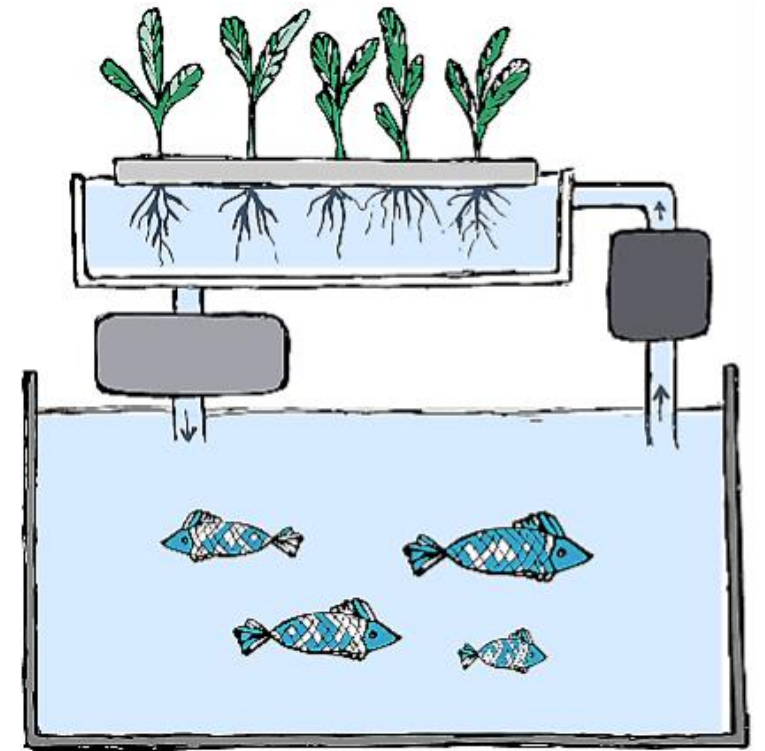




Commercial aquaponics

Unlocking opportunities and
tackling barriers.



Märta Tivesten & Moa Lorentzson

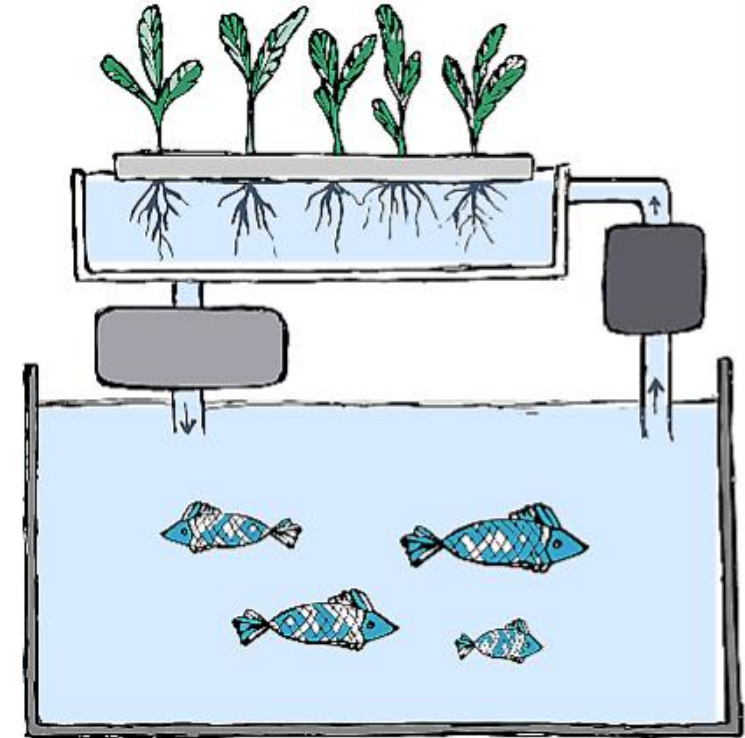
The School of Business, Economics and Law at the University of Gothenburg



Commercial aquaponics?

