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Development of a database of Material Flow Analysis for agro-food processing craft villages in Red River Delta of Vietnam

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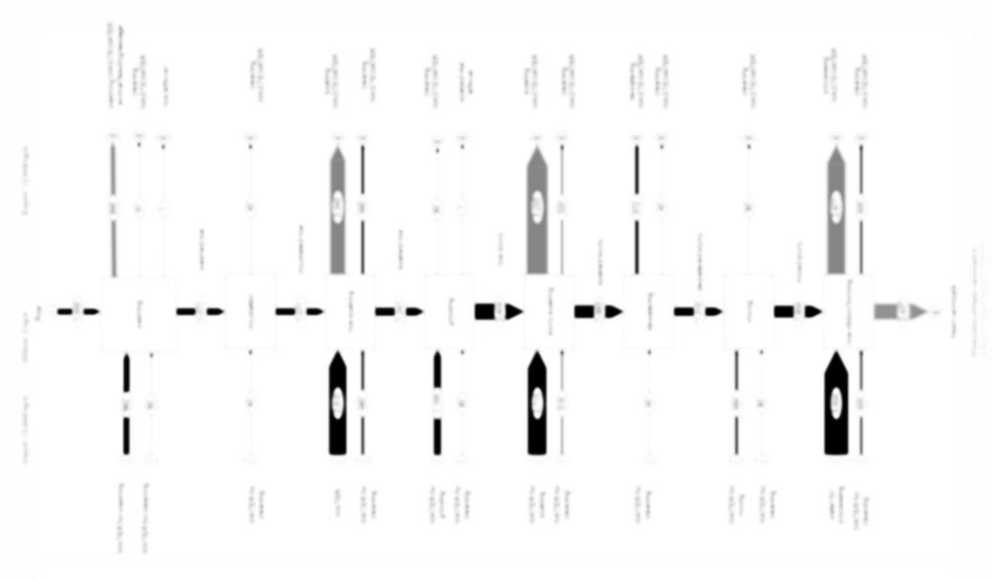

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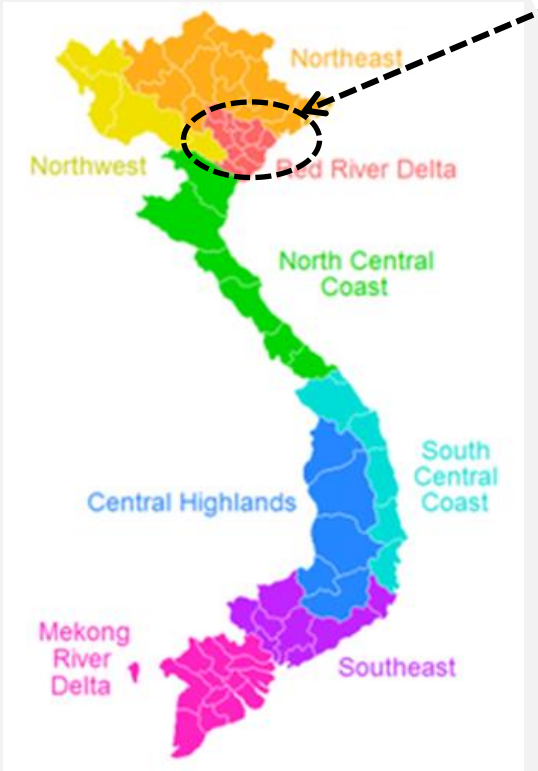
Introduction



[source of map: Wikipedia]

11 provinces in Red River Delta

Craft village definition:

- 30% households in productions and stable for more than 2 years
- Abiding by State legislation

[source: Circular No 116/2006/TT-BNN]

- Productions at level of family: takes place at household or designated area

Agro-food processing craft villages:

raw materials (and products): rice (liquor, noodle, **vermicelli**), soyabean (tofu), arrowroot (**starch**, **glassnoodle**), cassava (**starch**, liquor)

Problem statement:

- **Environmental problems**: starting after 1990, alarming in 2000s until now.

