Resilience Supply Chain Food and Beverage During the Pandemic in the Hospitality Industry

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ABSTRACT

Three years ago, the COVID-19 pandemic caused the hotel industry to decline in visitors and revenue. Therefore, this article describes a preliminary study proposing an AR (Agile, Resilience) index to assess the agility and resilience of companies and their respective supply chains. A resilience index that discusses how supply chains can handle unexpected disruptions. The results obtained from the weight calculation show that all proposed practices are relevant to improving agile and supply chain resilience. The combined implementation value in the reference index AR is 3,548. The results of risk analysis using the House of Risk (HOR) method can be that the House of Risk (HOR) phase 1 model is to determine the priority of risk agents as the cause of risk in order to take preventive measures to cause the highest risk in the food & beverage business process, namely raw material stocks are still available with an ARP value of 648. The House of Risk (HoR) phase 2 model prioritizes proactive measures that effectively reduce the occurrence of risks based on financial capabilities and other resources. PA4 action with mitigation measures in the form of raw material orders reduced during COVID-19 with a Tech value of 10530.

Keywords: Resillience supply chain, AR Index, House of Risk (HOR), Agile

1. INTRODUCTION

The world is being hit by the COVID-19 outbreak, which initially came from Wuhan, Hubei province, China, in December 2019 and was designated by WHO as a world pandemic on March 11, 2020. The first COVID-19 case in Indonesia was detected on March 2, 2020. The COVID-19 pandemic is felt not only by Indonesia but also by all countries in the world. COVID-19 has affected business performance due to inconsistent material supply and organizations that have provided crucial needs to affect traditional procurement strategies. It has motivated practitioners and researchers to explore how companies generate the art of management to cope with the consequences of the COVID-19 pandemic and the unexpected effects of events on supply chain resilience(Shivajee et al., 2022).

During the COVID-19 pandemic, several measures were taken to prevent the spread of the virus and protect public health. In the presence of lockdown during the COVID-19 pandemic, several industries, such as the aviation industry and the tourism and hospitality industry, were closed. After the gradual relaxation, these companies must adjust to new remote and capacity guidelines, operating curfews, declining revenues, job losses, and widespread insecurity expected to continue(Ntounis et al., 2022). Annoyance supply chain It comes in all forms and usually results in consequences ranging from mild to severe, starting from financial losses, increased cost needs, reduced market share, and customer turnover. In general, supply chain resilience is the basis for every company facing a crisis due to the unexpected(Harrington & Chain, 2014). Supply chain resilience is his ability to prepare food security in the face of various changes and disruptions. The COVID-19 pandemic has put tremendous pressure on the supply chain. Through disruption, it tested its resilience in several areas, including the hospitality industry, on its part food and beverage (Dou et al., 2021). Supply chain resilience The hotel should be built in a unique position. Resilience at different scales at each stage of the food chain. To build resilience and achieve truly sustainable results, companies in the food and beverage industry should implement strategies that identify vulnerabilities and drive adaptive action at all stages of their supply chains. As investors pay more attention to environmental, social, and governance principles, the company food and beverage should be encouraged to report their level of protection(Bezares et al., 2021).

2. LITERATURE REVIEW

Paradigm resillience, which relates to supply chains' ability to cope with unexpected disruptions. Today, the focus of supply chain design should be on resilience, although in the past the top priority was service optimization or reducing costs. Paradigm resillience will contribute to supply chain are more competitive in time, quality and

customer service, increasing market share and strengthening leadership. Index resillience will affect performance and competitiveness supply chain (H. Carvalho et al., 2013) . In reducing these risks, methods are used House of Risk (HOR). Method House of Risk (HOR) is used to determine risk and Risk Agent Causes of risk and proposed strategies to mitigate Risk Agent. The HOR method is carried out in two phases, namely: House of Risk (HOR) phase 1 and House of Risk (HOR) phase 2. Method House of Risk (HOR) phase 1 conducts risk identification based on a business process framework using practice indicators Agile and resillience. Then the method House of Risk (HOR) phase 2 as a risk strategy determination (F. Chaisani., 2021). The following table 1 shows past research.

