

Research Contributes to Qatar: Findings from the SAFE-Q Project

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Acknowledgement and Disclaimer



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Live Tweet!



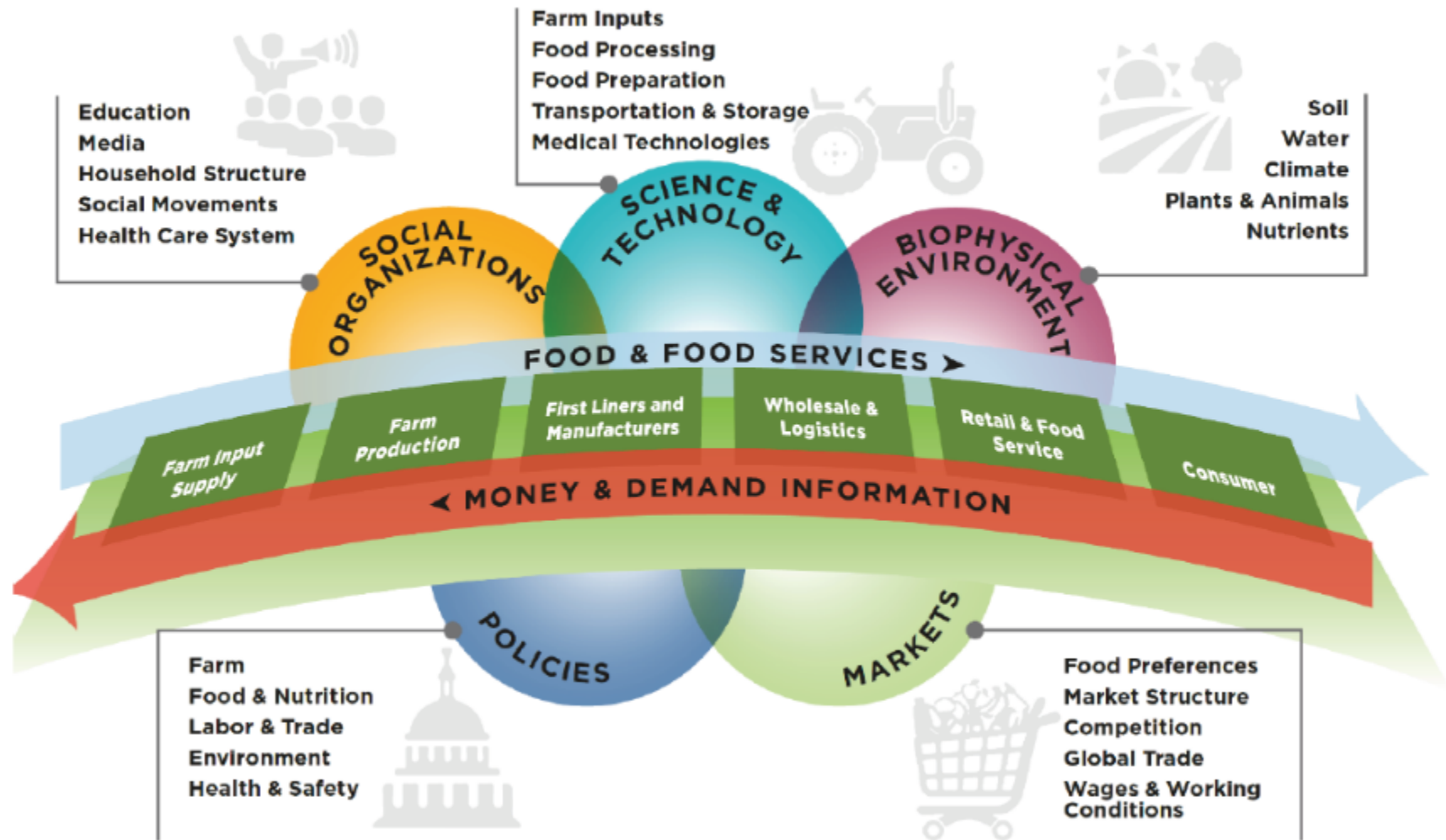
#safe-q
#foodwaste
@Safeqproject



1. Food Security and Food Waste

Overview

Food Supply Chain - context



Source: Institute of Medicine / National Research Council (2015)

What is Food Security?

❖ The World Food Summit of 1996 defined food security as existing:

“...when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”.



Source: World Health Organisation

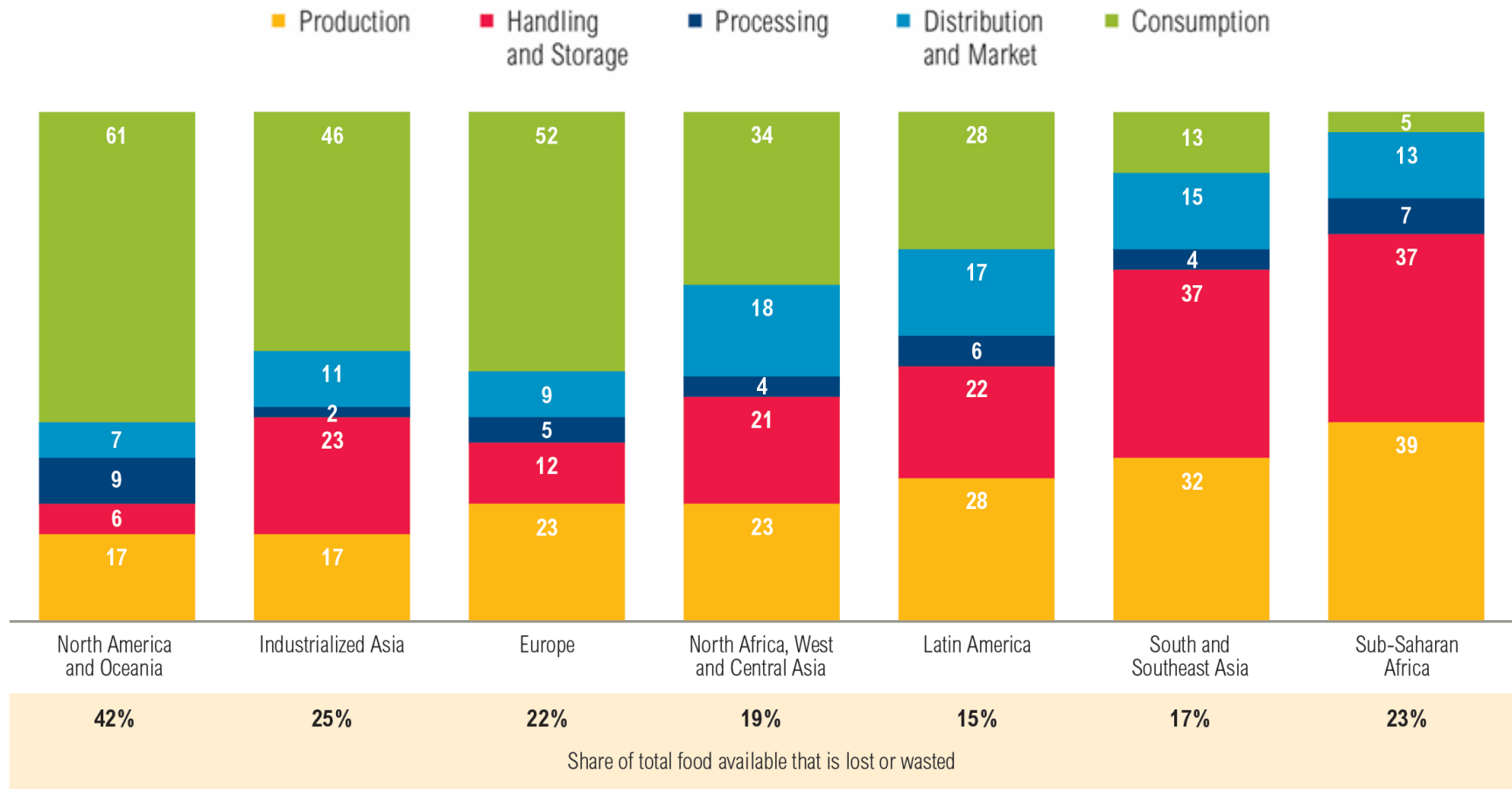
Origins of Food Waste (WRI)



Source: WRI analysis based on FAO. 2011. *Global food losses and food waste – extent, causes and prevention*. Rome: UN FAO.

 WORLD RESOURCES INSTITUTE

Where does Food Waste occur? (WRI)



Note: Number may not sum to 100 due to rounding.

Source: WRI analysis based on FAO. 2011. *Global food losses and food waste – extent, causes and prevention*. Rome: UN FAO.



Food Loss or Food Waste?

