



UNIVERSITAS GADJAH MADA

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Ketahanan Pangan dan Keamanan Pangan : Mencari Alternatif Konsep Baru

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Definitions

- Food security exists when all people, at all times, have physical and economic access to sufficient, **safe** and nutritious food that meets their dietary needs and food preferences for an active and healthy life". (World Food Summit, 1996)
- Food security means that all people, at all times, have physical, social, and economic access to sufficient, **safe**, and nutritious food that meets their food preferences and dietary needs for an active and healthy life. (United Nations' Committee on World Food Security)

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SDGs Target 2.1



- By 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round

Proposed Indicators

- Proportion of population below minimum level of dietary energy consumption
- Percentage of women of reproductive age (15-49) with anemia
- Prevalence of stunting and wasting in children under 5 years of age
- Percentage of infants under 6 months who are exclusively breast fed
- Percentage of women, 15-49 years of age, who consume at least 5 out of 10 defined food groups

Primary goal Target :

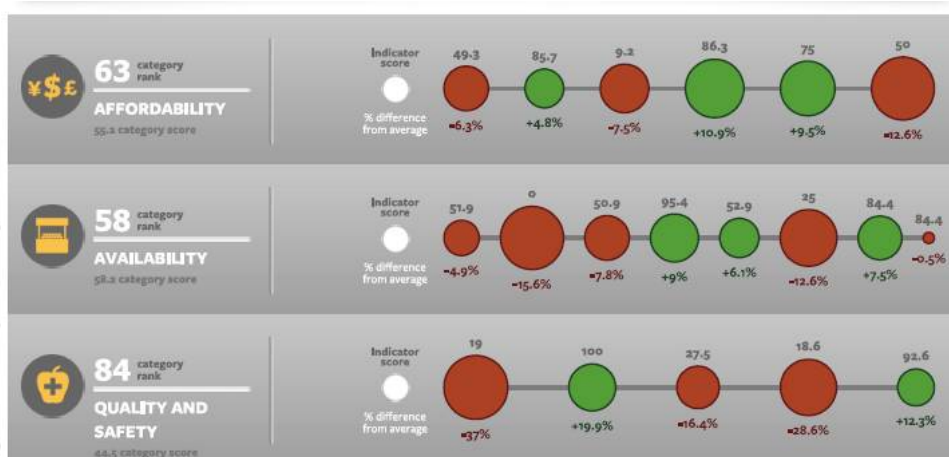
- End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

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65 Indonesia

54.8 score Figures are from annual baseline model (October 2018).



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Global Food Security Index (GFSI)

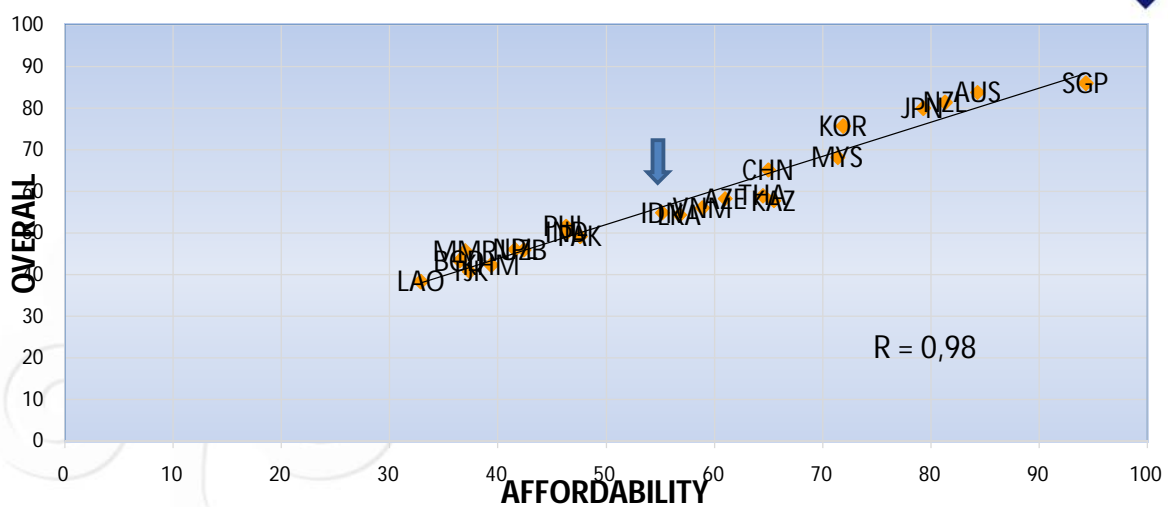


- Affordability
 - Measures the ability of consumers to purchase food, their vulnerability to price shocks and the presence of programmes and policies to support customers when shocks occur.
- Availability
 - Measures the sufficiency of the national food supply, the risk of supply disruption, national capacity to disseminate food and research efforts to expand agricultural output.
- Quality & safety
 - Measures the variety and nutritional quality of average diets, as well as the safety of food.