Table 1 Previous Research

No	Citations	Method	Object	Result	Contribution Journals in Research
1	(V. Shivajee et al., 2022)	*Procurement System*	*Supply chain resillience* of business performance in COVID-19	Procurement *systems* can identify new strategies and practices	The *procurement* function has made a significant contribution in creating supply chain resilience during the COVID-19 pandemic
2	(N. Ntounis et al., 2022)	*Design approach* and *Business Resillience Composite Score* (BRCS)	Tourism-dependent businesses in the English city	The application of BRCS relative to some other sectors such as professional services, tourism-dependent businesses are more vulnerable to the pandemic.	Providing policymakers' relevant insights can include indications of the relative priorities of initiatives across industry sectors to improve the impact of tourism based on its relative resilience
3	(B. L. Harrington et al., 2014)	Traditional approach	*DHL Resillience*	DHL has developed *resillience* 360 for risk analysis that maps the company's supply chain risks.	Provide an understanding of *traditional* approaches to responding to supply chain risks following predictable patterns
4	(Z. Dou et al., 2020)	*Convenience-snowball sampling*	Food system resilience during pandemics across national China and the United States	Household food security worsened during pandemic	Provide an understanding of food system resilience across a range of functional indicators
5	(N. Bezares et al., 2021)	The qualitative descriptive method is SWOT analysis	*Food and Beverage* at Cavinton hotel Yogyakarta	Due to COVID-19, public awareness of cleanliness, health, safety and environmental sustainability is very large	Provide understanding related to innovation and strategies in order to survive the COVID-19 pandemic
6	(L. Hendriyati et al., 2021)	Triangulation test method	Hospitality industry	Strategies that have been successfully carried out in the hospitality industry to make businesses bounce back after the pandemic	Provide an understanding of suggested strategies to build supply chain resilience
7	(P. L. Rini et al., 2022)	*House of Risk* (HOR) based on the SCOR model	Fish supply chain amid COVID-19 pandemic	HOR identified 31 risk events and 46 risk agents	Provide an understanding of risks and design mitigation strategies
8	(C. Solisa et al., 2022)	*House of Risk* (HOR)	Construction projects at CV.Asri Tehnika	Risks that occur in CV.Asri Tehnika	Understand the understanding and purpose of using the HOR method to help overcome problems with supply chain activities

No	Citations	Method	Object	Result	Contribution Journals in Research
9	(E. W. Abryandoko., 2020)	Agile *index* and *resillience*	*Agile* automotive companies	Using *agile* indices to assess the *agile* of automotive companies with *appropriate supply chains*	Understand agile indices and *resillience* with *supply chains*
10.	(H. Carvalho et al., 2013)	Triangulation test method	Hospitality industry	Strategies that have been successfully carried out in the hospitality industry to make businesses bounce back after the pandemic	Provide an understanding of suggested strategies to build supply chain resilience
11.	(F. Chaisani., 2021)	*House of Risk* (HOR)	Construction projects at CV.Asri Tehnika	Risks that occur in CV.Asri Tehnika	Understand the understanding and purpose of using the HOR method to help overcome problems with supply chain activities

3. METHOD

Research methodology describes the stages carried out to obtain and process the data used. There are four stages of the resillience model, namely:

3.1 Stage 1 (react) model resillience

3.1.1 Determination of the Resillience Indicator

At this stage, the research aims to determine resillience indicators that are in accordance with XYZ hotels engaged in the hotel industry. These indicators will then be adjusted to the current condition of the company. The following table 2 is the determination of resillience indicators adjusted to previous research.