(Swedish / UK definitions)



- ❖ **Food Losses**: “take place during agricultural production, post-harvest, and processing stages”,
i.e. **LOGISTICS-DRIVEN**
- ❖ **Food Waste**: “occur at the end of the food chain (distribution, sale and final consumption)”,
i.e. **BEHAVIOUR-DRIVEN**



- ❖ **Avoidable**: food / drink thrown away which is still **edible**
- ❖ **Possibly Avoidable**: food / drink consumed or not used than **can be made edible**
- ❖ **Unavoidable**: food / drink waste via preparation of food that is **inedible**



2. Food Security in the GCC

Interdependencies & Unintended Consequences

#MARKET NEWS

AUGUST 23, 2017 / 9:20 AM / 3 MONTHS AGO

Qatar food security project gets \$440 mln bank financing

Reuters Staff

2 MIN READ

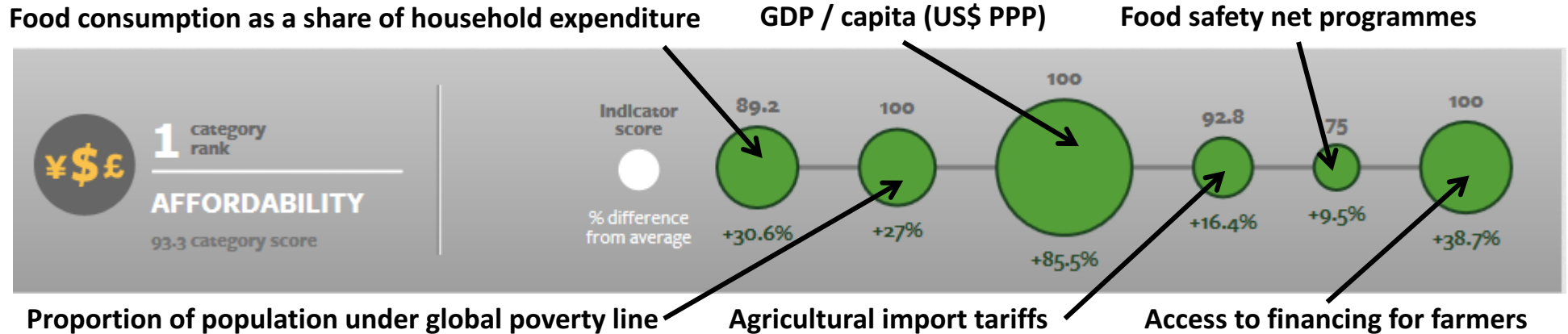


DUBAI, Aug 23 (Reuters) - Qatar Islamic Bank signed to provide 1.6 billion riyals (\$440 million) of financing to build a food processing and storage facility at the country's Hamad Port, as Doha strengthens its resistance against sanctions by other Arab states.

The 530,000 square metre facility, to be built by AlJaber Engineering in about two years, will include equipment to process and refine rice, raw sugar and edible oils, the bank said on Wednesday.

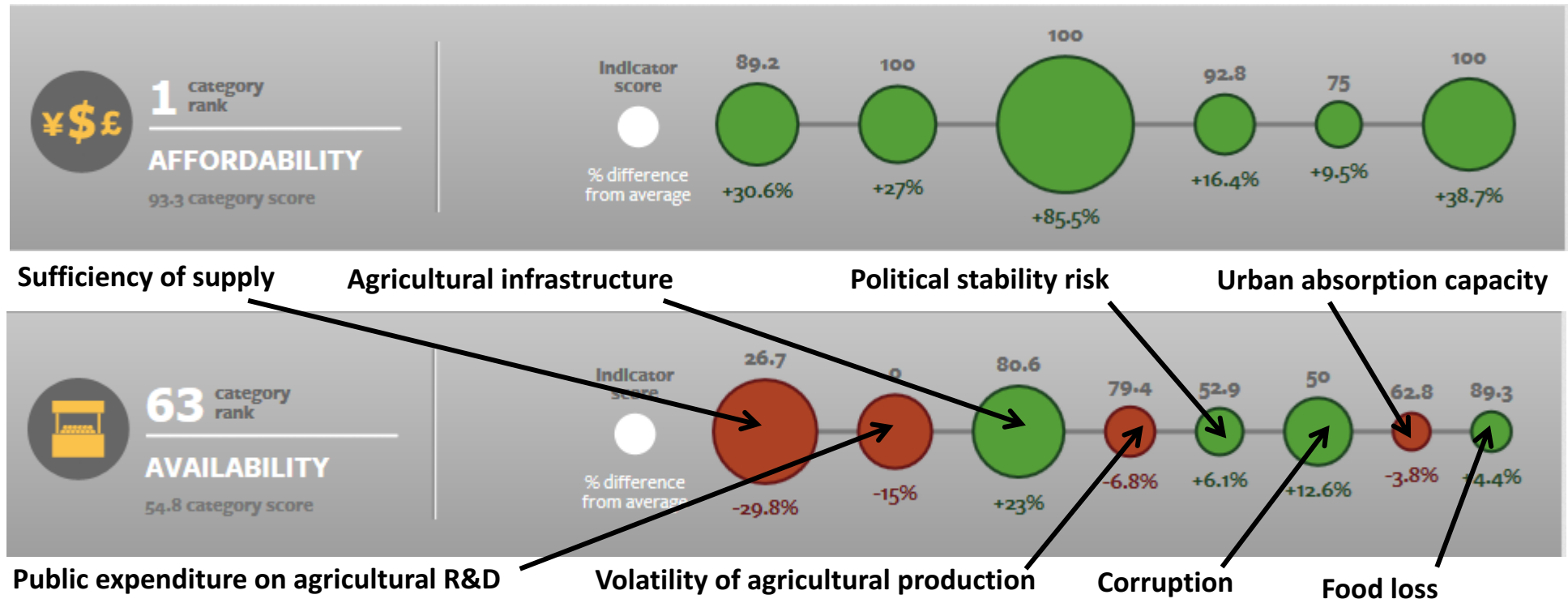
It will also feature rice silos, warehouses and edible oil storage tanks. Some of the food processed by the facility may be exported regionally or globally, and waste products from the facility will be used to create animal feed.

Global Food Security Index (EIU) - Qatar



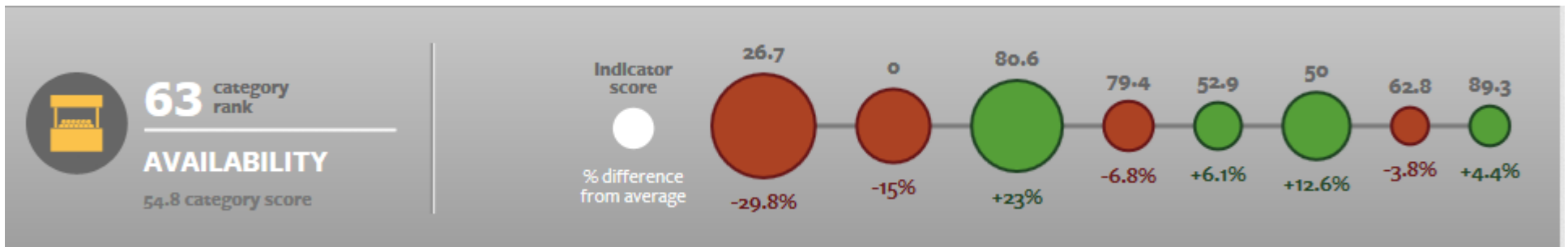
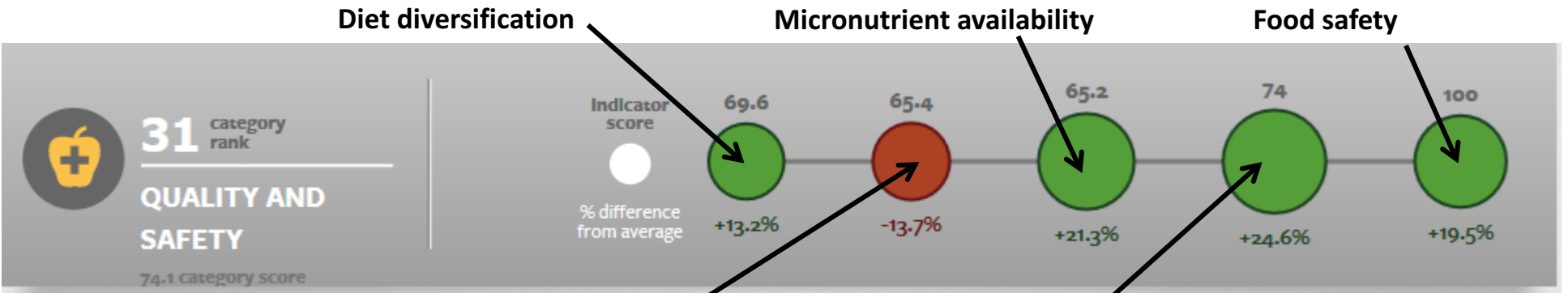
Source: EIU

Global Food Security Index (EIU) - Qatar



Source: EIU

Global Food Security Index (EIU) - Qatar



Source: EIU

Qatar: Low food consumption, high quality



Source: EIU



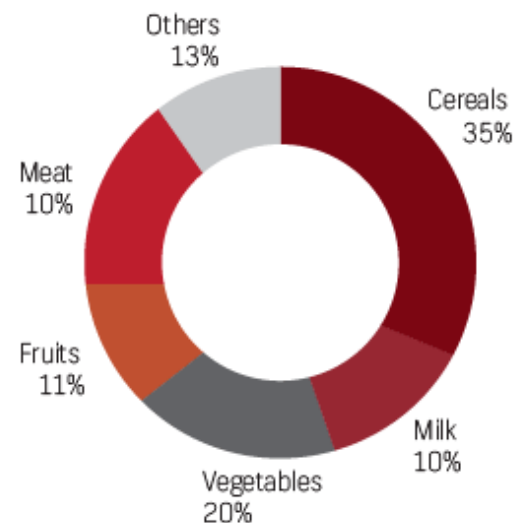
3. SAFE-Q Project

Research impact and outcomes

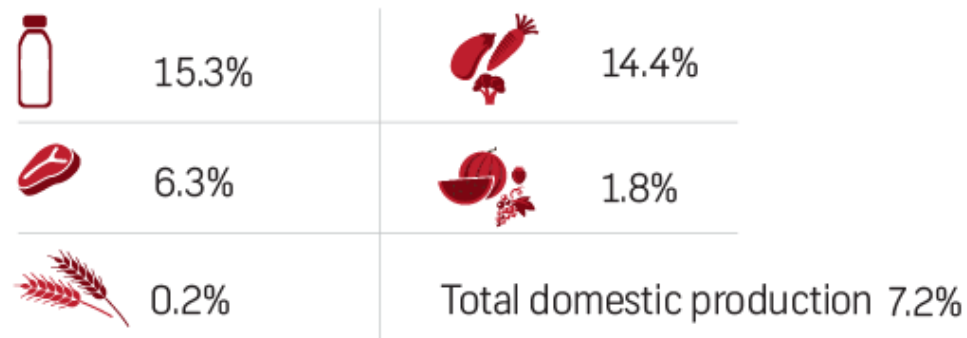
Qatar's Profile



Qatar food consumption by product (%)



What Qatar produces for its own needs



Source: FOASTAT, Arab Agricultural Statistics Year Book, Alpen Capital, CIRS (GU Qatar) – all as of 2013

Qatar's Food Security at a Glance

- ❖ Qatar has increased its total domestic production substantiality since 2015 beyond 7%
- ❖ Qatar still imports over 90% of its food requirements.
- ❖ Qatar is 100% dependent on desalinated water and is a huge challenge in term of improving its domestic production.
- ❖ Biggest volumes normally come through Saudi Arabia and UAE: since 2017, these volumes now come via alternative providers.