Food villages: **Water and wastewater crisis!**

- **Increasing energy demand**
- **Ineffective env. regulations**
- Research projects and much governmental effort **booming in 2000s until now…**

=> ☹ Problems now and future: water and energy crisis, env. degradation-related problems (social conflict, health, economic)

=> ☺ Potential in resources and energy recovery

Development of craft villages and environmental problems

(adapted from Dang Kim Chi, 2005: „Làng nghề Việt Nam và môi trường" (Craft villages Vietnam and Environment))

Objectives

- Development of a **Material Flow Analysis (MFA)** database of goods, energy and elements of **Carbon, Nitrogen, Phosphorous**
- suggest solution for sustainable production as well as for environmental and resources management

Methodology

DATA COLLECTION

Primary data

Field work

Hanoi, Bac Ninh

production process

interviews

sampling

rice vermicelli, glass noodle, arrowroot starch, cassava starch, rice sheet

Laboratory analysis

Hanoi University of Science

pH, TS, VS, COD, TN, TP, TOC

Secondary data

Literature

Procductions: rice liquor, cassava liquor, rice noodle, tofu

Concentration of **N, P, COD from other sources** than craft villages

=> **INHAND** project *„integrated water concept for craft villages in Vietnam“*

DATA PROCESSING
(excel, STAN, statistic tools)

MFA database
(energy, goods and elements of C, N, P)

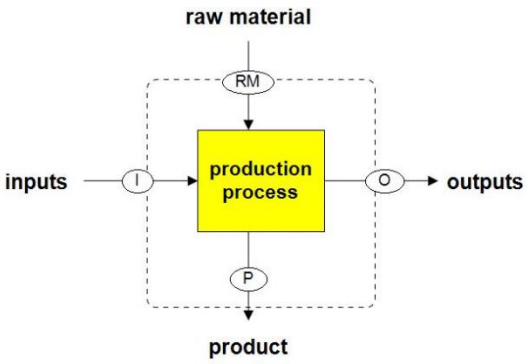
production processes —*extrapolation process*→ **region Red River Delta**

…….evaluations and scenarios……..

Methodology (cont.)

Structure of MFA-Database

Level of production process
Layer of goods and elements of C, P, N

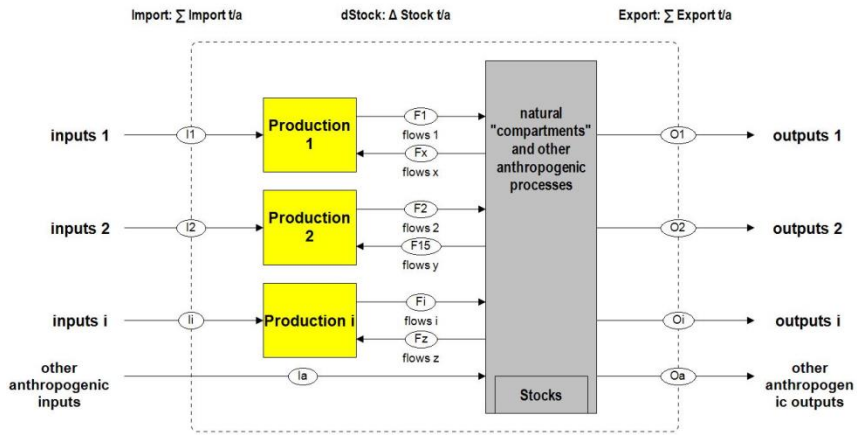


other anthropogenic processes of C, N, P

extrapolation process

mass of C, N, P per unit product!