Table 2 Agility and Resillience Practices of Previous Research

Agile practices	References					Resilient practices	References			
	a	b	c	d	e		a	b	c	d
First-tier supplier ==> Focal firm				✓	✓	**First-tier supplier ==> Focal Firm**				
To use IT to coordinate/integrate activities in design and development					✓	To use sourcing strategies to allow switching of suppliers	✓			
To use IT to coordinate/integrate activities in procurement					✓	Committing to contracts for material supply (buying capacity whether it is used or not)	✓			
Ability to change delivery times of supplier's order					✓	To make use of flexible supply base/flexible sourcing			✓	
To reduce the development cycle time					✓	To develop visibility to a clear view of upstream inventories and supply conditions		✓		
Focal Firm					✓	**Focal Firm**				
To use IT to coordinate/integrate activities in manufacturing			✓	✓	✓	Designing production systems that can accommodate multiple products and real-time changes	✓			
To integrate supply chain/value stream/virtual corporation	✓					To use a multi-skilled workforce	✓			
To use centralised and collaborative planning				✓		Exceed capacity requirements	✓			
To reconfigure the production process rapidly	✓					Postponement			✓	
To produce in large or small batches		✓				To minimise batch sizes		✓		
To accommodate changes in production mix					✓	To constitute strategic stock		✓	✓	✓
To reduce manufacturing throughput times to satisfy customer delivery					✓	To employ make-and-buy trade-off			✓	

Agile practices	References					Resilient practices	References			
	a	b	c	d	e		a	b	c	d
To reduce development cycle times					✓	To plan strategic disposition of additional capacity and/or inventory at potential 'pinch points'		✓		
To minimise setup times and product changeovers		✓				To develop visibility to a clear view production and purchasing schedules		✓		
To organise along functional lines			✓			To create total supply chain visibility				✓
To facilitate rapid decision making			✓			To reduce lead time		✓	✓	
Focal Firm ==> First-tier customer						To ensure process and knowledge back-up				✓
To use IT to coordinate/integrate activities in ligostics and distribution					✓	To employ a supply chain risk management culture		✓		
To increase frequency of new product introduction			✓	✓	✓	To develop collaborative working across supply chains to help mitigate risk		✓		
To speed up adjustments in delivery capability					✓	Source:				
To speed up improvements in customer service				✓	✓	a : Rice and Caniato (2003) c : Tang (2006)				
To speed up response to changin market needs					✓	b : Christopher and Peck (2004) d : Iakovou et al. (2007)				
To capture demand information immediately			✓							
To retain and grow customer relationship			✓							
To develop prodicts with added value for customers			✓							
Source: a : Naylor et al. (1999) c : Lin et al. (2006) e : Swafford et al. (2008) b : Goldsby et al. (2006) d : Agarwal et al. (2007)										

3.1.2 Resillience Indicator Assessment

At this stage, an in-depth analysis of each indicator of resillience from the company is carried out based on the data that has been collected. This in-depth analysis of each resillience indicator serves to describe how the company's condition in each of these resillience indicators . Each indicator also serves as an initial calculation of the recillience index value. This agile and resillience paradigm will help supply chains become more competitive in terms of time, quality and customer service, increase market share and improve leadership. The selection of indicators is adjusted to the company through a questionnaire given to the Head Office Department (HOD) of the hotel. The following table 3 shows the analysis of each indicator.

Table 3 Agile and Resillience Practices in Companies

Agile practices	Company		Resilient practices	Company	
	Exist	None		Exist	None
First-tier supplier ==> Focal firm			**First-tier supplier ==> Focal Firm**		
Using IT to coordinate / integrate activities in design and development	✓		Use procurement strategies to enable supplier turnover	✓	
Using IT to coordinate / integrate activities in procurement	✓		Commit to a supply material contract (purchase capacity whether it is used or not)	✓	
Ability to change the delivery time of supplier orders	✓		To utilize a flexible supply base / flexible resources	✓	
To reduce development cycle time	✓		To develop visibility into a clearer view of upstream inventory and supply conditions	✓	
Focal Firm			**Focal Firm**		
Using IT to coordinate / integrate manufacturing activities	✓		Design production systems that can accommodate multiple products and changes in real time	✓	
To integrate supply chains/value streams/virtual enterprises	✓		To use a workforce that has a lot of expertise		

