. In the interface development process, the focus must be on the interface elements and the objects that the user sees and uses, rather than the capabilities of a program. The process that in detail illustrates how interface design and development is seen in the picture above.

2.4. Object Oriented System Design Approach

Object-oriented system design approach is a new approach technique in seeing problems and systems (software systems, information systems, or other systems) [2]. This approach views the system to be developed as a collection of objects in the real world. When abstracting and modeling objects, the data and processes owned by the object will be encapsulated (wrapped) into a single unit. In software engineering, the concept of object-oriented approach can be applied at the analysis, design, programming, and software testing stages. There are various techniques that can be used at each of these stages, with certain modeling rules and aids. Use case diagram: This diagram uses the set of use-cases and actors (a special type of class). This diagram is very important for organizing and modeling a system needed by the user. Activity Diagram: This diagram illustrates the various activities flow in the system designed, how each flow starts, the decisions that might occur, and how they end [10]. Sequence Diagram: A sequence diagram is an interaction that is determined at the time a message is sent at a certain time.

3. METHODOLOGY

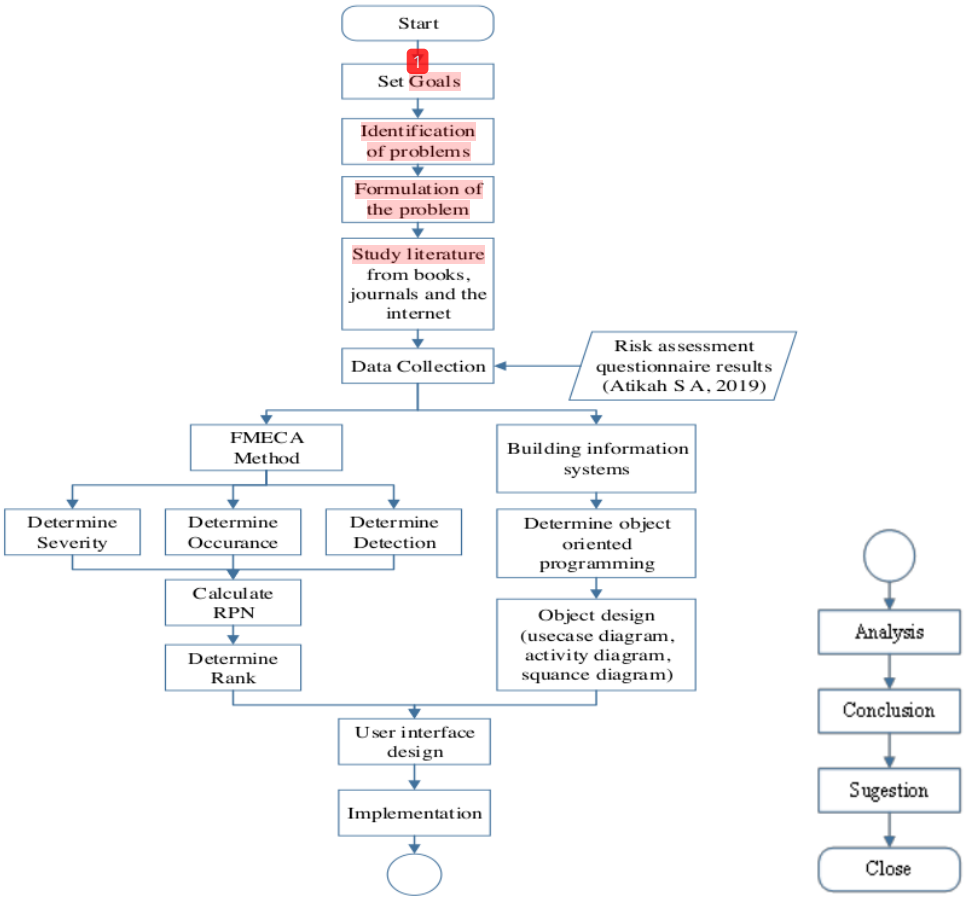

Figure 1. Research Flowchart

Based on the flowchart in Figure 1, the research flow is divided into 3 stages. The first step is to set goals, identify problems, formulate problems, study literature, and collect data. In the second stage, it is divided into two parts, namely the measurement of the magnitude of risk in the supply chain of the Wooden Toy Industry using the FMECA method. Data is taken from previous research [11] and building information systems, determining object oriented, designing object oriented, then combined to design user interface design and implementation. The third stage is to analyze the results of calculations and draw conclusions from the results of the analysis that has been made, so that the formulation of the problem and the research objectives that have been set can be answered and closed.

4. RESULT AND DISCUSSION

4.1. Supply Chain Risk Identification Based on Literature and Interviews

Identification of risks in the supply chain is carried out based on a literature study in the form of a reference journal according to [3] regarding risk categories in the supply chain lines that are generally found in companies. The categories are arranged in the form of sources of risk or *risk events* which are