Level of region Red River Delta
Layer of goods and elements of C, P, N



Simplification of MFA - Region Red River Delta, 2015

MFA – production process

Simplification of MFA – Region Red River Delta

arrowroot starch

productions

cassava starch

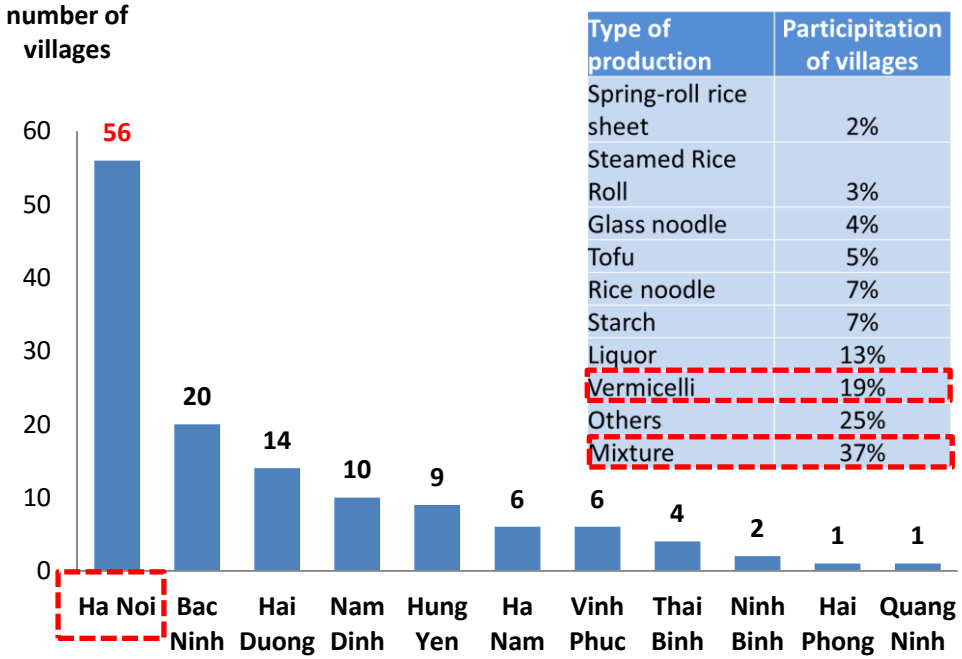
glass noodle

fresh vermicelli

Field site: Hanoi and Bac Ninh province

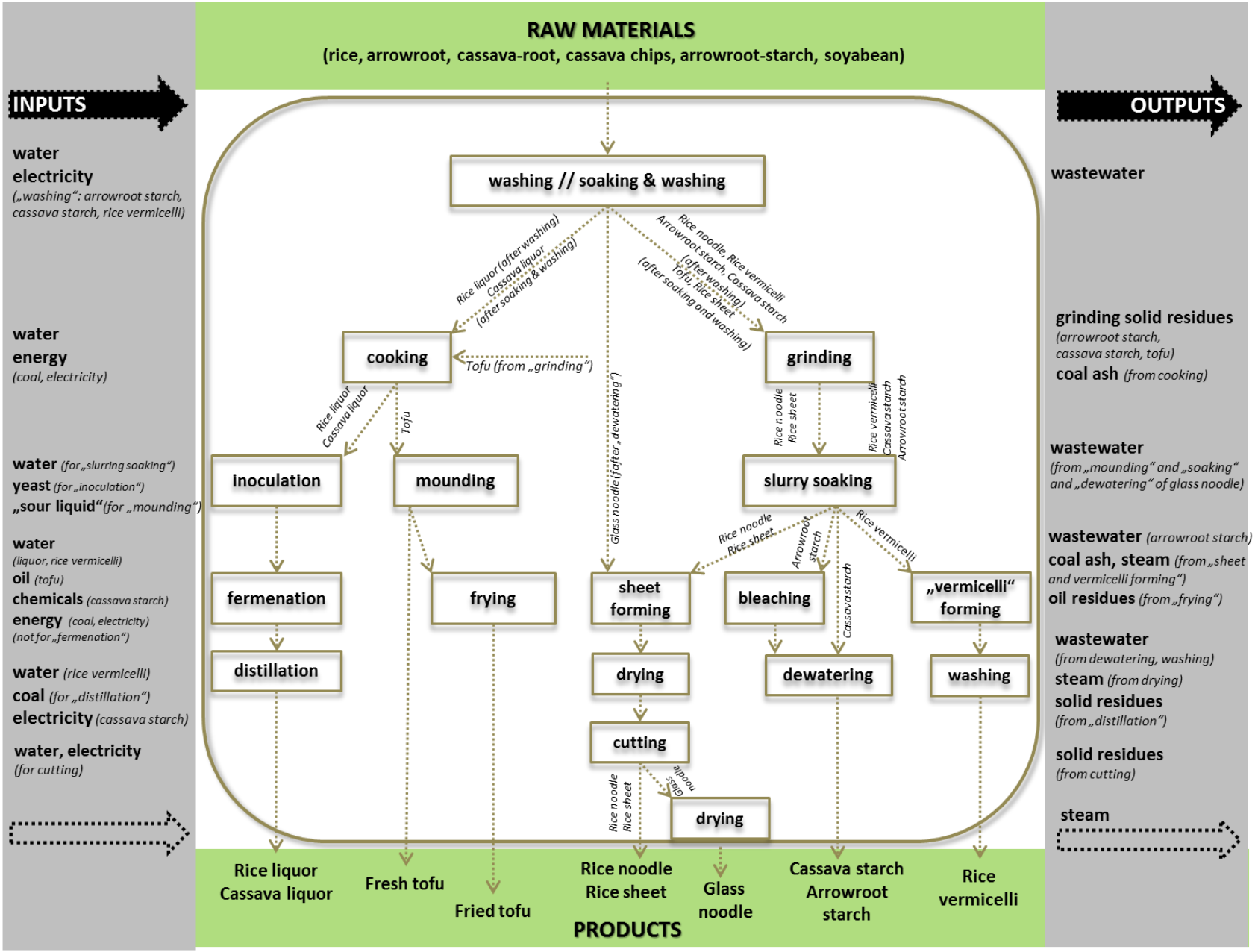
Time of investigation: March – April 2015, December 2015 – January 2016