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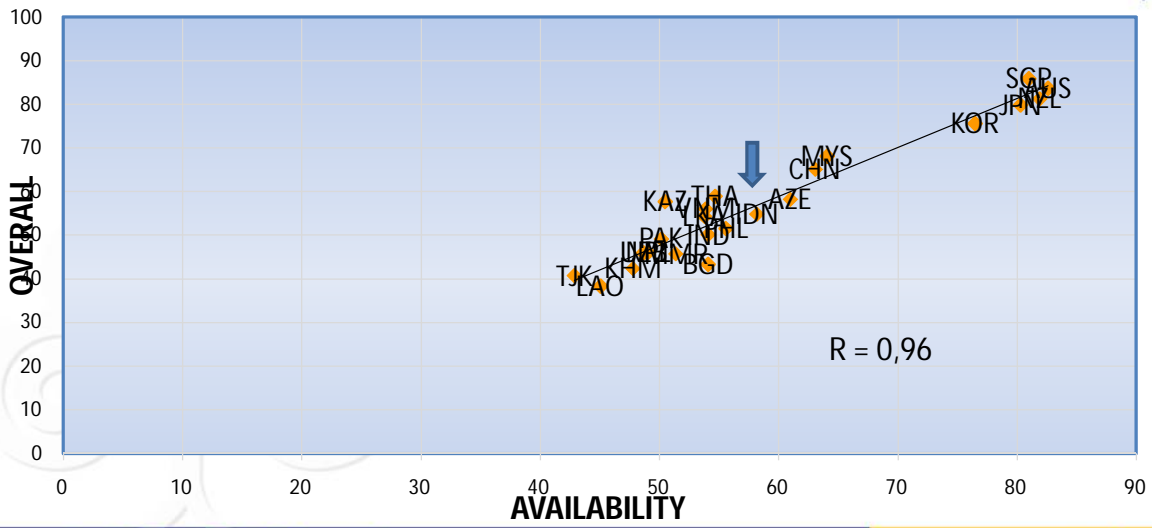
GFSI 2018: Asia and Pacific



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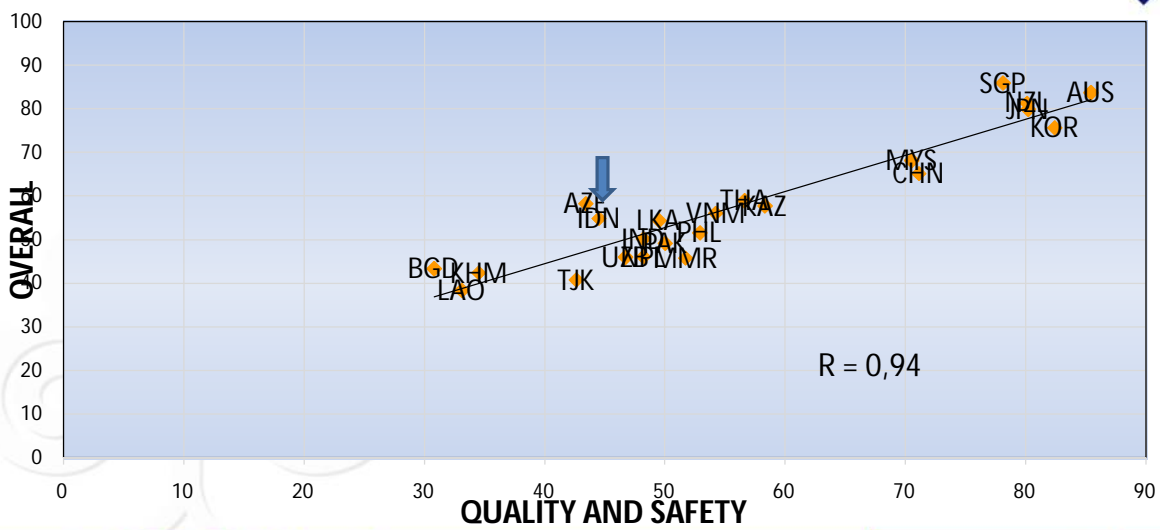
GFSI 2018: Asia and Pacific



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GFSI: Indonesia (2014-2018)



Year	Rank	Overall Score	Vietnam (Rank/Score)
2018	65	54.8	62 / 56.0
2017	69	51.3	64 / 54.0
2016	71	50.6	57 / 57.1
2015	74	46.7	65 / 53.4
2014	72	46.5	67 / 49.1

GFSI 2018: Indonesia "Strengths"

(are defined as any indicator score above 75.0)



Strengths (8)

- 100 Nutritional standards
- 95.4 Volatility of agricultural production
- 92.6 Food safety
- 86.3 Agricultural import tariffs
- 85.7 Proportion of population under global poverty line
- 84.4 Urban absorption capacity
- 84.4 Food loss
- 75 Presence of food safety net programmes

GFSI 2018: Indonesia "Challenges"

