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Mitigation strategies for supply chain risks in cassava chip SME using house of risk method (A case study in Langgeng Jaya Abadi SME, Malang Regency)

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KEYWORDS	ABSTRACT
Cassava chip Supply chain Risk assessment House of risk method	Langgeng Jaya Abadi is a small- and medium-scale entreprise (SME) located in Malang Regency with main business entity of producing cassava chips. In the operational of the business activities, the SME faced various issues that need to be immediately tackled or maintained by implementing risk mitigation strategies. Problems occured in Langgeng Jaya Abadi SME include a time-delay in delivery of cassava, planning mistakes, poor quality of cassava chips, and the sales fluctuation in cassava flour and and cassava chip. This study aimed to identify risk, as well as to assess and determine the risk mitigation strategies. The method used in the research was house of risk (HOR). The variables studied include supply risk, internal risk and demand risk. Four expert respondent were employed composed of supplier, SME owner, SME employee, and distribution agent. The results indicated that there were 24 risk events and 26 risk agents were identified. Risk assessment demonstrated that 2 priority risk agents include SME's employee negligence and planning errors. The study further determined six mitigation strategies such as evaluating employee performance, providing reprimands and sanctions, scheduling activities, improving demand information on cassava chips, establishing inventory controls, and improving internal coordination systems.

Introduction

Cassava (*Manihot esculenta*) is a type of tubers widely cultivated in Malang Regency. In 2013, cassava production in Malang Regency reached 335,980 tons (Indonesian Statistics, 2013). Cassava is one type of local foods. According to Utami (2015) local food is food produced and developed in accordance with the potential of local resources. Cassava chips are popular snack products in Indonesia.

Langgeng Jaya Abadi small- and medium-scale enterprise (SME) is one of the business entities in Malang regency producing cassava chips. The production capacity of Langgeng Jaya Abadi SME is about 1-1.5 tons of cassava generating about 400-600 kg of cassava chips every day. Based on research conducted by Meimuha (2017), it is known that the institutional structure of the supply chain of Langgeng Jaya Abadi SME consists of 1 middleman, SME and 9 distribution agents. The middleman is responsible for supplying cassava .

SME plays a role in processing cassava. The agent plays a role in distributing cassava chips.

Supply chain management is management of goods, information, and financial through a network of organization such as suppliers, producers, logistics providers, wholesalers/distributors, retailers aiming to produce and deliver products or services to consumers (Tang, 2006). In practice, supply chain activities often failed due to various problems faced which triggering various risks. Risk is an uncertainty that will negatively affect the achievement of organizational goals (Nasution et al, 2014). Therefore, a risk assessment is needed to reduce any risks that may arise. The results of the risk assessment can be used to design a risk mitigation strategy.

One method of risk assessments that widely used is House of Risk (HOR). HOR is a modification of Failure Modes and Effects Analysis (FMEA) and House of Quality (HOQ) methods aimed to prioritise risk sources to be firstly chosen for the most effective action in reducing the potential and sources

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of risks (Ulfah et al., 2012). The application of HOR consists of 2 phases. Phase 1 HOR is used to identify risk agents and potential risk events. Phase 2 HOR is used to design appropriate mitigation strategies (Wahyudin and Santoso, 2016).

Research Methods
The research was conducted at Langgeng Jaya Abadi SME located in Babatan Sidodadi Village, Kalipare District, Malang Regency. Data processing was carried out in the Laboratory of Agroindutrial Management, Department of Agroindustrial Technology, Universitas Brawijaya, Malang. The research was conducted from May to October 2017.

Four expert respondents were used include one middlemen, one SME owner, one SME employee, and one distribution agent. Based on the interview results, several risks were identifies, as shown in Table 1.