Results



Type of production	Participitation of villages
Spring-roll rice sheet	2%
Steamed Rice Roll	3%
Glass noodle	4%
Tofu	5%
Rice noodle	7%
Starch	7%
Liquor	13%
Vermicelli	19%
Others	25%
Mixture	37%

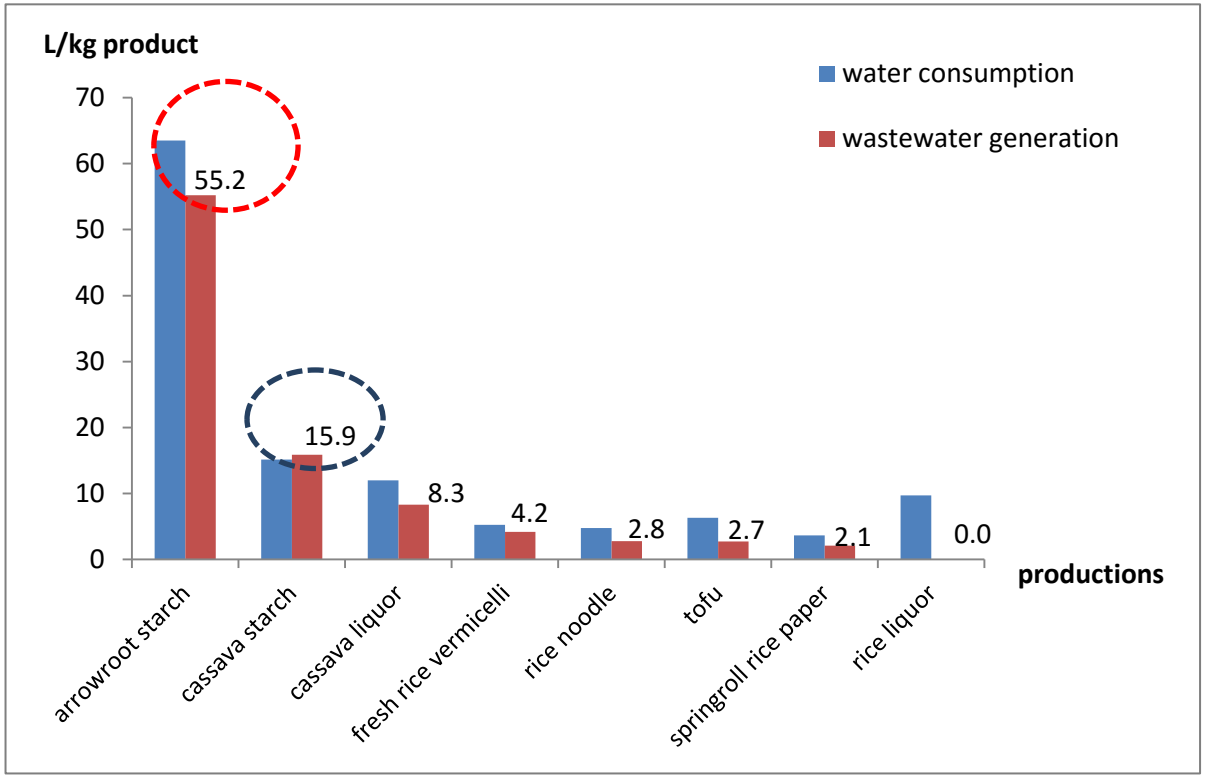
Distribution of agro-food procesing villages in Red River Delta