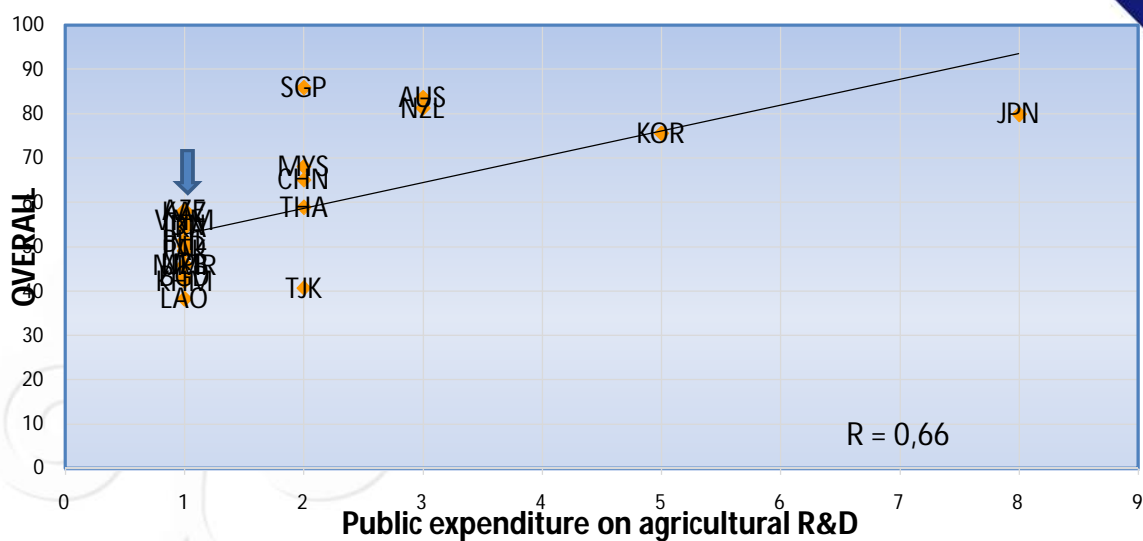
(are defined as any indicator score below 25.0)

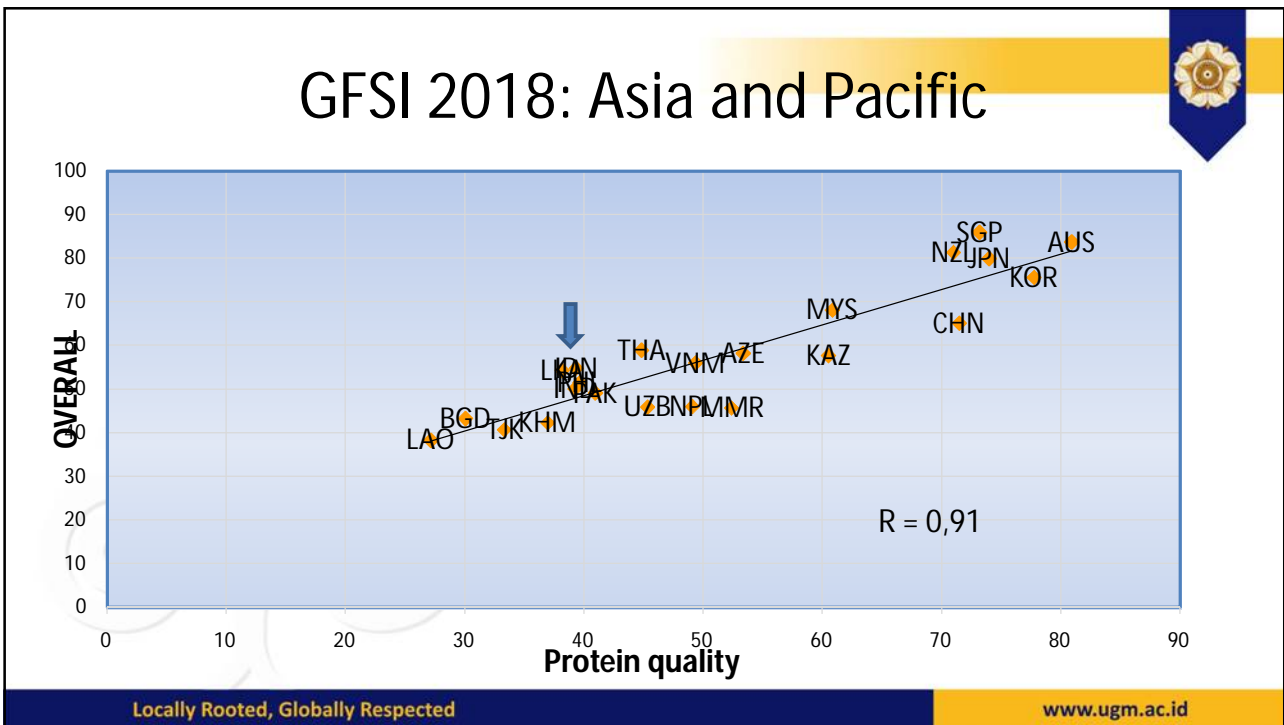
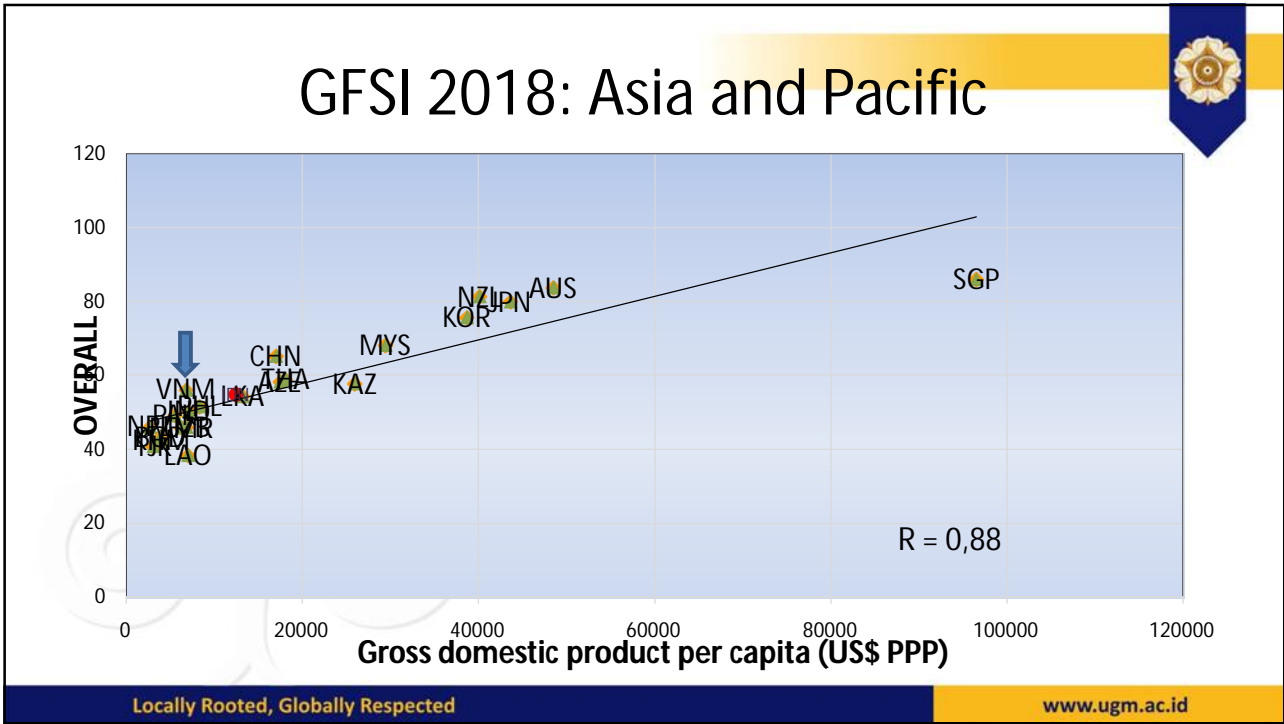


