Risk Mitigation Analysis of Santri Entrepreneurship Development Process Using House of Risk Matrix in the Pabelan Pesantren in Disruption Era

Suliswiyadi[1], S Noor[2], N Azizah[3]

Departement of Islamic Education, Universitas Muhammadiyah Magelang, Jalan Mayjen Bambang Soegeng km. 5 Mertoyudan, Magelang 56172, Jawa Tengah, Indonesia[1]
Sekolah Tinggi Agama Islam Muhammadiyah (STAIM) Blora, Jalan Raya Cepu-Blora km. 4, Palkembar, Seso, Blora 58261, Jawa Tengah, Indonesia[2]
Universitas Ibrahimy Situbondo, Pondok Pesantren Salafiyah Syafi'iyah, Sukorejo Situbondo, Jawa Timur[3]
{suliswiyadi@ummgl.ac.id[1], saadahnoor2018@gmail.com[2], nurulazizah@ibrahimy.ac.id[3]}

Abstract. *Pabelan Pesantren* is an educational institution that has undergone a long history and is now the third resurrection. This *Pesantren* also has functions and roles as a community development institution, including the economic development of Ummat. The consequence is to equip and train *santris* to be entrepreneurial so that after graduation they can be independent with their business. However, the pattern of education still prepares *santris* to become workers or laborers in the process of implementing educational products, in addition to job reduction problems due to the impact of automation from the applicability of the Industrial Revolution 4.0. Therefore, it is necessary to manage an efficient educational activity through actions to identify, evaluate risks and mitigate risks to achieve continuing education. What will be discussed in this study is identifying risk factors in input, process, output, outcome, and impact to determine how often such events occur and the degree of influence on Education sustainability. It is ensured that the risk should be minimized by using the risk map matrix. It then identifies the emergence of the risks to be established related to the risk event into the House of Risk matrix. From this research, it is expected to contribute to the mitigation measures that can reduce the incidence of risk in creating entrepreneurial behavior for *santris* in *Pesantren.*

Keywords: *Pesantren Pabelan, Santri Entrepreneurship, Risk Management*

1   Introduction

The quality of *santri* entrepreneurship produced by pesantren is one of the main process factors that are managed successfully. The better the quality of the *santri* entrepreneurship produced by the *pesantren*, the more students the entrepreneurial outcomes will be absorbed in the community into a product that drives the *ummah's* economy. The emergence of quality *pesantren* products is not determined by the production process alone. The procurement of raw materials from suppliers to the delivery process on time is an aspect of consumer satisfaction assessment. To achieve this success also requires the efforts of the parties involved [1].

Pabelan Pesantren in Magelang Regency is one of the good students. The operational process that occurs in every element of the supply chain in the *Pabelan Pesantren* plays an important role in producing the quality of entrepreneurial students. However, each operational process that occurs in the *Pabelan Pesantren* Magelang has the potential for problems or issues that can interfere with the process and will affect the outcome of the product. To survive and compete amid the pace of development of IPTEKS and Industrial Revolution 4.0 that can threaten the occurrence of disruption, the *Pabelan Pesantren* must be able to manage the supply chain owned, from raw material suppliers to finished products [2].

Preliminary observation data has shown several problems in the supply chain of *Pabelan pesantren* that influence the course of production operations. One of the examples of internal risk in *Pabelan Pesantren* is about the main raw material, the row input of the candidate students with input quality that has not been profitable, the potential input of the average students is lower middle class. Intellectually they are weak because usually, the prospective students who have good achievements tend to proceed to general education. Economically, their position is also in the lower middle class. As well as socially, they come from ordinary people [3]. This condition is also a problem for the *pesantren* because it will be influential in the education process. The consequence received from this risk is the production process to meet the expectations of the user will encounter many obstacles. This will inhibit and slow down the process of implementing supply chain management of the *pesantren*'s education system that meets the demands of quality. The background above explains that a risk identification needs to be done to know the constraints or problems that will arise and the sources causing the problem. The risk identification stage is used to map the characteristics and sources of risk that lead to the effectiveness and efficiency of supply chain performance [4]. The level of risk mitigation is also necessary to minimize the risk or disruption of the opportunities for supply chain elements.

