Examination of the Economic Feasibility of Methyl Bromide Alternatives

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Outline of Presentation

- Introduction
- Economic Analysis
  - Partial Budgeting
  - Previous Research
- Other Considerations
  - Competitive Advantage
  - Risk
- Expected Products

Introduction

- **USDA/CSREES Project**
  - A 3-year project funded in September 2008
    - www.oznet.ksu.edu/grsc_subi/MBT_project
  - Collaboration between K-State GSI, K-State Ag Econ, USDA-GMPRC, and Purdue University
  - Also supported by food industry service providers (Dow AgroSciences, IFC, Presto-X, Temp-Air) and stakeholders
- **Economic Analysis**
  - Analyze cost-effectiveness of MB, SF, and HT in food-processing facilities through research in pilot-scale and commercial facilities

Research Activities of Project

- **Project Research Activities**
  - Apply MB, SF, and HT in Hall Ross (pilot) mill
  - Monitor gas and temperature
  - Assess efficacy against red flour beetle life stages (eggs, young larvae, old larvae, pupae, and adults at two sanitation levels-dusting and 2 cm high flour))
  - **Determine benefits and costs of each treatment**
  - Refine and implement models in commercial facilities; train end users to use these techniques

Economic Analysis

- **Partial Budgeting**
  - Additional Costs and Reduced Revenue
  - Additional Revenue and Reduced Costs
- **Other Considerations**
  - Competitive Advantage
  - Risk

Partial Budgeting

- Involves answering four questions:
  - What new or additional costs will be incurred?
  - What current costs will be reduced or eliminated?
  - What new or additional revenue will be received?
  - What current revenue will be lost or reduced?
- Questions should be answered on the basis of what would happen if the proposed alternative was implemented.

Partial Budgeting

- **Additional Costs**
  - Costs that do not exist at the current time with the current plan.
- **Reduced Revenue**
  - Revenue currently received but which will be lost or reduced should the alternative be adopted.

Partial Budgeting

- **Additional Revenue**
  - Revenue to be received only if the alternative is adopted.
- **Reduced Costs**
  - Costs now being incurred that would no longer exist under the alternative being considered.

Partial Budgeting Format

Description of Problem _____

Additional Costs: _____	**Additional Revenue:** _____
Reduced Revenue: _____	**Reduced Costs:** _____
A. Total _____	**B. Total** _____

Net Profit Change (B. – A.) _____

Partial Budgeting

- Example: Methyl Bromide Critical Use Renomination for Post-Harvest Treatment of Structures, 2011
- **Important Notes:**
  - Cost and revenue estimates from the renomination are used below.
  - Estimates for our project may differ.

Partial Budgeting

- Example: Methyl Bromide Critical Use Renomination for Post-Harvest Treatment of Structures, 2011
- **Assumptions:**
  - 1,000,000 cubic foot facility
  - Temperature at 29.44 C or 85 F
  - Prices of methyl bromide and sulfuryl fluoride were assumed to be the same

Partial Budgeting Example

Description of Problem: Alternative: Sulfuryl Fluoride

Additional Costs: $26,932.75	**Additional Revenue:** $0
Reduced Revenue: $0	**Reduced Costs:** $13,001.75
A. Total $26,932.75	**B. Total** $13,001.75

Net Profit Change (B. – A.) -$13,931.00

Current Project

- **Cost Considerations**
  - Cost budgets and capital budgeting will be used to compute the costs associated with MB and SF fumigations, and HT in the Hal Ross flour mill and commercial facilities
  - Costs include the following: fumigants, monitoring devices, energy, labor, and equipment costs (leasing; purchasing).

Current Project

- **Revenue Considerations**
  - Revenue from alternatives may be reduced if a portion of the product needs to be discarded or the plant needs to be shut down for a relatively longer time period due to the treatment.
  - Conversely, revenue from the HT treatment may be higher if it is possible to obtain a higher product price due to the reduction in the use of fumigants associated with this treatment.

Other Considerations

- **Competitive Advantage**
  - Competitive advantage can be obtained by either focusing on cost or product differentiation.
  - Firms that focus on cost need to make sure that the price they receive is similar to other firms with this strategy. If lower costs result in lower product prices, the firm does not have a competitive advantage.
  - Firms that focus on product differentiation need to make sure that the higher price that they receive is not the result of having an uncompetitive cost structure.
  - There is no such thing as a “one size fits all” strategy.

Competitive Advantage

Relative Cost Per-Unit	Relative Price Per-Unit: Lower	Relative Price Per-Unit: Average	Relative Price Per-Unit: Higher
Lower	1 Indeterminate Position	2 **Competitive Advantage**	3 **Competitive Advantage**
Average	4 **Competitive Disadvantage**	5 Parity Position	6 **Competitive Advantage**
Higher	7 **Competitive Disadvantage**	8 **Competitive Disadvantage**	9 Indeterminate Position

