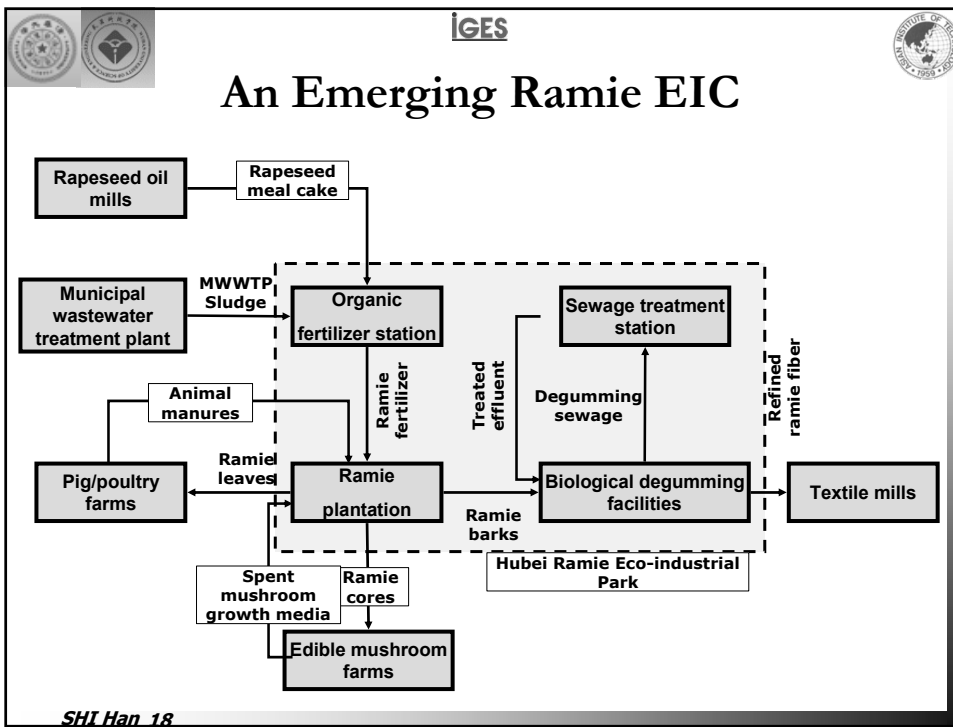


IGES

Main Exports of Xianning in 2007

Export goods	Export values (million US\$)	Growth rate in 2007 (%)
Machinery & electronics products	26.29	33.6%
Textile products & garments	16.54	106.2%
Medical materials	4.67	38.2%
Textile yarns and fabric	15.99	16.9%
Leather gloves	2.71	-42.7%
Total exports	79.9	33.6%

SHI Han 17



 **Technological innovation: mechanical harvesting**



SHI Han 13


 **Technological innovation: byproduct utilization**




SHI Han 20






 **Ramie byproduct: ramie cores**







SHI Han 25

 **Potential Positive Environmental Impacts**

- ✓ Soil conservation: In erosion-prone hilly regions in central China, ramie plantation can serve as a cost-effective alternative to combat soil erosion.
- ✓ Application of municipal sewage sludge as fertilizer: Municipal wastewater sludge can be mixed with rapeseed meal cake to produce organic fertilizer for ramie cultivation.
- ✓ Carbon sequestration: The dry weight of harvested ramie stem ranges from 3.4 to 4.5 t/ha/year
- ✓ Substitution of chemical and cotton fibers: The yield of degummed ramie fiber accounts for 1200 kg/ha/year.


SHI Han 26







Potential Negative Environmental Impacts

- ✓ Due to ramie's high yield of biomass, there would be a rapid decline in soil fertility if the harvesting practice involves total removal of the biomass. Current ramie cultivation uses a significant amount of chemical fertilizers resulting in non-point pollution.
- ✓ Ramie de-gumming is energy intensive.
- ✓ Ramie de-gumming consumes significant amount of water (up to 500 m³ water per ton of raw ramie fiber).
- ✓ De-gumming wastewater containing COD of 2500-10000 mg/l and SS of 200-600 mg/l causes severe water pollution.

SHI Han 27




Potential Socio-Economic Impacts


- ✓ Local economic development
 - Significant expansion of ramie cultivation
 - More cost-saving livestock
 - Edible mushroom cultivation
- ✓ Creation of job opportunities
 - Additional jobs for ramie plantation and processing
 - New jobs from new business activities in livestock, mushroom cultivation, and organic fertilizer
- ✓ Development of social capitals
 - Partnerships between traditionally unrelated industries
 - Better cooperation between local communities, business, governments, and NGOs

SHI Han 28


SWOP – Findings




<ul style="list-style-type: none"> • Availability of ramie residues in quantities suitable for livestock feeds, mushroom media & biomass • Existing local business activities in livestock, mushroom cultivation & organic fertilizing • Proximity to urban Wuhan opens avenues for new markets and new sources of technology <p style="text-align: right;">Strengths</p>	<ul style="list-style-type: none"> • Create additional jobs in ramie plantation, livestock, and mushroom cultivation • Improve ramie cluster profitability by reducing labor requirements & ensuring fiber quality • Prevent & control pollution through biological de-gumming & mechanical de-cortication <p style="text-align: right;">Opportunities</p>
<ul style="list-style-type: none"> • Backward, polluting ramie processing technology & equipment • Lack of a successful business model of large scale ramie plantation & processing • Inadequate utilization of ramie fiber and ramie byproducts <p style="text-align: right;">Weaknesses</p>	<ul style="list-style-type: none"> • Decentralized and small & medium scale biomass-based power generation systems • Community participation in environmental management and local industry development • Eco-tourism activity based on ramie eco-cluster <p style="text-align: right;">Potentials</p>

SHI Han 29


National Policies and Programs

- ✓ Related China's laws: Cleaner Production Promotion Law (2002) and Circular Economy Promotion Law (2008)
- ✓ National Targets for Energy Conservation and Pollution Reduction (2006-2010): 1) 20 percent reduction in energy intensity and 2) 10 percent reduction in COD and SO₂ emissions from 2006 to 2010.
- ✓ National Eco-industrial Parks Demonstration Program
- ✓ National Key Technologies R&D Program in Support of Cleaner Production and Circular Economy (2006-2010)
- ✓ Strengthened Environmental Discharge Standards for Ramie De-gumming Wastewaters
- ✓ National Program in Soil Conservation on Sloping Land




SHI Han 30



Local Policies and Programs

- ✓ Strategy for promoting the ramie industry in Xianning City
- ✓ Promoting the development of a ramie eco-industrial park in Xianning City
- ✓ Government campaign to shut down polluting small-scale ramie chemical de-gumming mills in Xianning
- ✓ R&D support to develop the cleaner production technology by the Hubei provincial and Xianning city governments

SHI Han 31



Conclusions

- ✓ The development of ramie EIC can promote local economic development, create new jobs, and generate positive environmental benefits, thus contributing to the sustainable development of urban fringe and rural areas.
- ✓ The development of ramie EIC has the potential to generate employments in rural areas, and facilitate the upgrading of rural labor force.
- ✓ To reform conventional agriculture practices, integrate traditionally separate industries for collective benefits, and create markets for resulting products are critical to ramie EIC but remain challenging.
- ✓ Technological innovation is essential to improve ramie quality, increase the profitability, and reduce the negative environmental impacts of the ramie cluster. Appropriate technology is key to success. Local universities, industries, and governments have formed partnerships to develop the feasible technology systems.

SHI Han 32