risk events and risk variables or *risk agents* which are risk agents from the results of *risk event* classification.

Table 1. Supply Chain Risk Factors and Variables

Risk Event	***Risk Agent***
Demand Risk	Competitor Moves
	Delays in Delivery to Customers
	Forecast Error
	Market Saturation
Environment Risk	Macroeconomic Uncertainty
	Natural Disasters
	Policy Uncertainty
	Social, Culture & Politic Uncertainty
Financial Risk	Cost/Price Risks
	Exchange Rate Risk
Information Risk	Breakdown of IT Infrastructure
	Distorted Information
	Inadequate Information Security
	Information Delay
	Wrong Choice of Communication
Operational Risk	Capacity Inflexibility
	Design Changes
	Disruption in Production
	Inventory Risks
	Variability in Production Process
Supply Risk	Dependency on Single Supplier
	Inflexibility of Supplier
	Poor Delivery Performance
	Supplier Poor Quality
	Supplier Bankruptcy

The risk classification is carried out based on the activities carried out by the company in the supply chain channel. Then do a compilation based on sub-risks or in this study referred to as risk events. Risks are classified as risk agents. Agent risk is the risk that causes a risk event to occur. Based on the results of secondary data collection from previous studies conducted by [11]. risks contained in Table 1, 25 risk agents were obtained from 6 risk events.

Table 2. Results of the Risk Assessment Questionnaire [11]

Risk Factor	Risk Variable	P1			P2			P3		
		S	O	D	S	O	D	S	O	D
Demand	Competitor moves	5	10	1	5	5	3	1	1	1
	Delays in delivery to customers	8	8	1	1	3	3	5	5	2
	Forcast errors	5	8	5	5	7	5	1	8	2
	Market saturation	7	2	2	5	5	3	5	3	8
Environment	Macroeconomic uncertainty	10	8	5	9	7	8	10	8	8
	Natural disasters	8	2	6	3	1	8	8	8	10
	Policy uncertainty	10	8	5	5	5	8	3	2	2
	Social uncertainty	10	8	5	3	4	3	5	2	4
Financial	Business risk	5	5	5	6	7	7	8	10	5
	Cost/price risk	8	1	2	5	6	1	1	2	4
Information	Exchange rate risk	10	1	2	3	2	2	3	5	2
	Breakdown of IT infrastructure	6	6	5	6	3	2	3	2	1
	Distorted information	5	4	8	5	4	4	2	2	1
	Inadequate information security	8	5	6	6	5	3	2	3	1
	Information delay	5	5	5	5	2	2	8	5	2
Operational	*Wrong choice of communication*	6	7	5	7	4	3	8	7	3
	Capacity inflexibility	5	5	1	6	4	3	8	10	1
	Design changes	8	5	5	6	5	3	8	5	2
	Disruption in production	6	6	4	3	3	3	5	8	2
	Inventory risk	4	5	5	4	7	4	1	1	1
Supply	Dependency on single supplier	5	2	3	6	5	3	5	3	1
	Inflexibility of supplier	2	2	2	6	6	3	8	8	3
	Poor delivery performance	7	1	1	8	6	4	1	2	2
	Supplier poor quality	8	1	1	7	5	4	5	8	5
	Supplier bankruptcy	10	1	1	5	3	2	3	8	2

