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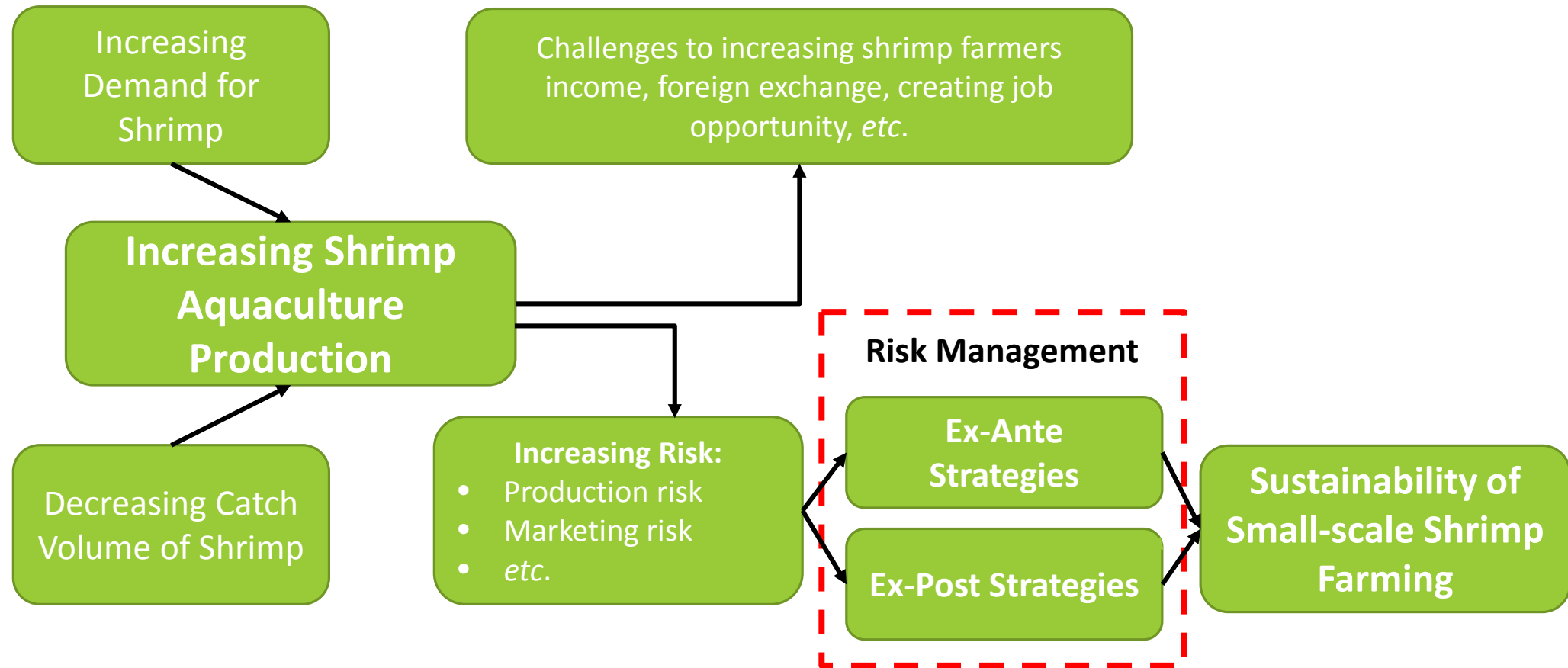
Coping up with the Risk, Increasing Sustainability; Strategies for Small-scale Shrimp Farming in Indonesia

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The Fast Growth of Indonesian Shrimp Production: Challenges and Uncertainty



Ex-Ante Risk Management Strategies Ex-Post Risk Coping Strategies



a **shock** is an unexpected or unpredictable event that affects to income of shrimp farmers, either positively or negatively

Material

- ❖ Surveys were conducted in both of south coastal area and north coastal area of East Java, Indonesia. The sample included 89 and 77 shrimp farms in south and north coastal areas, respectively.
- ❖ In-depth interviews with experts in shrimp farming were conducted to collect opinion and suggestion related to sources of risk and risk management strategies. In the total, 32 sources of risk and 34 risk management strategies were presented to the respondents.