Food Waste in Qatar poses challenges

- ❖ Qatar Statistic Authority (QSA): “(...) more than half of the municipal waste generated (...) contains **discarded food**.”

The Peninsula, 5th June 2013



- ❖ **Very challenging to produce 100% of Qatar's food needs:** hot weather, unfertile soil, and lack of rain.
- ❖ **Lack of water:** hindering expansion of agricultural production.
- ❖ **Global challenges remain:** International development, competition, population growth, climate change, energy supply....
- ❖ **Geopolitical risk may affect Food distribution:** impact of closure on one border

Safeguarding Food & Environment in Qatar (SAFE-Q)

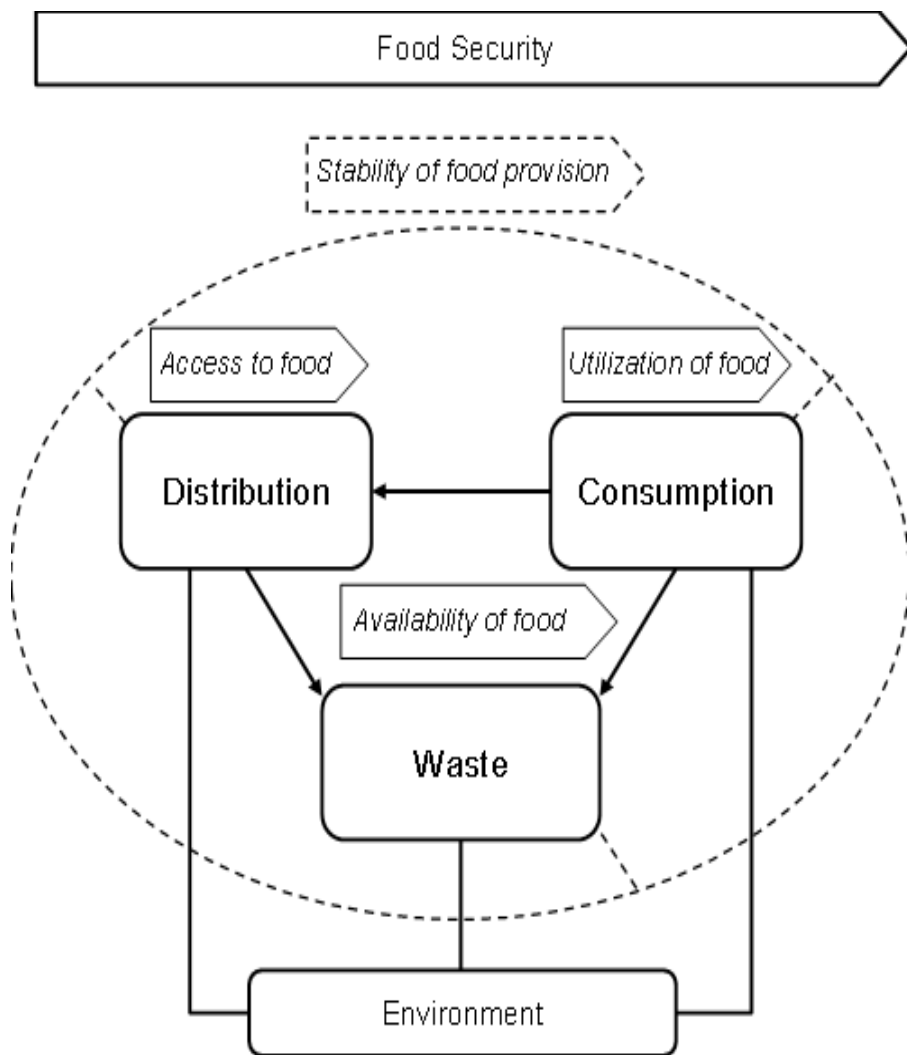
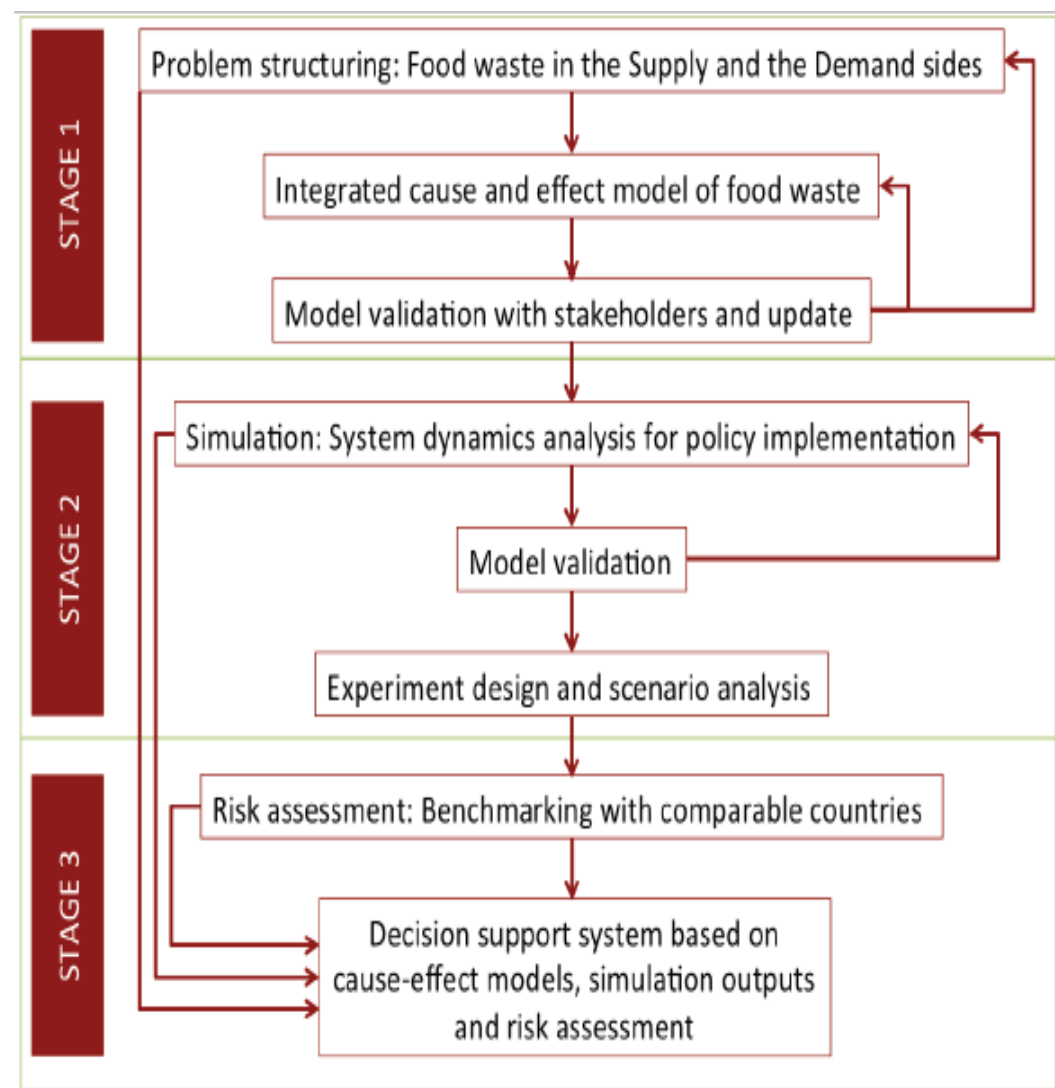
QNRF Grant: NPRP 7 - 1103 - 5 - 156



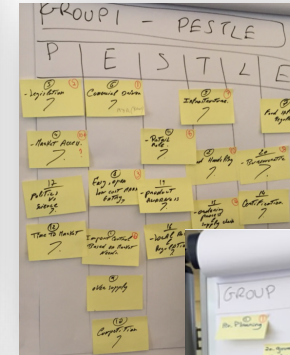
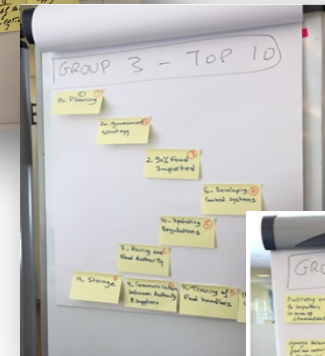
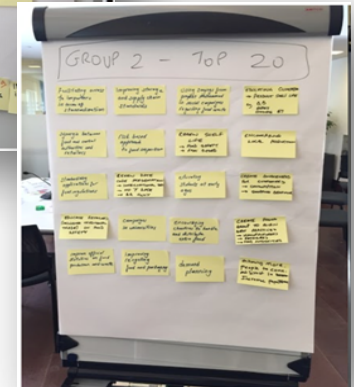
Safeguarding Food & Environment in Qatar (SAFE-Q)

- ❖ Focus on operational problems occurring during *production, distribution and transportation*.
- ❖ Focus on *storage, delivery and consumption of food*.
- ❖ Provide an estimate of the *food waste* occurring in distribution and consumption.
- ❖ Establish the link between distribution frequencies and the *food quality/safety/consumption* using simulation models.
- ❖ Allow *policy-makers* and *practitioners* to access food security and develop *strategies* to strengthen food supply chains.
- ❖ Seeks to support Qatari efforts to implement the *Qatar National Vision 2030* focusing on the long-term sustainability of the food supply chain.