Table 1. Risks in Langgeng Jaya Abadi SME

Variable Risk	Components
Supply Risk	1. Financial loss
	2. Cassava damage
	3. Reduction of cassava yields
	4. Labor shortage
	5. Cassava demand changes
	6. Delay in shipping cassava to Langgeng Jaya Abadi SME
Internal Risk	1. Planning mistake in procurement of cassava
	2. Planning mistake in procurement of cooking oil
	3. Planning mistake in procurement of packaging material
	4. Delay in receiving cassava
	5. Poor and varied quality of cassava
	6. Limitation in production process
	7. Decreasing production
	8. Error in packaging
	9. Reduction of the quality of cassava chips during storage
	10. Changing in demand of cassava chips
	11. Delivery of cassava chips
	12. Delay in payment from the distribution agent
	13. Receive returns on defective products
Demand Risk	1. Planning mistake in procurement of cassava chips
	2. Obstacles to the supply of cassava chips
	3. Bad quality of cassava chips
	4. Fluctuation in sales of cassava chips
	5. Lack of supply of cassava chips

Source: Primary Data (2017)

The data analysis technique used is the House of Risk (HOR). HOR consists of 2 phases, phase 1 for risk assessment and phase 2 for assessment of mitigation strategies.

Phase 1 HOR
Phase 1 HOR is the initial stage to identify risk events and risk agents, involving several stages as follows:
1. Identification of business processes/chain activities.
2. The supply chain operation references (SCOR) model focuses on the functions of supply chain management from an operational process perspective and includes customer interaction, physical transactions, and market interactions (Zhou et al., 2011). Mapping is carried out in 5 stages of business activities, include plan, source, make, deliver, and return.
3. Identification of risk events (Eij) and risk agents (Aj) in each business process.
4. Risk assessment which includes level of impact (severity), level of emergence (occurrence), and level of relationship (correlation). According to Parsana and Patel (2014) the assessment of severity aimed to calculate how much the effect of a risk event. Occurrence assessment aimed to calculate how often these risks arise (Ambekar et

al., 2013). Correlation assessment aimed to measure the relationship between risk agents and risk events (Wahyudin and Santoso, 2016).

5. Aggregate risk potential (ARP) calculation
6. The ARP value is useful for determining the priority order of risk agents which will be mitigated first based on the value of the ARP. ARP calculations use the following formula:

$$ARPj = Oj \sum Si\ Rij \qquad [1]$$

Phase 2 HOR

Phase 2 HOR is the design of mitigation strategies to handle priority risk agents, including several stages of:

1. Determination of the priority agent
   Determination of priority risk agent categories use Pareto law or known as 80:20 law (Lutfi and Irawan, 2012). Pareto law application is 80% of company losses caused by 20% critical risks.
2. Identification of mitigation actions
   Mitigation strategies are useful to eliminate or minimise the emergence of priority risk agents.
3. Determination of the correlation value between mitigation actions and risk agents
   The purpose of the correlation assessment is to find out how much influence the mitigation strategy with the risk agents. The correlation assessment uses a scale of 0,1,3,9.
4. Calculation of total effectiveness (TEk)
   Calculation of total effectiveness is useful to find out how much effective the implementation of mitigation strategies to risk agents (Lutfi and Irawan, 2012). TEk calculations use the following formula:

$$TEk = \sum ARPj\ Ejk \qquad [2]$$

5. Determination of the degree of difficulty (Dk)
   The level of difficulty assessment aimed to find out how difficult the implementation of mitigation strategies. Assessment of the level of difficulty was carried out using a Likert scale.
6. Calculation of the *effectiveness to difficulty* (ETD).
   Calculating the effectiveness to difficulty (ETD) Ratio is useful to determine the priority ranking of all mitigation strategies (Kristanto

and Hariastuti, 2014). ETD calculations use the following formula:

$$ETDk = \frac{TEk}{Dk} \qquad [3]$$

Results and Discussion
Institutional Structure of Langgeng Jaya Abadi SME

The supply chain is a set of activities involved in the process of transformation and distribution of goods from the raw materials to finished products for the consumers. The supply chain structure of Langgeng Jaya Abadi SME consists of middlemen, SME, and distribution agents. In supply chain activities, there are 3 streams namely goods flow, information flow, and financial flow (Anwar, 2011). Supply chain institutional structure can be seen in Fig. 1.