Challenges (4)

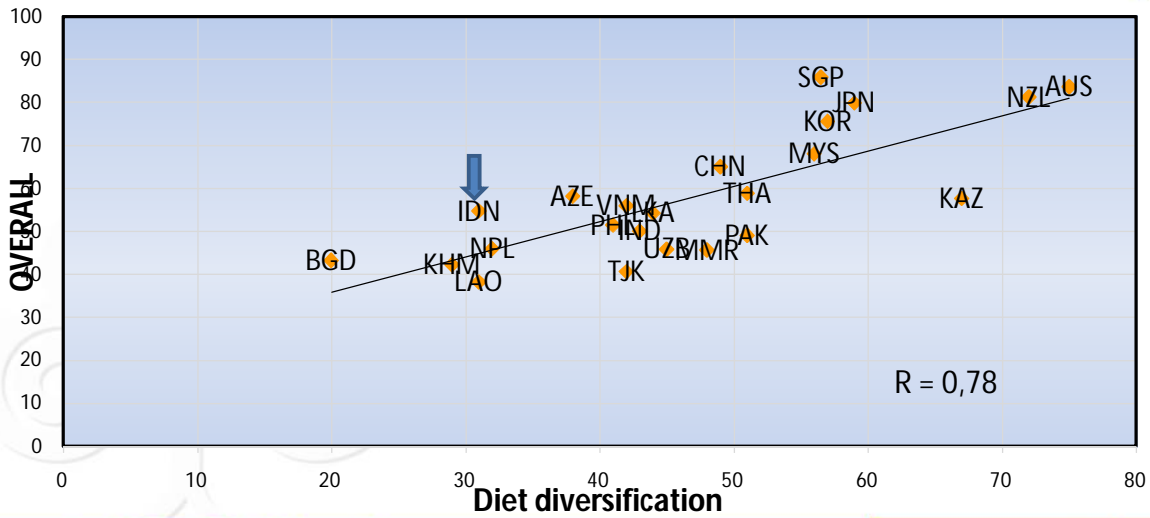
- 0 Public expenditure on agricultural R&D
- 9.2 Gross domestic product per capita (US\$ PPP)
- 18.6 Protein quality
- 19 Diet diversification