Agile practices	Company		Resilient practices	Company	
	Exist	None		Exist	None
To use a centralized, collaborative plan	✓		Exceeded capacity requirements		✓
To quickly reconfigure production processes	✓		Procrastination		
To produce in large or small batches	✓		To minimize batch size	✓	
To accommodate changes in the production mix	✓		To consolidate strategic stocks	✓	
To reduce production time to speed up delivery to customers	✓		To make a make-and-buy trade-off	✓	
To reduce development cycle time	✓		To plan a disposition strategy of additional capacity and/or inventory on potential 'pinch points'	✓	
To minimize setup and product replacement time	✓		To develop visibility into a clearer view of production and production schedules	✓	
To organize by functional flow	✓		To create total supply chain visibility	✓	
To facilitate quick decision making	✓		To parse the timeout	✓	
Focal Firm ==> First-tier customer			To ensure process and knowledge return	✓	
Using IT to coordinate / integrate logistics and distribution activities	✓		To implement a culture of supply chain risk management	✓	
To increase the frequency of the latest product introductions	✓		To develop collaborative work across the supply chain to help mitigate risk	✓	
To speed up customization in delivery capabilities	✓				
To accelerate improvements in customer service	✓				
To accelerate response to changing market needs	✓				
To meet information needs quickly	✓				
To maintain and develop relationships with customers	✓				
To develop value-added products for customers	✓				

3.2 Stage 2 (anticipate) model resillience

3.2.1 Calculation of Resillience Index Value

In the last stage of processing this data, the measurement of values on each dimension of resillience and the calculation of the overall correlation value for the company. The corresponding one is used to calculate each indicator of the company.

3.2.1.1 Weighted Practices

The assessment of the total weight of each corresponding sub-indicator is used to calculate each indicator of the company. The above equation shows that, in relation to each paradigm, corporate behavior is influenced by the degree of implementation of the practice and the corresponding weight. The following formula in the agile and resillience paradigm is:

$(B_A)j = \sum_{i=1}^{y} w_{Ai}$ x $(P_{Ai})j$..... (1)

$(B_R)j = \sum_{i=1}^{y} w_{Ri}$ x $(P_{Ri})j$..... (2)

Information:

- (PAi)j and (PRi)j respectively for companies is j and the level of practice application is i from the agile and resillience paradigms. The level of implementation of each practice is assessed on a 5-point Likert scale, namely:

1 : practice not applied
2: practice applied but not all departments
3 : Practice applied
4: Practice applied by almost all departments
5 : Practice applied to all departments

In this assessment, it is carried out with Head Office Department (HOD) of five departments namely, Operational HOD, HOD Accounting and HOD Engineering, HOD HRD and HOD Sales & Marketing. The following data is obtained from HOD Hotel XYZ.

3.2.1.2 Supply Chain AR Index Construction

The next step is to describe the correlation matrix for the practice under consideration. According to the correlation matrix, the variable is not highly correlated with others at a significance level of 5%. Most of them are not significantly related to each other at all. After weights accounted for and verified practice correlation, next is for the AR index (Agile, Resillience) to assess the level Agile and Resilient supply chain hotel with the following formula equation:

$AR_j = 0.5 \text{ x } (B_A)_j + 0.5 \text{ x} (B_R)_j$ .....(3)

Information:

$(BA)_j$ and $(BR)_j$ = corporate behavior j in accordance with agile and resillience paradigms respectively. If you want the supply chain to be more flexible, then the practice must be implemented (implementation). To determine the value of implementation, use a 5-point Likert scale, namely:

1 : practice not applied
2: practice applied but not all departments
3 : Practice applied
4: Practice applied by almost all departments
5 : Practice applied to all departments

3.3 Stage 3 (collaborate) model resillience

3.3.1 Risk Identification

The process of identifying risks to risk events in activities that occur at XYZ hotels is carried out by means of discussions and interviews with employees for assessment related to risk events. Determining the severity level provides an overview of the impact of risk events that disrupt business processes. Severity evaluation uses criteria on a scale of 1 – 10. Risk events can be found in identified risk events (risk agents), which are also identified by evaluating the level of potential sources of risk. Each cause of risk has opportunities that must be minimized to prevent risk events. The value of risk events and risk agents is carried out by discussions and interviews with XYZ hotel employees. Evaluation of occurance using criteria scale 1 – 10. Then give a correlation value to the risks that have been identified. Risk correlation is assessed by conducting interviews that discuss the relationship between risk events and risk causes. The scales used are 0,1,3 and 9. The severity and occurance assessment by XYZ hotel employees is processed in step 1 of the House of Risk (HoR) method to generate ARP (Aggregate Risk Potential) value.