Aquaponics: Integration of aquaculture and hydroponics. Water circulation, nitrification and symbiosis. Reuse of waste!¹

Commercial aquaponics: profit-driven enterprises, except from non-profit organizations that compete in a market with other profit-driven enterprises.²



1. Flores-Aguilar m.fl., 2024, s.3; Lennard & Goddek, 2019, s.4202-4203; Asadullah m.fl., 2020, s.79
2. Nationalencyklopedin, 2023, Fortnox, 2024



What is the problem?

- “A tool for sustainable and resilient food production”, without commercial success?¹
- Increased attention and high hopes in the EU!²
- Significant development - newly established businesses are increasing.³
- More qualitative research is needed - what is the status in Sweden?⁴

1. Goddek m.fl., 2019, s.5
2. Europeiska unionen, 2021
3. Horn m.fl., 2023, s.521; Love m.fl., 2015, s.65; Turnšek m.fl., 2020, s.1; Asadullah m.fl., 2020, s.78; Ibrahim m.fl., 2023, s.1
4. Goddek m.fl., 2015, s.4199



The research questions

1. *What are the barriers to commercial aquaponics in Sweden?*
2. *What measures can mitigate these barriers?*

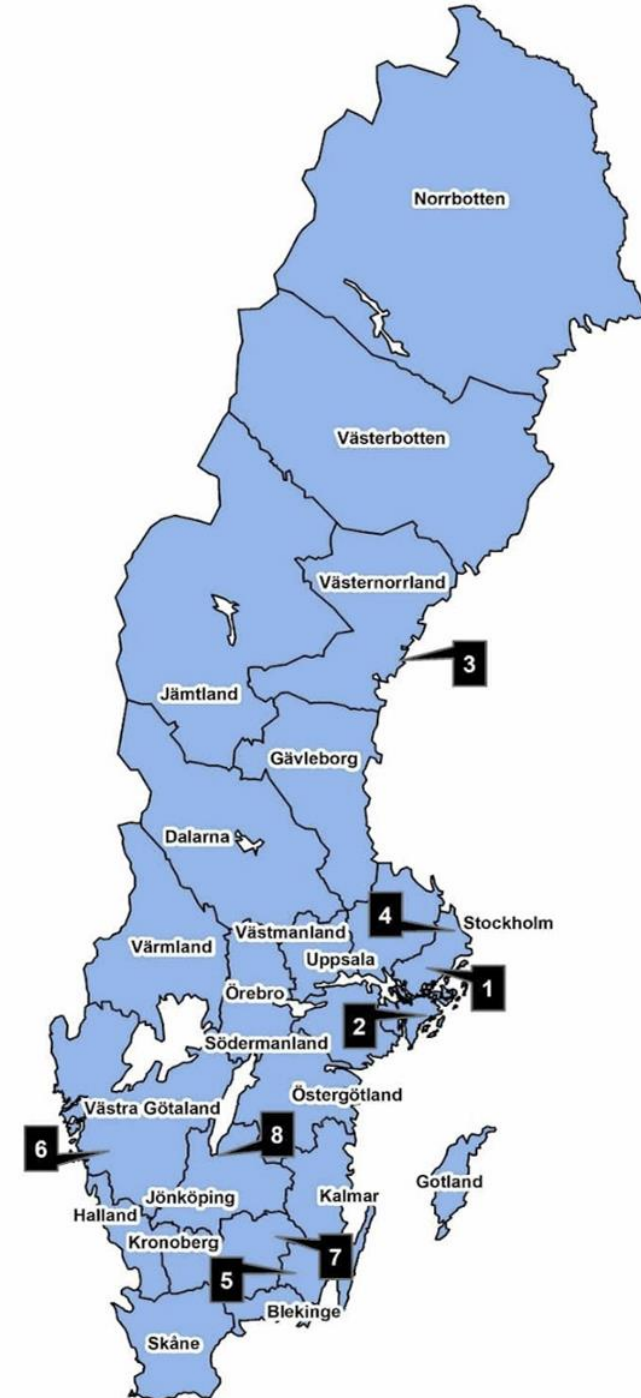
From an economic, regulatory, social and environmental perspective, with consideration to spatial variations (urban-rural) and physical planning.



