



“Global Development of the Food Industry – Technologies Shaping the Future”

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More Technology, Safety & Quality, Less Hunger

From post-harvesting in emerging countries to consumer

Milan, 25 March 2009



Executive Summary

(1) The bulk of the world food production is still concentrated in few regions

Only **few Developing** countries are dominating **value added South-South trade**

(2) The fact that one has only a small share of **traded processed products in total food sales (**10%**) points to the importance of **FDI**, which grew much faster than trade in last **two** decades**
Major changes & differences in consumption patterns among countries & regions need to be considered

(3) There is the need for a favourable framework
Technologies needed are being **transferred faster** than we all thought & through **non-usual patterns**
It is important to strengthen the **productive capacity** as comprehensively as possible



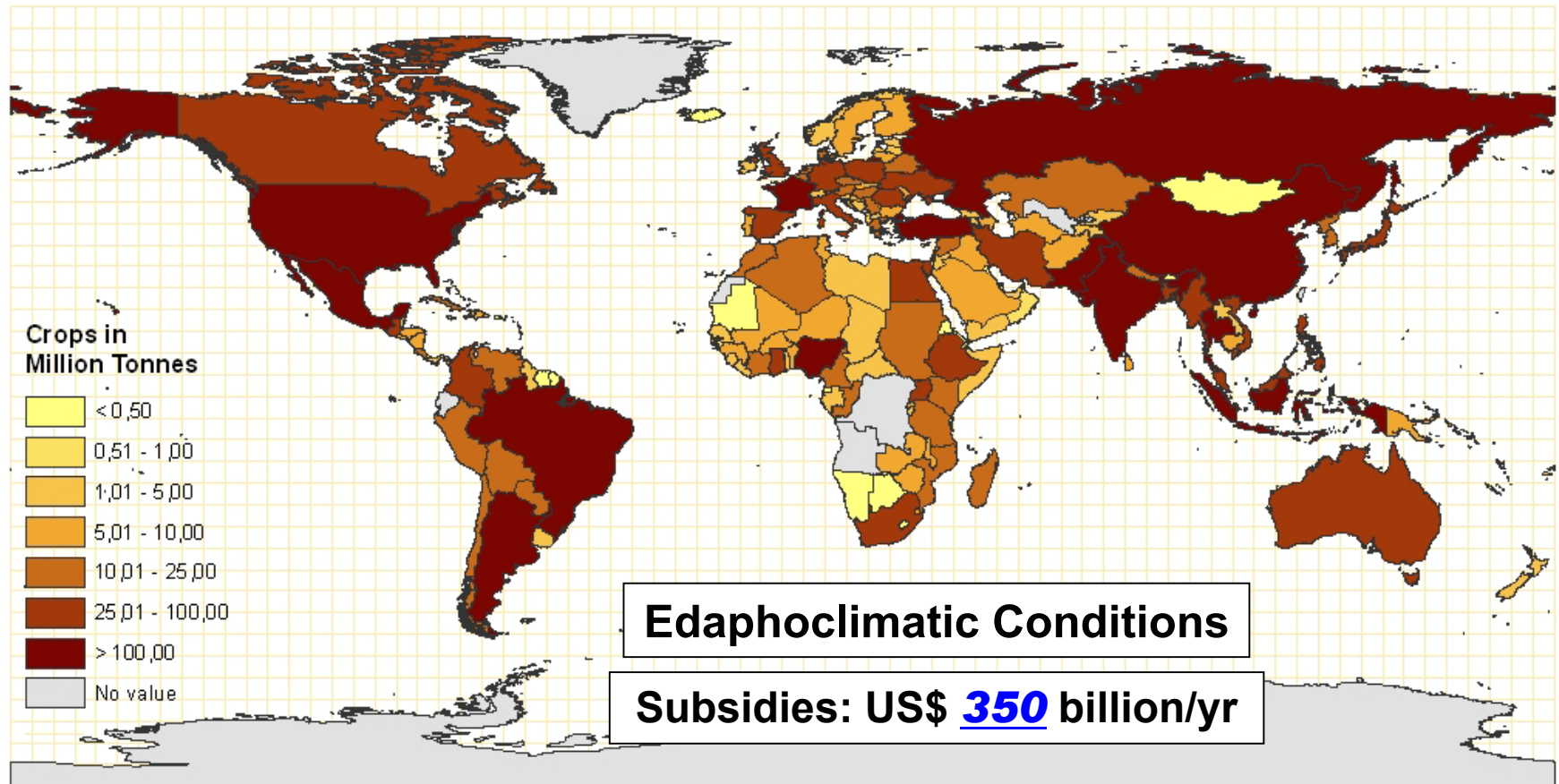
Background

- ~1bn people suffer hunger or under nutrition
- ~ twice as much on borderline of acceptable nutrition
- Social, economic, technological change
- Need to dramatically improve economic status and food situation in developing countries
- Continuing population growth estimated at 40% by 2050
- Economic changes in low income countries
- Increased urbanisation
- Lifestyle changes
- Increased meat consumption

Double Food Demand by 2050

...the bulk of the world food production is still concentrated in few regions...

