

Technologies Shaping the Future

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Context

- c.1bn people suffer hunger or under nutrition
- c. 2bn people on borderline of barely acceptable nutrition
- A time of great social, economic, technological change
- Potential to dramatically improve economic status and food situation in developing countries

Future Food Demand

- Continuing population growth 40% by 2050
- Substantial economic growth in low income countries
- Increased urbanisation
- Lifestyle changes
- Increased meat consumption

Double Food Demand by 2050

Constraints

- Available land and water resource
- Food versus Fuel
- Relative world distribution of people and food production capacity



- Need for international trade

Globalisation of Trade "The World on your Plate"



Chicken Kiev

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



Food Safety Authority of Ireland

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 Technological Change

- Social
- Technology and Science
- Economic
- Environmental
- Political

Social Drivers

- Consumer awareness, perceptions, attitudes and beliefs affecting preferences and choice
- Increasing per capita incomes in developing countries
- Demographic changes
- Lifestyle changes associated with urbanisation in developing countries

Technology and Science Drivers

EXAMPLES:

- Food preservation and processing technologies
- Packaging materials and forms
- Information technology
- Nanotechnology
- Nutritional science
- Bioinformatics
- Modelling and simulation technologies
- Genomics, proteomics, nutrigenomics

Environmental Drivers

- Waste reduction along supply chain
- Water conservation and use
- Energy efficiency
- Carbon footprint
- Reduced emission
- Optimisation of resource use

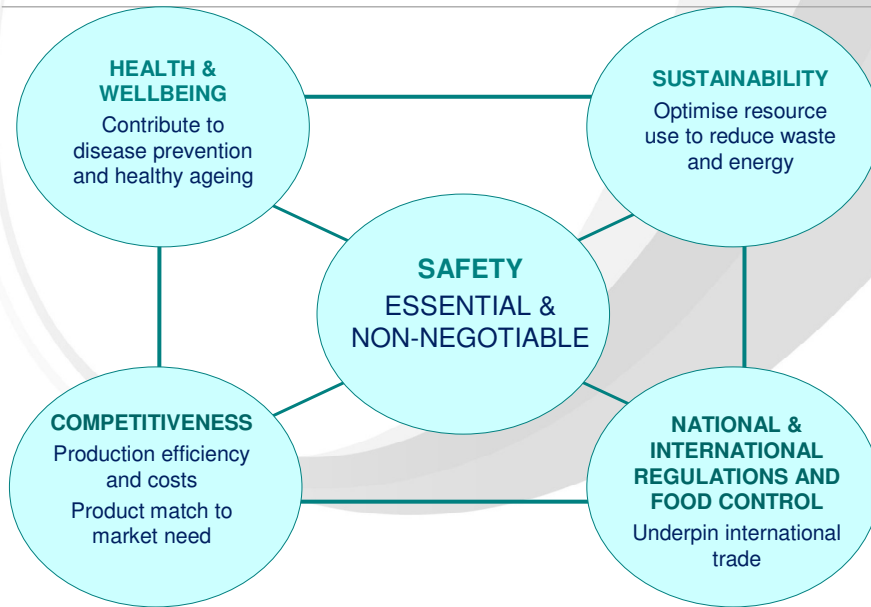
Economic Drivers

- Current wastage of crops
- Commodity / raw material costs (food vs fuel)
- Labour costs / availability
- Availability of risk capital
- Cost of compliance
- Cost of regulatory approval
- Acceptable returns of capital investments