Regarding risk in supply chain management of the *pesantren* education, risk management plays an important role to keep the supply chain system uninterrupted. In the supply chain system, risk management plays a very important role because it never knows what will happen in the future. In the context of the increased risk supply chain is partly the complexity of the network as a result of outside sources of the organization. In the context of supply chains, the increase in risk is partly the complexity of the network as a result of outside sources of the organization.

A study from Finch [5] states that network inter-organization can increase the risk factor of an organization especially when it relates to business partners. Currently, according to Tang [6], the risk of the supply chain is classified into operating risk and risk of interference. The level of dependency and complexity of the supply chain network currently makes the overall supply chain more vulnerable to interference. Any interference occurring in one of the supply chain elements can affect the overall supply network, such as the cessation of information flows and resources from upstream to downstream in the supply chain. This can lead to an imbalance between supply and demand. Therefore, the risk in the supply chain can be defined as the disruption of information flows and resources in the supply chain network due to termination and uncertain variation [7].

In general, the supply chain risk management process consists of risk identification, risk analysis, risk evaluation, and risk mitigation. Risk identification is recommended as a fundamental step in the process of risk management [8]. Most potential risks are not only within the organization but also between the members of the supply network as well as between the supply network and its environment must be identified. An unidentified risk may result in a directional fault in the supply chain risk management process (such as: Making a

Risk mitigation plan), giving rise to inexact or in conformity strategies to control these risks and this can lead to greater failures. The purpose of the research is to identify and analyze risks or disruptions that are likely to arise in education supply chain activities in *pesantren* and mitigate risk in the framework of supply chain activities development of *santris* entrepreneurship in *Pesantren*. The main objective of this research is to mitigate risk and prioritize mitigation action designed in a framework of the supply chain activities of the development of students' entrepreneurial activities in Pesantren.

Contributions or benefits of research that will be done to the process of education pesantren is expected to reduce the risks in the supply chain development of students entrepreneurs in the *pesantren* so that it can consider a risk in the future, devise a framework of some risks arising and will be followed up by the organizers and determine the strategies that want to be achieved so that the organization organizers can prevent the potential risks that will occur and the consequences when it happens.

The novelty of this research can design a pesantren education supply chain risk mitigation framework which is the beginning of its application in the field of entrepreneurship development in the complete pesantren which is embodied in the *House of Risk* model to develop a framework for managing risk.

The novelty of this research can design a risk mitigation framework for the education supply chain *pesantren* which is the beginning of its application in the field of development of students' entrepreneurship in the complete pesantren that is realized in the *House of Risk* model to develop a framework for managing risk.

Santri in the Disruption Era

The development of the era demands students to accelerate adaptability and change. *Santri* is required to have a broad intellectual, which can combine between world life and the hereafter. In the present era, the challenge of students is very different, with the progress of the era and the development of globalization. In addition to the very strong religious studies, such as the study of the *Kitab Kuning*, Moral, Tatakrama, Tawadhu, *santris* must compensate him with his intellectual ability.

Santri is faced with the Milenail era, which is a generation that lives in the progress of information and technology that has a different life pattern with the previous generations. Major changes will occur in various aspects of life, including the world of education. In this case, the *Pesantren* will have a new challenge to be able to stand in the middle of millennials.

The millennial generation *santri* now has the challenge of welcoming the 4.0 Industrial Revolution. The Era of the fourth industrial revolution has begun to live which is characterized by digital. One of the artificial intelligence (AI) is growing today. Not just for the industry, AI is also developed to facilitate human life. In addition to AI, other technologies are the support of the 4.0 industry, namely the internet of things, human-machine interface, robotic technology, and sensors. This technology is a sign that in the present era, aspects of life will enter the virtual world, the effect of its application is production efficiency and there is increased productivity and competitiveness. Like a coin that has two sides, the 4.0 Industrial Revolution does not only bring profit to the industrial sector, but it is also a new challenge.