Simplification of general production process

Results

Specific water consumption and wastewater generation

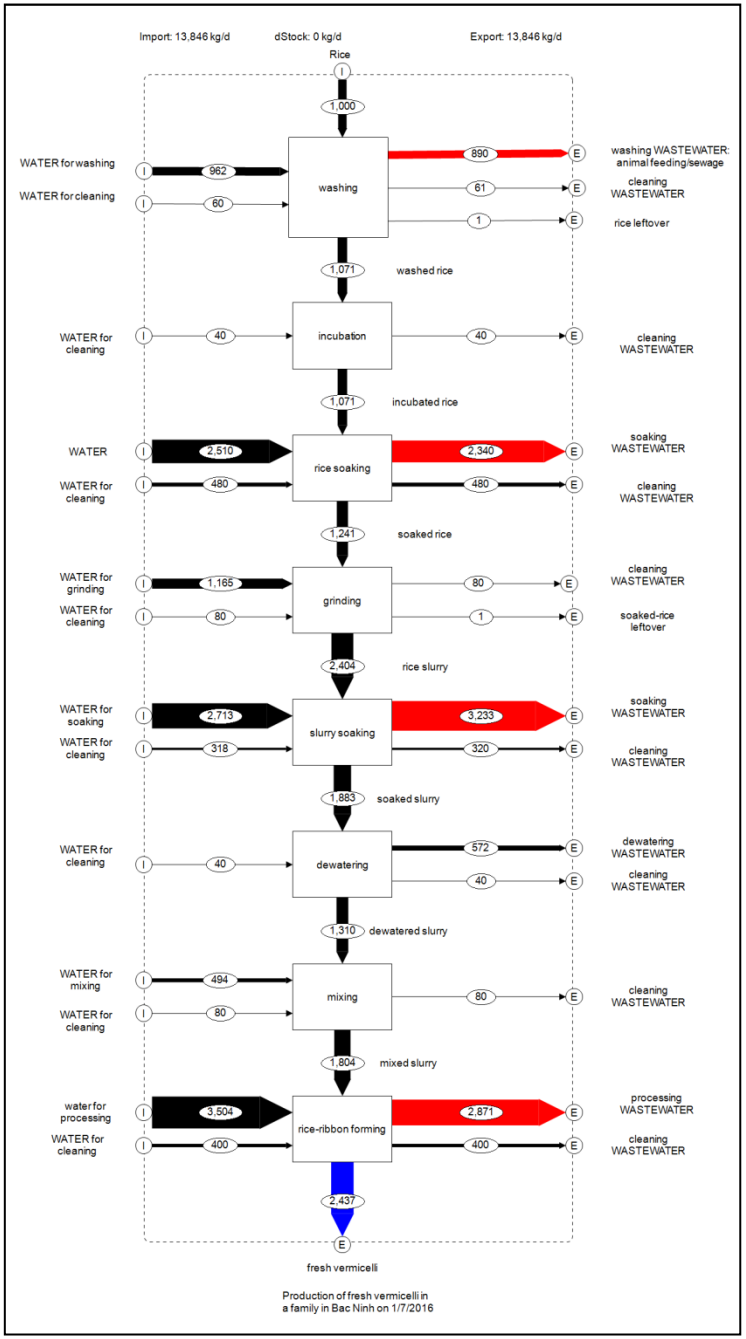


pH
COD [kg/kg product]
TN [kg/kg product]
TP [kg/kg product]
TC [kg/kg product]