Crops (Primary) Production Quantity, 2005



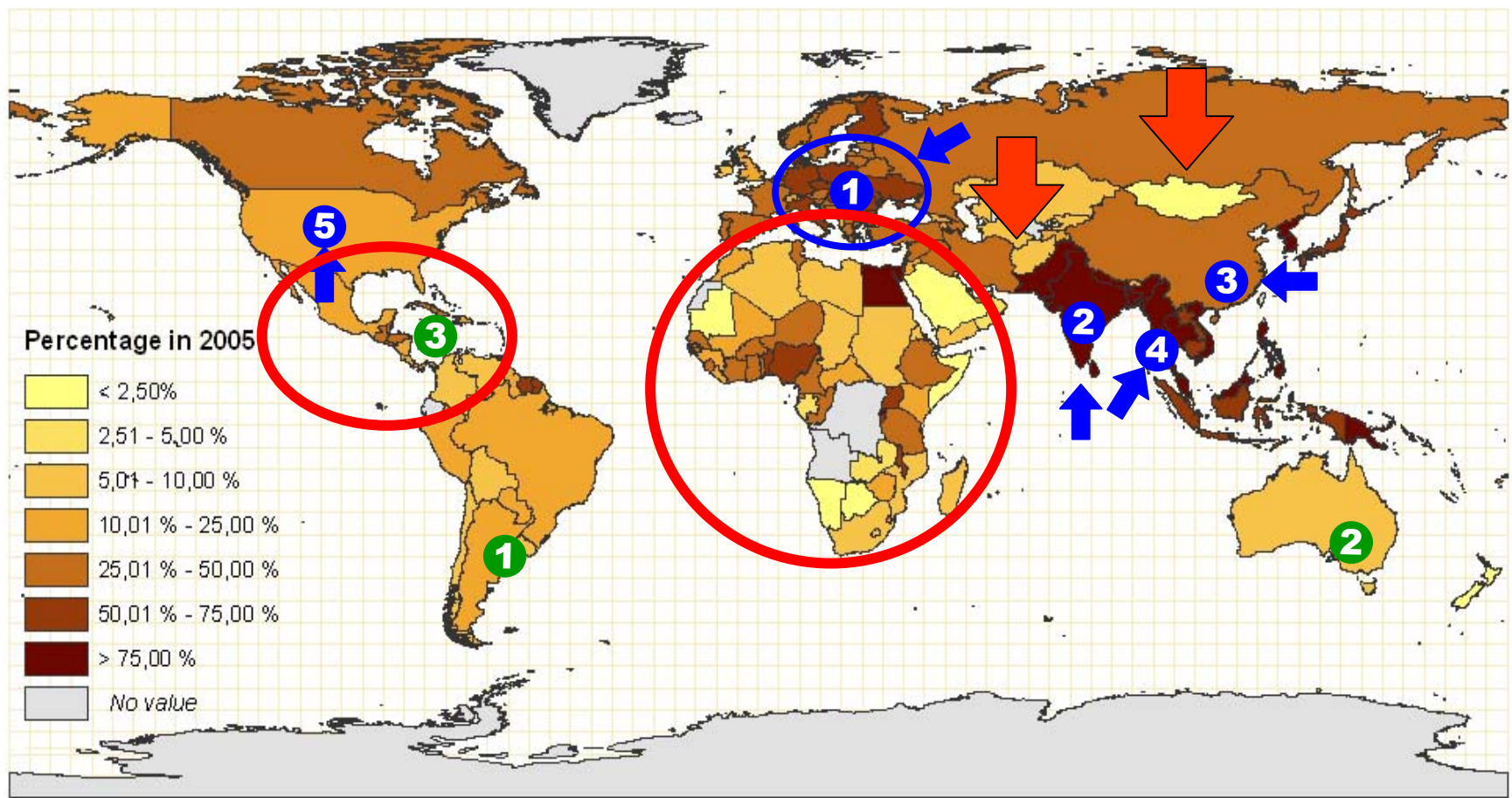
Source: Food and Agriculture Organization of the United Nations (FAO)
FAO Statistics Division, Production Database
1 October 2008

5.000
Kilometers

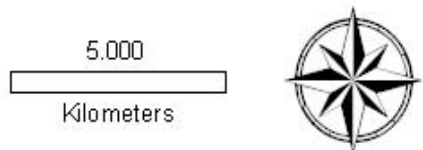


...intensively cropped land is concentrated in **five** areas: **Europe, India, Eastern China, Southeast Asia, & the Midwestern USA**; smaller concentrations in **Argentina, Australia, & Central America**...

Percentage of Area Harvested (Primary Crops) by Agricultural Area, 2005

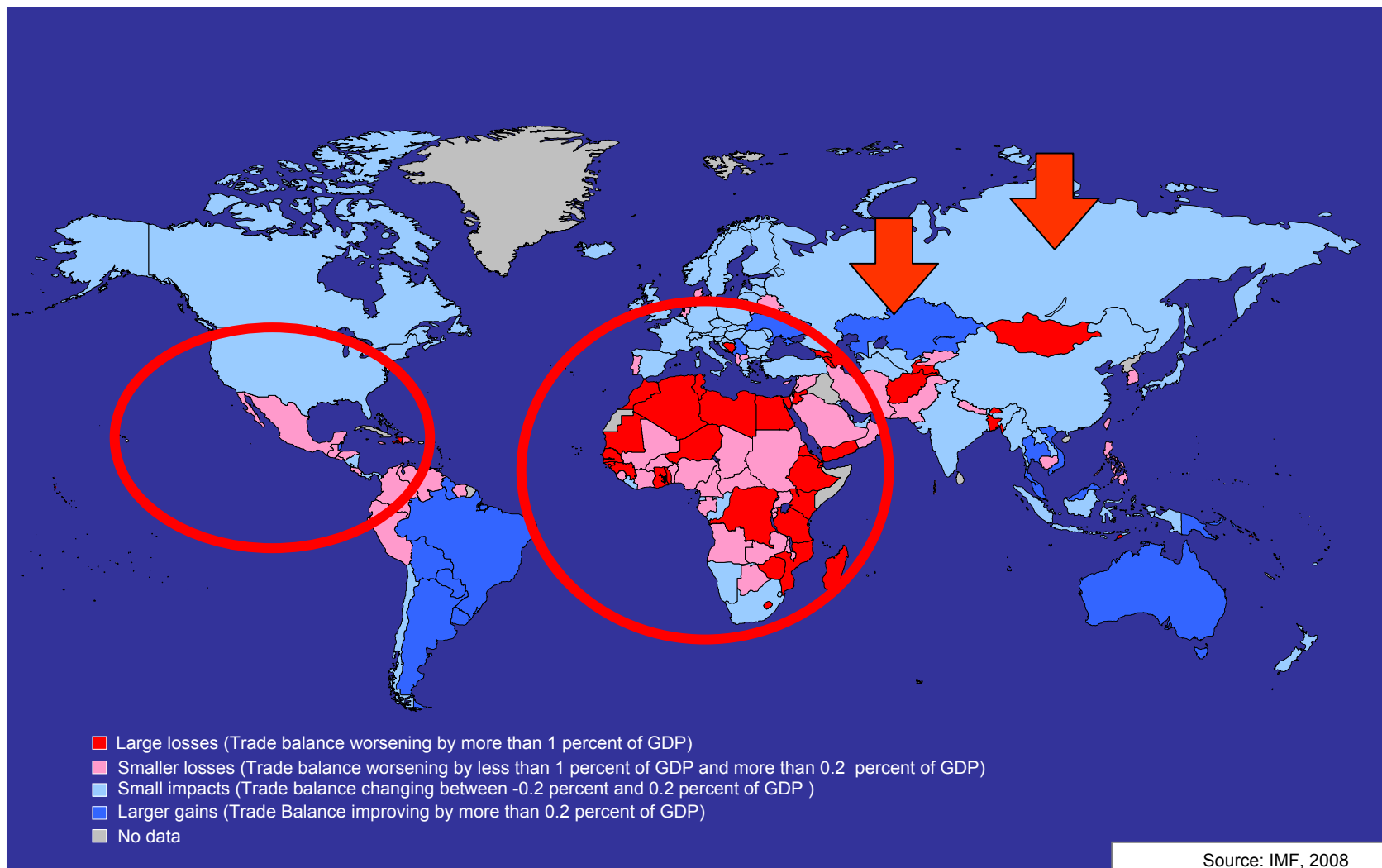


Source: Food and Agriculture Organization of the United Nations (FAO)
FAO Statistics Division, Production/Resources Database
1 October 2008