The world that has entered the era of Industrial Revolution 4.0 seems to be no longer a mere thumb, then the students must be able and open to face the challenges of technological progress of the era of this 4.0 industry revolution. So how can we survive and adapt in this era of the 4.0 Industrial Revolution? What Formula must be possessed by the millennial students to face the era? Of course, there is a special formula to face the 4.0 industrial Revolution, the formula is named 21st-century skills 4C, which is critical thinking, creativity, collaboration, and communication. Then Shao & Purpur [9], it argues that information literacy is one of the

higher-order thinking skills (HOTS) needed to develop and support academic, professional and personal success.

First, critical thinking, students must think critically to see the outside world. Science should be dug more broadly and deeply, able to understand a complex problem and able to connect a variety of information so that it brings up a variety of perspectives that then raises an idea and a solution. But the students must stick to the creed. *Secondly*, creativity, creativity should also be demonstrated by making breakthroughs and finding new and. Creativity will be very sturdy to one's creative thinking, creativity can produce new things that are usually economically worth, this will make the students empowered in the field of industry. *Thirdly*, collaboration, students must be aware and know that human beings are social creatures created by God of Nations and tribes (Al-Hujurat: 13), have a wide network and collaborate alias co-operation, and Synergize Unite potential with others. Fourth, is communication, is one of the keys to success in this life, a lot of problems emerge that only originated from miscommunication, and a students will not look smart if not able to convey the idea well, Especially if in a sermon or lecture, a student is required to have a reliable communication rhetoric, then the skills of communication is very important. Communication skills in the spoken or written language through various media (multimedia) become very important (Sudira, 2015) is facing the era of Industrial Revolution 4.0.

The 21st-century skills are the weapon to face the 4.0 Industrial Revolution. By implementing this formula 4C, the students are expected to have a capable ability to compete and anticipate rapid changes in the era of this 4.0 Industrial Revolution, only there are two options, adapt or elimination.

Risk Management

The definition of risk by the dictionary as a result of less pleasing (harmful, dangerous) of a deed or action. Risk is the impact of uncertainty over objective achievement, i.e. the deviation from what is expected can be positive and/or negative (ISO: 31000). According to Keown [10], the risk is the prospect of an unliked result (operational as a standard deviation). The definition of risk according to risk is the magnitude of deviation between the expected return rate (expected return – ER) with the actual return rate [11]. According to Vaughan & Elliott [12], the risk is defined as 1) the chance of loss, 2) the possibility of loss, 3) uncertainty, 4) the dispersion of actual from the expected result, and 5) the probability of any outcome different from the one expected.

Thus it is concluded that the definition of risk is a condition that arises because of uncertainty with all unfavorable consequences that may occur. Risk management has many definitions. One of them, risk management is defined as the process of planning, managing, and controlling resources and other activities in an organization to minimize the consequences of losses at a cost that is still in the level of project viability.

2   Method

House of Risk (HOR) is a modification of FMEA (Failure Modes and Effects of Analysis) and the House of Quality (HOQ) model to prioritize which sources of risk are first selected for the most effective actions taken to reduce the potential risks from the source of risk. In the first calculation, the step describes the basis of the supply chain process based on the SCOR (Supply Chain Operations Reference). The basis of the supply chain process is analyzed to identify the risks that might occur and the consequences if they occur. Then described in a set of potential risks from each source of risk and the impact caused by the source of risk. This model is also based on proactive allegations or estimates of supply chain risk management that

focus on preventive action, and reduce or reduce the likelihood of sources of the risk occurring. A reduction in risk source events will prevent some of the risk events from occurring.

In FMEA, risk assessment can be calculated through the calculation of the RPI (Risk Potential Index) obtained from the product of the likelihood value and the consequence value of each risk event. However, in the house of risk approach, the calculation of the value of the RPI is obtained from the probability of the risk source and the impact of damage related to that risk. Furthermore, this research proposes a spread model called HOR (House of Risk) which is used to determine which sources of risk are prioritized for mitigation or prevention measures and prioritize actions. Procedurally the stages of the research to be carried out will be shown as in the following figure.