GFSI 2018: Asia and Pacific





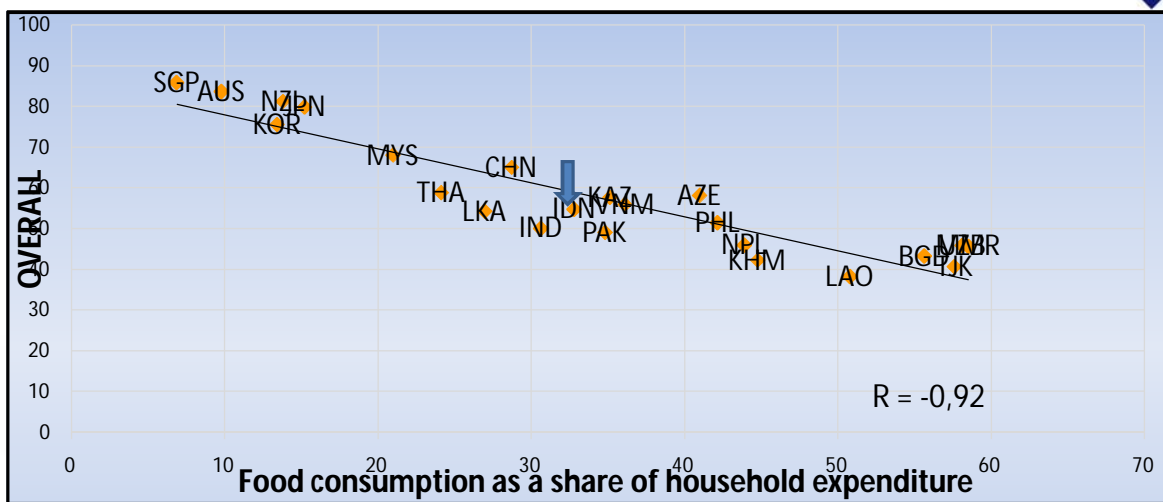
GFSI 2018: Asia and Pacific



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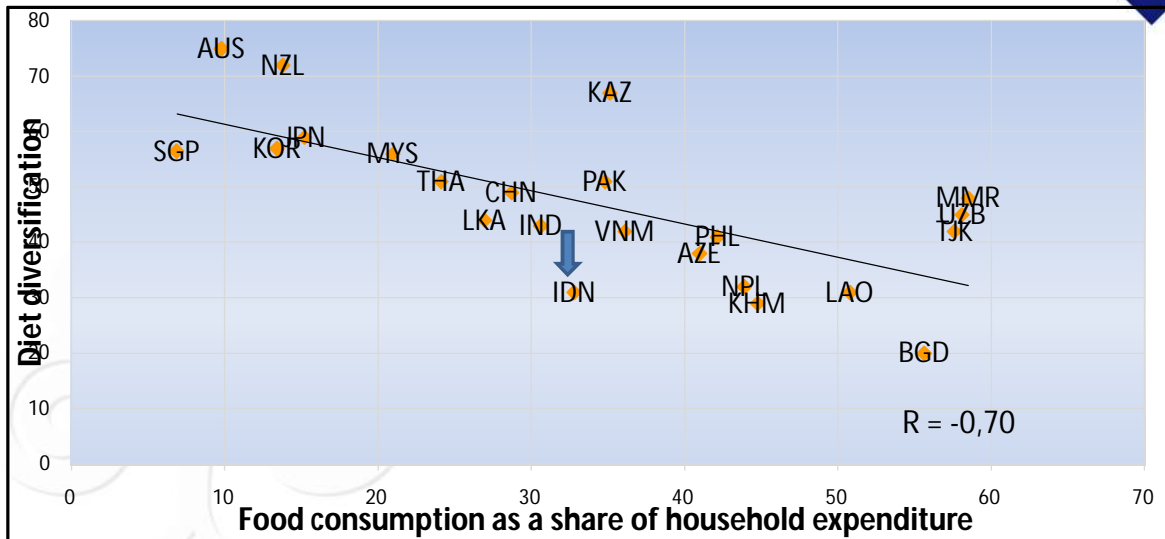
GFSI 2018: Asia and Pacific



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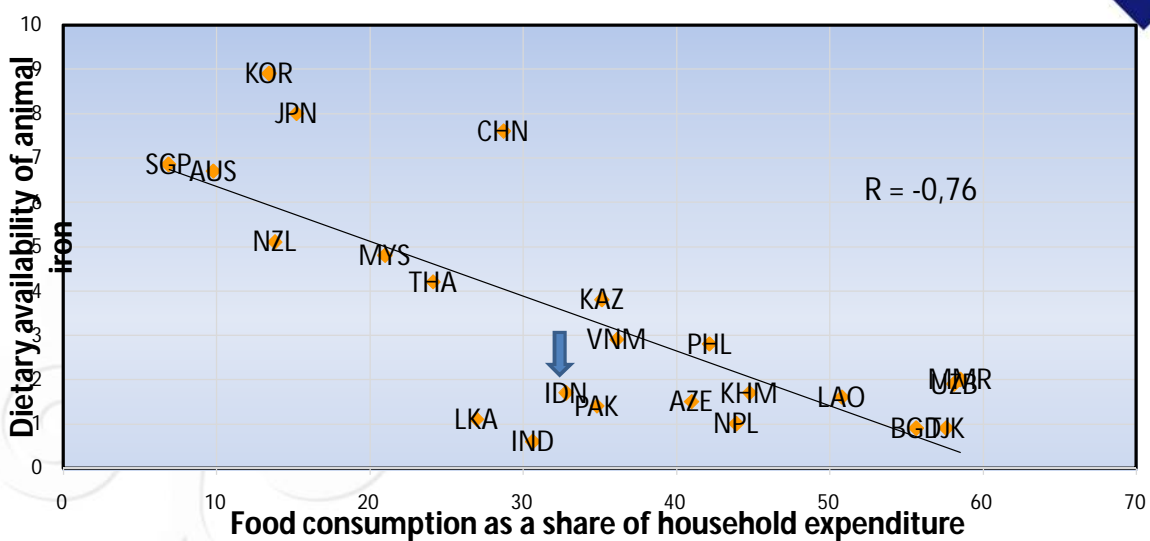
GFSI 2018: Asia and Pacific