Project Scope & Methodology



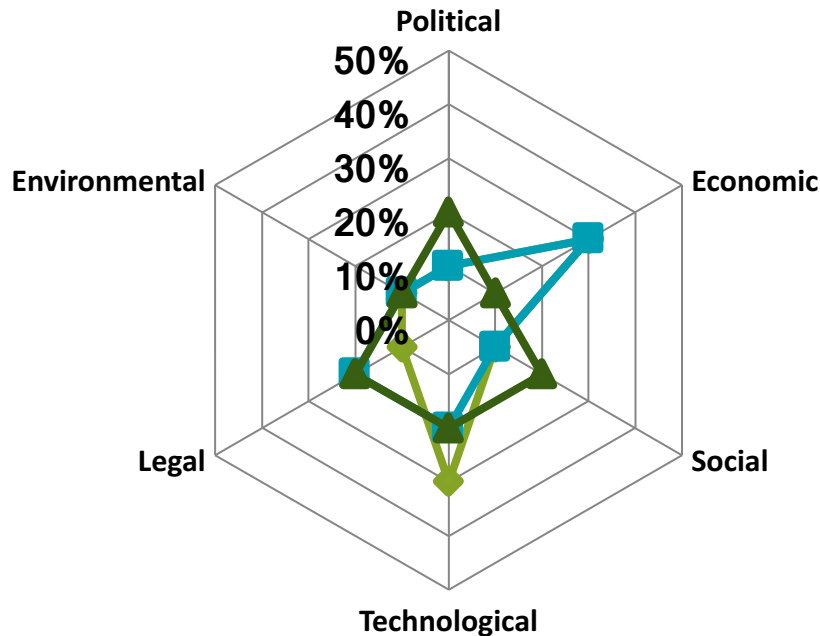
2015: SAFE-Q Stakeholder Workshops



A process of group-wise Prioritisation, Categorisation, Relative Importance and Inter-relationship mapping was utilised (using strategic management tools) as identified by Koivupuro *et al.* (2012)

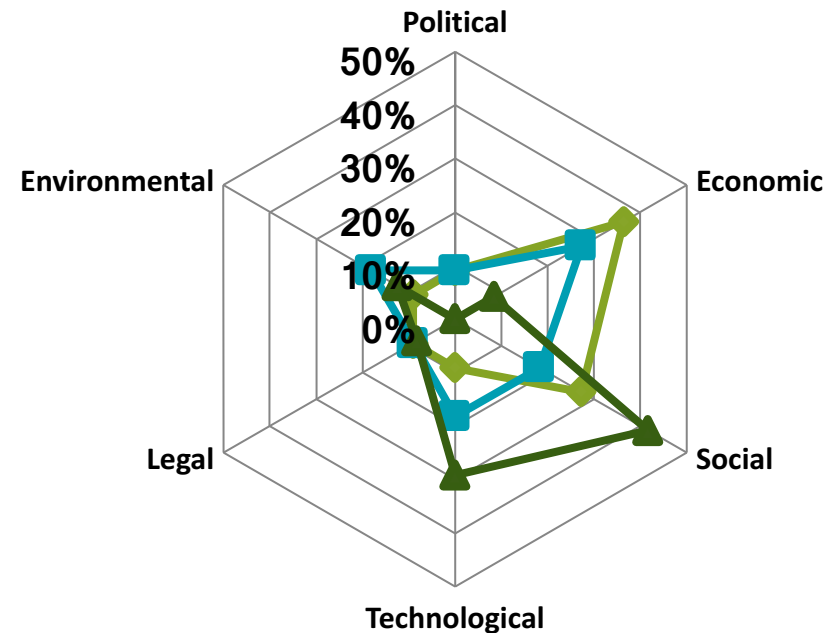
2015: SAFE-Q Stakeholder Workshops

Supplier groups



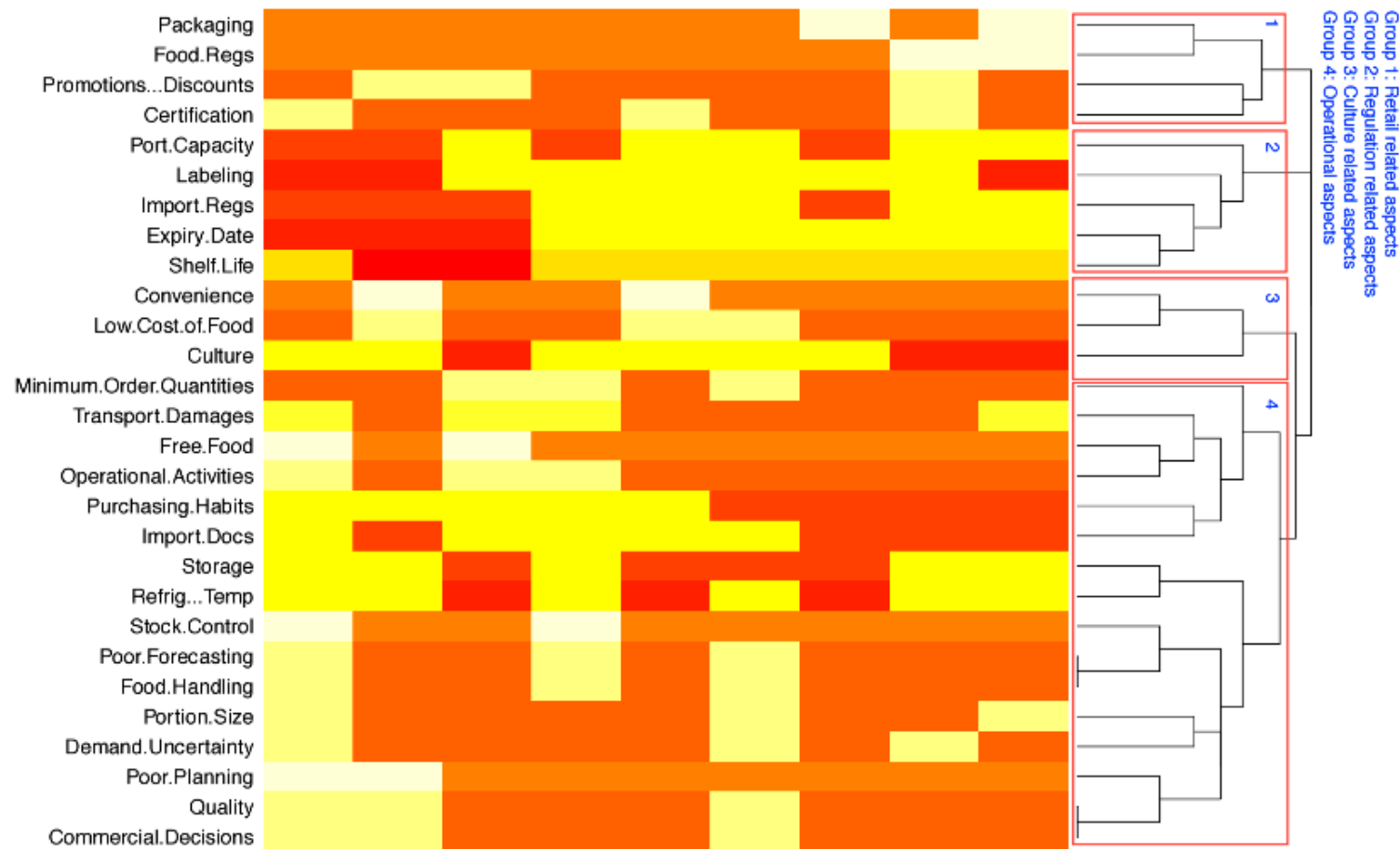
- ❖ Food storage
- ❖ Food packaging
- ❖ Food recycling
- ❖ Food safety regulation: sourcing, production, recovery

Consumer groups



- ❖ Food quality
- ❖ Food safety / Pest control
- ❖ Re-processing
- ❖ Education / Menu planning
- ❖ Recycling habits
- ❖ Self-sufficiency

2016: “Heatmap” of key stakeholder priorities



Source:

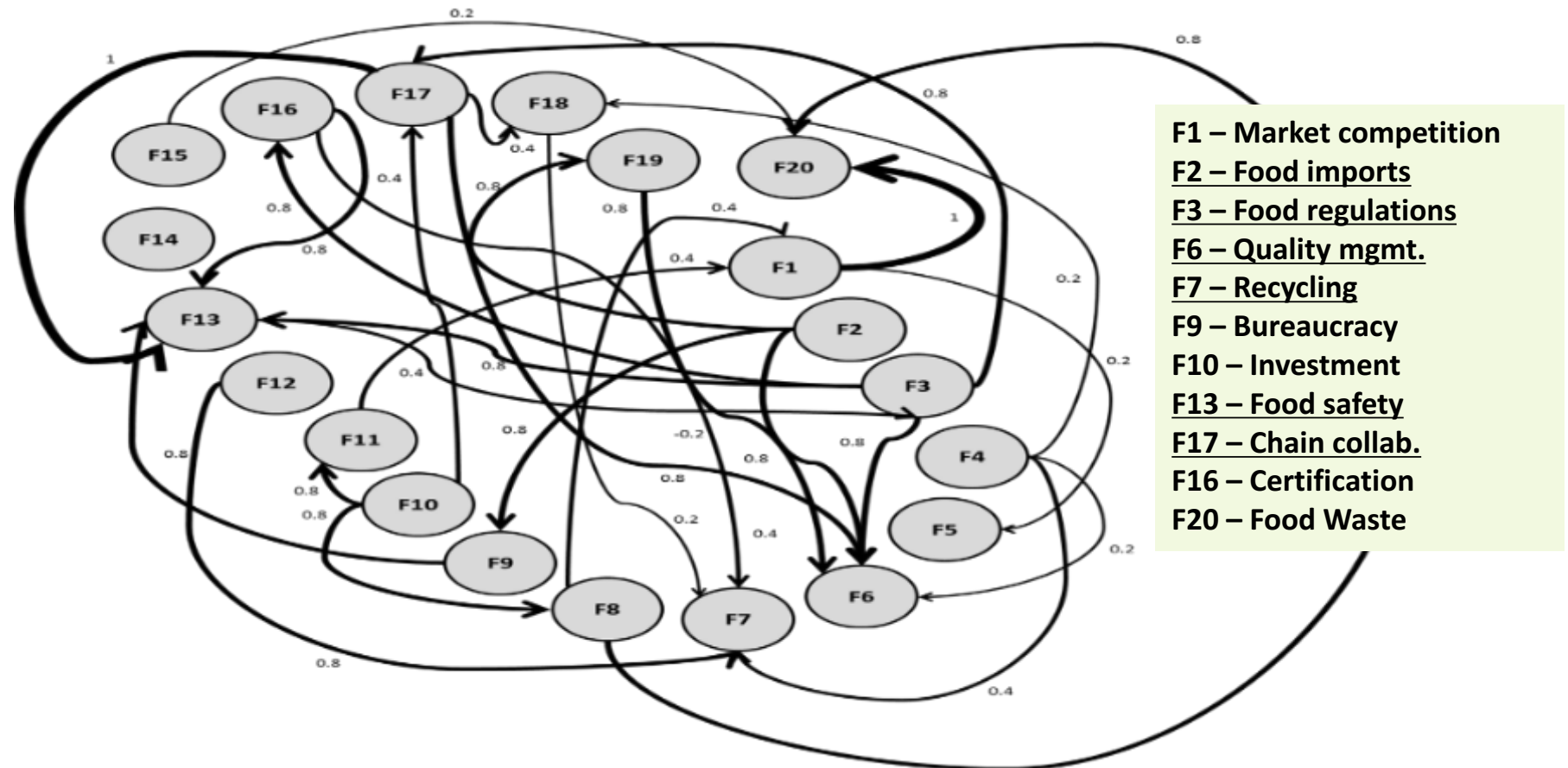
Aktas, E., Topaloglu, Z., Irani, Z., Sharif, A. and Huda S. (2016). Food Provision to Food Security: How can we reduce waste on the supply side?, *Qatar Foundation Annual Research Conference Proceedings 2016 (ARC 16)*, 22nd – 23rd March 2016, Doha, Qatar : SSHAPP2342. (Poster paper).

<http://dx.doi.org/10.5339/qfarc.2016.SSHAPP2342>.

Aktas, E., Topaloglu, Z., van 't Wout, T., Irani, Z., and Sharif, A. (2016). Factors Driving Waste in the Food Supply Chain. In, *Proc. European Cooperation in Science and Technology Action (COST '16)*, Food Safety and Food Security Workshop. 11th – 13th April 2016, Dubrovnik, Croatia, pp.8–9.

2016: FCM - Modelling Causality

Food market competition, regulations, import regulations, market access, bureaucracy, time to market and cross-chain collaboration affect food waste



Source:

Irani, Z., Sharif, A.M., Lee, H., Aktas, E., Topaloglu, Z., van't Wout, T., and Huda, S. (2017). Managing food security through food waste and loss: Small data to big data. *Computers and Operations Research*. In Press.

2016: Systems Archetypes of Food Waste

❖ “Attractiveness”:

- ❖ Which limit do we address first?

❖ Reinforcing elements:

- ❖ Food Supply

❖ Balancing elements:

- ❖ Food Demand

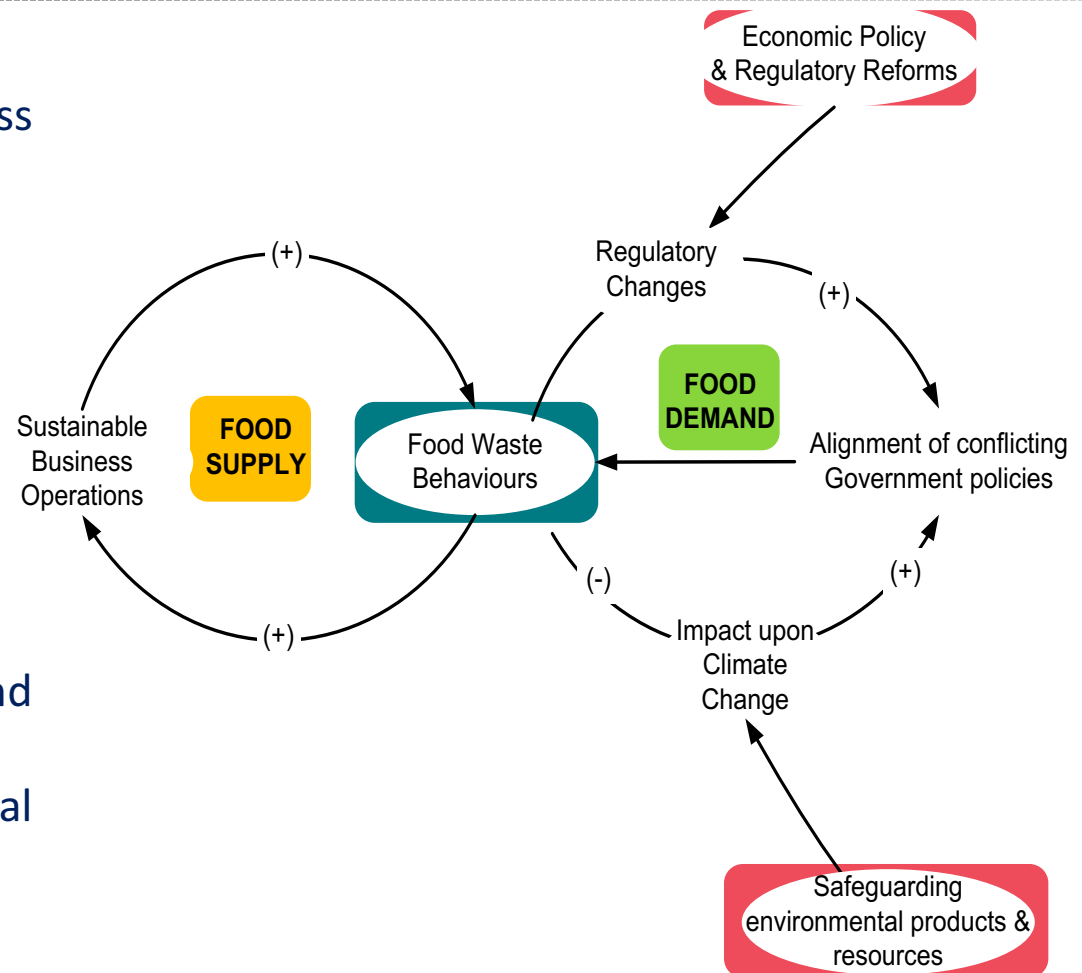
❖ Limiting conditions:

- ❖ Economic policy and Regulatory reforms
- ❖ Safeguarding environmental products and resources

❖ Results: Food waste behaviours

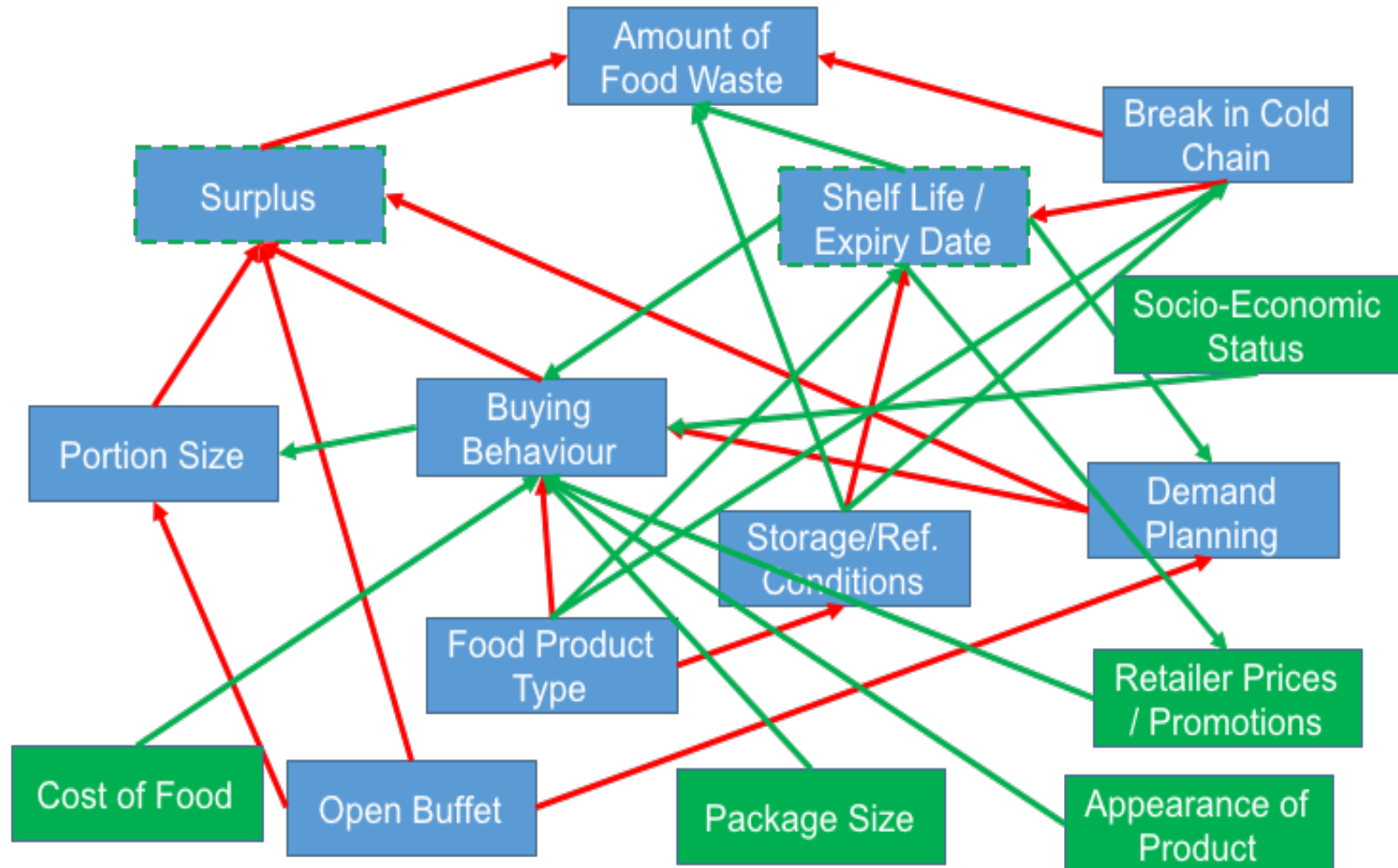
Source:

Sharif, A,M., and Irani, Z. (2016). People, Process and Policy perspectives on Food Security: an exploration using systems archetypes”. *Transforming Government: People, Process and Policy*, 10 (1): 3-10.



2017: Delphi Study findings

(Blue = via literature and I/Vs ; Green = via Delphi responses)



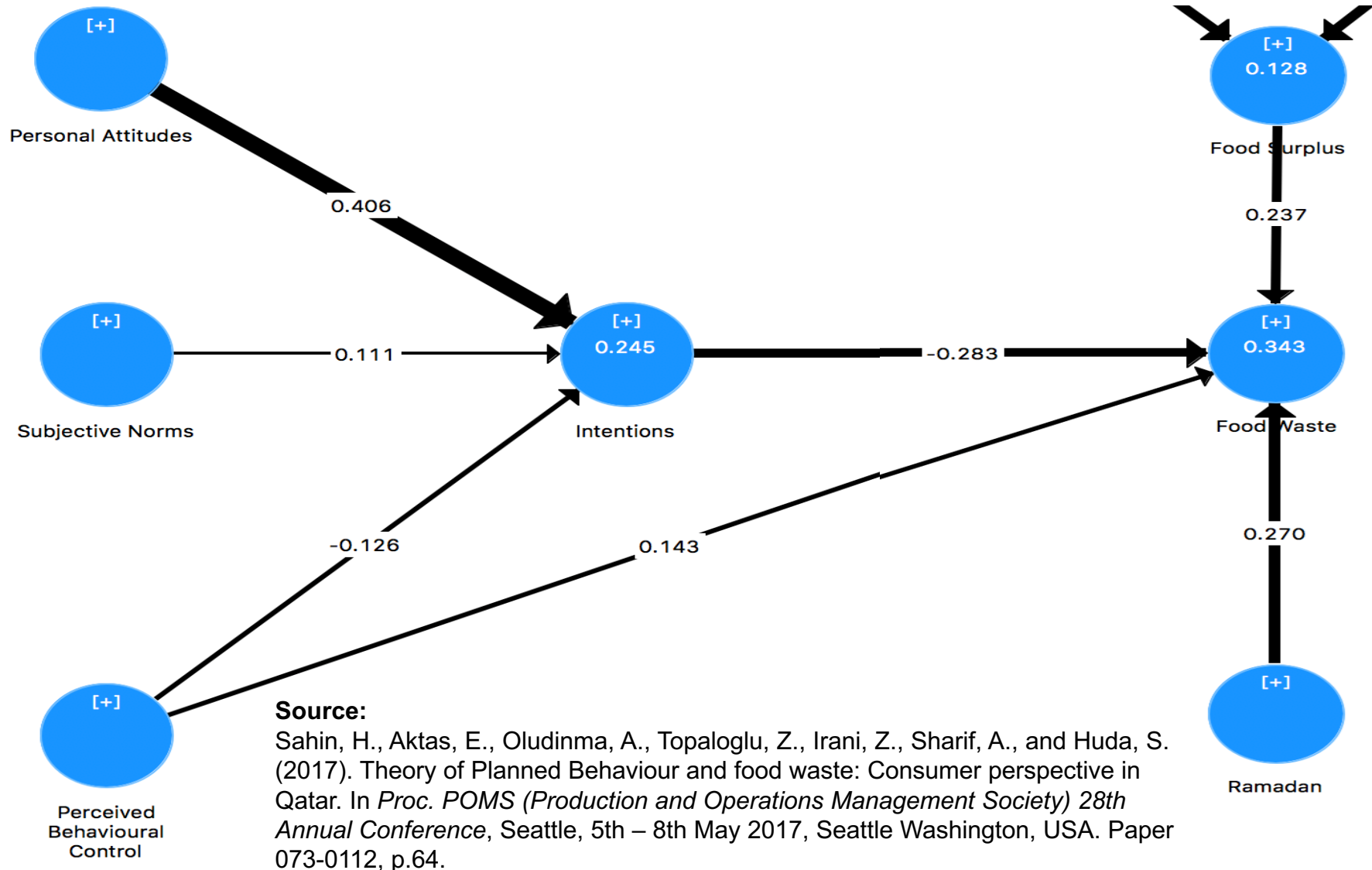
Source:

Aktas, E., Topaloglu, Z., **Sharif, A.M.**, Irani, Z., and Huda, S. (2016). "How Can Consumers Help Minimise Waste in the Food Supply Chain?", In. *Proc. 27th Production Operations Management Annual Conference 2016 (POMS 2016)*, 6th – 9th May 2016, Orlando, USA, Paper 065-0430, p.44 .