3.3.2. House of Risk (HOR) phase 1

After knowing the value of the relationship between the risk event and the risk agent, the ARP (Aggregate Risk Potential) value is found using the formula.

$ARPj = Oj\sum SiRij$.....(4)

Information:

ARP = Aggregate Risk Priority.
Oj = To measure the value of the probability of occurrence of a risk factor.
Si = Measure the impact of risk.
Rij = Measurement of the correlation value of risk events.

3.4 Stage 4 (orchestrate) model resillience

3.4.1 House of Risk (HOR) phase 2

After phase 1 of the House of Risk is completed, the next step is carried out by the House of Risk phase 2, which includes planning a risk management strategy to reduce the influence of risk factors and as a prevention of the occurrence of risks. The House of Risk phase 2 uses tables to determine the precautions to take. The calculation in House of Risk phase 2 involves total effectiveness of action (Tek), degree of difficulity performing action (Dk) and Effectiveness of difficulty ratio (ETDk) with the highest value, namely ETDk which will be prioritized for risk management actions. Total effectiveness is used to determine the level of efficiency of each risk management strategy. The calculation of total effectiveness and the results of the degree of difficulty assessment are determined by multiplying the correlation values between risk factors and preventive measures by the ARP value to the nth value.

4. RESULTS AND DISCUSSION

4.1. Results of Weighted Practices

The results obtained from the weight calculation show that all proposed practices are relevant to improving agile and supply chain resillience. Unimportant practice with an average score of 3.6 on the 5-point Likert scale. Other practices with ratings equal to or greater than 3.6 indicate that all practices in the calculation are relevant for the AR supply chain index. Here is table 4 of the results of calculating agile weight and resillience.

Table 4 Results of Calculating Agile Weight and Company Resillience

Agile variables	Mean Rating	Rank	Weighting	*Resillience variables*	Mean Rating	Rank	Weighting
PA1 = Company uses technology for ordering	3.6	19	0.03974	PR1 = The company uses procurement strategies to find the best and cheapest	4.4	2	0.06285

Agile variables	Mean Rating	Rank	Weighting	*Resillience variables*	Mean Rating	Rank	Weighting
				suppliers			
PA2 = The company uses technology to calculate the raw materials to be ordered to suppliers	4	7	0.04415	PR2 = The company has a commitment to the raw material supply contract	3.8	7	0.054285
PA3 = The company can change the delivery time of raw materials from suppliers	4	7	0.04415	PR3 = Company utilizes flexible supply	3.8	7	0.054285
PA4 = The company purchases raw materials that have run out in the kitchen	3.6	19	0.03974	PR4 = Company increases visibility by having the right budget	3.8	7	0.054285
PA5 = The company uses technology in carrying out service activities in the company	3.8	11	0.04194	PR5 = The company designs food processing from existing materials so that the processing time does not take much time	3.8	7	0.054285
PA6 = The company purchases with an integrated kitchen through Odoo to facilitate PR (Purchase Request) and SR (Store Request)	3.8	11	0.04194	PR6 = Company has a multitasking workforce	4	4	0.057142
PA7 = Company uses Odoo app for food orders between front office and kitchen	3.6	19	0.03974	PR7 = Company can suspend activities	3.6	8	0.051428
PA8 = Company prepares raw materials to be used before cooking	4	7	0.04415	PR8 = Company minimizes food production capacity	3.6	8	0.051428
PA9 = Company produces large or small scale through room system	3.8	11	0.04194	PR9 = Company consolidates existing stock of raw materials	3.8	6	0.054285
PA10 = Company rotates food at breakfast	4.2	4	0.04636	PR10 = The company manufactures and purchases goods	3.8	6	0.054285
PA11 = The company prepares raw materials to reduce customer waiting time	3.6	19	0.03974	PR11 = Company adds capacity	4.6	1	0.065714
PA12 = The company provides a monthly rotation of promo menus for food and beverages that have been prepared	3.8	11	0.04194	PR12 = The company ensures that the required raw materials are available on time	3.6	5	0.051428
PA13 = The company rotates the breakfast menu to prepare for the next day	4.2	4	0.04636	PR13 = Company develops real-time visibility on aspects of the supply chain	4.4	1	0.062857
PA14 = The company has a department with socialized duties and responsibilities	4	7	0.04415	PR14 = Company reduces customer waiting time	3.6	4	0.051428
PA15 = Department of Food & Baverage makes decision to provide food looking at room occupancy	4.4	2	0.04857	PR15 = The company knows the menu to be made and ensures raw materials are available	4	2	0.057142
PA16 = The company uses the application for the distribution of goods	3.8	11	0.04194	PR16 = Company implements supply chain risk management	4.4	1	0.062857
PA17 = Company makes large quantities of food and beverages for new menus	3.6	19	0.03974	PR17 = Companies can develop collaborative work across the supply chain	4	1	0.057142