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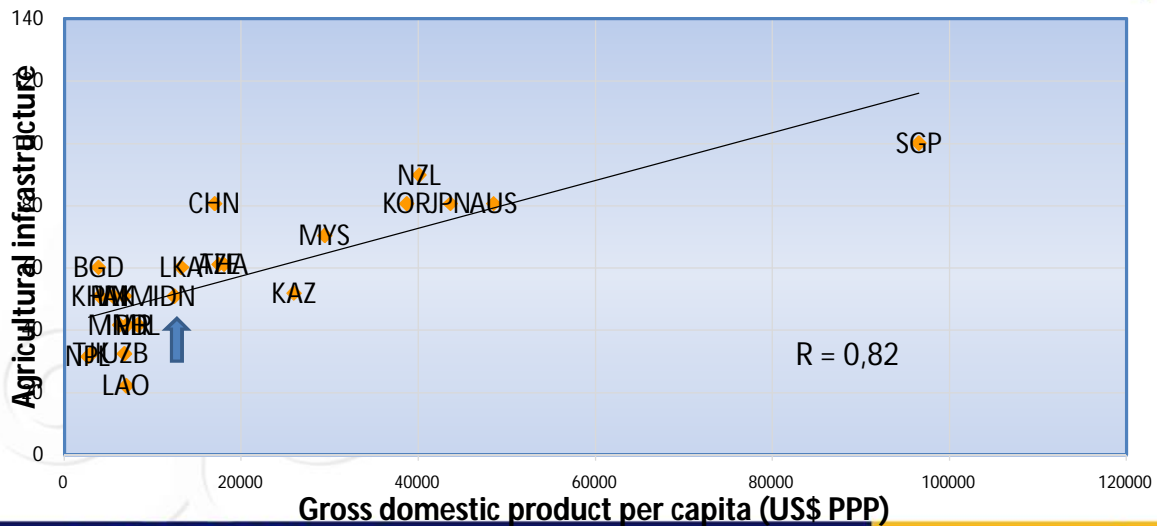
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Why do we need alternatif concept on achieving Food Security ?

The food we eat today is unsustainable for two reasons:

- The food system causes unacceptable environmental impacts and it is depleting non-renewable resources.
- Our food can be regarded as 'fossil food' because its production relies on fossil fuel, non-renewable mineral resources, depletion of groundwater reserves and excessive soil loss.

(Holden et al., 2018, www.nature.com/npjscifood)

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Megatrends in food and agribusiness

Source: Cole et al., *npj Science of Food* (2018) 2:14.



Megatrend	Consequences
A less predictable planet	Supply of limited resources is being further constrained by more severe and unpredictable climate events and more potent microbes, pests and diseases.
Health on the mind	An ageing population, rising levels of chronic disease and increasing social awareness around health and wellbeing are creating demand for foods that provide specific and holistic health outcomes.
Choosey customers	Rising wealth, increasing choice and greater market access are driving demand for a more diverse range of foods and food service options.
One world	As food and beverage value chains become increasingly global, new market opportunities are created while at the same time introducing competition.
Smarter Food Chains	Increasing demand for food, the use of big data and more sophisticated e-commerce platforms are driving the creation of leaner, faster, more agile and low waste value chains.

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Food demand vs ecological footprint

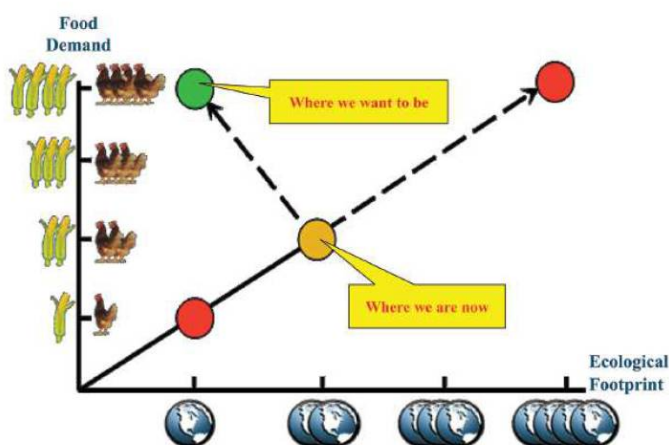



Figure 4.1 Food demand vs ecological footprint.

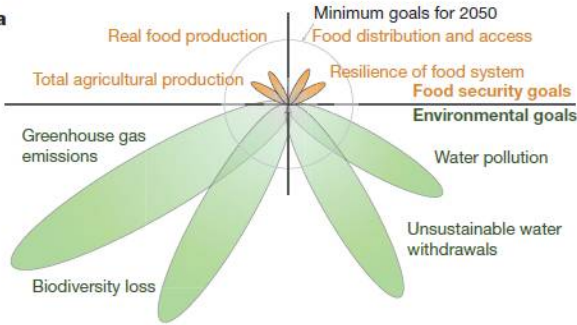
Source: Sundmaeker et al., 2016. <https://www.researchgate.net/publication/304900564>

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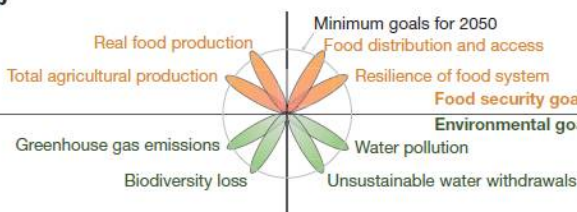
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a



b



Alternative concept to achieve goals for food security and environmental sustainability by 2050

(Foley et al., 2011, doi: 10.1038/nature10452)