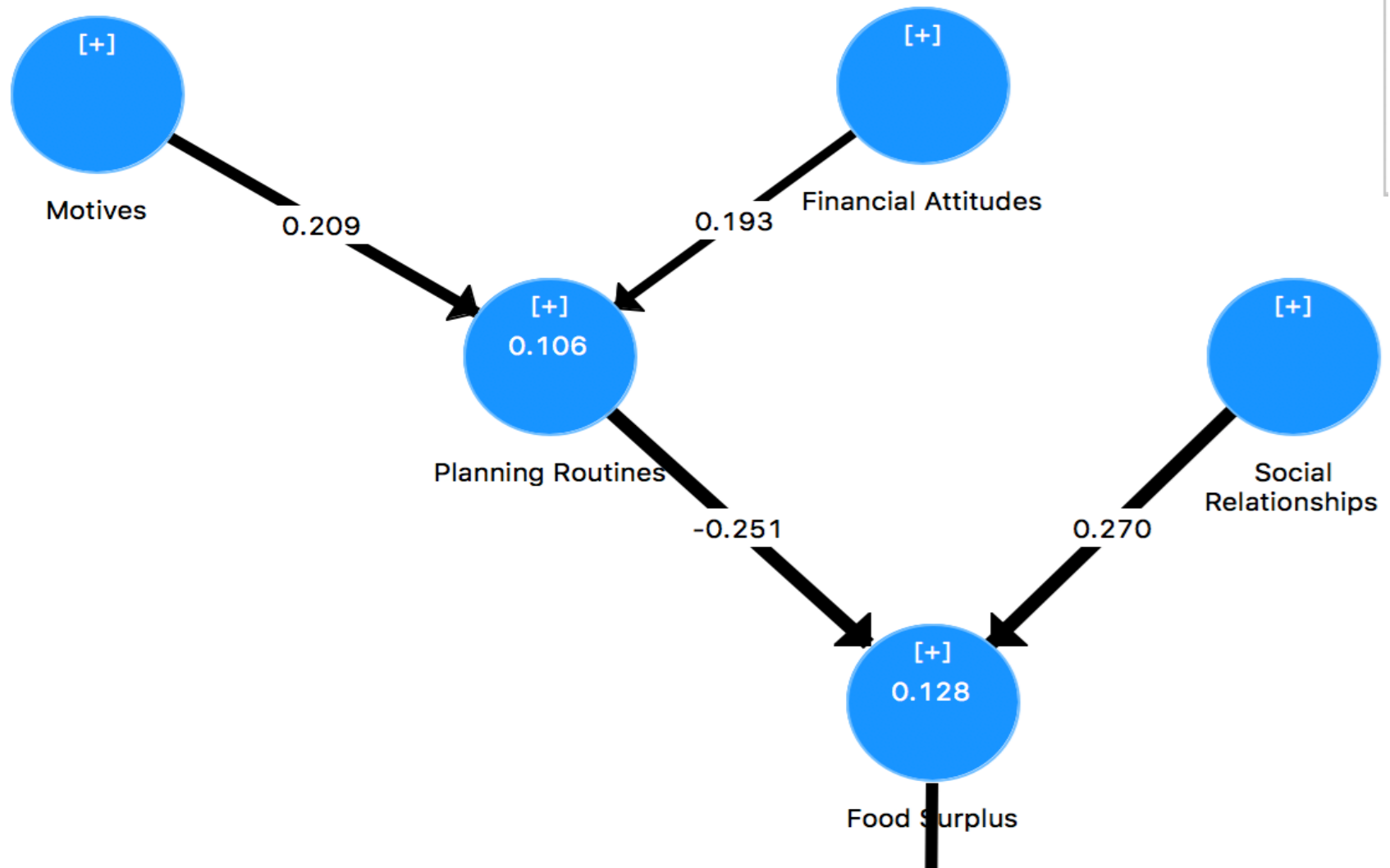
2017: Delphi Study findings

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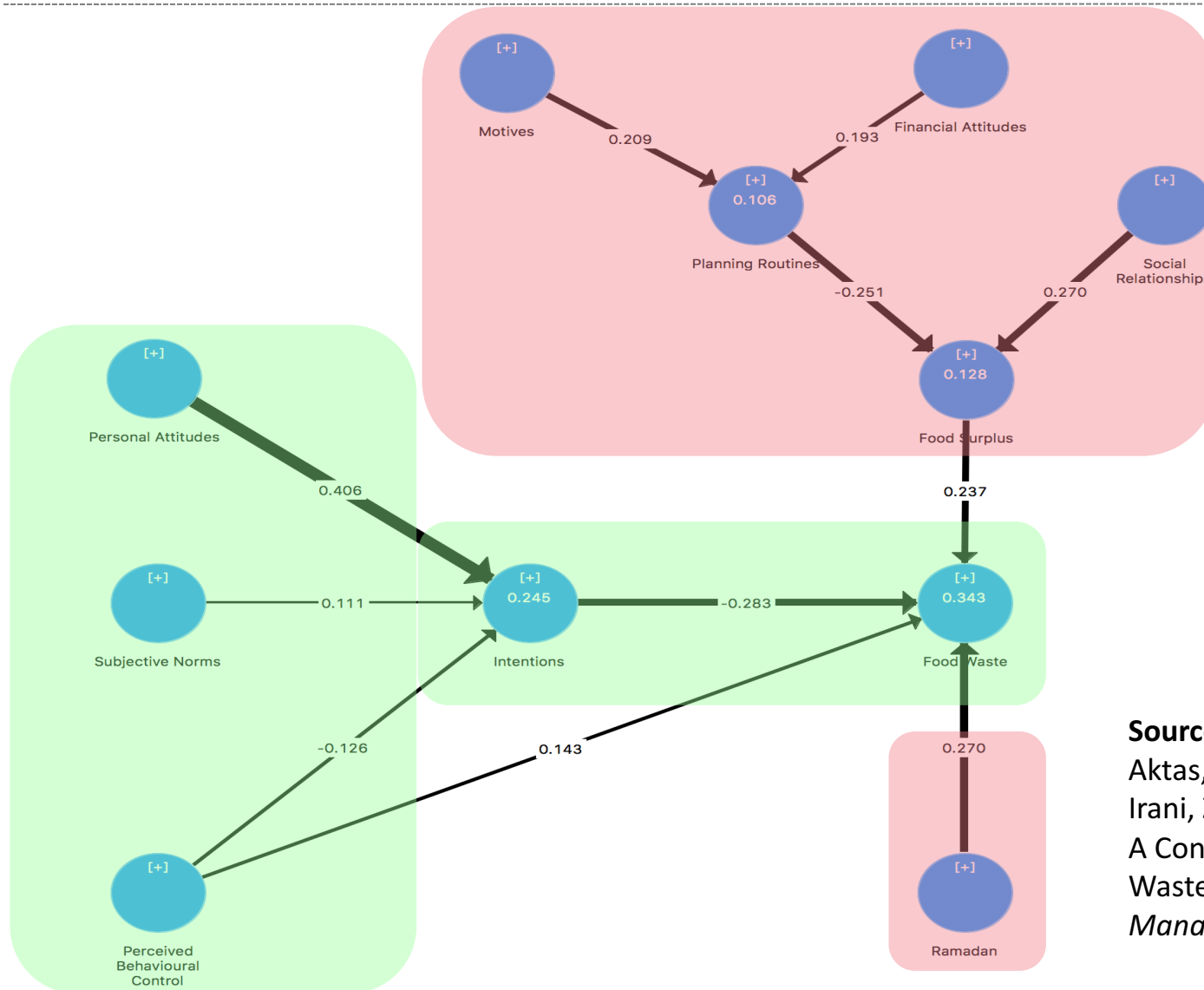
2017: Theory of Planned Behaviour (TPB)



2017: Theory of Planned Behaviour (TPB)



2017: TPB overall (Green = TPB theory; Pink = SAFE-Q)



Source:

Aktas, E., Sahin, H., Oledinma, A., Huda, S., Irani, Z., Sharif, A.M., van T'wout, T. (2018). A Consumer Behavioural Approach to Food Waste, *Journal of Enterprise Information Management*. Submitted

DEMAND SIDE



Novelty and Contribution



Originality of Research

No systematic study in this way conducted before in the State of Qatar (from a social systems/ behavioural perspective)

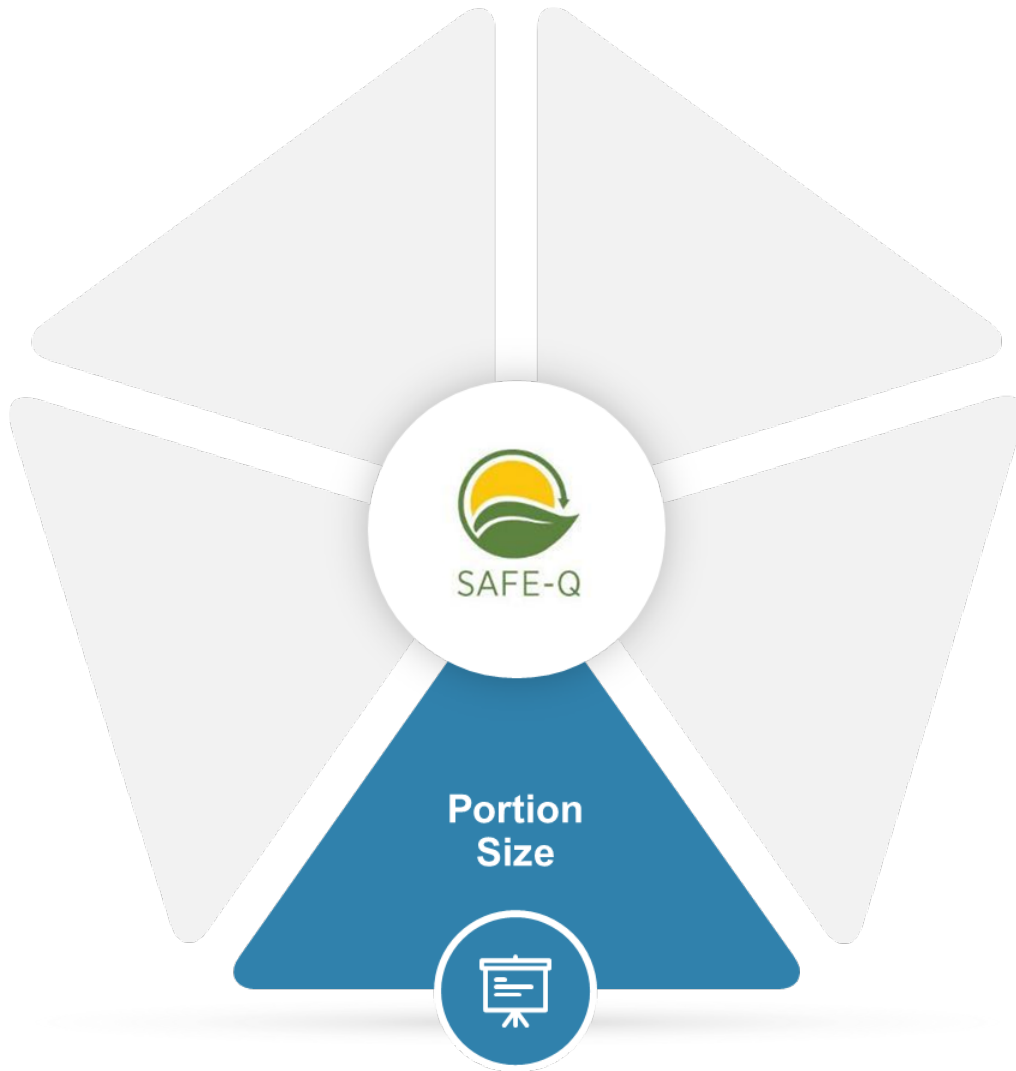
Novelty and Contribution



Scope of Research

Inclusion of consumer perspective in addition to food producer and / or distribution stakeholders