Agile variables	Mean Rating	Rank	Weighting	*Resillience variables*	Mean Rating	Rank	Weighting
PA18 = Company prepares raw materials to reduce customer waiting time	3.8	11	0.04194				
PA19 = Company prepares raw materials to be used before cooking	3.8	11	0.04194				
PA20 = The company can serve customer needs	4.8	1	0.05298				
PA21 = Food &; Baverage Department can perform services according to customer wishes	4.4	2	0.04857				
PA22 = The company conducts promotions to maintain relationships with customers	3.8	11	0.04194				
PA23 = Company can provide customer food requests	4.2	4	0.04636				

4.2 Supply Chain AR Index Construction Results

Table 4 illustrates the correlation matrix for the practice under consideration. According to the correlation matrix, the variable is not highly correlated with others at a significance level of 5%. Most of them are not significantly related to each other at all. The following table 5 is the correlation of weighted supply chain practices.

Table 5 Weighted Correlation of Companies

Correlation Matrix		PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10	PA11	PA12
Agile Practices	PA1	1.000	-0.133	-0.801	-0.308	0.534	0.308	0.142	-0.142	0.378	0.134	-0.309	0.267
	PA2	0.133	1.000	0.000	0.000	-0.250	0.866	0.267	-0.668	-0.530	0.250	0.000	0.875
	PA3	-0.801	0.000	1.000	0.000	-0.875	0.000	-0.267	0.000	-0.530	-0.250	0.000	-0.250
	PA4	-0.308	0.000	0.000	1.000	0.289	-0.167	0.000	0.617	-0.408	0.722	1.000*	-0.144
	PA5	0.534	-0.250	-0.875	0.289	1.000	-0.289	0.267	0.267	0.530	0.375	0.289	0.000
	PA6	0.308	0.866	0.000	-0.167	-0.289	1.000	0.000	-0.617	-0.612	0.289	-0.167	0.722
	PA7	0.142	0.267	-0.267	0.000	0.267	0.000	1.000	-0.429	0.378	-0.267	0.000	0.535
	PA8	-0.142	-0.668	0.000	0.617	0.267	-0.617	-0.429	1.000	0.000	0.401	0.617	-0.802
	PA9	0.377	-0.530	-0.530	-0.408	0.530	-0.612	0.378	0.000	1.000	-0.530	-0.408	-0.177
	PA10	0.133	0.250	-0.250	0.722	0.375	0.289	-0.267	0.401	-0.530	1.000	0.722	0.000
	PA11	-0.308	0.000	0.000	1.000**	0.289	-0.167	0.000	0.617	-0.408	0.722	1.000	-0.144
	PA12	0.267	0.875	-0.250	-0.144	0.000	0.722	0.535	-0.802	-0.177	0.000	-0.144	1.000
	PA13	-0.801	0.125	0.500	0.722	-0.250	-0.144	0.000	0.267	-0.530	0.250	0.722	0.000
	PA14	-0.429	0.668	0.668	0.000	-0.802	0.617	0.000	-0.429	-0.756	0.000	0.000	0.401
	PA15	0.000	-0.866	0.000	-0.167	0.144	-0.667	-0.617	0.617	0.408	-0.144	-0.167	-0.866
	PA16	-0.802	0.250	0.875	0.289	-0.750	0.144	-0.134	0.000	-0.707	0.000	0.289	0.000
	PA17	0.143	0.802	0.134	0.000	-0.401	0.926	-0.143	-0.429	-0.756	0.401	0.000	0.535
	PA18	0.309	0.433	-0.433	-0.167	0.289	0.167	0.926	-0.617	0.408	-0.289	-0.167	0.722
	PA19	0.535	-0.250	-0.875	0.289	1.000**	-0.289	0.267	0.267	0.530	0.375	0.289	0.000
	PA20	-0.756	-0.530	0.530	0.612	-0.177	-0.612	-0.378	0.756	-0.250	0.177	0.612	-0.707
	PA21	0.143	0.802	-0.134	0.309	0.000	0.617	0.571	-0.429	-0.378	0.267	0.309	0.802
	PA22	0.535	-0.250	-0.875	0.289	1.000**	-0.289	0.267	0.267	0.530	0.375	0.289	0.000
	PA23	0.756	0.530	-0.530	-0.612	0.177	0.612	0.378	-0.756	0.250	-0.177	-0.612	0.707