Fig. 1. Research Flow Chart
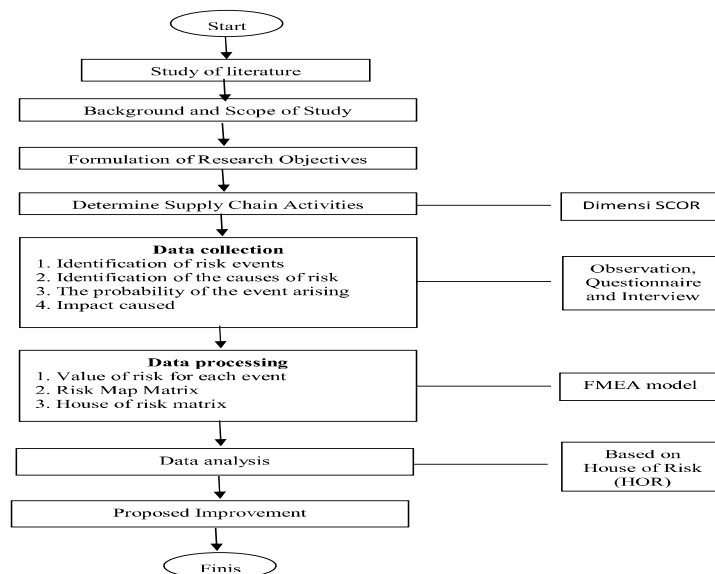
3   Result and Discussion

Risk Identification

Identification of business processes or activities of pesantren education supply chain based on the SCOR model which is divided into business sub-processes or dimensions of plan, source, process, output, and outcome. The division of business processes aims to find out where these risks can arise (where are the risks). In addition to business processes, it is also identified as the party responsible for the business processes and the risk specifications for each business process. Next, determine the value of the Risk Priority Index (RPI) which is a product of the likelihood value and the consequence value of each risk event.

Risk Mapping Matrix

The Risk Map Matrix is a matrix obtained from the relationship between the probability of a risk event and the impact of a risk event. Mapped into 5 (five) risk categories, namely extreme risk, high risk, moderate risk, low risk, and very low risk. The following is a picture of the risk map matrix for each risk event.

Fig. 2. Risk MapMatriks

Risk status is mapped into 5 (five) categories which are depicted in different colors. For red indicates the risk of extreme status, for orange indicates the risk of high status, for yellow indicates the risk of moderate status, blue indicates the risk of low status, and green indicates the risk of very low status. Based on the matrix above, the risk status categories to be handled are the risks of extreme, high, and moderate status. So that the risk events that will be controlled are as shown in the following table:

Table 1. Risk Status

Code	Risk Event	Score RPI	Risk Status
E16	Utilization of IT in the learning process does not yet exist	16	Extreme
E8	IT (Information Technology) resources to support pesantren entrepreneurship are very low	12	Hight
E17	The introduction of digital material for the development of *santri* entrepreneurship is completely absent	9	Moderate
E21	*Santri* failed to master the digital system to form entrepreneurship	9	Moderate
E19	No quality testing of entrepreneurial *santri* products was carried out during the process	9	Moderate
E20	Student products that have an attitude of independence do not work	9	Moderate
E22	Public satisfaction of low pesantren alumni	8	Moderate
E18	The measurement of the success of students' entrepreneurial attitudes was never done	6	Moderate
E6	Lack of expertise and qualifications of Human	6	Moderate

	Resources (educators) in entrepreneurship		
E2	It's hard to find students who meet the qualified row input	4	Low
E4	Supply chain mismatches with program planning	4	Low
E9	The contents of the curriculum are not yet clearly integrated with entrepreneurship aspects	4	Low
E10	Not optimal environmental support in the formation of *santri* entrepreneurship	4	Low
E23	The success of *santri* in entrepreneurship is not appreciated by their pesantren	4	Low
E25	There is no measurement of productivity of economic functions for students after *pesantren* education	4	Low
E13	The learning process of developing creative, innovative and proactive characteristics is not apparent	4	Low
E24	Tracer studies are very minimal for periodic *pesantren alumni*	4	Low
E1	Does not have the formulation of entrepreneurial santri specifications	3	Low
E7	The students' entrepreneurial intentions are very low	3	Low
E3	Capacity planning that is not as planned	2	Very Low
E5	The immediate change in the plan for the operationalization of *pesantren* education	2	Very Low
E12	The need for high achievers is not owned by students	2	Very Low
E14	Co-curricular support in the implementation of the entrepreneurship curriculum is unclear	2	Very Low
E11	*Santri* does not have a clear vision and mission of entrepreneurship	1	Very Low
E15	The interaction of educators and students is limited to academic support	1	Very Low

House of Risk Matrix

It is a matrix that illustrates the correlation between risk events and the causes of risk. So we get the number of correlation values obtained from the sum of the weight of the relationship between risk events and the causes of risk. Here is a figure of the House of Risk matrix.