Middlemen play a role in supplying cassava as raw material for making cassava chips to the SME. The role of middlemen in the supply chain is very important. According to Carr et al. (2006), the existence of suppliers is useful to improve the performance and capability of the supply chain. Activities that occur in middlemen include information flow, product flow, and financial flow. Information flow happened by receiving order cassava from the SME. Product flow occurred was shipping cassava to the UKM. If demand is high, middlemen can send 3.5 tons of cassava every two days. The financial flow took place when the middlemen received payment of cassava sales. The payment is done in cash.

Langgeng Jaya Abadi SME plays a role in processing cassava into cassava chips. The SME as producer is included in the internal supply chain. According to Aishah (2013), the integration in the internal supply chain is critical due to its greatest impact on supply chain activities. The production capacity of cassava chips is 1-1.5 tons per day cassava to produce 400-600 kg of cassava chips. The activities found in Langgeng Jaya Abadi SME were in the form of information flow, product flow, and financial flow. Information flow related to order of cassava chips from the distribution agents. Ordering cassava chips depends on the product sale. The product flow includes the shipping of cassava chips to the distribution agent. When demand is high, SME are able to send 700 kg of cassava chips 3 times in a month. Financial flow occurs when SME received payment from the distribution agents. The payment was made on the next shipment.
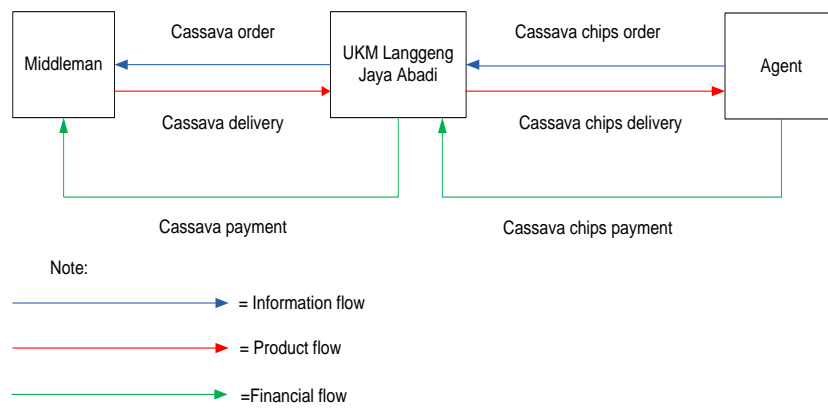
Figure 1. Supply Chain Institutional Structure of Langgeng Jaya Abadi SME

Distribution agents play a role in distributing cassava chips to the consumers. Collaboration between manufacturers and the agents is an important solution to overcome uncertainty of demand thus enhancing the supply chain performance (Chung, 2008). The distribution Agents sell cassava chips with carts. Sales are usually high at tourist destination areas or during special events (i.e. Christmas, New Year, the celebration of independence day). Price of 1 kg cassava chips is IDR 30,000.

Mapping of Supply Chain Activities Based on SCOR

The activities that exist in middlemen, SME and agents were then mapped with the SCOR model, as can be seen in Fig. 2.

Identification of Risk Events and Risk Agents

The study found a total of 24 risk events and 26 risk agents happened in the middlemen, SME, and distribution agents. Risk events are events that can result in a company loss. Risk agents are the cause of risk events (Ulfah et al., 2012).