Based on Table 2, it can be seen that each expert has a different assessment. Assessment uses a *Lickerd* scale (ordinal) which ranges from 1 to 10 to make it easier for experts to do the assessment. The *severity of the* assessment given is related to how severe the impact of the risk is if it occurs. And on the *detection* assessment given is related to how easily the risk can be detected if it occurs.

4.2. Data Processing and Analysis

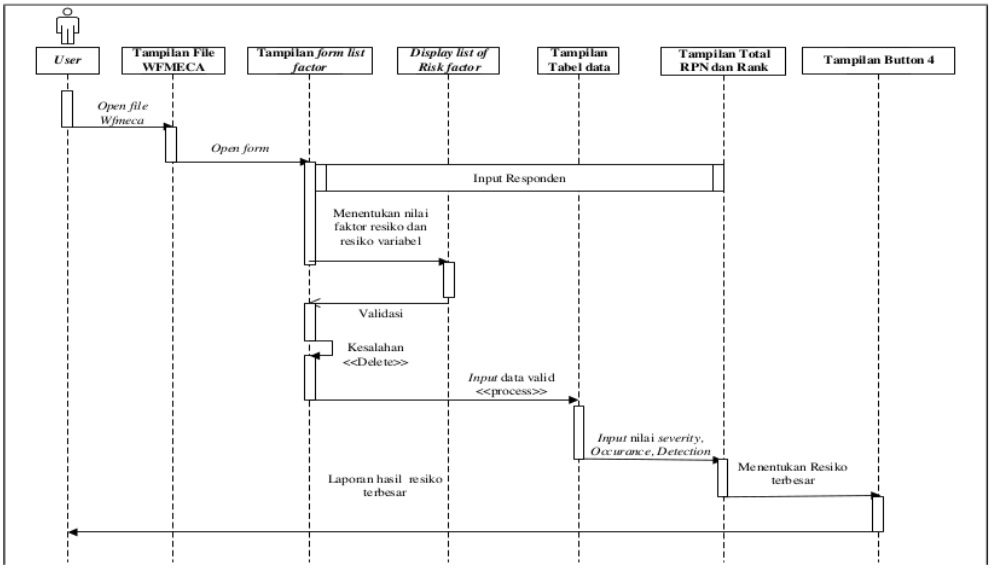

Figure 2. Squance Diagram Object Oriented

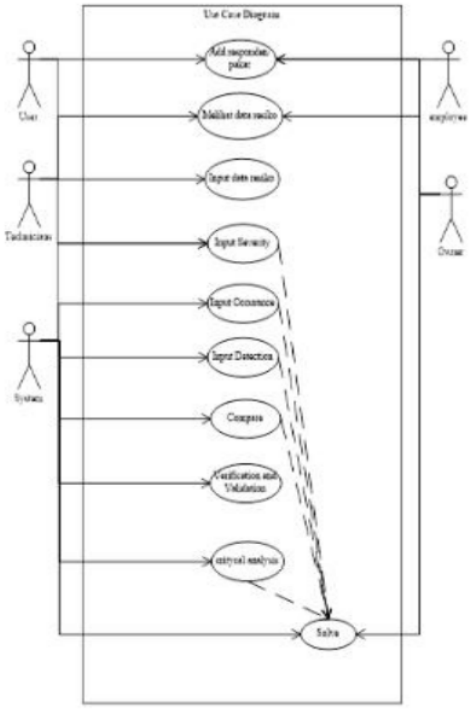

Figure 3. Use case diagram user interface OOP

Figure 4. Activity Diagram Object Oriented

From use case diagrams, sequence diagrams and activity diagrams explain the interactions between interrelated objects and are arranged in a time sequence based on the activities carried out.

