

# **Labor situation of kelp farmers and the change in farming practice**

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# Outline

1. Introduction

2. Clarify the operation of the new business

3. Analysis of the new operations by time study

4. Discussion

# 1. Introduction

## Topics

1. Kelp farming Fishermen in Fukushima earned incomes only between September - January.
2. New business adopted between March and May.
3. 5 of the 58 fisherman in Fukushima participate in the new business.

## A question arise

Why 53 fisherman  
have not participate in the new business?

# 1. Introduction

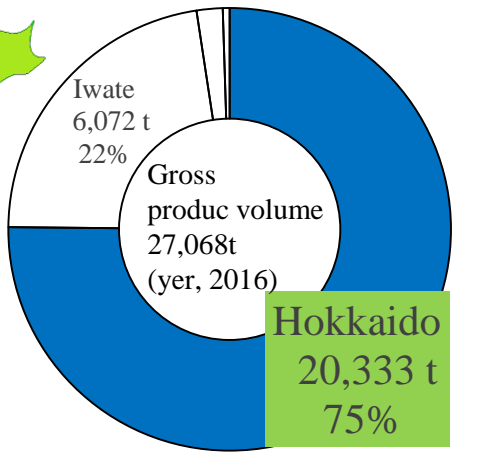
## **Objectivities**

1. Clarify the operation of the new business.
2. Consider limiting factors to adopt new operation.

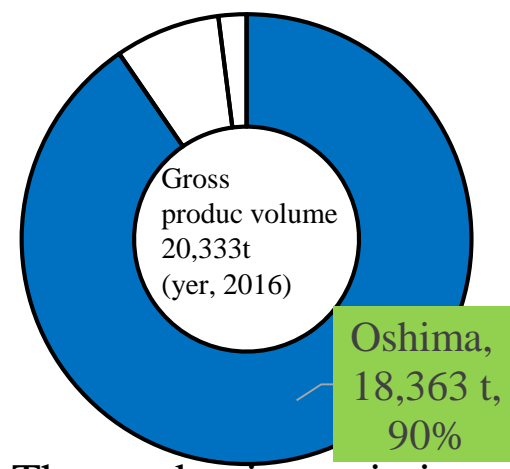
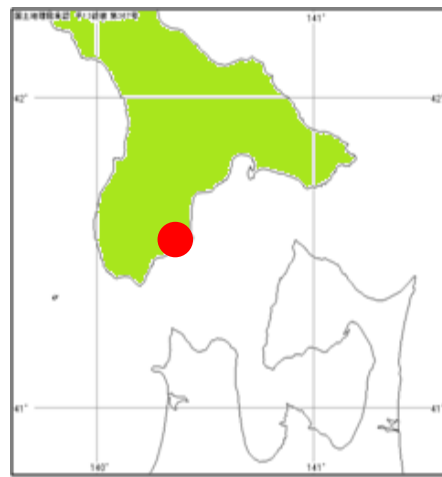
## **Method**