Risk Assessment

Identified risk events and risk were then assessed for severity, occurrence, and correlation. The results of the assessment of risk events and risk agents in the supply chain of Langgeng Jaya Abadi SME can be seen in HOR Phase 1, as shown in Table 2.
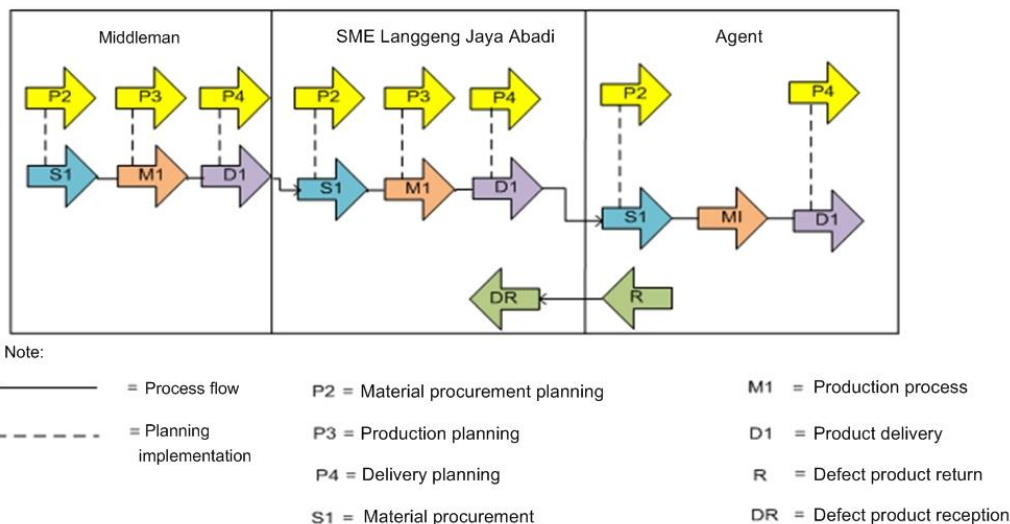

Figure 3. Mapping of Langgeng Jaya Abadi SME Supply Chain Activities with SCOR

Table 2. HOR Phase 1

		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	Severity
Plan	E1	9																										6
	E2	9																										6
	E3	9																										5
	E4		3																									4
Source	E5			3	9																							5
	E6					9																						5
	E7						1	1																				6
	E8								9																			6
	E9									9	9																	5
Make	E10						3					1	9															6
	E11						3						3															6
	E12													9														6
	E13													3														5
	E14														3	3	3	3										4
	E15																		9									5
	E16									9																		5
	E17									9	9										1							6
	E18													3														5
Deliver	E19			9			3						3	3														5
	E20	3																										5
	E21																					3						5
	E22																						3	1	1			6
Return	E23																									9	9	4
	E24																									3		6
Occurance		3	3	4	4	2	3	3	3	4	4	3	5	6	4	3	3	5	4	3	2	5	5	3	5	3	5	
ARP		504	36	60	360	90	171	18	162	576	396	18	435	414	120	36	36	60	48	135	12	75	90	18	30	108	270	
Ranking		2	19	16	6	13	8	23	9	1	5	24	3	4	11	20	21	17	18	10	26	15	14	25	22	12	7	

ARP Calculation

Based on the ARP calculation, the risk agents with the highest ARP value was the negligence of the SME employee (A9) at the value of 576, followed by planning mistake (A1) at the value of 504, error in the cultivation of cassava (A12) at the value of 435, no contract between the middlemen with laborers (A13) at the value of 414, damage to packaging (A10) at the value of 396, error estimation of middlemen at purchase (A4) at the value of 360. ARP assessment results a can be seen in Table 2.

Determination of Priority Risk Agents

Determination of priority risk agents based on Pareto law, namely 80:20. The selected priority agents contribute around 20% of the total ARP value. By Focusing on the 20% of the causes of critical risk, thus 80% of the company's impact can be overcome (Lufti and Irawan, 2012). Priority risk agents obtained included SME employee negligence (A9) and SME planning mistake (A1). The results of calculations with Pareto diagrams is shown in Fig. 3.

Designing Mitigation Strategies

After getting two priority risk agents, a mitigation strategies were then drafted. There are six mitigation strategies can be employed include evaluating employee performance (PA1), giving reprimands and sanctions (PA2), improving request information for cassava chips (PA3), making inventory control (PA4), making activity scheduling (PA5), and improving internal coordination system (PA6).

