Deciphering Public Policy Terms and Concepts: A Path Forward to Justifying the Forensic Sciences in the Future

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Introductory Thought

"… a [U.S.] president who is routinely asked tough questions, one who believes that ***'policy analysis'*** is not for sissies, might be more likely to ask some tough questions himself and thus improve his odds of avoiding failure."

"The best presidents, of course, combine decisive intuition and deep knowledge of the policy implications of their actions."[1]

Do we, as Forensic Administrators act or desire to be the "Best Presidents"?

Public Policy Analysis Primer

Public policy analysis (PPA) systematically examines a problem, identifies and evaluates alternatives, ***recommending*** the best policy or program. It is procedurally diverse using both qualitative and quantitative methods; integrates various data sources (*foresight*, articles, research data, etc.) and synthesizes in ***a report usable by all levels of public administrators, legislators and elected officials, stakeholders, and actors (individuals or groups concerned about a problem).***

The evaluation criteria in the report generally includes four (4) major topical areas: technical feasibility, economic and financial possibility, political viability, and administrative operability. The economic and financial possibility criterion is the focus of the poster.

Terms

Ex-Ante evaluation (prospective policy analysis) forecasts the effects of a proposed action. Answers whether the policy/program will work.

Ex-Post evaluation (descriptive policy analysis) examines the effects of a demonstration project or an implemented policy/program. Answers whether the policy/program should be continued, modified, or eliminated.

Demonstration project is a research designed small scale project and evaluation based upon an *ex-ante evaluation* which culminates with an *ex-post evaluation*.

Social science research examines the impact(s) of a policy/program for the "greater good" of society. *Public policy analysis* is a highly specialized area of social science research.

Evidence-based programs are positive impact programs based upon *social science research*.

Crime Solutions.gov contains a forensics area for national *evidence-based programs*. NIJ's solicits research proposals *(evidence-based, public policy evaluation)* to examine the impact of forensic advances on the criminal justice system and changes in policies to adapt to the greater use of forensic evidence.

Back-of-the-Envelope Calculations are simple estimates to define a problem, establish key points in a problem, or checking estimates to known reference data.

Cost effectiveness analysis examines the costs and benefits to accomplish a goal. Generally, only the costs are monetarized, benefits are listed.

Cost efficiency analysis is a very complex analysis compared to *cost effectiveness*. Both costs and benefits are monetarized and compared.

Note: Not all cost effectiveness analysis are cost efficient

Cost-Benefit analysis is the most useful and versatile tools for measuring *cost efficiency*. Conducted over a period of time, usually 3, 5, 7 years or longer. The federal government publishes annual guidance for calculations.

Examples

Instrument Evaluation (hypothetical)

Note: Can also used as benchmarking comparison

Case: A Laboratory Director (LD) is evaluating a replacement GC/MS for drug chemistry. Recently, a new "FAST GC/MS" came on the market claiming to increase productivity. The LD desires to compare current technology to the new FAST technology. The LD arranges to conduct an on-site comparison *(very limited small scale demonstration project)*.

"Eyeballing" the results, the LD thinks the FAST GC/MS may improve productivity. **How can the LD ensure the results are valid?** The LD decides to compare means *(back-of-the-envelope calculations)*, GC/MS is 18.8, FAST GC/MS is 23, *thinking not a large difference!* The LD calls the *policy analyst*, who computes quick statistics. The policy analyst returns verifying the two means are correct and has a 95% confidence the FAST GC/MS does produce more results (t-test, df = 8).

Instrument Evaluation Results

Analyst	GC/MS	FAST GC/MS
1	20	24
2	18	22
3	16	21
4	17	21
5	23	27

Total cases worked per day per analyst. All normal administrative duties associated with casework and laboratory protocols are included.

The LD asks the policy analyst for assistance in constructing a quick *cost effectiveness analysis*. Together, the cost of the FAST GC/MS is $50,000 more, will take a month to install and validate prior to placing on-line. The benefits are increased case productivity of 4.2 cases/day/analyst. Assuming five (5) forensic scientists per unit, overall productivity will increase by 105 cases/week, 4,725 cases per year.