4.3. Data Processing Using Methods

In the activities of the supply chain of the Wooden Toy Industry, there are 25 risk variables which are grouped into 6 risk factors namely demand, environment, finance, information, operations and supply. To identify and determine the magnitude of the risks and risks that often occur in supply chain activities, in this study data processing was performed using the method (FMECA) [11].

Figure 5. Display user interface on Ms. Excel

Figure 6. Display list Factor risk and List variable risk

Risk Factor	Weight	Risk Variable	S	O	D	RPN	Rank
Demand	0.22	competitor moves	5	4	2	32.5926	24
Demand		Delays in delivery to customers	5	5	2	49.7778	17
Demand		Forcast errors	8	4	4	112.444	7
Demand		Market saturation	3	6	4	81.8519	10
Environment	0.082	Macroeconomic uncertainty	8	10	7	518.778	1
Environment		Natural disasters	4	6	8	185.778	3
Environment		Policy uncertainty	5	6	5	150	5
Environment		Social uncertainty	5	6	4	112	8
Financial	0.234	Cost/price risk	7	6	6	263.185	2
Financial		Exchange rate risk	3	5	2	32.6667	23
Information	0.094	Breakdown of IT infrastructure	3	5	2	28.4444	25
Information		Distorted information	4	5	3	48.8889	18
Information		Inadequate information security	3	4	4	57.7778	16
Information		Information delay	4	5	3	77.037	12
Information		Wrong choice of communication	4	6	3	72	14
Operation	0.179	Capacity inflexibility	6	7	4	154	4
Operation		Design changes	6	6	2	66.8519	15
Operation		Disruption in production	5	7	3	122.222	6
Operation		Inventory risk	6	5	3	79.3333	11
Operation		Variability in production process	4	3	3	43.3333	19
Supply	0.191	Dependency on single supplier	3	5	2	41.4815	20
Supply		Inflexibility of supplier	5	5	3	75.8519	13
Supply		Poor delivery performance	3	5	2	37.3333	22
Supply		Supplier poor quality	5	7	3	103.704	9
Supply		Supplier bankruptcy	4	6	2	40	21

Figure 7. Display severity, occurance, detection

Form Button 4

Risk Factor	Weight	Risk Variable	S	O	D	RPN	Rank
Information	0.094	Breakdown of IT infrastructure	3	5	2	28.4444	25
Demand	0.22	competitor moves	5	4	2	32.5926	24
Financial	0.234	Exchange rate risk	3	5	2	32.6667	23
Supply	0.191	Poor delivery performance	3	5	2	37.3333	22
Supply	0.191	Supplier bankruptcy	4	6	2	40	21
Supply	0.191	Dependency on single supplier	3	5	2	41.4815	20
Operation	0.179	Variability in production process	4	3	3	43.3333	19
Information	0.094	Distorted information	4	5	3	48.8889	18
Demand	0.22	Delays in delivery to customers	5	5	2	49.7778	17
Information	0.094	Inadequate information security	3	4	4	57.7778	16
Operation	0.179	Design changes	6	6	2	66.8519	15
Information	0.094	Wrong choice of communication	4	6	3	72	14
Supply	0.179	Inflexibility of supplier	5	5	3	75.8519	13
Information	0.094	Information delay	4	5	3	77.037	12
Operation	0.179	Inventory risk	6	5	3	79.3333	11
Demand	0.22	Market saturation	3	6	4	81.8519	10
Supply	0.191	Supplier poor quality	5	7	3	103.704	9
Environment	0.082	Social uncertainty	5	6	4	112	8
Demand	0.22	Forcast errors	8	4	4	112.444	7
Operation	0.179	Disruption in production	5	7	3	122.222	6
Environment	0.082	Policy uncertainty	5	6	5	150	5
Operation	0.179	Capacity inflexibility	6	7	4	154	4
Environment	0.082	Natural disasters	4	6	8	185.778	3
Financial	0.234	Cost/price risk	7	6	6	263.185	2
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Figure 8. Display result