Assessment of Mitigation Strategies

After designing the strategy, an assessment and calculation of the correlation value between the mitigation strategy and the risk agents, the value of total effectiveness, and the degree of difficulty value were carried out, as can be seen in Table 3.
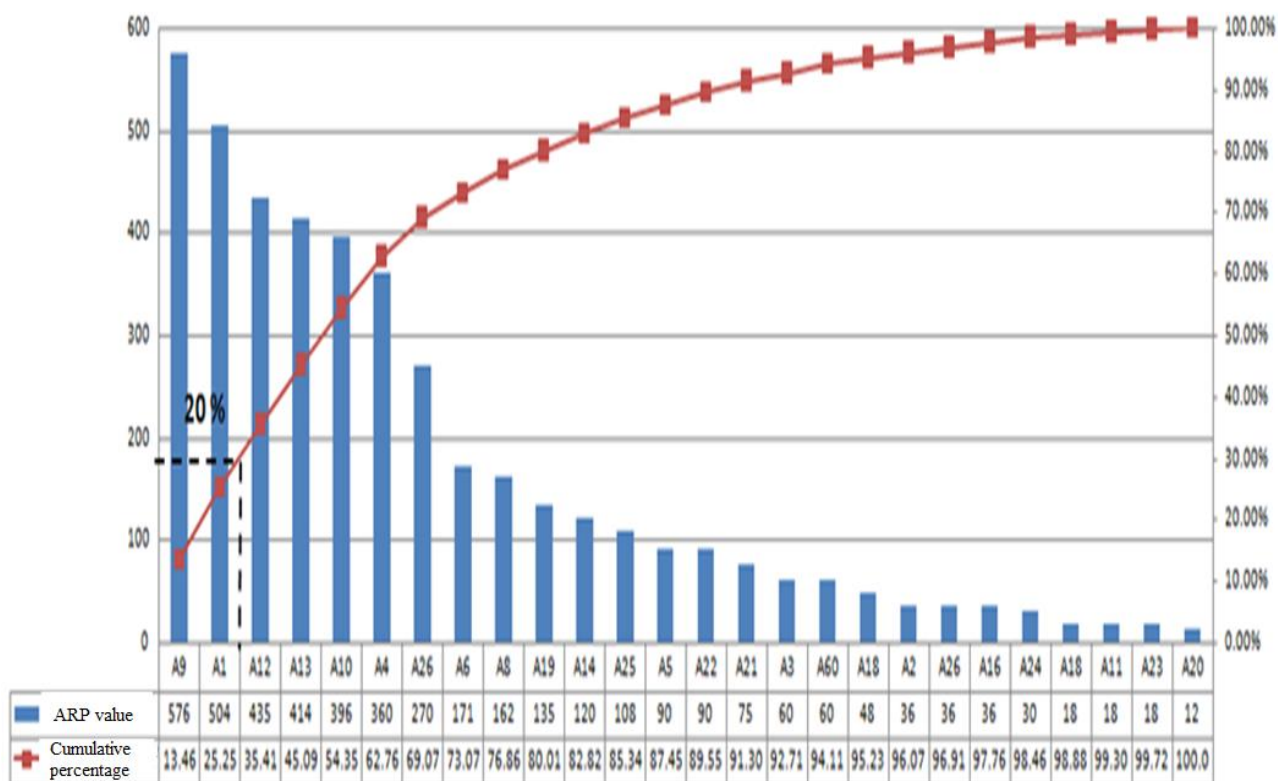
Figure 3. Pareto *Aggregate Risk Potential* Diaghram

Table 3. HOR Phase 2

Risk agents	Mitigation Strategy						
	PA1	**PA2**	**PA3**	**PA4**	**PA5**	**PA6**	**ARP**
A9	9	3					576
A1			3	3	3	3	504
TEk	5184	1728	1512	1512	1512	504	
Dk	3	3	4	4	3	3	
ETD	1728	576	378	378	504	168	
Rank	1	2	4	5	3	6	

Source: Primary Data (2017)

Calculation of ETD Ratio
ETD calculations are useful for determining the priority ranking of all mitigation strategies (Table 3).
1. Evaluating employee performance (PA1)

Evaluating employee performance is a strategy for solving the emergence of risk agents due to negligence of the Langgeng Jaya Abadi SME employee when packing (A9). Job evaluation is a process to identify and measure the nature, behavior, and achievement of employee individually or in groups as a basis for making decisions. The main purpose of performance appraisal is basically to review the performance of an individual during a specified period, to identify areas of strength and weakness, as well as to set targets to be achieved in the overall organisational goals (Joseph, 2015).