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Food Loss and Waste





Largest food wasters
(per person per year)



Saudi Arabia
427kg



Indonesia
300kg



US
277kg



UAE
196kg

Methane from food in landfills is **21 times more damaging** than CO₂

Reducing US food waste by 20% over 10 years would cut **18 million tons** of greenhouse gases annually

In **rich countries**, consumers waste most food




In **developing countries**, food losses occur before reaching the consumer




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The carbon footprint of food waste accounts for about **3.3 giga-tonnes** of greenhouse gas emissions, which is equivalent to one third of annual emissions from fossil fuels



If **one quarter** of the food currently lost or wasted were saved, it would be enough to feed the world's hungry

Top 3 / Lowest 3 Performers
in reducing food loss & waste

TOP PERFORMERS

1. France
2. Australia
3. South Africa


LOWEST PERFORMERS

23. United Arab Emirates
24. Indonesia
25. Saudi Arabia


Responses

BEST BEFORE
-- / -- / --


Clearer expiration date labels



Donations from food retailers




Consumer education



Reduction of food losses


Data from the Food Sustainability Index and index sources

Developed by

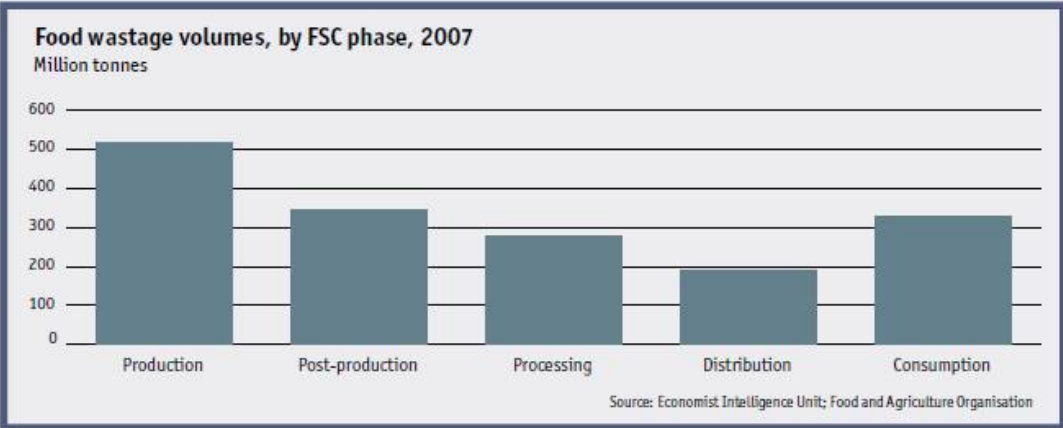


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While spillage and degradation are the primary causes of food loss throughout all the earlier stages of the FSC, once food enters the market system for the fourth stage of the FSC— distribution— spoilage and excess supply become the main drivers of food loss (GFSI, 2014).



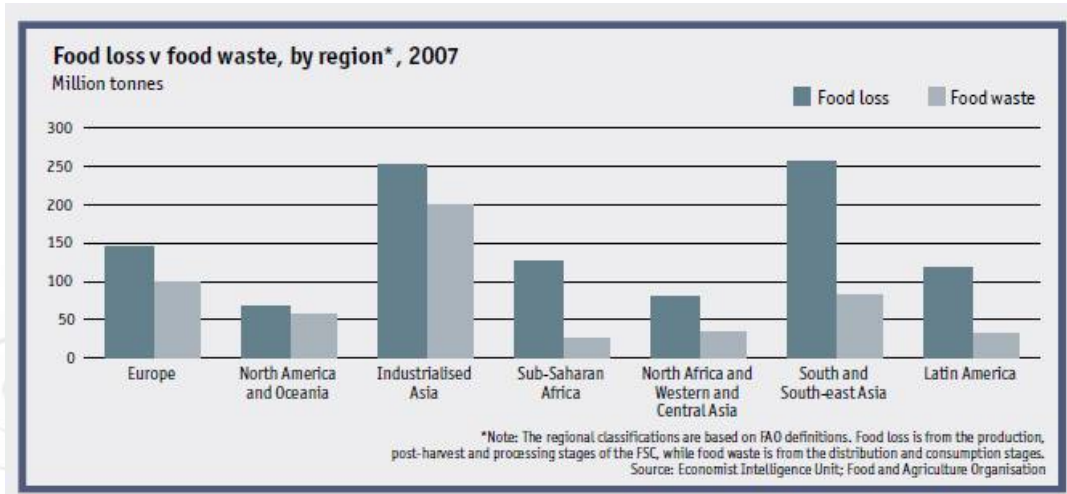
Food wastage volumes, by FSC phase, 2007
Million tonnes



FSC Phase	Wastage Volume (Million tonnes)
Production	~500
Post-production	~350
Processing	~280
Distribution	~180
Consumption	~320