Table 2. House of Risk Matrix

Risk Event	RPI	A01	A02	A03	A04	A05	A06	A07	A08	A09	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
E16	16	3	9	3	3			3			3			3		3		3			
E8	12	9	9		1	3	3		3	9		1			1		3		3		
E17	9	1	3	1				3					1								
E21	9	9	9			9	3				3			3		1	1	1			
E19	9			9	1				1	1		3	1								
E20	9		3			3		3						3		1	3	1			
E22	8								1	1		1	3	3	3						
E18	6	1	3			3										3		3			
E6	6			1	3		3	1	1		9										
Correlation Score		23	36	14	8	18	9	10	6	11	15	5	5	12	4	8	7	8	3	0	0
Rank		2	1	5	10	3	9	8	12	7	4	13	13	6	14	10	11	10	15	16	16

The table above explains that the risk events are of high status and are being correlated with each cause of risk. The correlation weight is symbolized by number 1 if there is a weak correlation between Risk Event and Risk Agent, number 3 if there is a moderate correlation between Risk Event and Risk Agent, number 9 if there is a strong correlation between Risk Event and Risk Agent. To obtain the total correlation value of each Risk Agent from the total weight of each Risk Agent.

After getting the number of correlation values for each Risk Agent, then sort is based on the largest to the smallest correlation value to make a paretto diagram. The *paretto* diagram used has the 80/20 *paretto* principle, which means that 80% of problems are caused by 20% of the biggest causes. Here is a figure of the *Paretto* diagram.
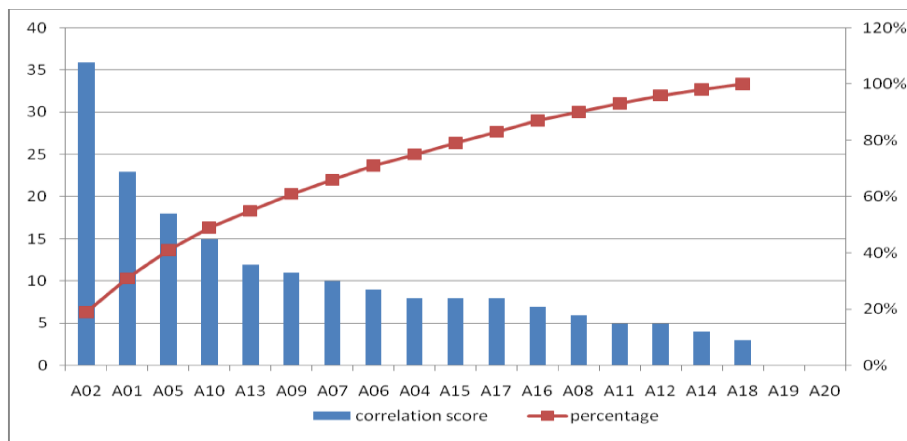

Fig. 3. *Paretto* Diagram

Based on the paretto diagram above, 20% of the biggest causes of problems are found in Risk Agents coded A02 and A01. So that the next Risk Agent will be made a handling strategy.

The proposed improvement is known to be the biggest risk in the process of digital utilization in the pesantren learning process, namely the A02 code-coded Risk Agent, the

quality procedures for the utilization of Information Technology, digital supporting and A01. Next, a recommended mitigation and development strategy will be developed as in the following table.