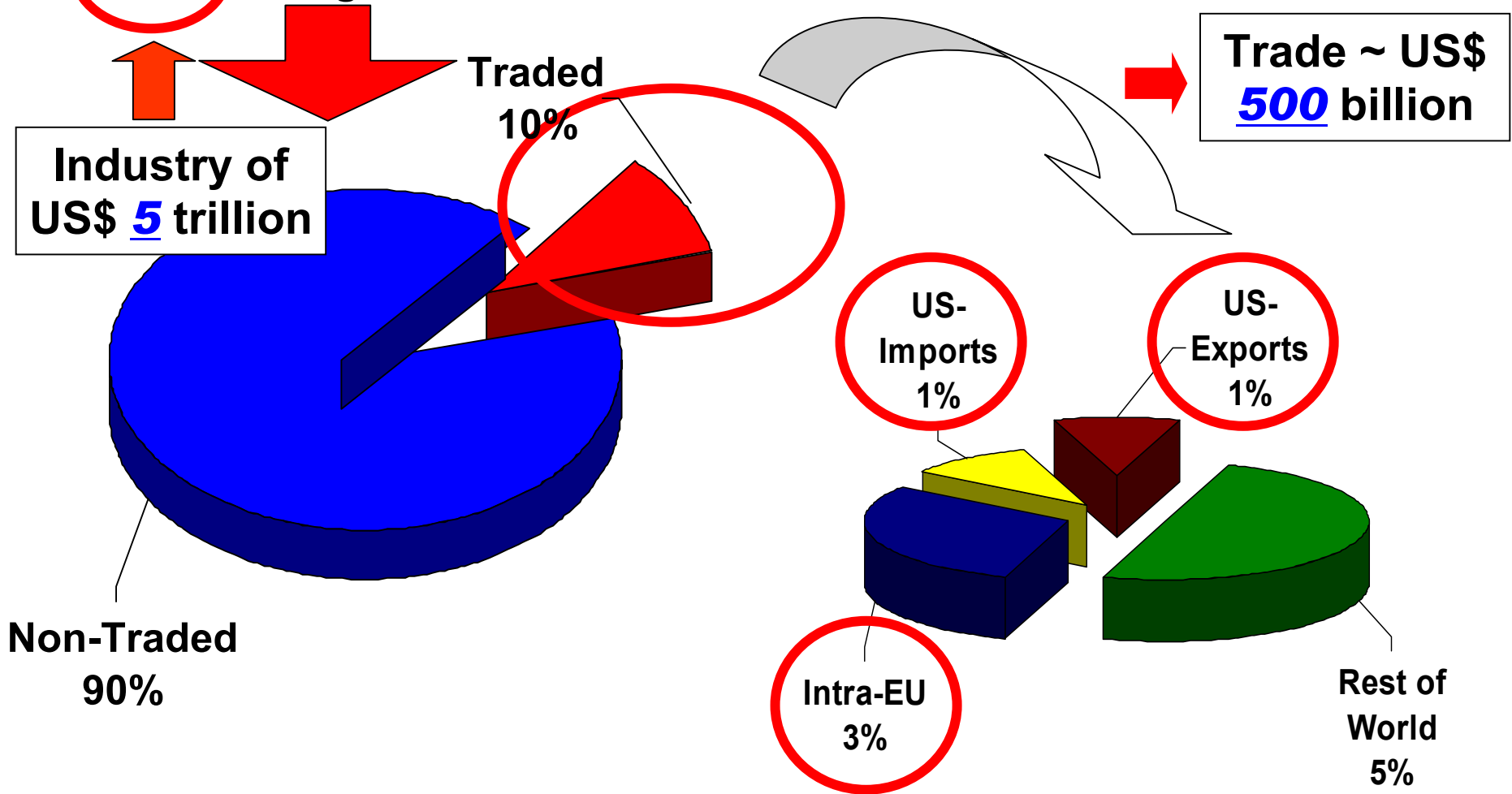
**...food import bill of developing countries:
US\$254 billion (2007) 33% more than in 2006...**



Source: IMF, 2008



...the fact that one has only a small share of **traded processed products** in total food sales (**10%**) points to the importance of **FDI**, which grew much faster than trade in last **two** decades...



Source: Trade data from UN COMTRADE, 2002 & Euromonitor; *Gehlhar and Regmi, 2005*, cited on Wilkinson & Rocha, for GAIF – 2008; New Delhi (FAO, UNIDO, IFAD)



“The World on your Plate”



**Herb
butter:**

- Salted butter - Ireland
- garlic puree - China, USA, Spain
- garlic salt - China, USA, Spain
- lemon - USA
- parsley - France, UK
- pepper - Indonesia
- water - Ireland

**Chicken
breast:**

- Chicken - Ireland, Belgium
UK, France etc.

Batter:

- Flour - Belgium, France
- Water - Ireland

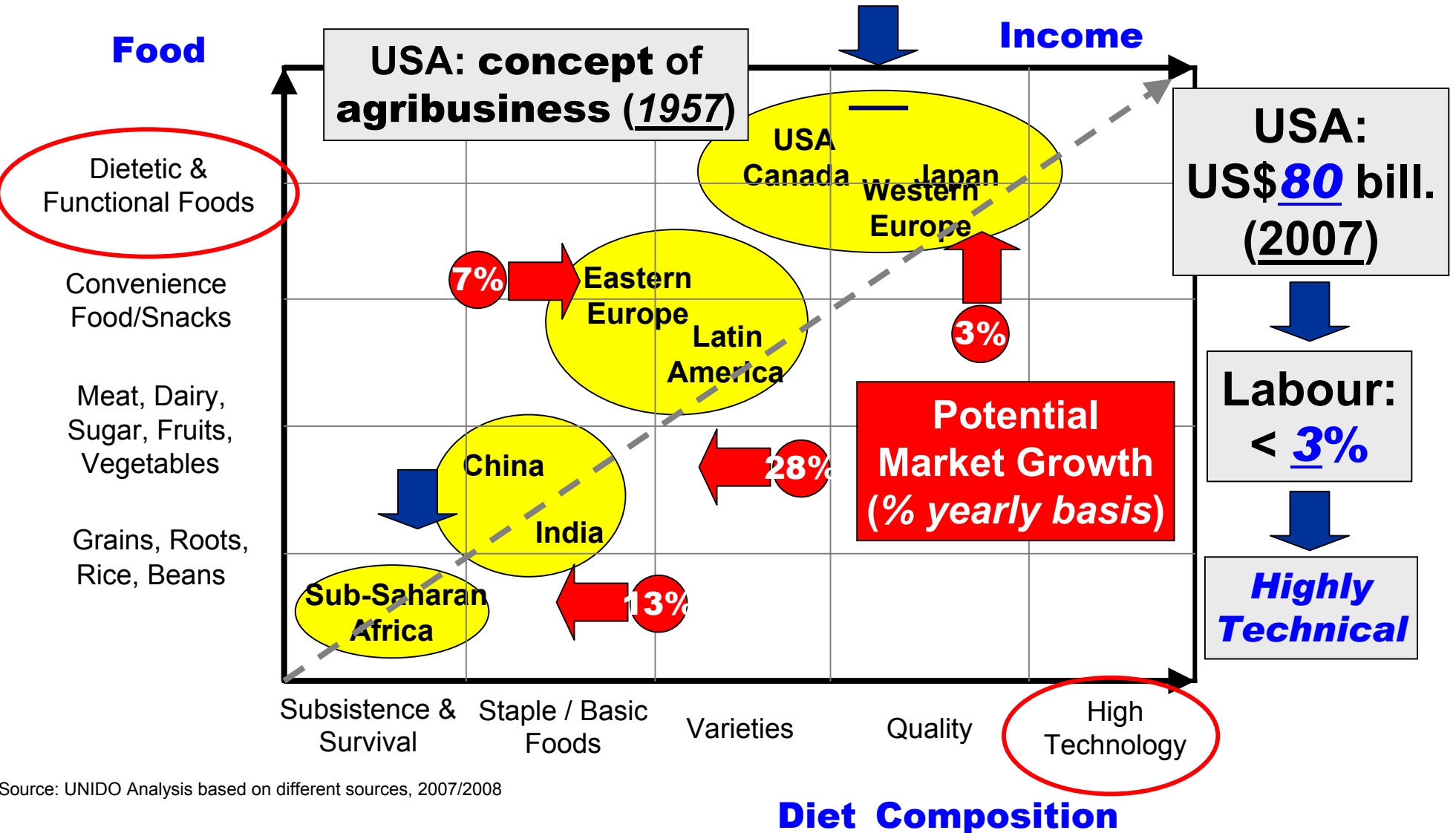
**Bread
crumb:**

- Bread crumb - Ireland, UK
- Rape-seed oil - EU, Australia
- Eastern Europe

Chicken Kiev



Changes & differences among countries & regions



Source: UNIDO Analysis based on different sources, 2007/2008



Urbanization transformed domestic markets of developing countries (& South-South trade) into the main source of expansion of global agri-food system

only few developing countries are dominating value-added food South-South trade (Argentina, Brazil, Chile, Indonesia, Malaysia, Thailand & Turkey)

...the “key” question is why only a few?



Reasons behind the success

1. **Organization of producers (especially small holders) combined with the use of the latest knowledge available**
2. **Availability of policies to support a favorable environment**
3. **Open to negotiations in the int'l scenario (trade –Doha–, standards, “codex” etc.)**

 **latest knowledge**



Establishment of the proper policies

1. Stabilization policies to minimize macroeconomic shocks

2. Allocation policies to set the right structure of expenditures on *R&D, education & infrastructure*

3. Re-distribution policies to support the demand for education & development of the required human resources for this specific industry

4. Micro-policies to suppress market distortions, lack of information & to stimulate production of the chain

5. And occasionally, demand policies to consolidate the consumption of the “targeted” commodities



Most critical development challenges in the next two decades

1. Climate Change (& implications to):

- the world manufacturing capacity;
- the world agriculture production;

2. Agriculture Production (& need to)

- Combine the production/trade of:
 - Food; Feed; Fiber; & Fuel (the four F's)
- Continue increasing productivity:
 - e.g. the follow up of the “green revolution”

There will be competition for limited land & water resources

3. Hopefully not for the next two decades the economic crisis

- which might effect the donations for development support



Changing demographic conditions and food demands



Design and development of efficient integrated systems of:

**Food Production
Processing
Preservation
and Distribution**

From rural producers to expanding and diversifying urban population



Drivers for Change

- **Social aspects**
- **Technology and Science**
- **Economic situation**
- **Environmental aspects**
- **Political situation**



Social aspects

| | Time-scale | | | | | | | | |
|-----------------------|---------------------------------------------------------------------------------------------------|--|------|--|------|--|------|--|------|
| | Now | | 2010 | | 2013 | | 2017 | | 2020 |
| Social factors | <i>In-migration</i> | | | | | | | | |
| | <i>Ageing of the population/shrinking availability of human capital</i> | | | | | | | | |
| | <i>Growing demand for information, quality, safe and healthy food</i> | | | | | | | | |
| | <i>Growing standards of life</i> | | | | | | | | |
| | <i>Changing of working, living and family patterns</i> | | | | | | | | |
| | <i>Increased gap between haves and have-nots/Social and regional imbalances growing in the EU</i> | | | | | | | | |
| | <i>Growing multiculturalism</i> | | | | | | | | |

Source: Deliverable 16 Road mapping report



Technology and Science

| | Time-scale | | | | | | | | |
|------------------------------|-------------------------------------------------------------------------------------------------------------|--|------|--|------|--|------|--|------|
| | Now | | 2010 | | 2013 | | 2017 | | 2020 |
| Technological factors | <i>Increased level of automation and greater use of technology (emphasis on energy-saving technologies)</i> | | | | | | | | |
| | <i>Greater use of ICT in managing supply chain</i> | | | | | | | | |
| | <i>Introduction and use of new fast analysis systems</i> | | | | | | | | |
| | <i>Development of new food packaging</i> | | | | | | | | |
| | <i>Increased functionality and added value in food</i> | | | | | | | | |
| | <i>Development of nanotechnology, GMO</i> | | | | | | | | |
| | <i>Expensive and limited access to modern technologies</i> | | | | | | | | |

Source: FF6 Deliverable 16 Road mapping report



Economic situation

| | Time-scale | | | | | | | | |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--|------|--|------|--|------|--|------|
| | Now | | 2010 | | 2013 | | 2017 | | 2020 |
| Economic factors | <i>Rising costs of energy, transportation, labour, prices, water (in certain areas)</i> | | | | | | | | |
| | <i>Rising demand for food</i> | | | | | | | | |
| | <i>Increasing competitiveness from third countries</i> | | | | | | | | |
| | <i>Increasing power of retailers</i> | | | | | | | | |
| | <i>Internationalization of distribution chains/Co-existence of two value chains: multinational and regional</i> | | | | | | | | |
| | <i>Coexistence of stratified and global niche markets</i> | | | | | | | | |
| | <i>Globalization</i> | | | | | | | | |
| | <i>Adoption of €</i> | | | | | | | | |
| | <i>Increasing market share of organic food</i> | | | | | | | | |
| <i>Exploitation of the market segment for regional products</i> | | | | | | | | | |

Source: FF6 Deliverable 16 Road mapping report



Environmental aspects

| | Time-scale | | | | | | | | |
|------------------------------|-----------------------------------------------------------------------------|--|------|--|------|--|------|--|------|
| | Now | | 2010 | | 2013 | | 2017 | | 2020 |
| Environmental factors | <i>Global warming and associated phenomena</i> | | | | | | | | |
| | <i>Scarcity of food and fresh water</i> | | | | | | | | |
| | <i>Over-fishing of oceans</i> | | | | | | | | |
| | <i>Pollution of water, soil and air</i> | | | | | | | | |
| | <i>Growing awareness of environmental issues (and resulting activities)</i> | | | | | | | | |
| | <i>Towards sustainability</i> | | | | | | | | |