Novelty and Contribution



Representation of food

Portion size is a subjective measure of consumption / waste

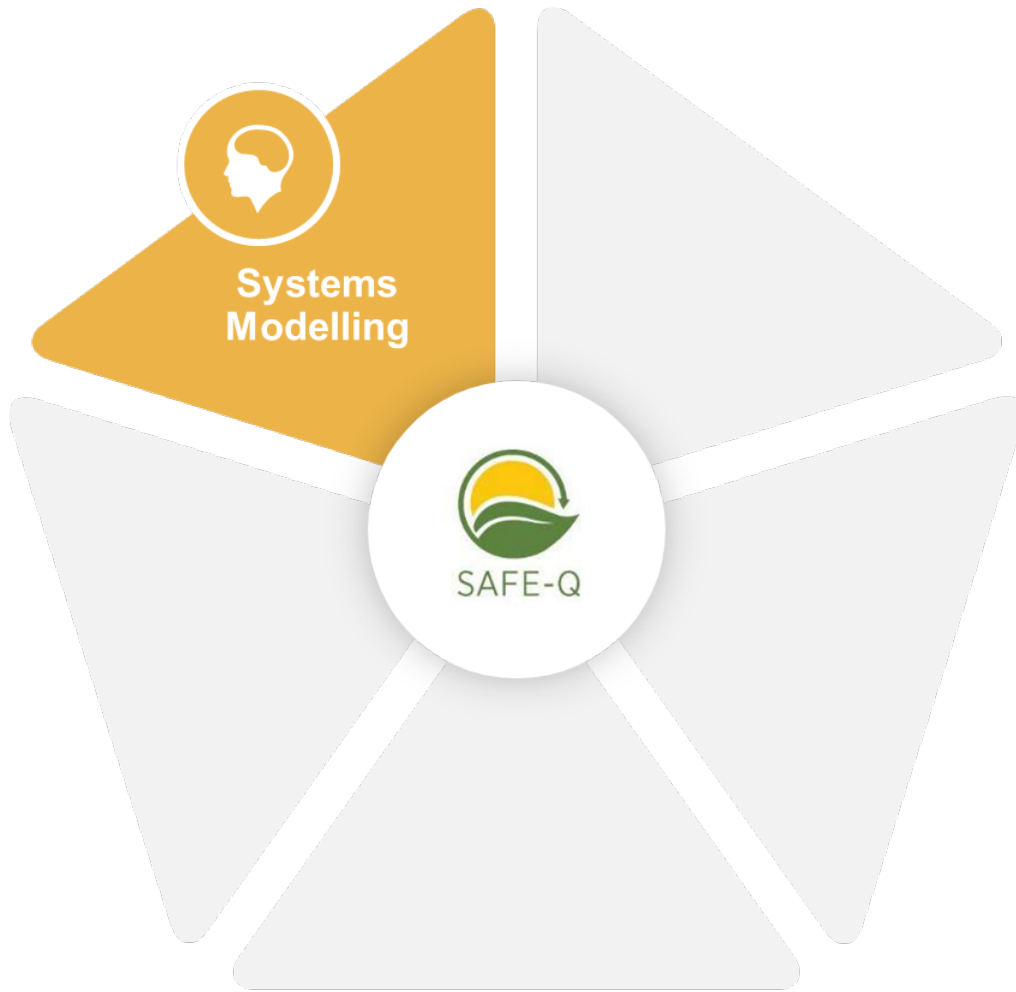
Novelty and Contribution



Improvement and Continuous Monitoring

Waste data recording and audit is limited

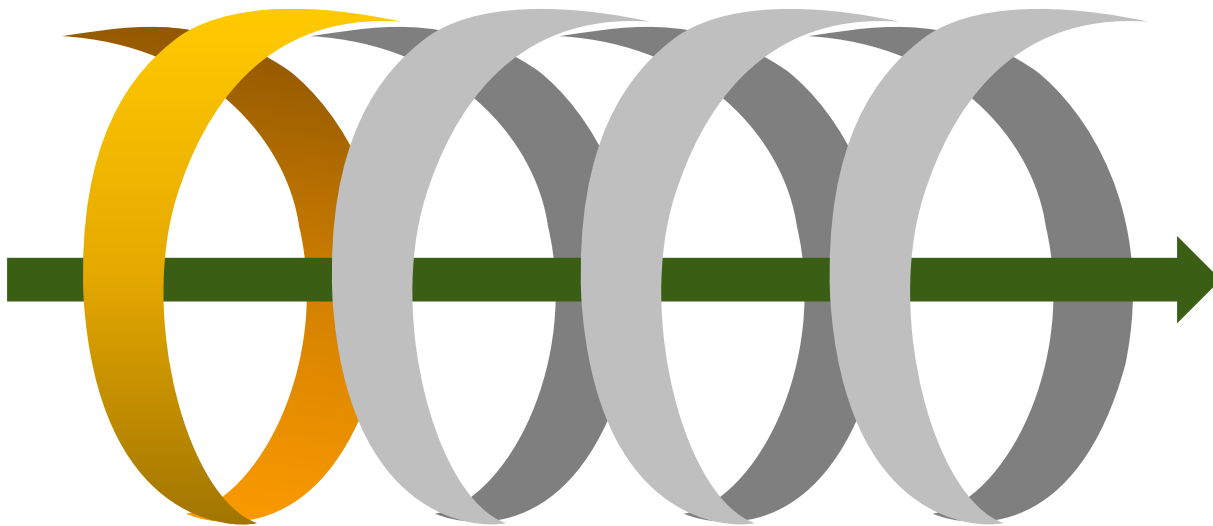
Novelty and Contribution



Cognitive / Behavioural

Simulating the decision-making and behavioural intentions of consumers in depth

Impact and Recommendations



Resilient Food Supply

Food supply chains in Qatar are fragmented

**Improve via
infrastructure and
education (supply
chain skills)**

Impact and Recommendations

Circular Economy

**Reduce, Recycle, Reuse
food**

**Policies to develop a
circular economy
strategy and
programme that
includes and involves
consumer education**



Impact and Recommendations

Understand Behaviours



Consumer behaviours do have a significant impact on food waste

- **Structured shopping lists**
- **Strategies for improved food storage / use of surplus food**
- **Better capacity and demand management**
- **Healthier promotions,**
- **De-cluttered display strategies**

Impact and Recommendations

Policy making

Involve Policy makers in dialogue with producers and consumers

Run focussed events for stakeholders across the food supply chain on causes as identified (expiry date, demand management, storage)
→ R&D, nutrition and health, water & energy nexus, “citizen science”

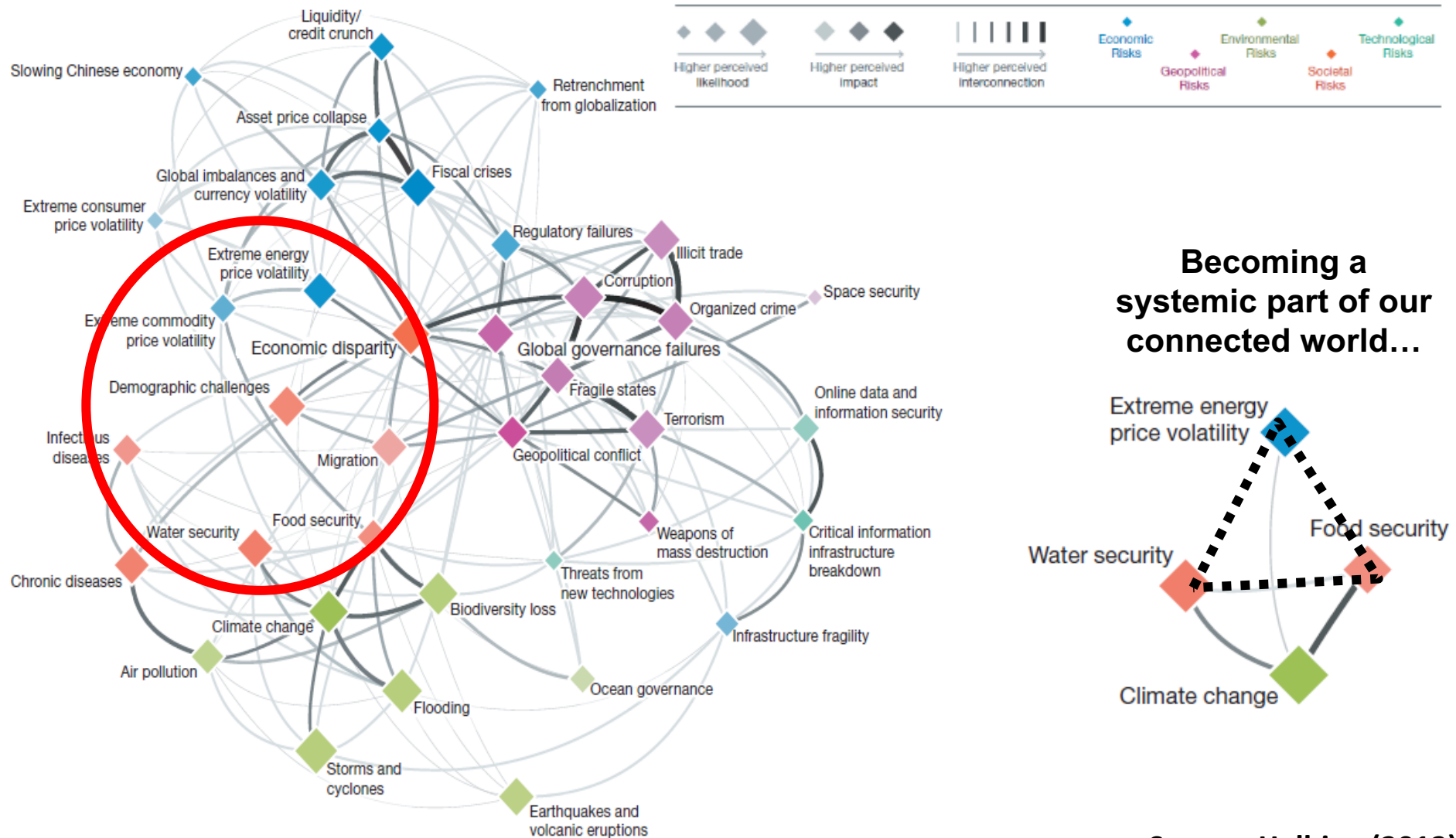




4. Future Research Avenues

Food–Energy–Water Nexus, Circular Economy

Resource security is interconnected



Source: Helbing (2013)

Commoner's 4 laws of Ecology

❖ Our research prompts us to consider future research avenues:

- *Everything is connected to everything else*
 - ❖ Ecosystem interactions exist
 - ❖ Pursue causality / complexity
- *Everything must go somewhere*
 - ❖ Waste as an “alternative resource” (circular economy concept)
- *Nature knows best*
 - ❖ Reflect upon consumption habits
 - ❖ Include water and energy = nexus
- *There is no such thing as a free lunch*
 - ❖ No “zero burden”: upstream ownership is required!
 - ❖ Optimise resource yields and balance flow of resources



*Prof. Barry Commoner
1917 - 2012*



Thank You!

Questions

 @Safeqproject

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