




A Modular Approach to Analyzing Environmental Innovation

Suganthi Simon
Evaluation Support Division
National Center for Environmental Innovation
U.S. Environmental Protection Agency






Demands of Innovation

- ◇ Degree of relative advantage
 - How does the innovation compare to the traditional way of doing business?
 - Look at environmental, economic, enforcement, and public involvement aspects of the innovation
- ◇ Degree of transferability
 - How easily can the innovation be transferred to other industries, states, regions?
 - What factors will enable or hinder innovation transferability?



Making the Case for Evaluation

- ◇ Strategic investment begs the question– are we making a difference in how we do business and the way we do business?
- ◇ Project/program management takes place at staff level
 - Lack of accountability for designing programs with evaluation in mind
 - Lack of consistent performance measurement
 - Lack of knowledge of evaluation/performance measurement
- ◇ Need consistency across innovations to discuss relative advantage and transferability



Development of a Modular Approach

- ◇ Framework to ensure consistency and flexibility in analysis
- ◇ Promote tool to be used by entities outside of EPA
- ◇ Can be applied at any point during the innovation-life cycle
- ◇ Provides guidance on analyzing the innovation
- ◇ Relies on innovation theory to guide transferability decisions




Analysis Tool for Innovators: Modules for Innovative Environmental Programs

- ◇ Modules consist of:
 - Companion User's Guide
 - 6 Modules, can be used independently or together
- ◇ The modules fill a critical evaluation need by providing a flexible framework for collecting and examining much needed information on innovations
- ◇ It is anticipated that the modules will have far-reaching impacts by molding future projects and helping set strategic direction



What are the Innovation Modules?

- ◇ Series of questions, organized by topic—encourage critical thinking and assessment
- ◇ Six modules in draft form currently being tested:
 - Mapping the Innovation
 - Assessing the Environmental Results of the Innovation
 - Assessing the Costs and Cost Savings of the Innovation
 - Enforcement and Compliance Assurance
 - Public Involvement
 - Assessing the Potential Transferability of the Innovation



Describing the Modules

- ◇ Mapping— encourages logic modeling to describe the innovation— scope, goals, regulatory and programmatic issues
- ◇ Environmental Results—assists the practitioner in measuring results, establishing baselines, indicators and performance measures
- ◇ Costs/cost savings— outlines questions of the economic impact and how to assess cost-effectiveness
- ◇ Enforcement/compliance assurance—assesses the practical enforceability of the innovation
- ◇ Public Involvement—gathers information on stakeholder/public involvement in the innovative process
- ◇ Potential Transferability—helps rank the innovation on a five-part transferability scale to help determine if the innovation is ripe for broader diffusion




Who Should Use the Modules?

- ◇ Program managers, designers and staff participating in the innovation
- ◇ Team members can be assigned to modules that he/she is most familiar with
- ◇ Designed so EPA, other federal entities, state agencies, local and Tribal governments, private organizations and the public can use the tool and modify as needed




Who Is the Intended Audience?

- ◇ Information gathered is valuable to innovation team, decision-makers, participants and the public
- ◇ Quality of the data obtained through the modules can influence decisions to modify the innovation or whether to more broadly diffuse the innovation




How Can the Modules Help?

- ◇ Design an innovative project
- ◇ Identify types of data to assess the outcomes of the innovation
- ◇ Collect information to assess the innovation
- ◇ Assess relative advantage of an innovation to current approaches
- ◇ Improve the performance of the innovation so that it can be transferred and more broadly applied




When Should the Modules Be Used?

- ◇ Designing an Innovation—the modules help identify project goals and desired outcomes, baseline data, performance measures, enforcement and compliance aspects, public involvement requirements, and how to plan for transferability
 - It is often difficult to assess how well the innovation is working without planning for data collection early on in the design of the innovation




When Should the Modules Be Used?

- ◇ Implementation of an innovation— provides for assessment at different levels
 - Tracking and monitoring of the innovation
 - Pinpoint and address successful elements and barriers to success
 - If the innovation is not meeting expectations in any one area, the modules can be used to conduct a deeper level of analysis




When Should the Modules Be Used?

- ◇ Innovation termination—The practitioner should look at each applicable question in each module with the expectation that robust qualitative and quantitative information can provide a complete picture of how well the innovation performed relative to the traditional approach



When Should the Modules Be Used?

- ◇ Conducting an evaluation study– the practitioner should use the logic model developed in Module 1 to identify appropriate evaluation questions
 - Use the modules to provide quantitative and qualitative data needed for evaluation



Module 1: Mapping

- ◇ Background and Purpose of the Innovation
- ◇ Identifying Customers, Partners and Stakeholders
- ◇ Tools that Assist the Innovation
- ◇ Drivers for Innovation
- ◇ Barriers to Innovation
- ◇ Describing the Logic of the Innovation



Module 2: Assessing Results

- ◇ Identifying environmental goals
 - Matching the logic model to measurement
- ◇ Measuring results
 - Data types—indicators, performance measures, outcomes
 - Baseline—normalizing, timeframe, assumptions
 - Data sources, collection, verifiability



Demonstrate the technical and financial feasibility of recycling waste pallet wood into a value added flooring product