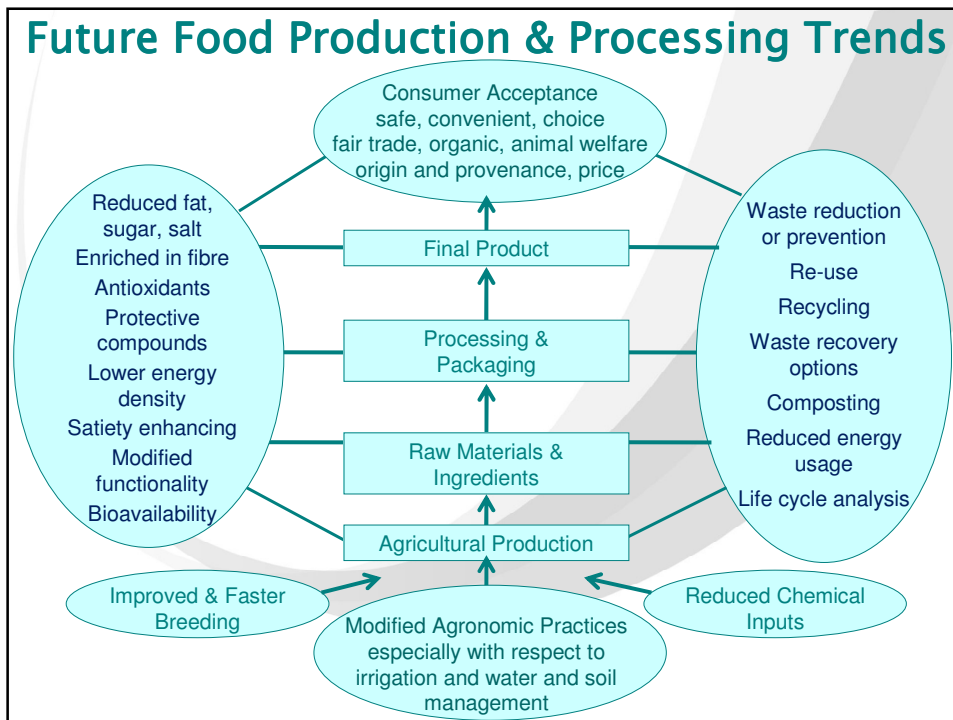
Political Drivers

- Regulatory frameworks – national and international
- Fiscal incentives for R&D and innovation
- Barriers to international trade
- Policies on food, diet and health
- Education and training policies

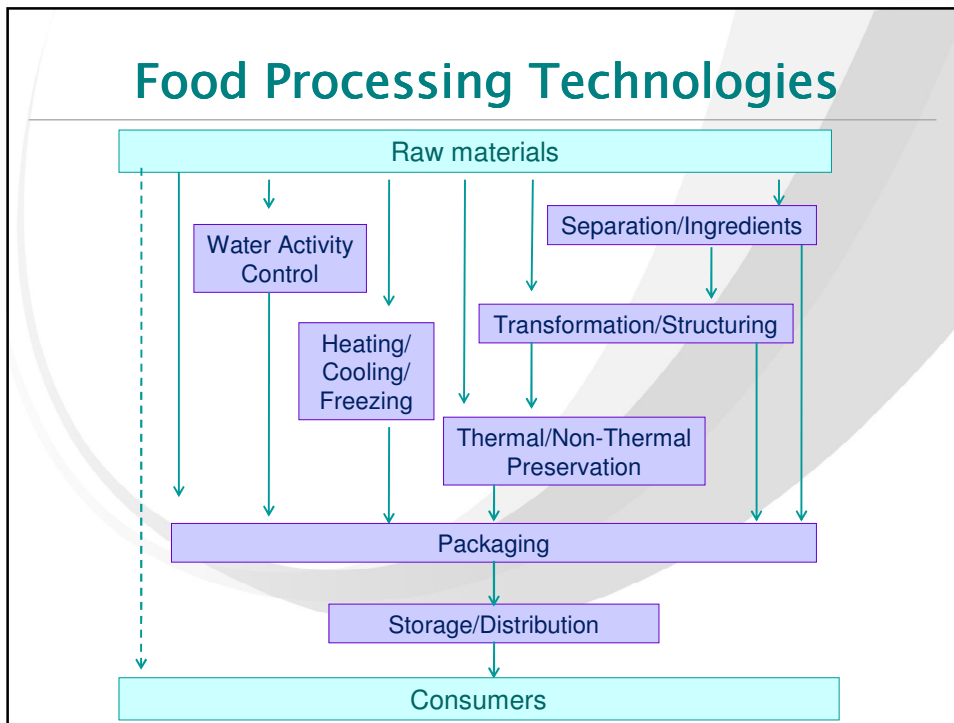
Drivers for Technologies shaping the Future