Source: FF6 Deliverable 16 Road mapping report



Political situation

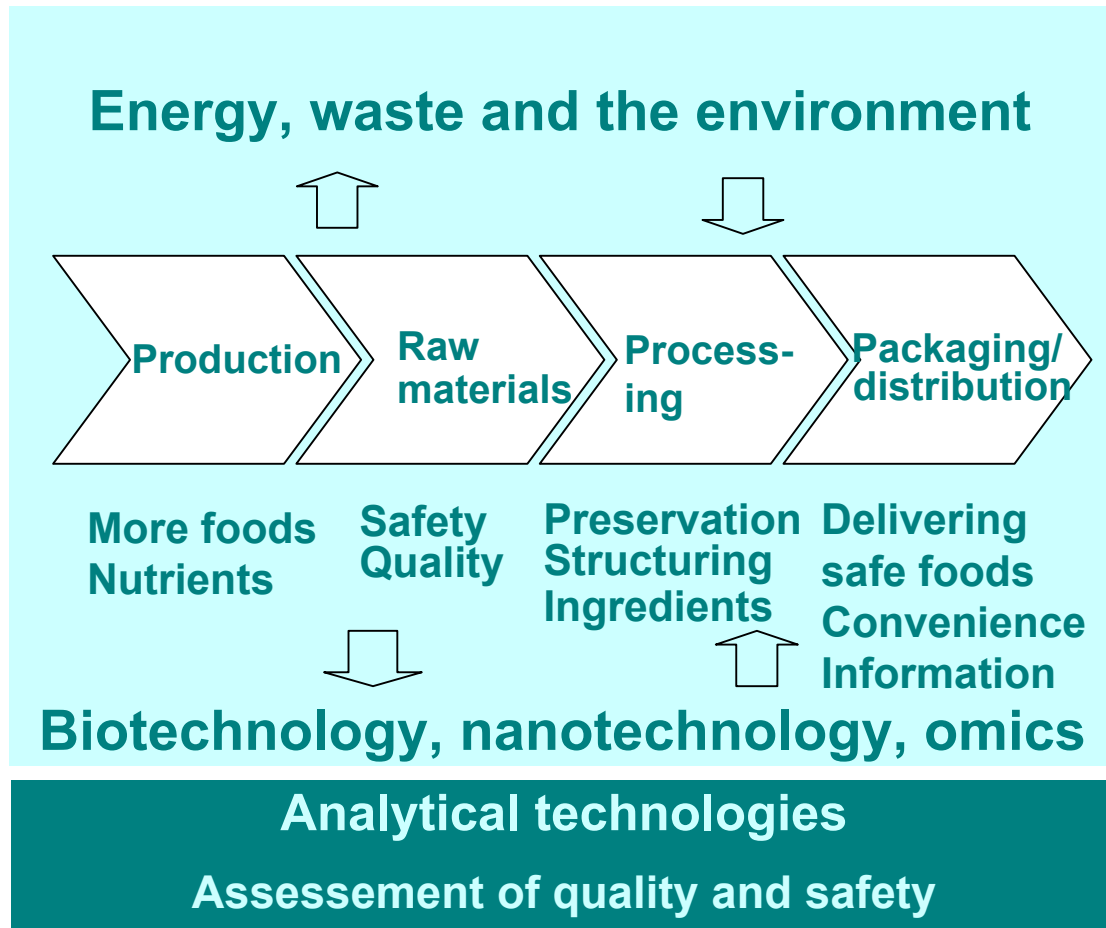
| | Time-scale | | | | | | | | |
|--------------------------|------------|--|------|--|------|--|------|--|------|
| | Now | | 2010 | | 2013 | | 2017 | | 2020 |
| Political factors | | | | | | | | | |
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Source: FF6 Deliverable 16 Road mapping report