Solid residues [kg/kg product]

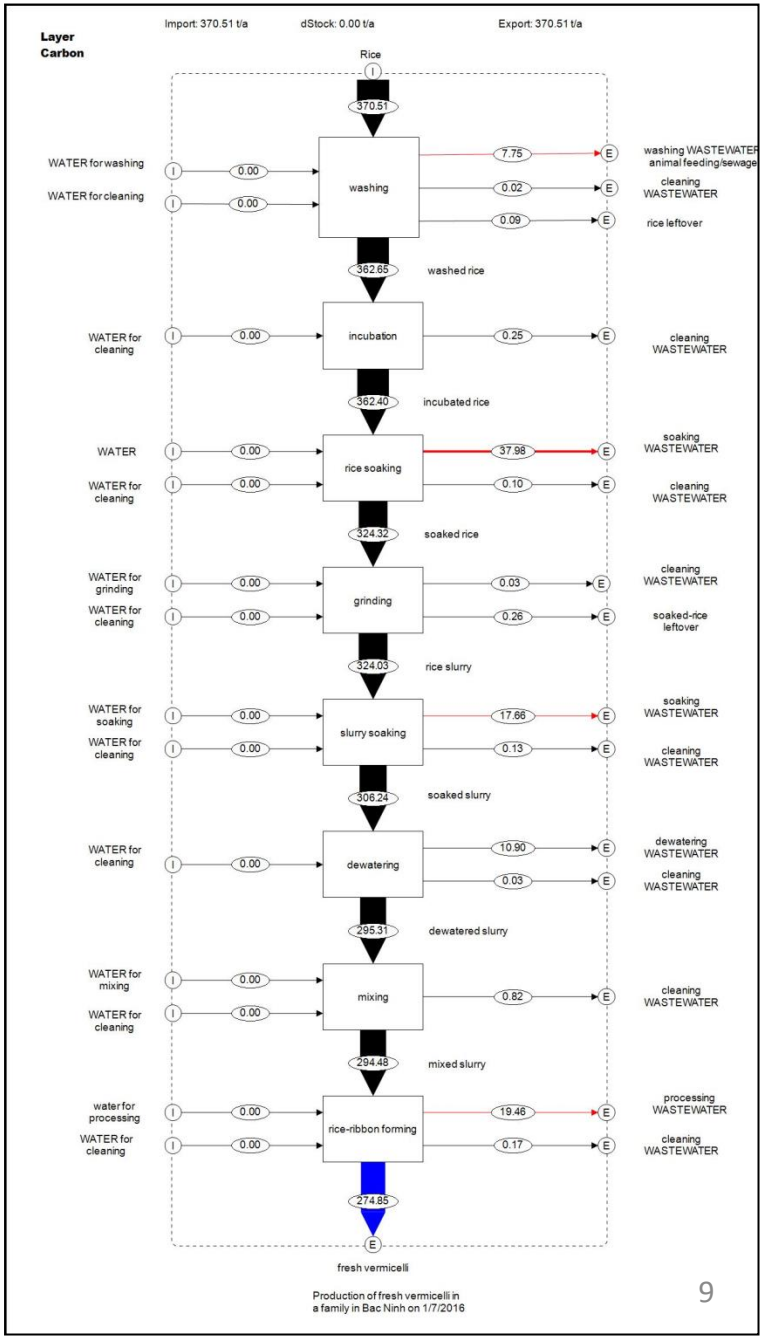
	Cassava liquor	Rice liquor	Tofu	Arrowroot starch	Cassava starch
generation	4.45	2.16	1.1	**14.07**	**4.45**
usage	animal breeding	animal breeding	animal breeding	**canal**	**recycled and cannal**

Layer of goods



MFA – production process of fresh rice vermicelli

Layer of element: C



next steps

- Data uncertainty consideration
- Extrapolation to regional MFA
- Plausibility check and model calibration
- Sensitivity analysis
- Senarios developement

Thank you for your attention!