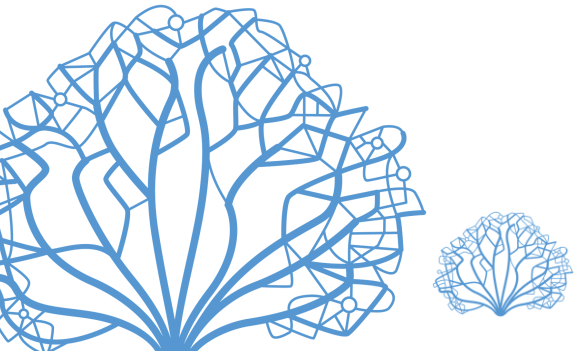


Qualitative data collection: Semi-structured interviews

- 8 respondents within 6 counties.
- Identifying and mapping respondents.
- Purposive selection - context and criteria: run businesses in Sweden, with relevant knowledge.¹
- 1 week data collection.
- Via video or telephone calls.



1. Bryman, 2018, s.463



Previous research

Outlines several barriers related to:

economic viability, regulatory framework, lack of knowledge, finite natural resources, climate change and land access.

Suggests several measures:

- Reduced production chain, system improvements, favorable economic instruments, diversified business model.
- Legislative changes: simplify permit processes, allow organic certification, adjust negative externalities.
- Educational programs and effective marketing strategies.
- New Sustainable production methods, increased resource efficiency, production optimization, tax reforms¹

Data mainly collected in Europe, the USA and the UK.

1. Asadullah m.fl., 2020, s.78; Ibrahim m.fl., 2023, s.1, Turnšek m.fl., 2020, Raulier m.fl., 2023, Milčić m.fl., 2017





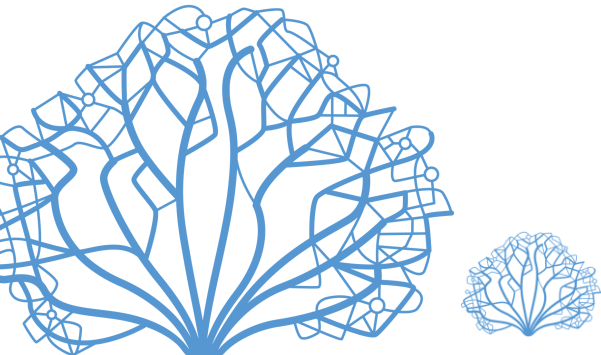
The result

Economic aspects

Barriers: high financial costs, poor access to funding, low competitiveness and low productivity (small scaled production) → no economic viability

Internal measures: cost savings, effective business plans, adjusted production scales and diversification.

External measures: increased funding and subsidy, tax reforms.



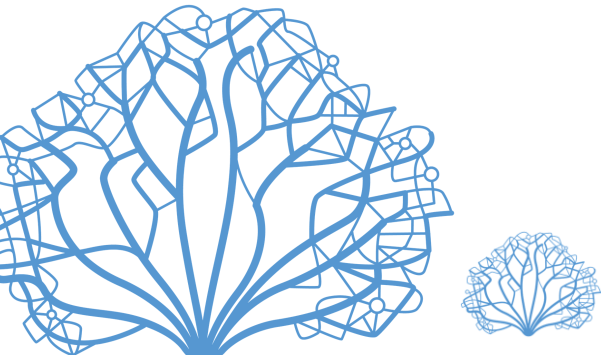


The result

Regulatory aspects

Barriers: existing legislation - permit and subsidy regulations, organic certification and legal interpretations.

External measures: new tailored legislation for aquaponics - granted permits and subsidies, allow organic certification, uniform and generous interpretation by authorities, new methods for evaluation.



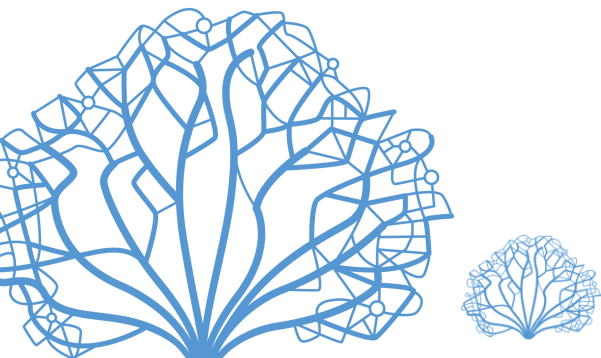


The result

Social aspects

Barriers: lack of knowledge within and outside the businesses, existing attitudes among consumers and within the industry.