Figure 5 explains the appearance of the user interface on the excel macros that have been designed, then in Figure 6 input the risk agent data and risk variables in the list of factors, then click Save and Process, then the table will come out like Figure 7. From Figure 8 Displays the results of clicks from button 4 which displays the rank results to find out the highest risk. From the data generated RPN highest amounted to 518 778 with a level of critical extremely high, in part *risk factor and Environment* and *Risk Variable Macroeconomic uncertainty*. It is causing a risk not to be accepted it must immediately do mitigation.

5. CONCLUSIONS AND RECOMMENDATIONS

The prototype design of the object-oriented programming industry's toy-based supply chain risk management system can be completed using the FMECA method on Macro Excel, making it easier for users to determine the greatest risk in the company in order to minimize risk. There are 25 risk variables and risk variable classification into six risk factors, namely demand, environment, finance, information, operations, and supply. Based on data processing using the Macro Excel user interface with the Failure Mode, Effects and Criticality Analysis (FMECA) methods, The results show that the risk factors identified in the environment (environment) with macroeconomic uncertainty (total economic uncertainty) the highest of 518,778.

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6. REFERENCES

[1] Bahauddin, Achmad and Minata, Arina 2015 *Analisis dan Strategi Penanganan Risiko Supply Chain Pada PT. Batik Banten Indonesia Menggunakan AHP dan FMECA*. Universitas Ageng Tirtayasa, Cilegon.

[2] Grady Booch1991 *Object-Oriented Analysis and Design with Application*. Benjamin/Cummings.

[3] Jafarnejad, A, Ebrahimi, M, Ali Abbaszadeh, M and Abtahi, SM 2014 Risk Management in Supply Chain using Consistent Fuzzy Preference Relations. *International Journal of Academic Research in Business and Social Sciences*, **4**(1).
[4] Lipol, Lefayet S, Haq, J 2011 *Risk Analysis Method: FMEA/FMECA in The Organizations*. (Boras: University of Boras).
[5] Mahadewi Lufina 2017 *Proses Manajemen Resiko*. Retrievied from : https://swa.co.id/swa/my-article/proses-manajemen-risiko (accessed on 28 october 2019)
[6] Paolo, Berno 2010 *A Tool for The Integration of FMECA and Diagnostic Analysis*. (Italia: Politechnic Milan).
[7] Sumajouw, MD and Sompie, BF 2014 Manajemen Risiko pada Perusahaan Jasa Pelaksanaan Konstruksi di Provinsi Papua (Studi Kasus di Kabupaten Sarmi). *Jurnal Ilmiah Media Engineering* **4**(2), 109-118.
[8] Schlegel, Gregory L, Trent, Robert J 2014 *Supply Chain Risk Management: An Emerging Discipline*. CRC Press Taylor & Francis Group, Boca Raton.
[9] Siagian, D and Sugiarto 2006 *Metode Statistika*. (Jakarta: Gramedia Pustaka Utama)
[10] Suryadi, L 2015 Analisis dan Perancangan Sistem Informasi Pendistribusian Gas Lpg Bersubsidi dengan Metodologi Object Oriented Studi Kasus PT. XYZ. In *Seminar Nasional Informatika (SEMNASIF)* **1**(5).
[11] Tanjung WN, SA Atikah, et al. 2019 Risk Management Analysis Using FMECA and ANP Methods in the Supply Chain of Wooden Toy Industry. *IOP Conference Series: Materials Science and Engineering*.
[12] Zaroni.2015. *Manajemen Risiko Rantai Pasok dalam Model SCOR*. Retrieved from Supply Chain Indonesia:http://supplychainindonesia.com/new/manajemen-risiko-rantai-pasok-dalam-model-scor/ (accessed on January 31, 2019)

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