Method

- ❖ This research used the concept of the level of risk to measure the potential impact of sources of risk on the shrimp farms.
- ❖ The level of risk is defined as the result of consequence (significance) and likelihood (probability) of each risk.

$$\text{Risk Level} = \text{Consequence} * \text{Likelihood}$$

- ❖ Five points Likert scale was employ to measure the consequence and likelihood as follows;

Likert Scale	Consequence (Significance)	Likert Scale	Likelihood (Probability)
1	Negligible	1	Rare
2	Minor	2	Unlikely
3	Moderate	3	Possible
4	Major	4	Likely
5	Severe	5	Almost certain

The Sources of Risk in Shrimp Farming

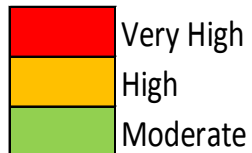
Table 1. The Sources of Risk in Shrimp Farming

Source of Risk	Group	Consequence	Likelihood	Risk Level	Rank
Brackish water quality	Production	3.016	3.393	10.234	12.927
Do not conduct treatment before stocking shrimp fries	Production	3.714	2.971	11.035	
Excessive stocking density	Production	3.593	3.399	12.213	
Feeding management failure	Production	4.503	2.929	13.186	
High mortality due to diseases	Production	4.921	4.450	21.897	
Inappropriate pond design	Production	3.423	3.077	10.532	
Inappropriate pond location	Production	4.249	2.648	11.251	
Inappropriate shrimp fries size	Production	3.143	2.902	9.121	
Lack of information about shrimp fries origin	Production	3.958	2.902	11.486	
Low quality of formulated shrimp feed	Production	4.899	2.712	13.286	
Low quality of shrimp fries	Production	4.921	3.040	14.957	
Water pollution due to excessive formulated feed	Production	4.561	3.492	15.924	
Harvesting without grading	Harvesting and Marketing	3.545	2.696	9.556	12.912
Inappropriate harvesting method	Harvesting and Marketing	3.524	2.749	9.686	
Shrimp price volatility	Harvesting and Marketing	4.926	4.434	21.841	
Shrimp size variability	Harvesting and Marketing	3.376	3.130	10.565	
High interest rate for loan	Financial and Credit Access	3.392	2.638	8.948	11.969
High wages of hired labor	Financial and Credit Access	3.039	2.553	7.760	
Increasing formulated feed price	Financial and Credit Access	4.643	4.035	18.734	
Lack collateral for loan	Financial and Credit Access	3.762	2.890	10.874	
Not enough capital to operating shrimp farms	Financial and Credit Access	4.091	3.306	13.528	
Asymmetric information between buyer and farmers	Personal	3.478	2.690	9.359	11.147
Flood	Personal	3.026	2.575	7.793	
Lack of knowledge of pond preparation	Personal	4.216	2.682	11.307	
Lack of knowledge to prevent shrimp diseases	Personal	3.889	3.257	12.665	
Lack of labor knowledge	Personal	3.978	2.698	10.733	
Not enough formulated feed supply	Personal	3.899	3.527	13.752	
Not enough labor supply	Personal	3.184	2.628	8.368	
Shrimp farmers doesn't have brackish water treatment facility	Personal	4.843	2.839	13.750	
Polluted brackish water sources	Personal	4.651	2.709	12.597	
Change government policy and regulation	Policy and Institutional	4.254	2.861	12.170	9.753
Low level of awareness from shrimp farmers	Policy and Institutional	2.724	2.693	7.335	

The Top 10 Sources of Risk in Shrimp Farming

Table 2. Top 10 Sources of Risk in Shrimp Farming

Group and Sources of Risk	Significant	Likelihood	Level of Risk	Overall Rank
Production				
High mortality due to diseases	4.921	4.450	21.897	1
Water pollution due to excessive formulated feed	4.561	3.492	15.924	4
Low quality of shrimp fries	4.921	3.040	14.957	5
Low quality of formulated shrimp feed	4.899	2.712	13.286	9
Feeding management failure	4.503	2.929	13.186	10
Harvesting and Marketing				
Shrimp price volatility	4.926	4.434	21.841	2
Financial and Credit Access				
Increasing formulated feed price	4.643	4.035	18.734	3
Not enough capital to operating shrimp farms	4.091	3.306	13.528	8
Personal				
Not enough formulated feed supply	3.899	3.527	13.752	6
Shrimp farmers doesn't have brackish water treatment	4.843	2.839	13.750	7
Policy and Institutional				
Change policy and regulation in shrimp production	4.254	2.861	12.170	14



The result shows that the sources of risk has interconnected with each other.

- ❖ Feeding management failure lead the water polluted due to excessive formulated feed.
- ❖ High mortality due to diseases tend to influence the shrimp price volatility due to excess demand in the market.
- ❖ Increasing formulated shrimp price cause not enough capital to operating shrimp farms.