Internal and external measures: increased educational efforts and effective marketing strategies.





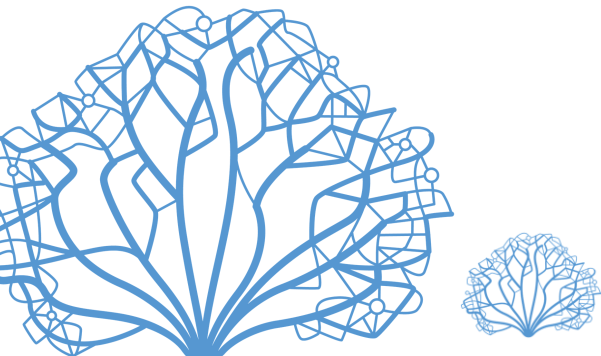
The result

Environmental aspects

Barriers: limited access to production space, stable energy supply and feed and fish fry.

Internal measures: installation of new technology, strategic location, coordinated procurement of feed and fish fry by practitioners.

External measures: physical planning - favourable infrastructure, integrating greenhouses into urban spaces, industrial symbiosis, utilizing underused premises in cities and rural areas. Domestic feed and fish fry production.



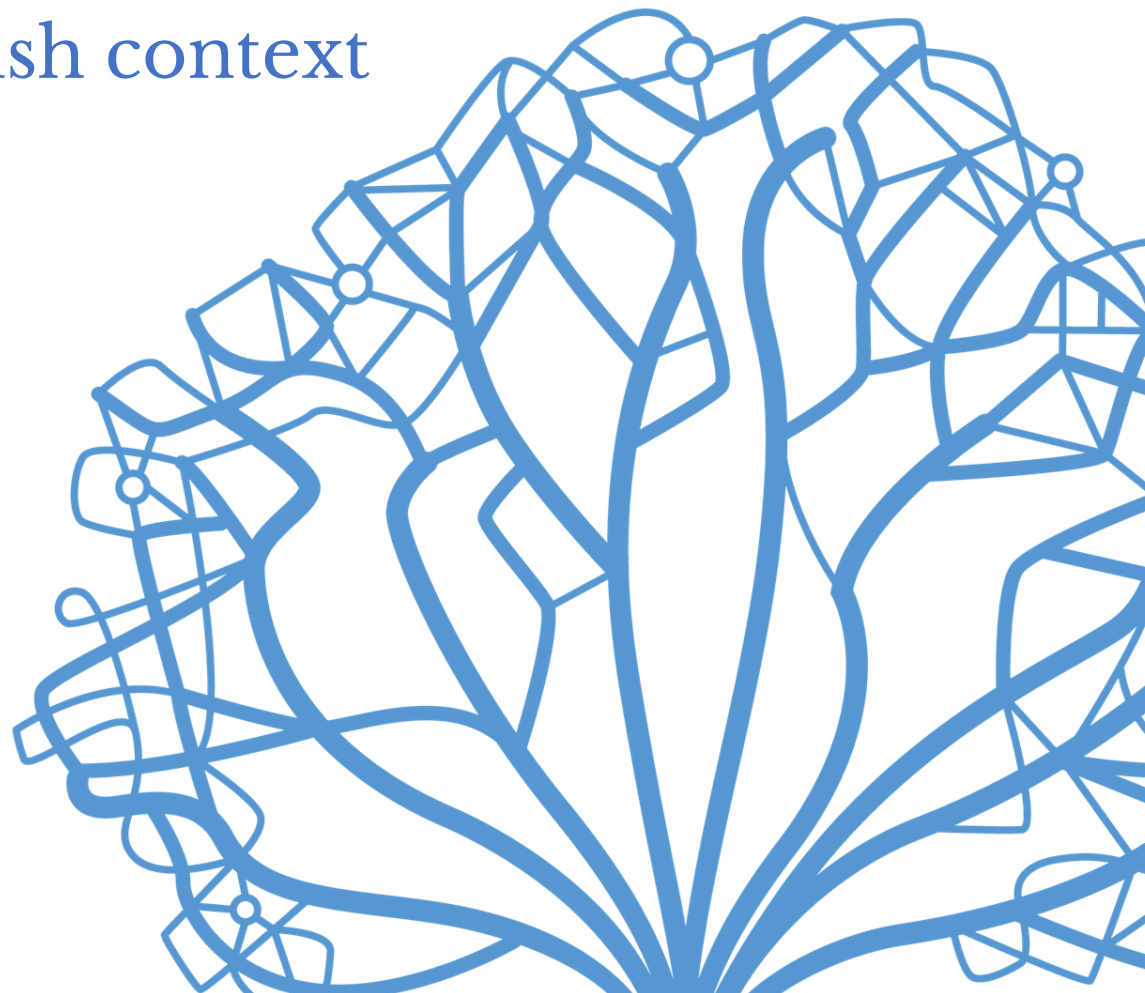


The result

New knowledge specific to the Swedish context

Our contribution

- **Economic aspects:** a lack of business savvy knowledge.
- **Regulatory aspects:** spatial variation in access to financial grants (urban/rural).
- **Social aspects:** lack of knowledge within authorities
- **Environmental aspects:** unsustainable feed production, integrating aquaponics in spatial planning.



Conclusions and further research

Increased research efforts with a broad selection of societal actors and their perspectives and roles.

The multi-helix model is relevant - cooperation between academia, private and public sector.

Impossible to determine the future of commercial aquaponics, but internal and external efforts in and for the sector have potential to create a more favourable circumstance.





What are the success factors for implementation in Sweden?





Create economic viability

Reduce high costs

Internal measures

- Energy costs - isolation in production facility, utilizing waste heat, choice of fish species.
- Transportation costs - small production chain.

External measures (municipal level)

- Reduce permit fees for building production facilities.
- Lower supervision fees.
- Increase access to financial guidance, e.g. economic calculation systems.
- Offer credit guarantees.
- Remove energy taxes.
- Include industrial symbiosis in physical planning.