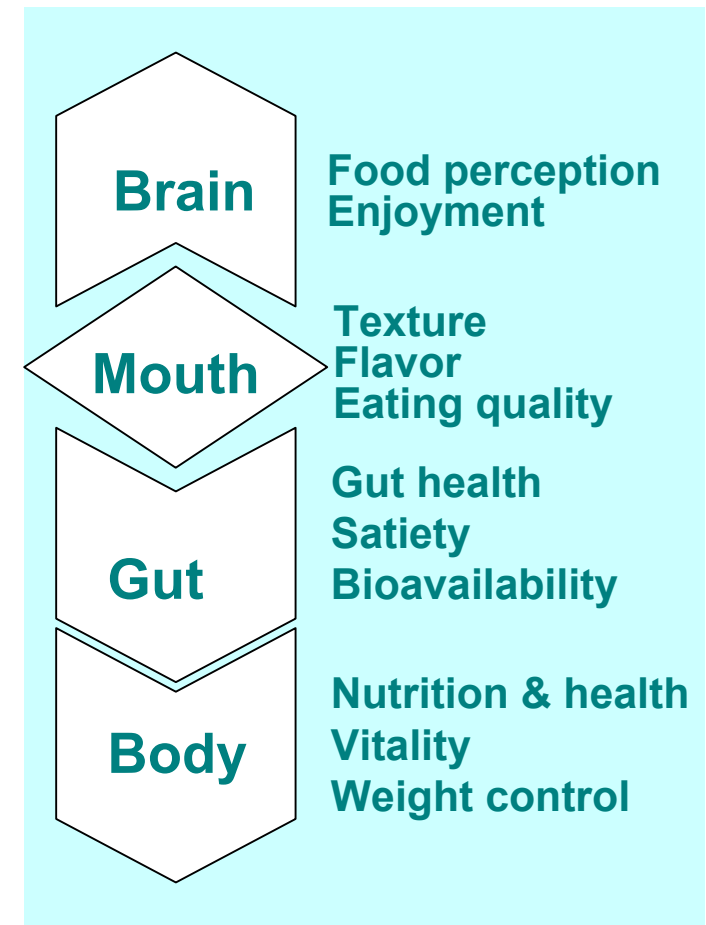


The dimensions of the food industry of the future

Food chain

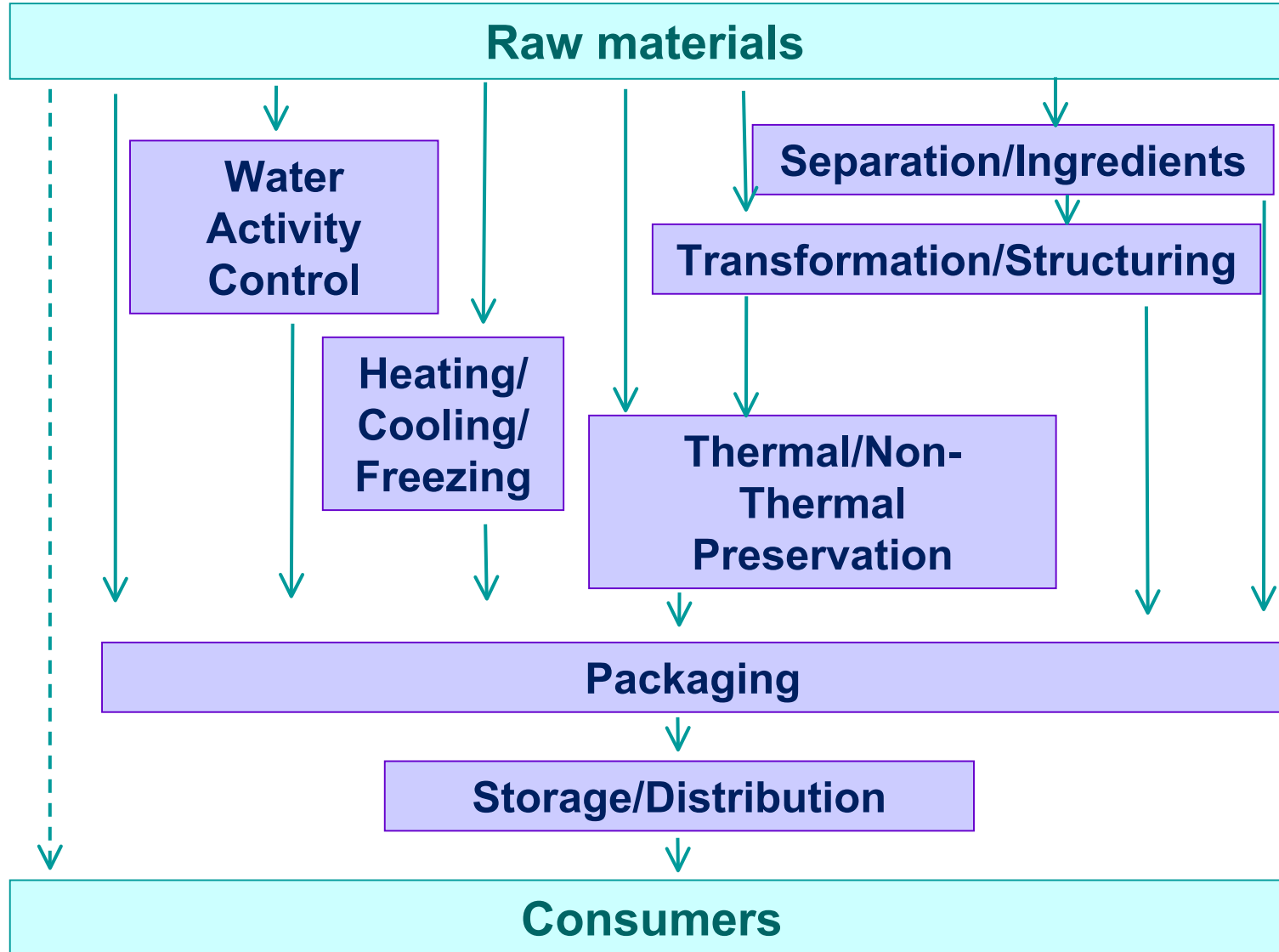


Consumer



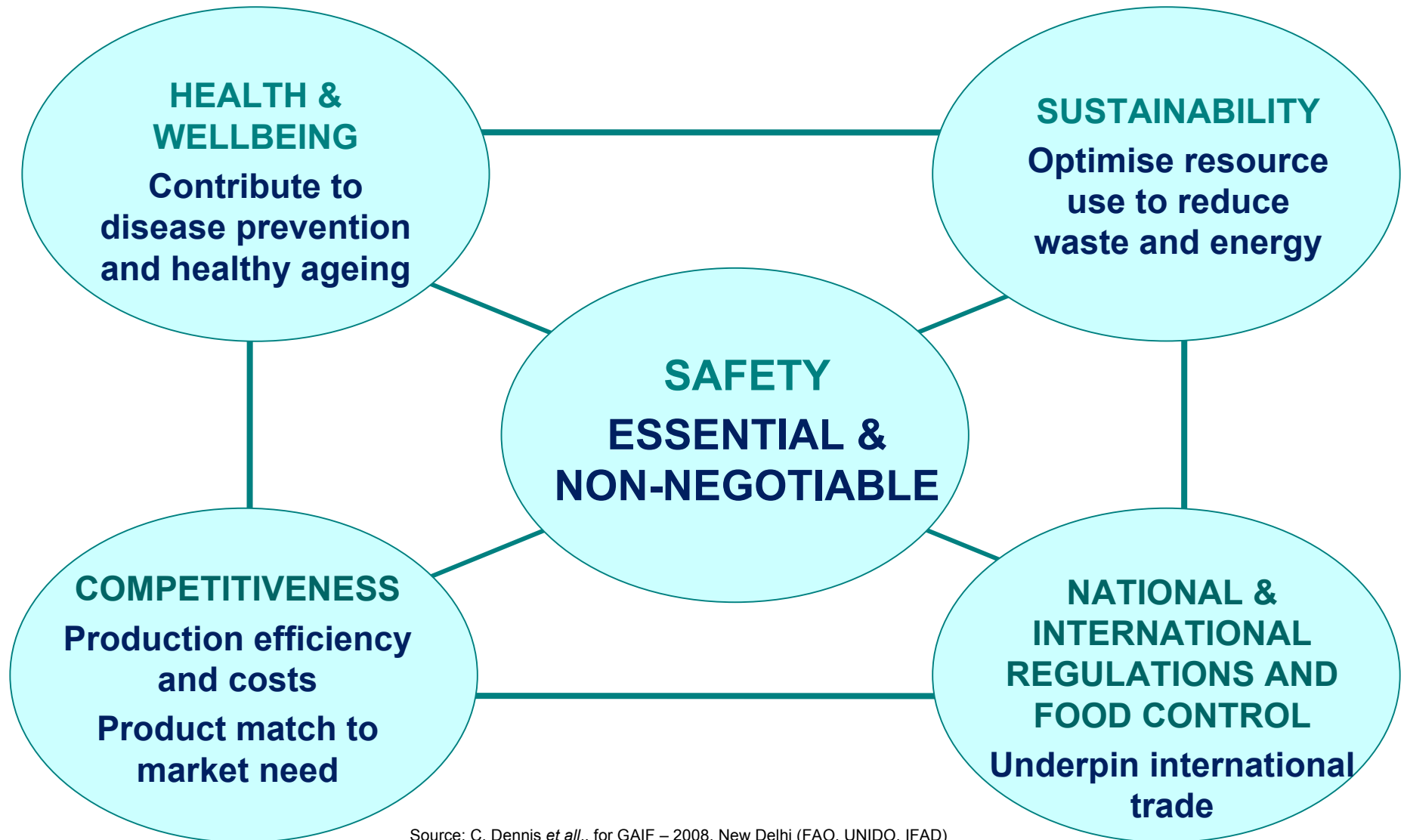


Food Processing Technologies