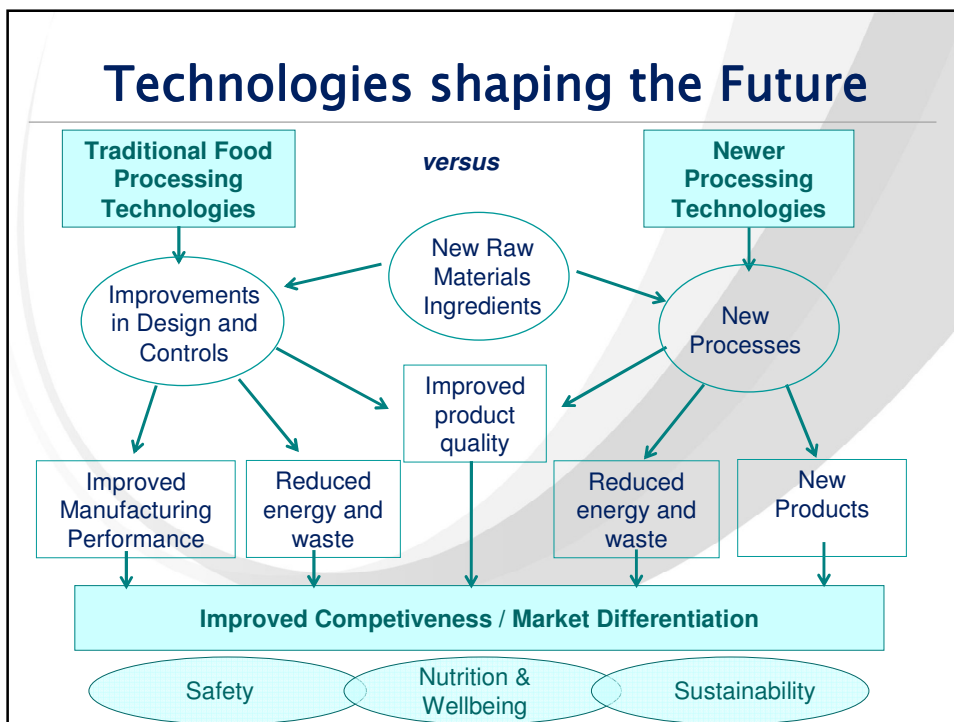
Future Food Production & Processing Trends



Food Processing Technologies



Technologies shaping the Future



Generic Technologies in Agri-food Sector

- Sensor and Analytical
- Bioinformatics

- Biotechnology
- Nanotechnology

- Energy saving
- Waste reduction
- Waste conversion
- 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

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

Ideal Scenario

Public policies create motivating and enabling environment



Encourage / catalyse / stimulate entrepreneurial development



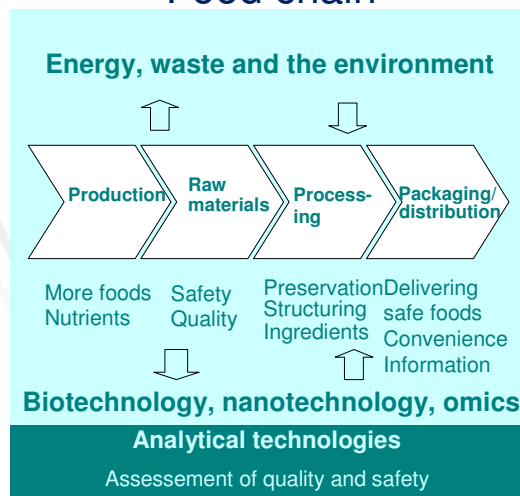
Entrepreneurs access and utilise technologies



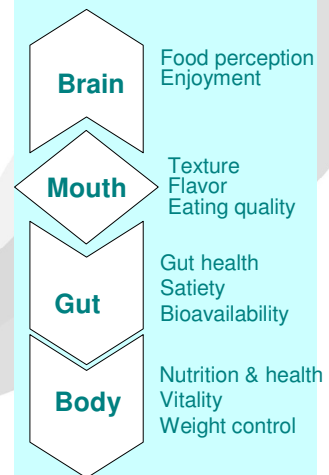
Deliver products to meet customer and consumer needs

The dimensions of the food industry of the future

Food chain



Consumer



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