Create economic viability

Increase access to grants

Internal measures

- Storytelling - strategic marketing.
- Conscious business models.

External measures

- Increased funding in private and public sectors.
- New types of grants, specific to aquaponics.
- Support for market adaptation.





Create economic viability

Increase competitiveness

Internal measures

- Identify suitable customer groups and business partners.
- Local trade agreement and markets.
- Effective marketing.
- Diversified business models.

External measures

- Promoting collaborations between food sectors.
- Increase government funding and financial advice.
- Promoting cooperations between different stakeholder groups and authorities for equal conditions.
- Public procurement of aquaponic products (in municipalities and regions).





Public procurement, with focus on climate smart food production



Pond Fish and Greens AB deliver Clarias to schools and elderly care in Skara, Vara and Grästorp, in Västra Götaland.





Enact new tailored legislation Adapted to aquaponics

- Make permits more easily obtained
Remove unnecessarily strict permit and control requirement.
- Simplify the application procedures.
- Develop new methods for juridical review
Collaboration between producers, municipal authorities, and county administrative boards
- Evaluate existing legislation!
A partnership between entrepreneurs and authorities.



Increase the knowledge Within and outside operations

Internal competence (private sector)

- Access to educational programs at vocational schools and universities.
- Need of further research.
- Collaborations between actors within the business sector.
- Use of business advisory services.

External competence (public sector and civil society)

- Increased educational efforts (politicians!)
- Political priorities.
- Public procurement.
- Forming partnerships with valuable marketing opportunities.
- Build relationships with local retailers.





Educational programs in Sweden exist, but are few...