Exhibit 2: Environmental Results Table

Project Objectives with Goals	Pre-innovation Base Statistics	Output Metrics	Sources of info and Calculations	Impact/ Outcome
Produce recycle pallet flooring Goals sq. ft	Pallet Hardwoods used in U.S: 4.5 billion board feet/yr (1998)	# square feet of flooring produced (from recycled pallets)	Production records	Natural resource conservation - Estimated percentage (increase compared to baseline) of hardwood tree conserve (trees/yr)*
		# trees not cut for flooring*	Calculation based on production records*	Percentage of trees saved from harvesting when compared to baseline.
Divert Pallet wood waste from landfilling/waste management methods	Over 305,000 tons per year of wood pallets are disposed in landfills in NC (1998)	# square feet of pallet boards diverted	Production records	Conservation of landfill/waste management capacity (tons/yr) compared to the baseline
		Tons of Pallet wood diverted from landfilling	Calculations based on production records	
Reduce greenhouse gases through carbon sequestration and landfill methane reduction.	No statistics.	MTCE	Model tools**	% GHG methane reduction MTCE



Module 3: Costs and Cost Savings

- ◇ Savings– time, capital, operation, maintenance, and who derives benefits
- ◇ Costs:
 - Real-resource compliance
 - Government and stakeholder
 - Social
 - Transitional
- ◇ Relative Cost Advantage
 - Marginal savings and costs



Exhibit 3—Costs/Cost Savings Model Table

Baseline Costs	Costs of Innovation	Net Change: Costs or Cost Savings
Real-Resource Compliance Costs		
Government Regulatory Costs		
Social Costs		
Transitional Costs		
Indirect Costs		



Module 4: Enforcement and Compliance

- ◇ Monitoring, record-keeping and reporting
- ◇ Compliance assurance with an “innovation agreement”
- ◇ Practical enforceability
- ◇ Redirecting regulatory oversight
- ◇ Results and relative advantage



Exhibit 4—Model Table for Monitoring, Reporting, and Record-Keeping (MRR)

Environmental Media and Pollutants of Concern	Monitoring Approach (continuous, parametric, analytical testing, composite sample, grab sample)	Materials Use and Operating Parameter Requirements (e.g., application rate, percentage by weight)	Data Collection Frequency	Reporting Requirements for Regulatory Authorities and Stakeholders	Record-Keeping Requirements	Compliance Notes (specify date of report and note any deviations)
Air Emissions by Pollutant (tons/year)						
Average Effluent Concentrations by Constituent (mg/L)						
Hazardous Waste Generated (pounds)						



Module 5: Public Involvement and Stakeholder Feedback

- ◇ Stakeholder participation
 - Identification
 - Regulatory requirements
 - Levels of participation
- ◇ Collaborative Dialog Approaches
- ◇ Availability of Information
- ◇ Stakeholder Feedback
- ◇ Responsiveness to Stakeholder Priorities and Concerns



Module 6: Transferability

- ◇ Based on pioneering work of Everett Rogers on the Innovation Diffusion model presented in *Diffusion of Innovation* (1962)
- ◇ Rogers' work provides a systematic approach to understanding the nature of innovations and the existing conditions and culture necessary for accepting, adopting and implementing innovations



Assessing Transferability

- ◇ *Relative Advantage* is the degree to which an innovation is perceived as being better than the idea it supersedes
- ◇ *Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters
- ◇ *Ease of Adoption* is the degree to which an innovation is perceived as relatively easy to understand and use
- ◇ *Trialability* is the degree to which an innovation may be experimented with on a limited basis
- ◇ *Observability* is the degree to which the results of an innovation are visible to potential practitioners of the innovation



Assessing Transferability

- ◇ Personal Experience and Observations
 - Does the innovation represent an improvement?
 - Is it ready for diffusion?
 - What are the primary drivers and barriers to diffusion?
 - At what organizational level can the innovation be diffused?



Exhibit 5—Transferability Scale

**Innovation-Diffusion
Components**

High

Moderate

Low

Relative Advantage


Compatibility

Ease of Adoption¹

Trialability

Observability

¹ For ease of adoption, “high” responses are positively related to an innovation’s rate of adoption, whereas “low” responses are negatively related. For trialability, “high” responses are positively related.



Benefits of the Modules

- ◇ Flexible tool, can be used by anyone with an environmental innovation
- ◇ Can be used at a variety of innovation program stages
- ◇ Provides steps on how to build evaluation and performance measurement into innovative projects
- ◇ Can be used on a variety of innovations–
 - New modules have been designed for innovations with Environmental Management Systems



Limitations of the Modules

- ◇ Completion of the modules does not equal an evaluation
- ◇ Modules can be manipulated by the practitioner
- ◇ Information generated by the modules is only as good as the information inputted into the modules
- ◇ Can be highly subjective



Next Steps

- ◆ Modules and User's Guide are available for comment in the U.S. Federal Register until October 31, 2004
- ◆ Pilot testing Module use in an evaluation of an innovative state stormwater permitting program and a state EMS permitting program
- ◆ Use the pilot tests to improve the tool

How to Access the Modules?

<http://www.epa.gov/evaluate>

- ◇ The draft modules and Companion User's Guide is available for review and comment on EPA's webpage

The screenshot shows the EPA Evaluation Support webpage. The header includes the EPA logo and the text "U.S. Environmental Protection Agency Evaluation Support". Below the header is a search bar with a "GO" button and a breadcrumb trail: "EPA Home > Evaluation Support". The main content area is titled "Evaluation of Environmental Programs" and features a large introductory paragraph starting with "By constantly evaluating its environmental programs, EPA is able to capitalize on lessons learned...". Below this, there are two highlighted buttons: "Innovation Analysis and Evaluation" and "Building Program Evaluation Capacity". A left sidebar contains a list of navigation links such as "What is Program Evaluation?", "Building Evaluation Capacity", "Analyzing Innovations", "The Program Evaluation Network", "Recent Additions", "Reports and Publications", "Fact Sheets and Tools", "Training", "Frequently Asked Questions", "Glossary", and "Program Evaluation Information".