The LD presents the findings to the Department Director and requests the additional $50,000 for the new FAST GC/MS. The Department Director does not feel he can justify the funding based upon other Department fiscal requests, along with justifying/defending to the legislature. The LD goes back and contacts the policy analyst for advice. The policy analyst suggests a *cost-benefit analysis*. The LD agrees and supplies an array of fiscal information from foresight and other data sources.

A few days later, the policy analyst returns providing a *benefit-cost ratio* of **31.40** based upon *a five (5) year cost-benefit analysis* (Over the five period, for every dollar spent returns $31.40 in benefits) . The LD *frames* the new findings, taking the new report to the Department Director. Based upon the other funding requests, the Department Director provides the additional $50,000 since the ratio *(opportunity costs)* justifies spending the money in the most effective manner. The Department Director also believes there will be no problem with the legislature since opportunity costs far outweigh other projects and provide an easy justification for the project with taxpayers and other stakeholders.

On the advice of and assistance from the policy analyst, the LD sets up an *ex-post evaluation* for when the new FAST GC/MS arrives. The policy analyst advises the LD it can be used to:

1. Justify continued support and purchase of additional FAST GC/MSs;
2. Modify the program and readjust the benefit-cost ration; or
3. Eliminate the new instrument since it's no different than the other instruments.

Is this one way to become the "Best President"?

Terms *(continued)*

Benefit-Cost Ratio is one measure of *efficiency*. Analogous to return on investment (ROI).

Opportunity Costs (for taxpayers, stakeholders, legislators, etc.) are resources diverted to make a policy/program possible. The *benefit-cost ratio* is utilized in the decision, the higher the ratio, the more likely a policy/program will be funded compared to other policies/programs requesting funding.

Framing is a pragmatic plan/story usable all levels of public administrators, legislators and elected officials, stakeholders, and actors, that includes various public policy analyses.

Utilizing Doleac's PPA Analysis: "The Effects on DNA Databases on Crime"[2]

- Example of an *ex-ante evaluation*.
- Very few PPAs in CRMJ, especially doing economics of crime analysis.
- Finding: "*Back-of-the-envelope* estimates on the marginal cost of preventing each crime suggests DNA bases are much more *cost-effective* than other law enforcement tools." Can we utilize this information? **Yes**, with caveats since it is an *ex-ante evaluation.*
- Finding: Major crime reduction benefits with larger databases. Can we use this to justify expansion of databases?
- DNA indexing cost is less than $40.00 used in calculations. Is this correct cost correct from our data? Do we have the data? Roman's cost (next frame) is much different.
- Finding: The marginal cost of crime prevention with CODIS is $70.00. Comparing marginal costs of sentences ($7,600) and police officers (26,300 – 62,500), author concludes CODIS is more effective in preventing serious crime.

What are the next steps to the analysis?
Verify true costs?
Create a small *demonstration project?* Doable…Maybe?

How is the forensic community going to utilize this information?
Frame the information into justifications?

How does the forensic community balance the funding needs for criminal analysis (backlogs of cases, additional staffing and infrastructure, minimum staffing levels, etc.) versus funding for CODIS?

Sorting Through Rapid DNA Testing

Rapid DNA testing currently has several different major types (Direct PCR, Fast PCR, and Rapid DNA [instruments]), different methodologies for each, different target audiences, varies national forensic interests (NIST, FBI) examining/reacting to all the technologies. Currently, all analytical approaches are for standards/reference samples, although one Fast PCR method may soon be applied to case work.
We'll be forward-looking, assuming that all the hurdles have been cleared and all types are available for use in casework, very small scale research *(ex-ante evaluations)* have been conducted (Butts and Vallone, NIST: 2012[3], contains a wealth of data) thus we can derive data for more focused *demonstration projects, evidence-based reports, and continued ex-post evaluation research*, to justify anyone of the methodologies.

What is the next step?

