

Perspective on Innovation and Technology

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Innovation and Food Systems

- Innovations - New ways of doing things
- Technological
 - Mechanical
 - Chemical
 - Biological
 - Agronomical
- Managerial (Bookkeeping)
- Institutional (Cooperatives)
- Political

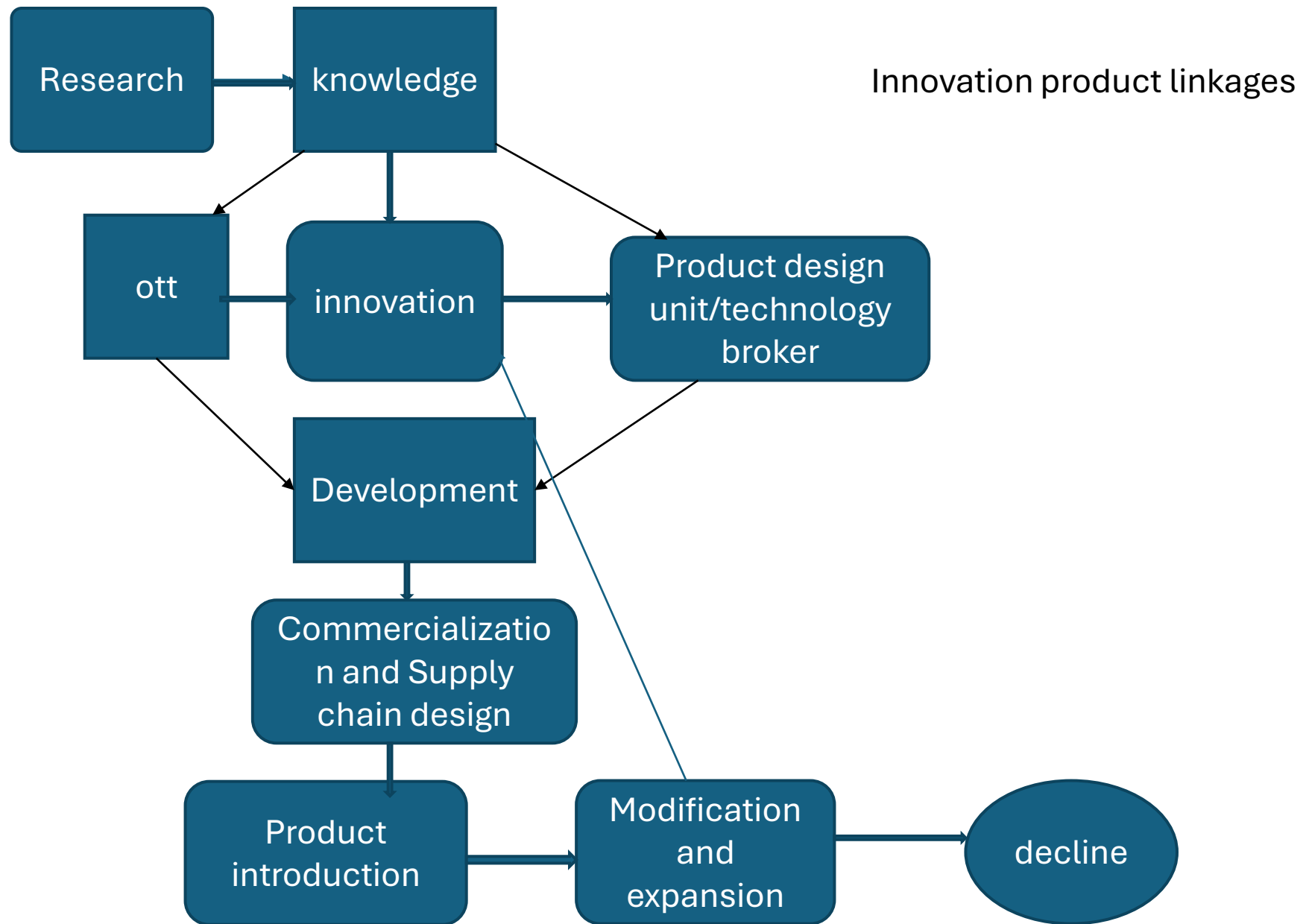
Policy and Innovation

- Innovations are economic activities that require input like capital and labor to produce knowledge and then the outcome
- Induced innovation – innovation is affected by economic consideration
 - Lack of water leads to improved irrigation technologies
 - Labor scarcity leads to mechanization
 - New knowledge that reduces the cost of technologies would lead to their development
 - Consumer desires may lead to new innovations

Symbiotic Innovation and Product Supply Chains

- Innovation Supply Chain
 - Research
 - Development
 - Upscaling
- Different Categories
 - Educational Industrial Complex
 - Recombinant Innovations
 - Relentless Innovation
 - Government Political Innovation
- Product Supply Chain
 - Feedstocks
 - Processing
 - Distributing
 - Adoption and Diffusion
- Product Supply Chain Evolves
 - Designed to pursue profit, adjusted for
 - Risk
 - Credit
 - Policy
 - Supply chains may develop multiple products
 - Structure may include
 - Vertical integration
 - Contracting
 - Products evolve - supply chains expand over time

There is a feedback loop between innovation and product supply chain.