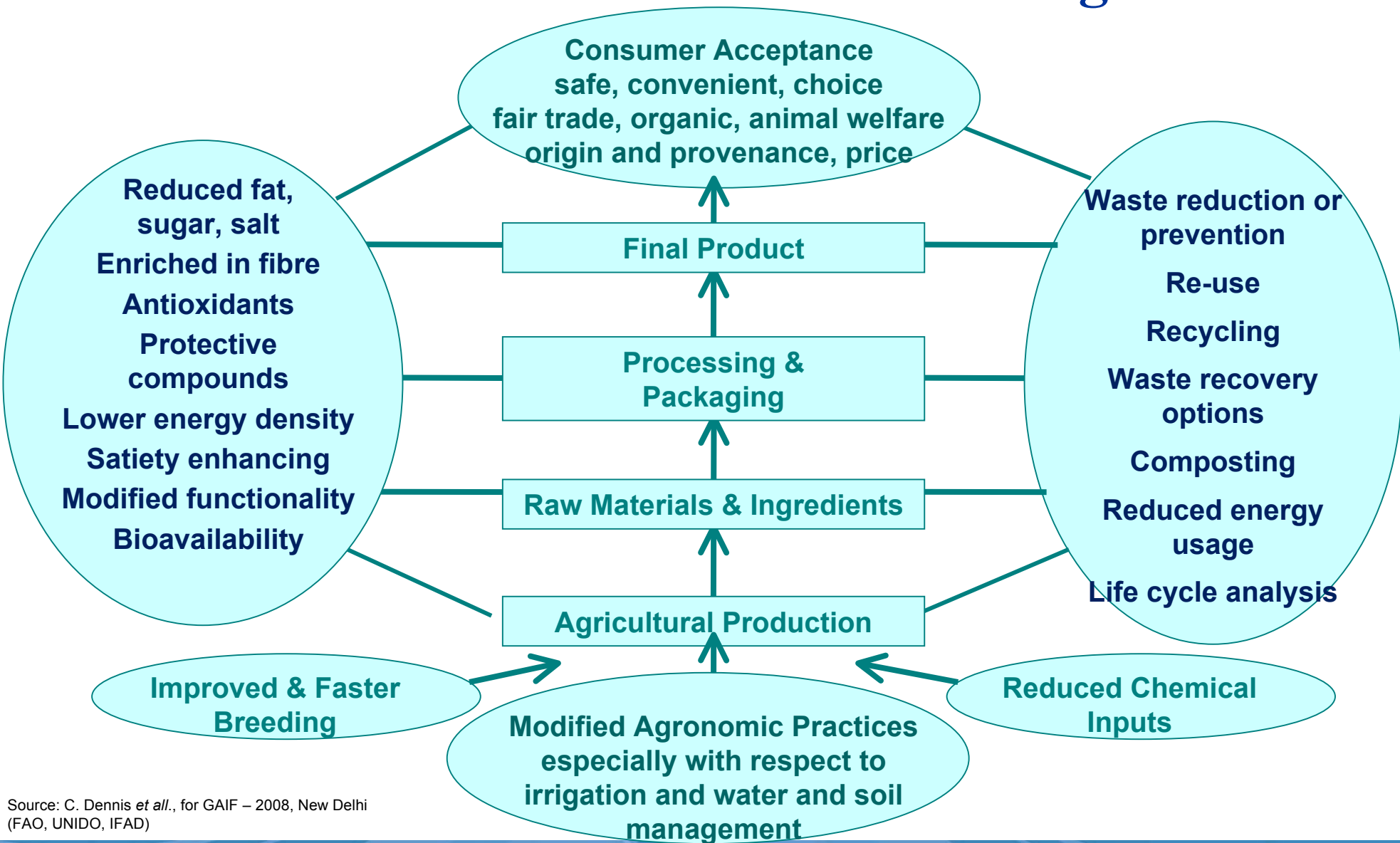
Drivers for Technologies shaping the Future



Source: C. Dennis *et al.*, for GAIF – 2008, New Delhi (FAO, UNIDO, IFAD)



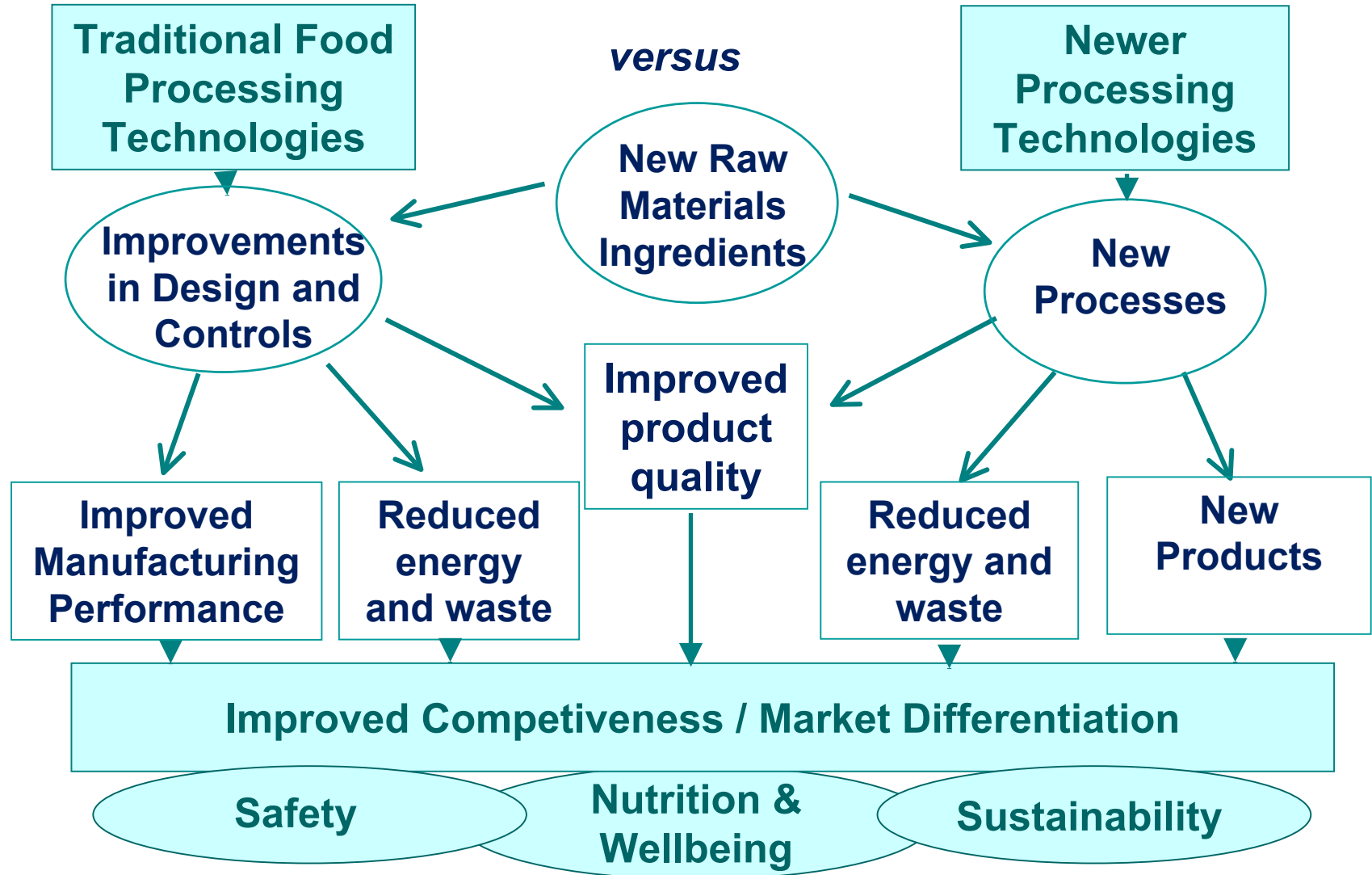
Future Food Production & Processing Trends