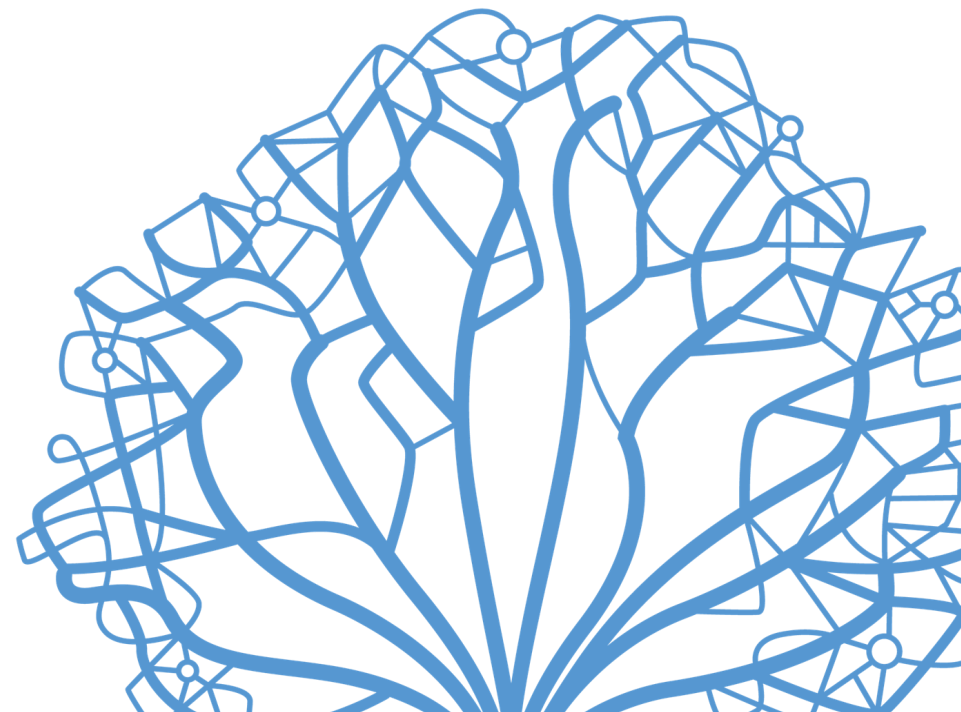


Engineer in aquaponics; 2 years.

In Norrtälje/Väddö and in Härnösand.

In cooperation with *Campus Roslagen* and
and *Utvecklingscentrum för vatten* (academia).

Offer separate courses as well.





Business advice from professionals

Consultancy, education, seminars, study visits...

- **“Fisk i hus”**: A handbook for aquaponic practitioners, suitable for start-ups. Written by Kimberly Berglöf, Jason Bailey and Peter Eklund.
- **“Aquaponics”**: A single course in aquaponics. Held by Jens Björkqvist, at Folkuniversitetet.
- **Pilot plant** for business, research and development. Used by Johannas Stadsodlingar, Sollentuna.
- **Consultancy services**: design, construction, grant applications, physical planning,... (e.g. Svensk Aquaponik and Pond Fish and Greens).





Change the attitudes

Competitiveness and skepticism

- Collaborations within the food sector.
- Industrial symbiosis for increased cooperation.
- Effective marketing and tailored sales strategies.
- Attract a broader customer base.
- Be attention seeking! Media exposure and strategic locations.
- Utilize tourism and local interest.
- Sales in school cafeterias or other public institutions - public support!

Increased knowledge is a parallel process!



Ödevata Gårdshotell & Fiskecamp, Emmaboda





Make resources available

Access to production space

- Physical planning for production facilities and storage.
- Location in rural areas is a good option - lower land and labor costs, unused facilities.
- Use school facilities for aquaponics.
- If space is lacking - containers as production facilities.
- Increase greenhouse rentals.
- Integrate in living areas?



Integration of greenhouses Seems to be up-coming...



An innovative way to achieve sustainability and resilience in rural areas?





The Bovieran concept



Make resources available

Access to stable energy

Internal measures

- Purchase a personal electric generator.
- Invest in energy-efficient equipment.

The energy supply is often more likely to be stable in urban areas. How can it be improved in rural areas?

Industrial symbiosis!
Integrate it in physical planning.





Make resources available

Access to feed and fish fry

- Coordinated purchases.
- Domestic production.
- Increase the range of fish species.
- Reuse waste in feed production.





Thank you
for listening!