- Interview-based investigation
- Time study

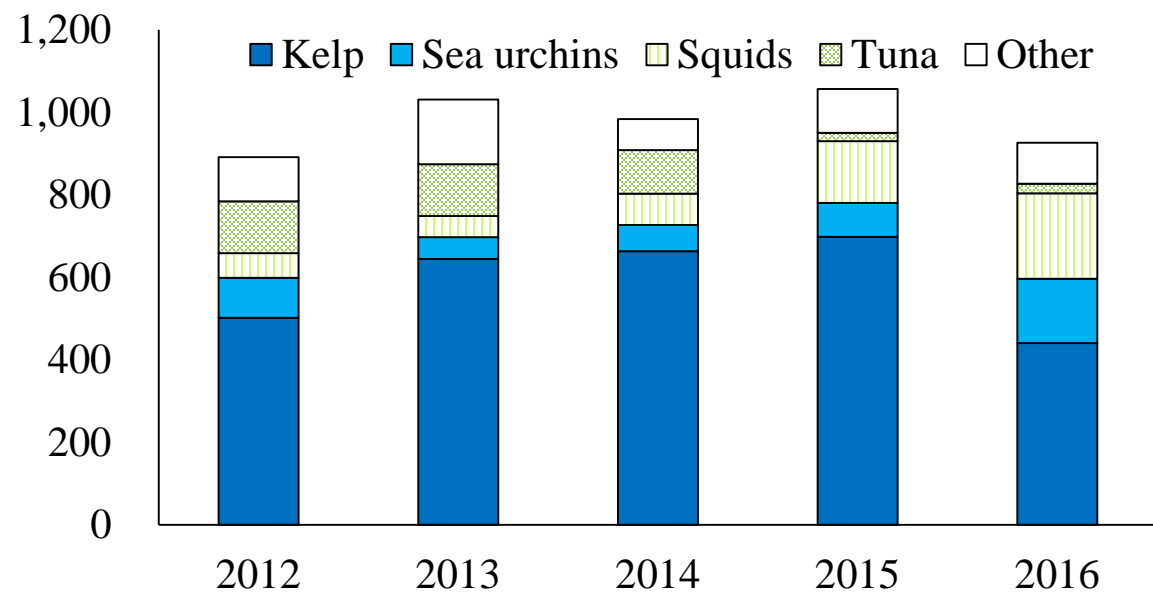
# Research site



The production ratio in each prefecture in Japan



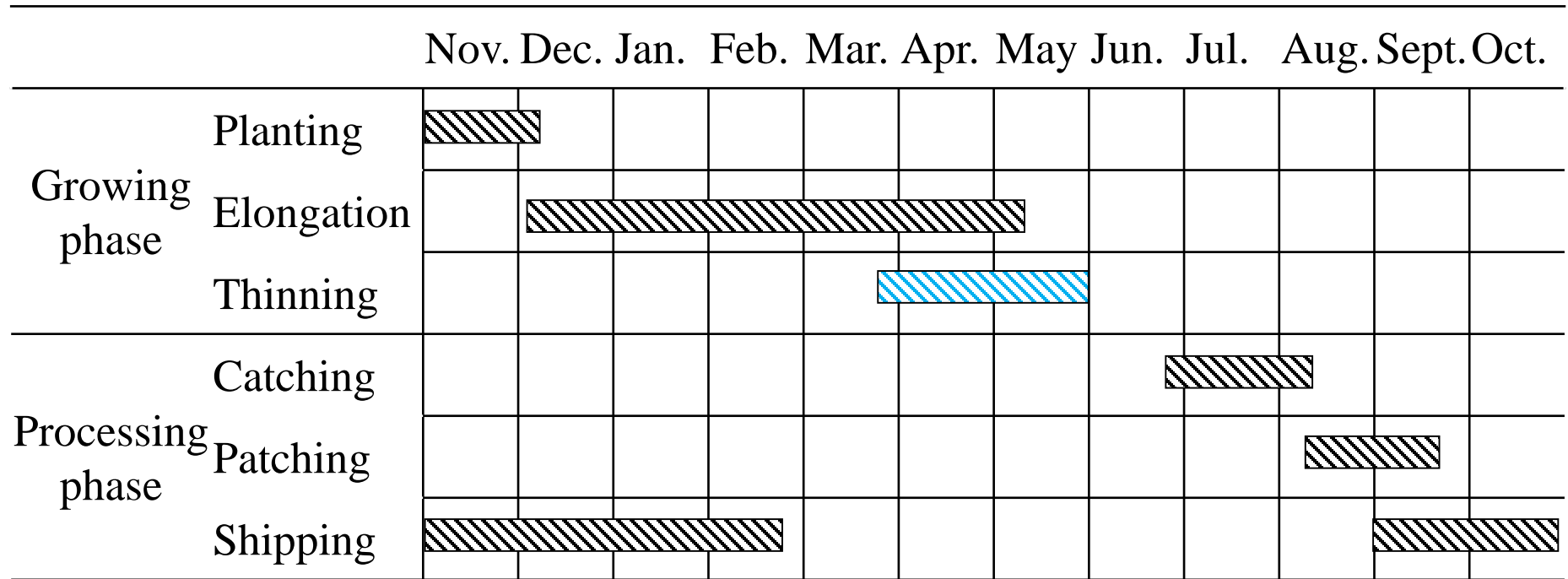
The production ratio in each region in Hokkaido



**Kelp is major product of Fukushima fishing village**

A production value of Fukushima fishing village in 2012 – 2016.

# Annual work flow of kelp farming in Fukushima.



- Average income of kelp farmer is about 6mil.yen. (53600 \$)
- Kelp farmer operate sea urchins fishing as a side business.
- New business is effective for stable incomes.