Adoption (individual choice) Diffusion (aggregate adoption)

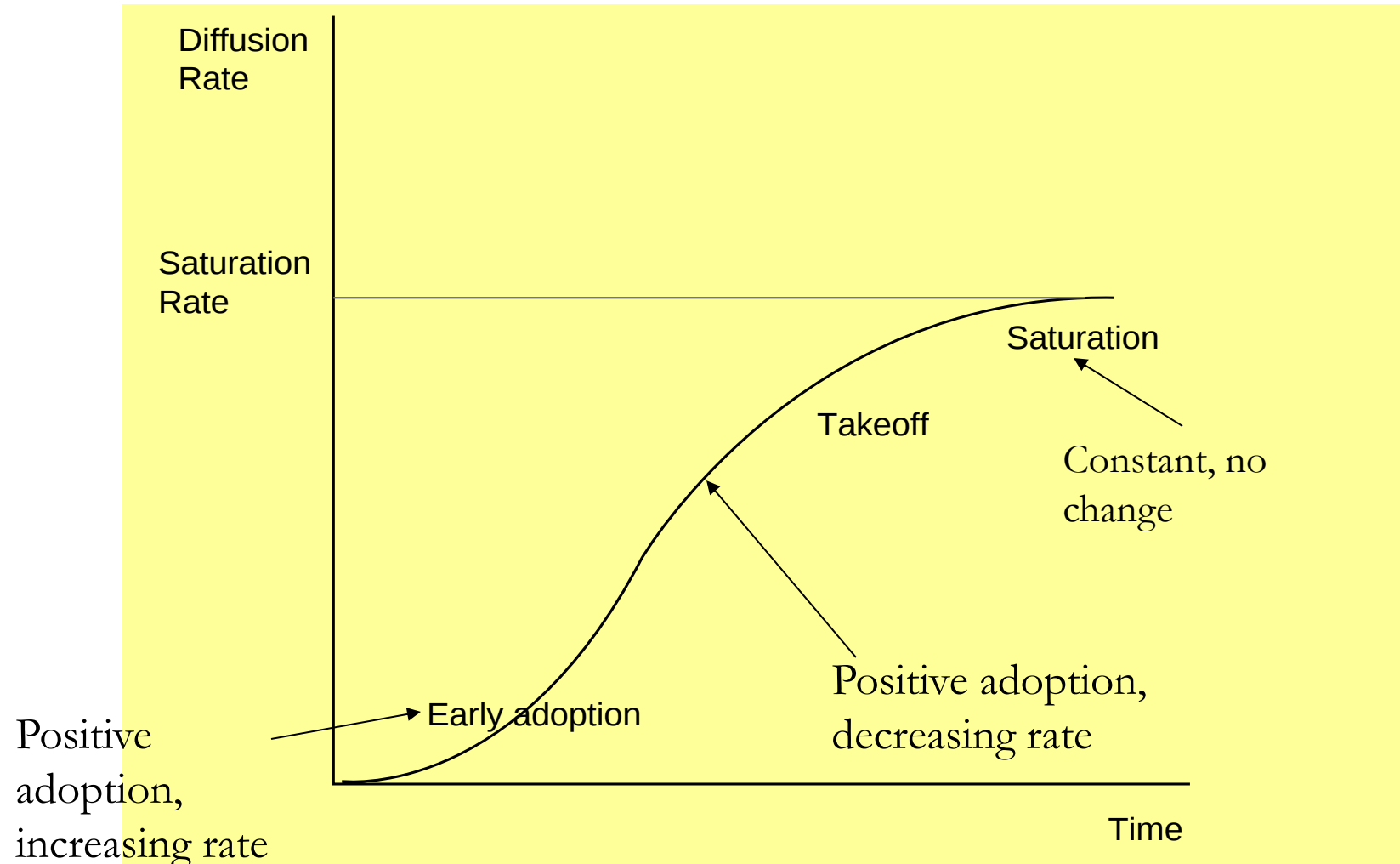
- Individual Choice
 - Awareness
 - Assessment
 - Decision
 - Reevaluation
- Adoption choices is affected
 - Economic conditions
 - Socio-economic factors
 - Marketing
 - Risks
 - Reliability
 - Fits
 - Marketing tools like
 - Moneyback guarantee
 - Demonstrations
 - Extension
 - Information

Affected option

- Heterogeneity
- Different individuals make different choices
- Factors affecting choices
 - Price & Quality
 - Size & Income
 - Education & Health
 - Location
 - Interest
- Successful production introduction is associated with approaching, first, people who are most likely to adopt

- Dynamic Factors
- Learning by doing (cost of technology declines over time)
- Learning by using (benefits of technology increased over time)
- Network externalities (there is gain when more people adopt the technology)

The S-Shaped Diffusion Curve



Technology challenges of Agriculture and Food

- Climate Change, Food Security, Biodiversity preservation, Rural Poverty, Sustainability, Food Safety
- Sustainability requires a transition from non-renewable to renewable, away from fossil fuel to the bioeconomy
- Bioeconomy – production of goods and services with natural resources, taking advantage of modern technologies
- Agriculture is more than food and fiber – plants are effective chemical machinery – can be used to produce fine chemicals, energy,
- Bioeconomy contains Ag, forestry, oceans, biomanufacturing
- Needs to be circular – reuse, recycle, and reduce waste

Policy Challenges

- Support for research (basic and applied)
- Educating the workforce and the public – generating awareness of life science and the environment
- Mechanism to allow support for new industries
- Science-based regulation
- Rewarding pollution reduction, carbon sequestration
- Thinking globally and acting locally