Source: C. Dennis *et al.*, for GAIF – 2008, New Delhi (FAO, UNIDO, IFAD)



Technologies shaping the Future





Generic Technologies in Agri-food Sector

- **Sensor and Analytical**
- **Bioinformatics**

- **Biotechnology**
- **Nanotechnology**

- **Waste reduction**
- **Residues (waste) conversion**
- **Energy saving**
- **Automation and robotics**

Information and Communication



Bioinformatic Applications

- **Gene sequence analysis**
- **Microbiology**
- **‘Omics’**
 - ✓ genomics – gene expression and regulation,
 - ✓ proteomics – protein structure, interactions, functions,
 - ✓ cell content
 - ✓ nutriomics – nutrient availability
 - ✓ nutrigenomics (genetics and nutrition)

BIOINFORMATIC DATABASES



Biotechnology

- **Herbicide tolerance**
- **Pest and disease resistance**
- **Adaption to climatic and soil condition**
 - **Drought**
 - **Salinity**
 - **Acidity**
 - **Temperature extremes**
- **Quality improvement**
 - **Proteins, oils, fats, starches, vitamins**
 - **Functional components, antioxidants**



Nanotechnology

- **Encapsulation and delivery of nutrients and functional components**
- **Uptake and bioavailability of bioactives**
- **Developments of tastes, flavours, textures**
- **Active and intelligent packaging**
- **Labels and traceability**
- **Smart surfaces**
- **Application and efficacy of agrochemicals**



Biotechnology and Nanotechnology

- **Possible risks**
 - **Human health**
 - **toxicity, allergenicity**
 - **bioaccumulation**
 - **Environment**
 - **spread of pesticide resistance to weeds**
 - **release of nanoparticles**
- **Regulation, labelling and approval - consumer choice**
- **Health claims**
- **Ethical considerations**



Information and Communication

- **Cell phones, internet access**
- **Greater direct access to international markets**
 - web site
 - Internet auctions
- **Greater accessibility to information**
 - Technologies, market data, scientific and technical databases
- **Direct connection between buyer and seller**
- **Improved and real time traceability**



**It is
Businesses not Governments
which create wealth**

**Governments should create
Environments in which Business can
thrive and prosper**

**It is the Entrepreneur who has to take the
decision**



Public Policies

- **Technologies not applied in isolation**
- **Create enabling environment for investment by entrepreneurs and companies**
 - **Fiscal incentives for innovation**
 - **Availability of skilled people**
 - **Incentives for training and development**
 - **Availability of start-up finance, risk capital**
 - **Market information – regulatory / commercial**
 - **International promotion**
 - **Infrastructure – transport / communication**



The ideal scenario

Public policies create the motivating & enabling environment



Encourage / catalyse / stimulate entrepreneurial development



Entrepreneurs access & utilise technologies



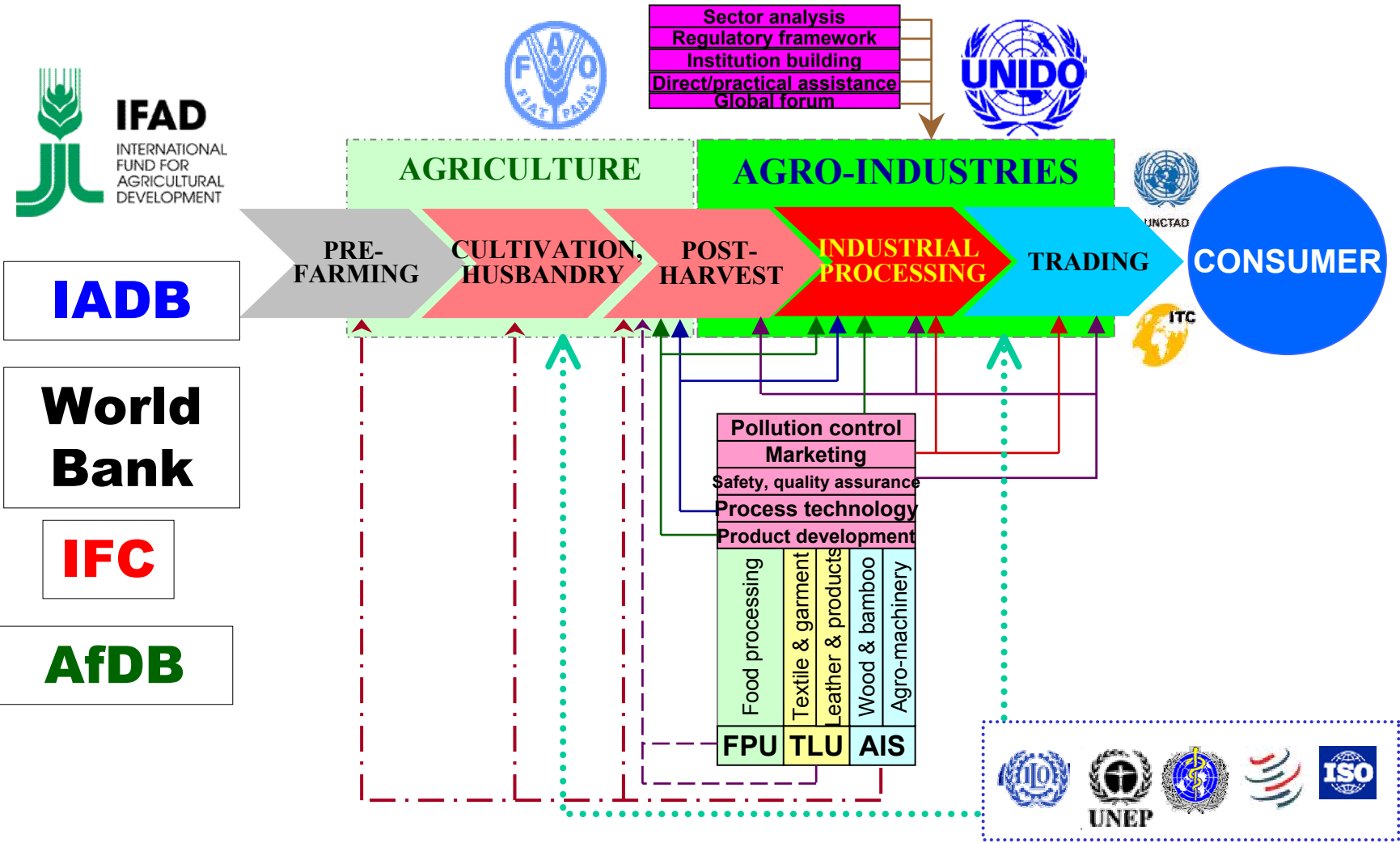
Build up capacity to meet customer & consumer needs & integrate into global markets



...the required response is clearly linked to a systematic cooperation of advanced knowledge bodies in order to continuously increase productivity...



Basis is the Agro Value-chain





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Thank you

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Reducing poverty through sustainable industrial growth