Overview of the use of economic analysis to set priorities for SPS capacity-building

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Structure

• Context
• Role and nature of economic analysis
• Approaches to economic analysis
• Decisions on the basis of multiple criteria
• Conclusions
Context

- Significant weaknesses in SPS capacity in developing countries
- Limited resources:
  - Domestic
  - Donors
- Evidence of inefficiencies in technical cooperation:
  - Supply-led
  - Lack of priority-setting
  - Overlaps versus gaps across donors
- Thrust towards enhanced aid effectiveness:
  - Information sharing
  - Coordination
  - Economic analysis
- Little evidence of systematic use of economic analysis in practice
Analysis of trade-related SPS capacity-building

- SPS measures curtailing exports
  - Elements of SPS capacity inhibiting compliance
    - Options to enhance SPS capacity
      - Costs of each option
      - Benefits of each option
        - Trade impacts
        - Wider socio-economic impacts
Role of economic analysis

• ‘Sift out’ projects with net cost
• Identify priorities within capacity-building needs:
  – Weaknesses in SPS capacity
  – Products
• Identify efficient approaches to capacity development:
  – Alternative solutions
  – Points of intervention
Benefits of economic analysis

• Economic efficiency
• Objectivity
• Transparency & accountability
• Inclusiveness
• Appreciation of risk & uncertainty
Challenges in undertaking economic analysis

- Costs and benefits can be wide-ranging and difficult to identify
- Costs and benefits can be difficult to measure
- Costs and benefits can be difficult to attribute
- Spill-over effects may be significant
- Data is almost always an issue:
  - Availability
  - Quality
- Changes *nature* of decision-making processes:
  - How decisions made
  - Cost and time intensity of decision-making processes
  - Influence & power structures
- Risk that open up a ‘can or worms’
Economic analysis methods

• Cost-benefit analysis:
  – Which options yield net benefit?
  – Which option yields greatest net benefit?

• Cost-effectiveness analysis:
  – Which option most cost-effective way of achieving given objective?

• Multi-criteria decision analysis:
  – Which option best way of achieving outcome with multiple objectives?
  – What is impact of changing priorities across multiple objectives?
Cost-benefit analysis

- Compute and compare flow of costs and benefits over time
- Costs and benefits expressed in monetary units
- Comparison to baseline - usually the status quo
- Focus:
  - Narrow versus wider impacts
  - Partial versus general equilibrium effects
- Cost estimation:
  - Engineering approach
  - Econometric approach
  - Accounting approach
- Benefit estimation:
  - Quantification
  - Monetization
Cost-benefit analysis

- Most widely applied approach to economic analysis of SPS controls
- Relatively few applications in developing countries, especially in area of food safety
- Applied to *ex ante* and *ex post* analysis
- Wide variation in approaches – simple accounting frameworks to econometric models
- Often appreciable data problems
- Applications tend to be highly context-specific
- Some evidence of more routine use:
  - Project preparation/appraisal
  - Regulatory impact analysis
Costs of upgrading hygiene controls to EU standards in Keralan fish processing plants
Cost of implementing HACCP in Mexican meat processing sector

Importance score:
- Investment in new equipment
- External consultants
- Staff time in documenting system
- Structural changes to plant
- Managerial changes
- Staff training
## Estimated costs and benefits of HACCP in the US meat and poultry sector

<table>
<thead>
<tr>
<th>Benefit Scenarios</th>
<th>Benefits</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Low-range</td>
<td>1.9</td>
<td>9.3</td>
</tr>
<tr>
<td>Mid-range I</td>
<td>4.7</td>
<td>23.4</td>
</tr>
<tr>
<td>Mid-range II</td>
<td>26.2</td>
<td>95.4</td>
</tr>
<tr>
<td>High-range</td>
<td>47.2</td>
<td>171.8</td>
</tr>
</tbody>
</table>
Sector-wide economic impacts of HACCP in US meat and poultry processing sector

<table>
<thead>
<tr>
<th>1993 US$ billion</th>
<th>Reduced premature death</th>
<th>Reduced medical expenses</th>
<th>HACCP costs</th>
<th>Total change</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10 billion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$-2 billion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$-4 billion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Reduced premature death: $10 billion
- Reduced medical expenses: $-2 billion
- HACCP costs: $-4 billion
- Total change: $0 billion
Predicted growth in Peruvian exports of fresh asparagus from enhanced hygiene controls

- Growth rate 5%
- No growth from 2004
## Impact of enhancement in food safety controls on Peruvian exports of asparagus