Assessment of employee performance can be seen from the aspects of responsibility, goals and targets, and work performance (Wijayanti and Wimbarti, 2012). These 3 aspects can be used as a reference by the owner of Langgeng Jaya Abadi SME to assess the performance of each employee. Employee evaluation activities can be done once a week after the operational working time. The existence of performance appraisal makes the owner of Langgeng Jaya Abadi SME can place any competent employees to important production processes such as the packaging process. A mistake in packaging process reduces the crispiness of cassava chips

2. Providing reprimands and sanctions (PA2)

Giving reprimands and sanctions is a mitigation strategy is also useful to mitigate A9 risk agent. Nowadays, the owner of Langgeng Jaya Abadi SME only gave reprimands to employees, include warnings to be more careful when packing the cassava chips. According to Juma and Moronge (2015), giving reprimands to employees is one of discipline methods. The purpose of the discipline approach is to increase employee performance. Provide reprimand and sanctions can have a deterrent effect on employees (Hariri et al., 2013). Provision of sanctions by owners of Langgeng Jaya Abadi SME can be done in the form of wage deductions or additional working hours.

3. Making activity scheduling (PA5)

Making activity scheduling is a strategy to solve the emergence of risk agents in the planning mistake of Langgeng Jaya Abadi SME (A1). To date, Langgeng Jaya Abadi SME has no activity scheduling. This makes the existing activities in the Langgeng Jaya Abadi SME cannot be properly implemented. According to Simenovava et al. (2015), production scheduling aimed to maximise the operational efficiency and to reduce costs. In manufacturing, the scheduling goal is to minimise production time and costs, by notifying the production facility when to make, with which staff, and which equipment.

Activity scheduling that needs to be made by Langgeng Jaya Abadi SME include scheduling of the cassava ordering, the purchase of cooking oil, the purchase of packaging materials, the production, and the cassava shipping to agents. Activity scheduling can be made in weeks or months. Activity scheduling is expected to be used as a reference in carrying out activities, thus ensuring plans to be executed well. According to Masruroh (2008), good scheduling will have a positive impact, particularly lowering the operating costs and delivery time, leading to increase customer satisfaction.

4. Improving the request information for cassava chips

Improvement of information in Langgeng Jaya Abadi SME can be carried out by appointing someone to make a report/note on the cassava chips orders from each agent in one period. The recording or data documentation can be done manually. According to Pradana et al. (2015), information on demand and supply is needed for decision making process in a manufacturing industry, especially in deciding the aggregate planning. According to Li and Zhang (2013), adjusting the amount of supply with the number of requests is an important task. Therefore, information on demand for an item can help to improve the manufacturer's decision about the number of products to be produced for meeting the demands.

5. Controlling inventory

One of the inventory functions is to avoid the company from fluctuating demand (Wradana et al., 2014). Inventory control in Langgeng Jaya Abadi SME can be carried out by calculating the needs of cassava, cooking oil and packaging materials using previous data of cassava chips demand. Inventory control must be adjusted to the demand for the item. Information data on cassava chips demand for every period is important as a reference in determining all materials needed. According to Mogere et al. (2013), the purpose of inventory control is to fill up customer demand, thus the company must ensure that stock-out is avoided without incurring high inventory costs.