Table 3. Risk Status

Code	Risk Agent	Mitigation Strategies
A02	Weak utilization of Information Technology (IT) in entrepreneurship learning	Build quality awareness for all managers of Pabelan boarding schools towards IT
		Making SOP to control the entrepreneurial learning process
		Creating a learning system based on MOOCs (Masive Online Open Course)
A01	The low Information Technology (IT) resources in supporting pesantren entrepreneurship education	IT training is designed for managers, educators, and pesantren students every period
		Collaboration with partners to support IT understanding for boarding school managers
		Compiled e-digital oriented pesantren policy

4   Conclusion

Based on the risk mapping matrix, there are 9 risk events with extreme, high and moderate status. The risk event is chosen based on the value of the RPI, from the results of the multiplication between likelihood and consequence.

According to the house of the risk matrix, 2 causes of risk must be controlled, namely the digital utilization process in the pesantren learning process and the information technology utilization quality procedure. The 2 causes of risk are chosen based on the largest correlation value of 20% of the total correlation value using paretto diagram. The biggest cause of problems is the Risk Agent coded A02 and A01. So that the next Risk Agent will be made a handling strategy.

There are recommended treatment strategies based on the biggest causes of risk, namely: Building quality awareness for all Pabelan boarding school managers towards IT, Making SOP control the entrepreneurial learning process, Creating a learning system based on MOOCs (*Masive* Online Open Course), Designed IT training for managers, educators, and Islamic boarding school students every periodically, Collaboration with partners to support IT understanding for boarding school managers, and Prepared e-digital oriented pesantren policies.

References

[1]   S. Hidaya and I. Baihaqi, "Analisis Dan Mitigasi Risiko Rantai Pasok Pada Pt . Crayfish Softshell Indonesia," *Pap. Ind. Inst. Teknol. Sepuluh Nop.*, pp. 1–6, 2014.

[2]   Suliswiyadi, M. Kurnia, A. Miswanto, and I. Nugroho, "Entrepreneurship education model of pesantren based on theopreneurship," *Opcion*, vol. 34, no. 86, pp. 2229–2240, 2018.

[3]   M. Qomar, *Pesantren dari Transformasi Metodologi menuju Demokratisasi Institusi.* Jakarta: Erlangga, 2007.

[4]   S. Nasution, Y. Arkeman, K. Soewardi, and T. Djatna, "Identifikasi Dan Evaluasi Risiko Menggunakan Fuzzy Fmea Pada Rantai Pasok Agroindustri Udang," *J. Ris.*

Ind., vol. 8, no. 2, pp. 135–146, 2014.

[5]   P. Finch, "Supply chain risk management," *Supply Chain Manag. An Int. J.*, vol. 9, pp. 183–196, Apr. 2004, doi: 10.1108/13598540410527079.

[6]   C. Tang and B. Tomlin, "The power of flexibility for mitigating supply chain risks," *Int. J. Prod. Econ.*, vol. 116, no. 1, pp. 12–27, 2008, doi: 10.1016/j.ijpe.2008.07.008.

[7]   U. Jüttner, H. Peck, and M. Christoper, "SUPPLY CHAIN RISKMANAGEMENT: OUTLINING AN AGENDA FOR FUTURE RESEARCH," *Int. J. ofLogistics Res. Appl.*, vol. 6, no. 4, pp. 197–210, 2003, doi: 10.4028/www.scientific.net/AMR.356-360.2743.

[8]   J. Hallikas, I. Karvonen, U. Pulkkinen, V.-M. Virolainen, and M. Tuominen, "Risk Management Processes in Supplier Networks," *Int. J. Prod. Econ.*, vol. 90, pp. 47–58, Feb. 2004, doi: 10.1016/j.ijpe.2004.02.007.

[9]   X. Shao and G. Purpur, "Effects of Information Literacy Skills on Student Writing and Course Performance," *J. Acad. Librariansh.*, vol. 42, no. 6, pp. 670–678, 2016, doi: 10.1016/j.acalib.2016.08.006.

[10]   A. J. Keown, *Dasar-dasar Manajemen Keuangan*. Jakarta: Salemba Empat, 2002.

[11]   B. Siswanto, A. Sudiarno, and P. Karningsih, "Improvement of Preventive Maintenance Process Implementation Effectiveness with House of Risk (HOR) Method Approach," *ITES Int. Conf.*, pp. 100–112, 2018.

[12]   T. Sinha and E. J. Vaughan, *Fundamentals of Risk and Insurance*, vol. 61, no. 2. 1994.