## 2. Clarify the operation of the new business

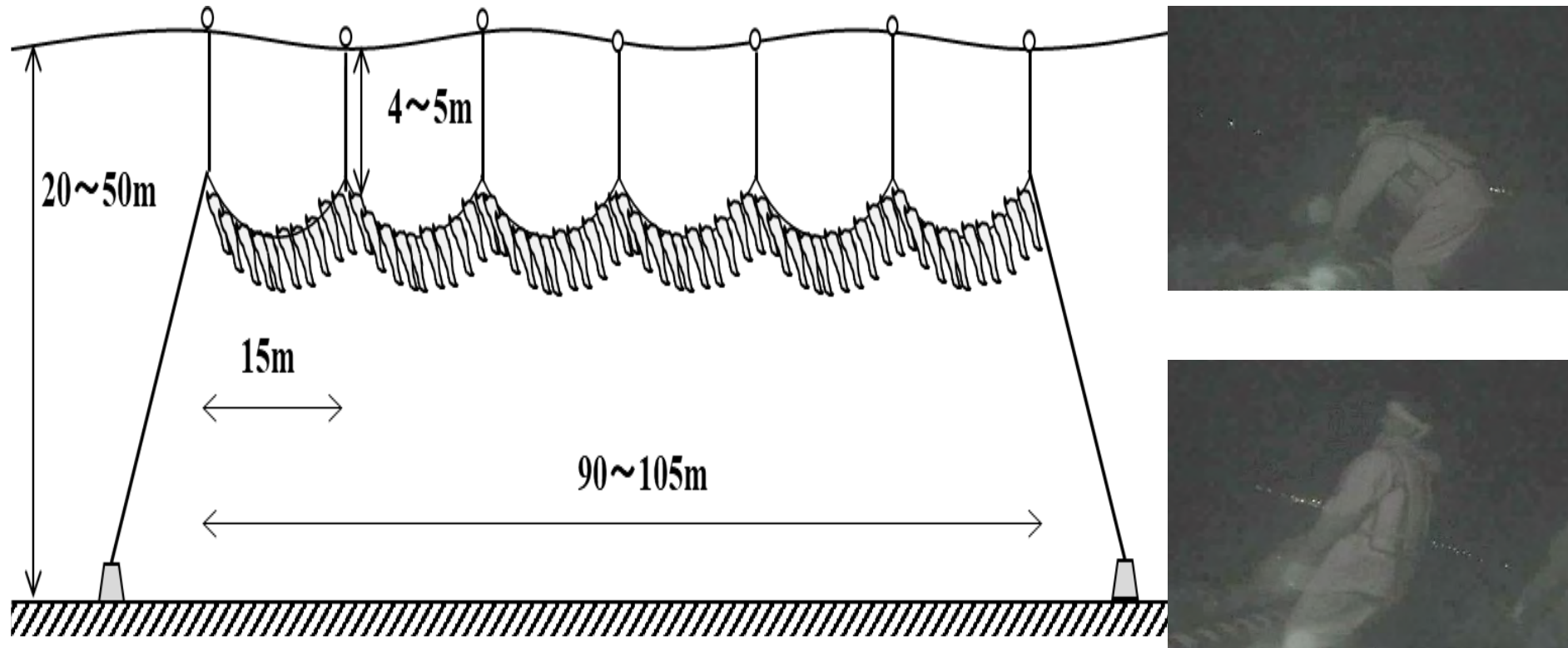
**2.1 The outline of thinning work.**

**2.2 A daily work flow of new business.**

**2.3 An income of thinning kelp.**

## 2. Clarify the operation of the new business

### 2.1 The outline of thinning work.



Fisherman operate about 5 hours per day.

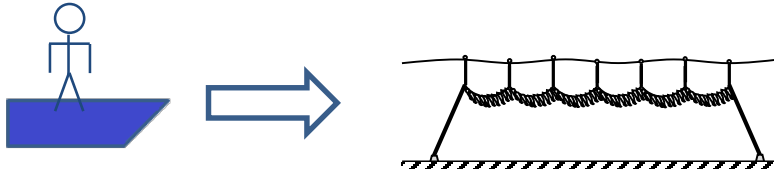
This operation needs certain light climate and calm current.



## 2. Clarify the operation of the new business

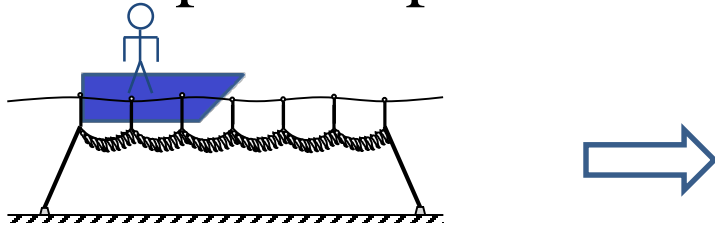
### 2.2 A daily work flow of new business.