6. Improving internal condition

Through coordination, it is expected that the achievement of company goals is effective and efficient, the overlapping work and job void from each work unit is prevented, and weaknesses or difficulties encountered in carrying out the work are identified, thus corrective actions can be taken (Siagian, 2011). Improvement of internal coordination in Langgeng Jaya Abadi SME can be in the form of appointing one employee as coordinator. The coordinator is in charge of communicating various problems occurred (i.e. the stock of cassava, cooking oil, packaging materials, and cassava chips) to the owner of Langgeng Jaya Abadi SME.

According to Abdulah (2012), as a management function, internal communicators include several skills such as anticipating, analysing and interpreting public opinion, attitudes, and issues that might have good or bad impact to the organisation. In short, in the era of globalisation, organisations are beginning to realize that employee communication is no longer "good to do" but it is important to succeed in business.

Conclusions

The supply chain structure of Langgeng Jaya Abadi SME consists of middlemen, SME and agents. Identification results found 24 risk events and 26 risk agents. Based on the risk assessment, there are 2 priority agents that have the largest contribution, including employee negligence (A9) and planning

errors (A1). There are six risk mitigation strategies can be applied to reduce the emergence of risk agents by evaluating employee performance (PA1), providing reprimand and sanctions (PA2), making activity scheduling (PA5), improving request information for cassava chips (PA3), controlling the supply of raw materials, supporting materials and packaging materials (PA4), and improving the internal coordination system (PA6).

Conflict of interest

The authors declare that there is no conflict of interest in this publication.

References

Abdulah, Z. (2012) 'Perception of employees on internal communication of a leading five star hotel in Malaysia', *Journal of Asian Social Science*, 8(2), pp. 17-26

Aishah, T.N., Pyeman, J. and Tajjudin, R.M. (2013) 'Integration of internal supply chain management (SCM) towards long run competitiveness', *Journal of Management*, 3(1), pp. 12-15

Anwar, S.N. (2011) 'Manajemen rantai pasokan (*Supply Chain Management):* konsep dan hakikat', *Jurnal Dinamika Informatika,* 3(2), pp. 1-7 [In Indonesian]

Ambekar, S.B, Elbadbakar, A. and Shrudhy,V. (2013) 'A review: implementation of failure mode and effect analysis', *International Journal of Engineering and Innovative Technology*, 21(8), pp. 37-41

Carr, A.S., Kaynack, H., Hartley, J. and Ross, A. (2006) 'Supplier dependence: impact on supplier's participations and performance', *International Journal of Operation Production Management,* 28(9), pp. 899-916

Chung, W. (2008) 'The rules of distributorv in supply chain-push-pull boundary', *International Journal of Business and Managemnet*, 3(7), pp. 28-39

Hariri, R., Astuti, R. and Ikasari, D.M. (2013) 'Penerapan metode *six sigma* sebagai upaya perbaikan untuk mengurangi *pack defect* susu Greenfields (Studi kasus pada PT Greenfield, Malang)', *Jurnal Teknologi Pertanian*, 14(2), pp. 141-150 [In Indonesian]

Indonesian Statistics. (2013) Luas Panen, Produktivitas dan Produksi Ubi Kayu 2013. [Accessed on 10 November 2016. <http://jatim.bps.go.id/linkTabelStatis/view/id/119> [In Indonesian]

Joseph, O.B. (2015) 'Effectiveness of performance appraisal as a tool to measure employee productivity in organisation', *Jurnal of Public Administration and Governance*. 4(4), pp. 135-148

Juma, C.A. and Moronge, M. (2015) 'Influence of progressive discipline on employee performance in Kenya: a case of Mukurwe-Ini Wakulima Dairy LTD', *Journal of Bussines and Change Management*, 2(105), pp. 1549-1594

Kristanto, B.R. and Hariastuti, N.L.P. (2014) 'Aplikasi model house of risk (HOR) untuk mitigasi risiko pada supply chain bahan baku kulit', *Jurnal Teknik Industri,* 2(13), pp. 149-157 [In Indonesian]

Li, C. and Zhang, F. (2013) 'Advance demand information, proce discrimination, and preorder strategies', *Journal of Manufacturng and Service Operations Management*, (15)1, pp. 57-71