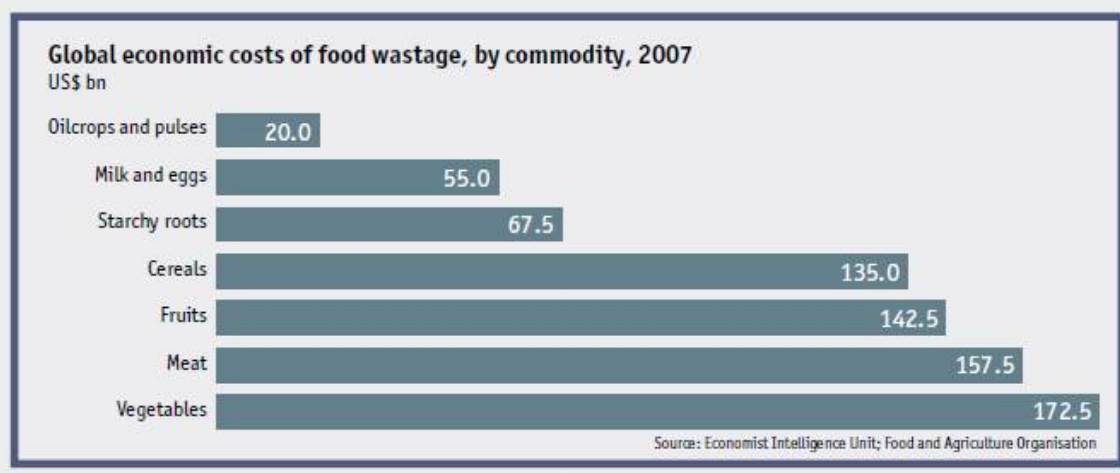
Source: Economist Intelligence Unit; Food and Agriculture Organisation

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Recommendation



It is suggested that:

- halting agricultural expansion,
- closing yield gaps,
- increasing efficiency,
- changing diets and
- **reducing food loss and food waste**

could lead to a doubling (100-180% increase) of global food availability with reduced environmental impacts of agriculture.

(Foley et al., 2011, doi: 10.1038/nature10452)

Recommendation



To achieve these changes, it is necessary to harness internet technology, in the form of an 'Internet of Food', which offers the chance to:

- use global resources more efficiently,
- stimulate rural livelihoods,
- develop systems for resilience and
- facilitate responsible governance by means of computation , communication, education and trade without limits of knowledge and access.

(Holden et al., 2018, www.nature.com/npjscifood)

'The Internet of Food'



- In order to transition to a sustainable food system, we need specific technology infrastructure to allow high-quality data to be collected about the food system that will permit the best possible decision-making.
- Key requirements are:
 - standard vocabularies and ontologies to allow integration of data sets across the internet,
 - proliferation of low cost sensing to allow orders of magnitude change in the supply of empirical observation data, and
 - new analytical methods to collate, curate, analyze and utilize data across the whole food production system
- This technology will give us the chance to transition from fossil food to sustainable food systems.

Internet of Food and Farm 2020



(Sundmaerker et al., 2016, <https://www.researchgate.net/publication/304900564>)

- **Precision Agriculture** will be extended to Smart Farming, in which a farm becomes a smart web of interoperable farm objects. A major improvement that will be added, is the seamless integration of sensing and monitoring, smart analyses and planning and smart control of farm operations for all relevant farm processes ('whole farm management perspective').
- **Tracking and Tracing** systems will develop towards end-to-end visibility and real-time tracking and tracing on a fine granularity level, e.g. up to individual products. Moreover, traceability will be increasingly integrated with smart sensing systems and consequently add data about product features, production methods, and ambient conditions.

Internet of Food and Farm 2020

(Sundmaerker et al., 2016, <https://www.researchgate.net/publication/304900564>)



- **Food Safety and Quality Management** systems will transform from a defensive, reactive approach towards a proactive approach, in which food chains can be monitored, controlled, planned and optimized remotely based on real-time information of a broad range of relevant parameters.
- **Food Processing and Manufacturing** will increasingly be transformed into agile control systems in which processing machines function as autonomous connected objects with embedded intelligence. This will especially be achieved by integrating new and cost-effective sensors for real-time monitoring of processing activities, ensuring machine interoperability, and implementing algorithms for early detection of food safety and quality issues.

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Internet of Food and Farm 2020

(Sundmaerker et al., 2016, <https://www.researchgate.net/publication/304900564>)



- **Consumer Food Awareness** will develop towards a fully consumer-centric approach that combines IoT technologies for different application areas, including Smart Homes, Smart Shopping, and Smart Health and Leisure. These applications will combine food-related information from different stakeholders for personalised food intake advices.

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Peta Ketahanan dan Kerentanan Pangan 2018



- *"Pelaksanaan pembangunan yang dilaksanakan selama 4 tahun terakhir ini telah berhasil menghantarkan Indonesia mencapai swasembada beberapa komoditas strategis yaitu beras, bawang merah, cabai dan jagung"...* (sambutan Ketua Harian Dewan Ketahanan Pangan).

Peta Ketahanan dan Kerentanan Pangan 2018



- Ketersediaan informasi ketahanan pangan yang akurat, komprehensif, dan tertata dengan baik sangat penting untuk mendukung upaya pencegahan dan penanganan kerawanan pangan dan gizi.
- UU No 18/ 2012 tentang Pangan dan PP No 17/2015 tentang Ketahanan Pangan dan Gizi yang mengamanatkan Pemerintah dan Pemerintah Daerah sesuai dengan kewenangannya untuk membangun, menyusun, dan mengembangkan Sistem Informasi Pangan dan Gizi yang terintegrasi.
- Catatan: Indikator pada aspek ketersediaan pangan adalah rasio konsumsi normatif per kapita terhadap ketersediaan padi, jagung, ubi kayu, dan ubi jalar.



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