After obtaining the value of weight and correlation, behavioral calculations are carried out. The following table 6 shows the results of the calculation of company behavior.

Table 6 Agile and Resillience Behavior of Companies

Agile Practices	Implementation Degree (PA)j	Agile Practices	Implementation Degree (PA)j
PA1	4	PA13	3.8
PA2	2.6	PA14	3.6
PA3	4.2	PA15	3.2
PA4	3.8	PA16	3
PA5	3.4	PA17	4.2
PA6	3.4	PA18	3
PA7	4.6	PA19	4
PA8	4	PA20	3
PA9	3.2	PA21	3.2
PA10	3.8	PA22	3.6
PA11	3.4	PA23	4
PA12	4.2		
Agile behaviour reference value = 3.603$(B_A)j = \sum_{i=1}^{y} w_{Ai}\ x\ (P_{Ai})j$			

ResilliencePractices	Implementation Degree (PR)j	ResilliencePractices	Implementation Degree (PR)j
PR1	3.6	PR10	4.4
PR2	3.2	PR11	3.6
PR3	3.4	PR12	2.8
PR4	4.2	PR13	3.8
PR5	4	PR14	4
PR6	3.4	PR15	2.8
PR7	4.2	PR16	4.4
PR8	3.8	PR17	3.6
PR9	2.8		
Resillience behaviour reference value = 3.493$(B_R)j = \sum_{i=1}^{y} w_{Ri}\ x\ (P_{Ri})j$			
AR index reference value = 3.548 $AR_j = 0.5$ x $(B_A)_j + 0.5$ x$(B_R)_j$			

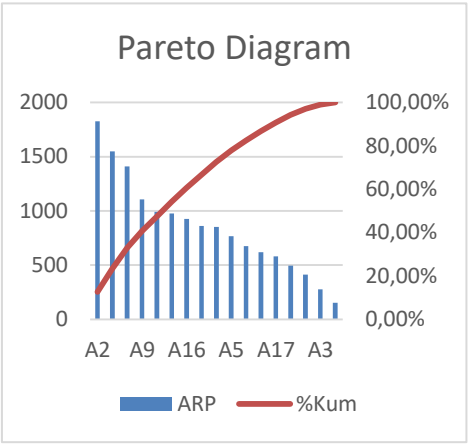
The combined implementation value in the reference index AR is 3,548. This value shows that in the current situation, XYZ hotel has sufficiently implemented agile and resillience practices. Therefore, supply chains need to be more flexible and durable to become more competitive.

4.3 House of Risk (HOR) phase 1

ARP (Aggregate Risk Potential) calculation is carried out to determine the risk that receives the solution based on the ARP (Aggregate Risk Potential) value received. The following table 7 and figure 1 show the cumulative ARP.