1. Fisherman thinning out kelp from a farm.



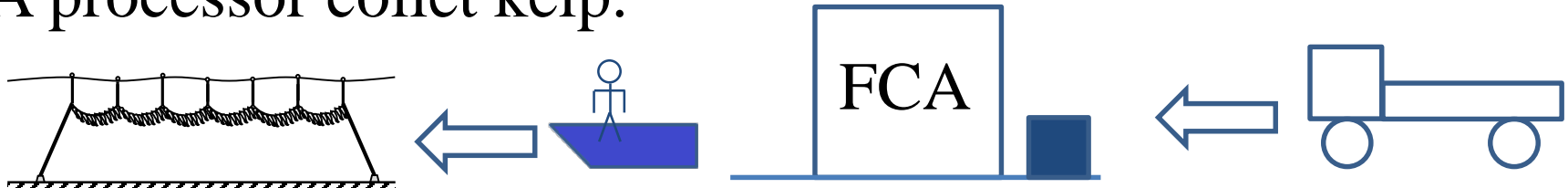
▪ 1.5 hours needed

2. Transport kelps to fisheries cooperative association.



▪ By 8 a.m

3. A processor collect kelp.



## 2. Clarify the operation of the new business

### 2.4 An income of thinning kelp.

- ① A unit price : 50yen/kg $\approx$ 0.44 \$ /kg
- ② An upper limit of shipment volume per day per head : 200kg
- ③ Operation days : 60days

**Total incomes of 60 days : 600,000yen $\approx$ 5300 \$**

(If fisherman hire one part-timer : 350,000yen $\approx$ 3100 \$ )

## 2. Clarify the operation of the new business

### **Brief summary**

- ❶ New business do not need new equipment investment
- ❷ Additional income is 35,000-600,000yen
- ❸ Increase work hours are about 1- 1.5 hour per day

**At first sight, this business is profitable for fisherman.**

## 3. Consider limiting factors to adopt new operation

**3.1 Time study for increased thinning work processes.**

**3.2 Compare existing work flow to new work flow.**

**3.3 Simulation of extend work days.**

## 3. Consider limiting factors to adopt new operation

### **3.1 Time study for increased thinning work processes.**

Details of increased work hours (1- 1.5 hour) is below.

The 30-40 minutes is for a round trip from port to fishing ground..

The other 30- 40 minutes is for shipment.

There is no major change in thinning movements.

**Increased work hours are not so enormous.**

# 3. Consider limiting factors to adopt new operation

## 3.2 Compare existing work flow to new work flow

Table1 Comparison of work flow with existing to new business.

In case of May		Sunrise														Shipment limit														Sunset	
Hour		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Existing	Sea Urchin	■															■														
	Sail				■																										
	Thinning																														
	Break																														
New	Sea Urchin	■																													
	Sail				■																										
	Thinning				■																										
	Shipment				■																										
	Break																														

- Increased work hours apply pressure to fisherman.
- many fisherman do not want to increase daily work hours.

### 3. Consider limiting factors to adopt new operation

#### Simulation of extend days

when fisherman extend total work days.

Average thinning hour per one day	:	<b>5h</b>
Increased work hour per one day	:	1-1.5h
Operation days	:	60days
Increased total number of working hours	:	<u>360-390h</u>
Increased number of working days	:	<u>12-18days</u>

**To extend work days is not good for total income.**

## 3. Consider limiting factors to adopt new operation

### **Brief summary**

- ❶ A limiting factor is time point of shipment.
- ❷ Fisherman do not want to increase daily work hours.
- ❸ Extend work days is not good for total income.



# 4. Discussion

**The time point is bottleneck to adapt new business.**

FCA abolish limit time point for shipment in 2018.

Table2 Comparison of work flow with existing to flow of 2018.

In case of 2018		Shipment limit														
		Sunrise	Shipment limit													Sunset
Hour		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Existing	Sea Urchin	█	█	█	█										█	
	Sail				█				█		█			█		
	Thinning				█	█	█	█	█	█	█	█	█	█		
	Break									█	█					
2018	Sea Urchin		█	█											█	
	Sail			█					█		█			█		
	Thinning			█	█	█	█	█	█	█	█	█	█	█		
	Shipment									█						
	Break									█	█					

**Participants were increased 5 to 33 after abolish time limit.**

## 4. Discussion

We must consider not only time interval but also time point.

Bottlenecks are sunrise, sunset, and shipment limit.

In this case, limiting factor can be abolished by discussion.

Social approach is important for solve bottleneck problem.