Hunt, 2000

Other Considerations

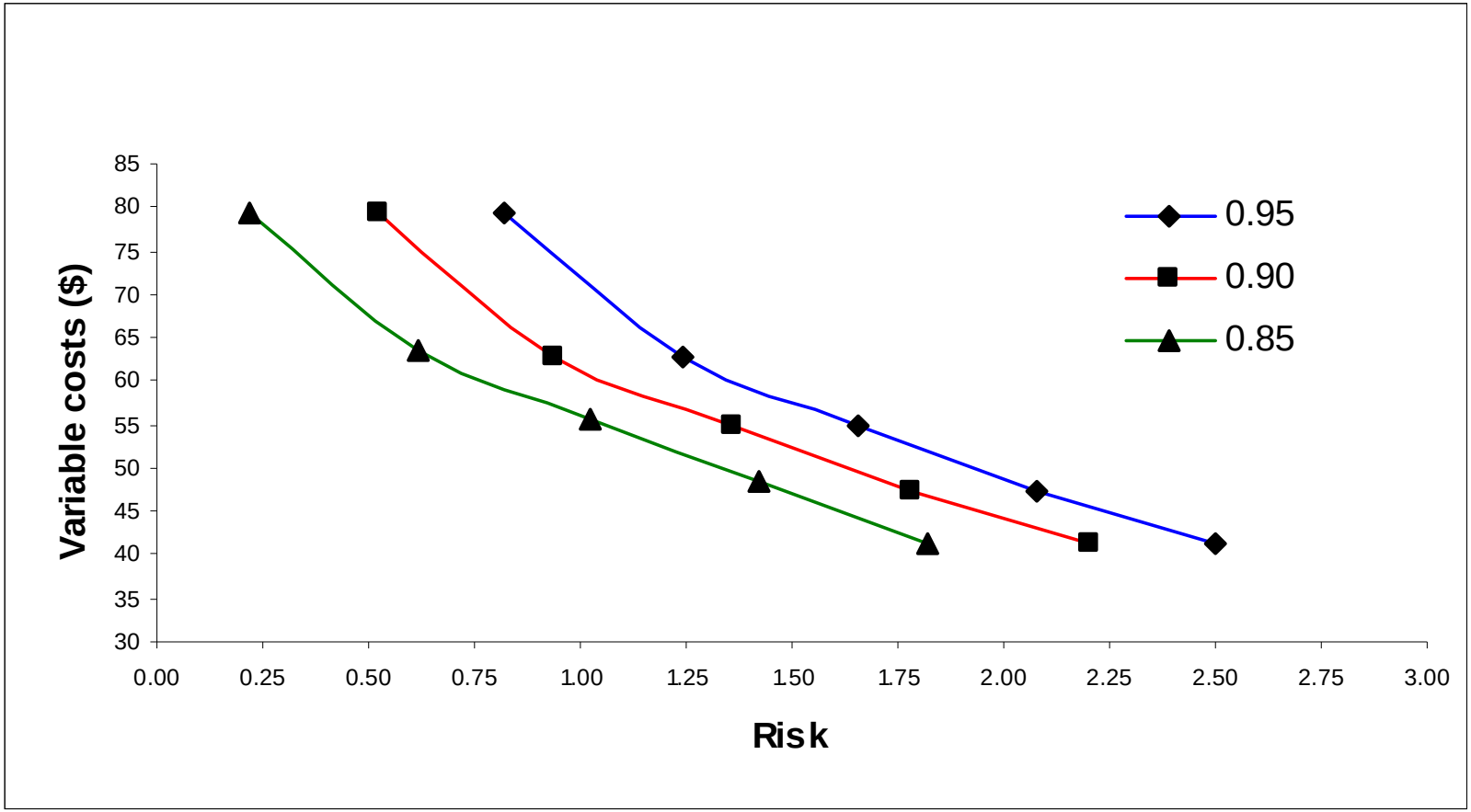
- **Impact of Risk**
  - Cost, revenue, and efficacy depend on many factors including labor costs, fumigant costs, and fuel prices.
  - The optimal control strategy may change as these factors change.
  - One of the easiest ways to examine risk is to use sensitivity analysis.
    - Example: Examine the impact of a change in fuel prices on the feasibility of a heat treatment.
  - If data is available, an optimization model can be used to examine risk.

Risk Research

- **Past Research: Tilley et al. (2007)**
  - An economic model of heat treatment and chemical applications was developed using minimization of costs at a target risk level associated with grain damaging insects.
  - Costs included labor, energy, and fumigants
  - Risk was measured as a deviation below a target mortality goal.

Empirical Risk Model

Tilley et al. (2007)



Incorporating Risk

- Data permitting, the model developed by Tilley et al. (2007) will be used to examine the tradeoff between insect mortality and cost across control strategies.
- This model examines the tradeoff between cost and total deviations below a target insect mortality rate.
- As the model allows for more total deviations below this target, cost decreases.

Project Outcomes

- **Economic Analysis**
  - Extension and research papers comparing the cost, revenue, and efficacy of the MB and SF fumigations, and the HT treatment.
  - E-mail: mlange@agecon.ksu.edu
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    - www.agmanager.info
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Citation

- **Economic Analysis**
  - Tilley, D.R., M.R. Langemeier, M.E. Casada, and F.H. Arthur. "Cost and Risk Analysis of Heat and Chemical Treatments." *Journal of Economic Entomology*. 100(April 2007):604-612.

Thank You

Questions?