- Create *cost-effectiveness evaluations* utilizing available data sources, conduct *back-of-the-envelope* calculations for costs and benefits, etc.
  - Costs: include all items that reflect **any and all types of costs**: analytical instrumentation costs, reagent costs, training costs, validation costs, infrastructure costs, other equipment costs, additional headcount, etc. This list should be as exhaustive as possible and reflect all costs in dollars.
  - Benefits: include all projected benefits: increased case productivity, eliminated/reduced analytical equipment, less space requirements, positive impacts to the criminal justice system, uses of the technology at various levels of the criminal justice system, projected societal benefits through reduction of crime.
- Create *demonstration project(s)* based upon the *cost-effectiveness evaluations.* The demonstration project should measure all the *costs and benefits* identified.
- Create *ex-post evaluation(s)(evidence based evaluation)* of the demonstration projects.
- Identify the best solution *(benefit-cost ratio)* and *frame* the solution to obtain support.
- Advocate the *framed* solution to all levels that fund or support the forensic sciences.

The Case for National Expansion

We'll start with NIJ's "The DNA field experiment: Cost-effectiveness analysis of the use of DNA in the investigation of high-volume crimes" report.[4] This is an *ex-post evaluation (evidence-based)*.
Performing quick *back-of-the-envelope calculations*, one can see the utility of implementing the project.

- Costs are $4,502 (DNA) and $14,169 (additional arrest).
- Cost of single homicide is $8,442,000 and a single sexual assault is $199,642 (tangible and intangible costs). [5]
- Therefore, the *cost* of a suspect identification and prevention of a sexual assault due to a CODIS identification provides a savings of $180,971, a homicide savings is $8,423,329 *(benefits)*.

Utilizing the report and other available data, a cost-benefit analysis was constructed.[6]

DNA Expansion Demonstration Program: Burglaries

Cost Effectiveness Analysis:

- Costs: Analytical Costs: $1,000 to screen case, $2,000 for DNA, $10,000 for CODIS ID
- Benefits: CODIS DB Hits: Murder - 18%; Sexual Assault - 20%; Burglary and Robbery - 55%; Miscellaneous - 7%; Reduced Cold Case Costs; Reduced Convicted Offender Costs

Cost-Benefit Analysis: Five Year Projection; Discount Rate = 2.6% (OMB Guidance, 2007).

- Costs: Staffing and Infrastructure Model (Bombard Model)[7]: Based Upon 50% Cases with Biological Material of 2005 Burglaries (UCR, 2005), 50% of Those Cases to DNA, 18% CODIS Hit Rate; Requires 8,200 New Biology Screening Headcount and 9,300 New DNA Headcount and Associated Costs
- Benefits: Victimization Costs (NIJ, 1996) Adjusted to 2007 Costs Based on CODIS DB Hits: Murder - 18%; Sexual Assault - 20%; Burglary and Robbery - 55%; Miscellaneous - 7%; Reduced Cold Case Costs; Reduced Convicted Offender Costs

Benefit-Cost Ratio = **25.85**: *Victim Tangible and Intangible Costs;* **9.00**: *Victim Tangible Costs Only.*

If We Are Working All Burglary Cases, Shouldn't We Be Working All Felony Cases? Biology/DNA, Latent Print, Firearms/Toolmark and Drug Chemistry Sections Only

Benefit-Cost Ratio = **1.08**: *Victim Tangible and Intangible Costs, Cost Savings from Cold Cases and Convicted Offenders;* **0.63**; *Victim Tangible Costs Only, Cost Savings from Cold Cases and Convicted Offenders.*

What is the Minimal Staffing Necessary To Work All Cases Going to Court? The nation's minimum staffing level?

Benefit-Cost Ratio = **3.28**: *Victim Tangible and Intangible Costs, Cost Savings from Cold Cases and Convicted Offenders;* **2.27**: *Victim Tangible Costs Only, Cost Savings from Cold Cases and Convicted Offenders.*

Why are we doing nothing with about this? Not *framed* correctly?

What is the next step to be the "Best President"?

References

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[7] Bombard, G. J. (2005): "A Proposed Model to Justify Adequate Staffing and Funding for Forensic Crime Laboratories," Poster at Annual ASCLD Symposium.

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