Table 7 Cumulative ARP
Figure 1 Pareto Diagram

Kode	Risk Agent	ARP	Kumulatif	%Kum	%Kum	Rank
A2	Stock of raw materials is still available	1827	1827	12.63%	12.63%	1
Al2	There is a PSBB in the supplier area	1548	3375	10.70%	23.32%	2
A4	Not much budget	1410	4785	9.74%	33.07%	3
A9	Employees do not comply with SOP	1105	5890	7.64%	40.70%	4
A7	Late in preparing materials	990	6880	6.84%	47.55%	5
A10	Employees are not careful in counting stock	975	7855	6.74%	54.28%	6
A16	There was an error in delivering the customer's order in F&B	925	8780	6.39%	60.68%	7
A6	Human error	860	9640	5.94%	66.62%	8
A11	Employees who are careless in inputting production and sales databases	852	10492	5.89%	72.51%	9
A5	Food waste	768	11260	5.31%	77.82%	10
A15	The quality of raw materials does not match the hotel's requirements	676	11936	4.67%	82.49%	11
Al4	Changes to customer orders	618	12554	4.27%	86.76%	12
A17	An error occurred in the packing process	581	13135	4.02%	90.77%	13
Al	Error in calculating the amount of raw materials	495	13630	3.42%	94.19%	14
A8	Planning calculation error	412	14042	2.85%	97.04%	15
A3	Waiting for F&B Manager approval	276	14318	1.91%	98.95%	16
A13	The cooking tools used are limited	152	14470	1.05%	100.00&	17



Based on table 6, the result of the ARP value that has the highest value is A2, namely the stock of raw materials in the company is still available with a value of 1827. The ARP rating in the Pareto chart whose value reaches the highest reaches 80% is the cause of risk with codes: A2, A12, A4, A9, A7, A10, A16, A6, A11, A5 and A15 accounting for 82.49% of the total ARP value.

4.4 House of Risk (HOR) phase 2

The calculation in House of Risk (HOR) phase 2 involves total effectiveness of action (Tek), degree of difficulty performing action (Dk) and Effectiveness of difficulty ratio (ETDk) with the highest value, namely ETDk which will be prioritized for risk management actions. The outcome of House of Risk (HOR) phase 2 is the proposed strategy or preventive action contained in HOR 1. The following table 8 shows the proposed strategy in House of Risk (HOR) phase 2:

Table 8 Strategy Proposals

Kode	Risk Event	Kode	Risk Agent	Kode	Tindakan pencegahan	Dk
E2	The number of raw material orders to suppliers decreased due to COVID-19	A2	Stock of raw materials is still available	PAI	Raw material orders reduced during COVID-19	3
E12	Supplier late in sending raw materials	Al2	There is a PSBB in the supplier area	PA2	Looking for new suppliers that suit the hotel	4
E4	The price of raw materials is relatively high	A4	Not much budget	PA3	Processing menus with available raw materials	3
E9	An error occurred in the cooking process	A9	Employees do not comply with SOP	PA4	Employee training every month	3
E7	Delay the production process (cooking)	A7	Late in preparing materials	PA5	Prepare raw materials before opening the hotel	2
E10	The stock of raw materials in the data does not match the existing stock (physical)	A10	Employees are not careful in counting stock	PA6	Implementing computer technology	2
E16	Customer orders do not match the availability of raw materials	A16	There was an error in delivering the customer's order in F&B	PA7	Carry out raw material calculations before opening a hotel	2
E6	There was an error in recording the customer's room number.	A6	Human error	PA8	Conduct cross checks between employees and customers when placing orders	2
E11	An error occurred while checking the receiving incoming material process.	A11	Employees who are careless in inputting production and sales databases.			
E5	There is a buildup of ready-made food	A5	Food waste	PA9	Reduce the number of menu batches	3

The strategy proposal that has been calculated in House of Risk (HOR) 2, obtained the result of the PA1 value, namely raw material orders reduced during COVID-19 which was the highest at 30681.

5. CONCLUSION

1. Based on the data processing and analysis that has been done, the conclusion obtained is The combined implementation value in the reference index AR is 3,548. This value shows that in the current situation, XYZ hotel has sufficiently implemented agile and resillience practices. Therefore, supply chains need to be more flexible and durable to become more competitive.
2. Based on the results of the analysis of the House of Risk method, it can be concluded as follows: A. This HOR 1 model to determine the priority of risk agents as the cause of risk in order to take preventive

measures to cause the highest risk in the project is A2 "Stock of raw materials is still available" with a value of ARP 1827. B. The HOR 2 model prioritizes proactive measures that effectively reduce the occurrence of risks based on PA1 capabilities. PA1 actions with mitigation measures in the form of raw material orders were reduced during a pandemic, such as COVID-19 with an ETDk value of 10227.

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