<table>
<thead>
<tr>
<th>Costs/Benefits 2006-15</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs of food safety upgrades</td>
<td>$14.14 million</td>
<td>$42.43 million</td>
</tr>
<tr>
<td>Expected export flows</td>
<td>$1,958.7 million</td>
<td>$2,461.9 million</td>
</tr>
<tr>
<td>Returns per $ investments in food safety capacity</td>
<td>46</td>
<td>174</td>
</tr>
</tbody>
</table>
Cost-effectiveness analysis

- Monetary costs of alternative options compared with (common) physical benefits
- Options ranked in terms of cost per physical benefit
- Option with greatest cost-effectiveness acts as baseline
- Will not determine if options produce a net benefit
- Most widely applied approach to assessment of medical interventions
- Limited applications to food safety and animal health controls
- Applications focus on alternative controls in very specific contexts
- Little or no application in developing countries
Cost effectiveness of interventions at various stages of Dutch pork supply chain

![Graph showing cost-effectiveness at different stages of the supply chain.](image-url)
Cost-utility ratios for food safety interventions in Dutch chicken supply chain

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Risk Reduction (%)</th>
<th>Reduction in Gastroenteritis ('000 case/year)</th>
<th>Direct Cost (€ million/year)</th>
<th>Cost-Utility Ratio (€ ‘000 /DALY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved farm hygiene (Substantial effect)</td>
<td>94</td>
<td>10</td>
<td>8-63</td>
<td>48-560</td>
</tr>
<tr>
<td>Phage therapy</td>
<td>63</td>
<td>6.7</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>Carcase decontamination - Dipping</td>
<td>77</td>
<td>9.2</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>Carcase decontamination - Dipping &amp; spraying</td>
<td>92</td>
<td>11</td>
<td>26</td>
<td>190</td>
</tr>
<tr>
<td>Scheduled treatment - Dipping</td>
<td>77</td>
<td>9.2</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>Consumer information on kitchen hygiene</td>
<td>3</td>
<td>0.5</td>
<td>1</td>
<td>190</td>
</tr>
</tbody>
</table>
Multiple-Criteria decision analysis

- Choice between options in terms of multiple criteria
- Can be applied to relatively large numbers of options that vary in the associated costs and benefits
- Costs and benefits do not need to be measured in common monetary or non-monetary units
- Highly flexible in terms of data requirements
- Wide range of methods that differ in how distinguish between options
- Widely applied in natural resource management, engineering....
- Little application to SPS controls....but some recognition could be of significant utility
Multi-factorial risk prioritisation framework for food-borne pathogens

INFO CARDS

IV Social Sensitivity
- Consumer – flag/no

III Market Level Impacts
- Sector Size ($), …

II Consumer Risk Perception:
- Scale Measure, …

I Public Health:
- DALY, COI, WTP
- Nutrition-Risk Trade-offs, …

3-Dimensional CUBE

Factor-dimension

Pathogen-dimension

Food-dimension

Visualization - Cobweb

Σ Info

Beef

Visualization - Cobweb

E.coli 015:H7

Value at risk, …
Consumer flag, …
DALY, …

Not sensitive, …

Visualization - Cobweb
Prioritisation of six food-pathogen combinations in Canada

<table>
<thead>
<tr>
<th>Pathogen-Food Combination</th>
<th>Decision Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public health</td>
</tr>
<tr>
<td></td>
<td>Consumer acceptance</td>
</tr>
<tr>
<td>E. Coli O157 in beef</td>
<td>1</td>
</tr>
<tr>
<td>L. Monocytogenes in ready-to-eat meats</td>
<td>2</td>
</tr>
<tr>
<td>Campylobacter spp in chicken</td>
<td>3</td>
</tr>
<tr>
<td>Salmonella spp in chicken</td>
<td>4</td>
</tr>
<tr>
<td>E. Coli O157 in spinach</td>
<td>5</td>
</tr>
<tr>
<td>Salmonella spp in spinach</td>
<td>6</td>
</tr>
</tbody>
</table>
Driving principles

• What questions need answering?
  – Number/range of options
  – Range/diversity of impacts

• What is feasible?
  – Data
  – Time
  – Resources
  – Skills/experience

• What compromise is acceptable in terms of rigour and/or completeness?

• Is there buy-in at key levels of the decision process?
Analytical contexts

- *Ex post* analysis of existing capacity-building efforts
- Analysis of large-scale capacity interventions
- ‘Demonstration’ analysis of controls on SPS risks and/or enhancements in capacity
- Choices between multiple capacity-building options/design of actions plans for capacity enhancement
Conclusions

• Strong case for use of economic analysis:
  – Theoretical basis
  – Previous applications
• However, are potentially considerable challenges
• Need a flexible approach that can be applied to make broad-based comparisons of capacity-building options
• Multi-criteria decision analysis potentially a valuable tool
• Whichever approach is employed, needs to be operationalised in a broader structured framework
• Use for supporting versus making decisions