The Ex-Ante On Farm Strategies

Table 3. The Ex-Ante On-Farm Strategies

		Informal Mechanism	Formal Mechanism	
			Market Based	Government Support
Ex-Ante Strategies	On Farm	<ul style="list-style-type: none"> • Risk avoidance <ol style="list-style-type: none"> 1. Reduce stocking density 2. Only buy shrimp fries from reliable place 3. Reallocated shrimp pond to designed area 4. Only buy shrimp fries that have SPF certificate 5. Buying formulated feed from reliable brands 6. Make credit arrangement before production cycle 7. Reduce brackish water pond size 8. Use large size shrimp fries 	<p>In terms of Ex-ante formal mechanism, most of small-scale shrimp farmers use aquaculture extension and shrimp fries from public hatchery as risk mitigation strategies.</p>	<ul style="list-style-type: none"> • Aquaculture extension <ol style="list-style-type: none"> 1. Request government support for technical assistant 2. Loan with flexible repayment schedule
		<ul style="list-style-type: none"> • Risk Reduction <ol style="list-style-type: none"> 1. Following better management practices 2. Strictly feeding management 3. Strictly manage water quality 4. Partial harvested 5. Attending workshop in shrimp farming 6. Develop brackish water treatment 7. Hire technical assistant 		<ul style="list-style-type: none"> • Supply of quality seeds, inputs, etc. <ol style="list-style-type: none"> 1. Supply shrimp fries from public hatchery
		<ul style="list-style-type: none"> • Diversification of income sources <ol style="list-style-type: none"> 1. Off-farm work 2. Farm diversification 		
		<ul style="list-style-type: none"> • Adoption advanced technique <ol style="list-style-type: none"> 1. Apply new technology in shrimp production 		

The Ex-Ante Risk Sharing Strategies

Table 4. The Ex-Ante Risk Sharing Strategies

		Formal Mechanism	
		Market Based	Government Support
Ex-Ante Strategies	Sharing the Risk	<ul style="list-style-type: none"> • Crop sharing 1. Sharecropping • Sharing equipment 1. Sharing machinery and paddle wheels • Informal risk pooling 1. Informal marketing contact with wholesaler 	<ul style="list-style-type: none"> • Contract marketing 1. marketing contract with processor • Insurance 1. Production contract 2. Vertical integration 3. Contract for shrimp farms inputs
		NONE	

- ❖ Regarding Ex-ante informal risk sharing mechanism, sharing risk between individuals (among shrimp farmers) through **sharecropping, sharing machinery and paddle wheels** are effective for counterbalancing consequences of events that affect some member of community.
- ❖ Transfer the risk to the third parties is the common method among shrimp farmers to smoothing their income. The results show that **production contract, price contract for farm input, and sharecropping** are the top three strategies in this group. Shrimp price volatility and increasing formulated feed price could be the main reason for selecting this strategy.

The Ex-Post Risk Coping Strategies

Table 5. The Ex-Post Risk Coping Strategies

		Informal Mechanism	Formal Mechanism	
			Market Based	Government Support
Ex-Post Strategies	Coping the Risk	<ul style="list-style-type: none"> • Change consumption pattern 1. Reduce consumption pattern • Reduce of assets 1. Dissaving • Reallocation of labor 1. Use family labor • Mutual aid 1. Use informal loan 	NONE	<ul style="list-style-type: none"> • Social assistance 1. Request social assistance after natural disaster

- ❖ In terms of risk mitigation strategies, the small-scale shrimp farmers tried to develop several strategies to **reduce fluctuation in their consumption or asset**.
- ❖ Due to lack of collateral and high interest rate for loan, the small-scale shrimp farmers tend to used **informal loan** and **dissaving** as **ex-post** risk coping strategies.
- ❖ Moreover, to reduce expenditure in shrimp production, the shrimp farmers used **family labor**. This strategy was effective to cope the personal risk, such as **increasing wages of hired labor** and **not enough labor supply**.
- ❖ In terms of formal mechanism, **request social assistant after natural disaster** to the government is the common risk coping strategies.

Conclusions

- ❖ Regarding the sources of risk, high mortality due to diseases and shrimp price volatility are by far the most damaging sources of risk that almost the majority of shrimp farmers in East Java had experienced.
- ❖ Based on groups the sources of risk, the group of production was the first rank, while harvesting and marketing risk in the second.
- ❖ In terms of risk management strategies, small-scale shrimp farmers develop several strategies to manage their risk before it occurs. Risk avoidance, risk reduction, and request support to the government are the primary methods. The risk avoidance can be achieved by strictly managed brackish water quality while production contract is the main strategies of risk transfer.
- ❖ In case the risk already occurs, the small-scale shrimp farmers tend to engage informal loan mechanism, dissaving and family labor to smoothing their consumption or asset as ex-post strategies. These strategies may reflect the inability of shrimp farmers to access formal loan from a financial institution.



Thank You