Lutfi, A. and Irawan, H. (2012) 'Analisis risiko rantai pasok dengan model house of risk (HOR)', *Jurnal Manajemen Indonesia,* 1(12), pp. 1-11 [In Indonesian]

Masruroh, N. (2008) 'Analisa penjadwalan produksi dengan menggunakan metode *ampbell dudeck smith, palmer*, dan *dannenbring* di PT.Loka Refraktoris Surabaya', *Jurnal TEKMAPRO,* 3(2), pp. 158-171 [In Indonesian]

Meimuha. (2017) ''nalisis kelembagaan rantai pasok UKM keripik singkong menggunakan interpretative structural modeling (ISM) (Studi kasus: UKM Keripik Singkong Langgeng Jaya Abadi, Kabupaten Malang). Skripsi Teknologi Industri Pertanian. Universitas Brawijaya Malang. [In Indonesian]

Mogere, K.M., Oloko, M. and Okibo, W.(2013) 'Effect of inventory control systems on operational performance of tea processing firms: a case study of Gianchore Tea Factory, Nyamira County, Kenya', *International Journal Of Business and Management*, 1(5), pp. 12-27

Nasution, S. Arkeman, Y., Soewardi, K. and Djatna, T. (2014) 'Identifikasi dan evaluasi risiko menggunakan fuzzy FMEA pada rantai pasok agroindutri udang', *Jurnal Riset Industri*, 2(8), pp. 135-146 [In Indonesian]

Parsana, T.S. and Patel, M.T. (2014) 'A case study: a process FMEA tool enhance quality and efficiency of manufacturing industry', *Industrial Engineering and Management Science*, 4(3), pp.145-152

Pradana, A.C., Santoso, P.B. and Eunike, A. (2015) 'Perancangan sistem informasi manajemen produksi dengan pemanfaatan pendekatan *fuzzy logic* untuk penentuan jumlah produksi', *Jurnal Rekayasa Dan Manajemen Sistem Industri*, 3(1), pp. 154-165 [In Indonesian]

Siagian, H. (2011) 'Pedoman kerja berbasis struktur organisasi', *Jurnal Wira Ekonomi Mikroskil*, 1(2), pp. 111-118 [In Indonesian]

Simeonovova, I., Gyorov, A. and Simeonovi.S. (2015) 'Modern methods for manufacturing planning and scheduling', *Journal of Science*, 1(1), pp. 635-639

Tang, C.S. (2006) 'Perspective in supply chain risk management', *Journal Production Economics,* 103, pp. 451-488

Ulfah, M., Maarif, M.S., Sukardi and Raharja, S. (2012) 'Analisis dan perbaikan manajemen risiko rantai pasok gula rafinasi pendekatan house of risk', *Jurnal Teknologi Industri Pertanian,* 1(26), pp. 87-103 [In Indonesian]

Utami, P. (2015) 'Potensi dan keterbatasan bahan pangan lokal sumber karbohidrat non-beras di Kabupaten Banyumas', *Jurnal Dinamika Ekonomi dan Bisnis*, 12(2), pp. 150-158 [In Indonesian]

Wahyudin, N.E. and Santoso, I. (2016) 'Modeling of risk management for product development of yoghurt drink using house of risk (HOR) method', *Journal Technology Management*, 9(2), pp. 98-100

Wardana, M.W., Saleh, F.H.M. and Parkhan, A. (2014) 'Pengendalian persediaan pada kondisi stokastik dan harga bertingkat menggunakan simulasi', *Jurnal Spektrum*, 12(2), pp. 165-175 [In Indonesian]

Wijayanti, A. and Wimbarti, S. (2012) 'Evaluasi dan pengembangan sistem penilaian kinerja pada PT HKS', *Jurnal Psikologi UNDIP*, 11(2), pp. 1-13 [In Indonesian]

Zhou, H., Benton, W.C., Schilling, D.A. and Milligan, G.W. (2011) 'Supply chain integration and the SCOR model', *Journal of Business Logistics*, 32(4), pp. 332-344