



Multidimensional ex-post evaluation of Research and Development (R&D) programs: the case of an oil refining R&D program in Brazil

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PRESENTATION OUTLINE

1.INTRODUCTION

2.THE ESAC EVALUATION METHODOLOGY

3.THE R&D PROGRAM UNDER EVALUATION: PROREC

4.THE ESAC EVALUATION: THE ECONOMIC DIMENSION

5.THE ESAC EVALUATION: THE SOCIAL DIMENSION

6.THE ESAC EVALUATION: THE ENVIRONMENTAL DIMENSION

7.THE ESAC EVALUATION: THE CAPACITATION DIMENSION

8.IMPACTS OF PROREC: THE FOUR DIMENSIONS

9.CONCLUSIONS

INTRODUCTION

ESAC: ex post R&D programs impacts evaluation methodology, developed by researchers at the Department of Science and Technology Policy (8 projects- sugar cane improvement program, coffee, sanitation, energy meteorology)

Four dimensions evaluated: Economic, Social, Environmental & technological Capacitation (ESEC)

Data from a diversity of actors impacted by the program/project

Case studied: refining R&D program funded by Petrobras, Brazil's major oil Co (evaluation and evaluation methodology transfer- tech management Dept)

Methodological procedures in a real life experience of ESAC application, applicable for the evaluation of any other R&D program

Results from a pilot application (4 projects): scaled up (after adjusting), final evaluation in force (representative sample, 20 projects)

THE ESAC EVALUATION METHODOLOGY

Traditional ex post R&D evaluation: cost benefit, efficiency, goals achievement

ESAC: beyond traditional indicators (metrics). Identifies qualitative impacts not traditionally measured: economic, social, environmental and technological capacitation, gathered from different actors- positive/negative impacts

Two step process: 1. identification of positive/negative project/program impacts (ESEC) in criteria related to the four dimensions (consults) 2. applying questionnaires on ESEC impacts to different groups impacted.

Questions: indicators of impacts, answered in a scale that ranges from -1 (maximum negative impact) to + 1 (maximum positive impact). Average for each indicator: Allows the measurement and presentation of impacts in a quantitative way (aggregated/disaggregated)

-1 (maximum negative impact); -0,75 (high); -0,5 (medium); -0,25 (little); 0 (no impact); 0,25 (little positive impact); 0,5 (medium); 0,75 (high); 1 (maximum)

THE R&D PROGRAM UNDER EVALUATION: PROREC

Need to improve ex post R&D programs evaluation

Petrobras' Optimization and Reability Program (Prorec)

Program for downstream costs cut, mainly refining

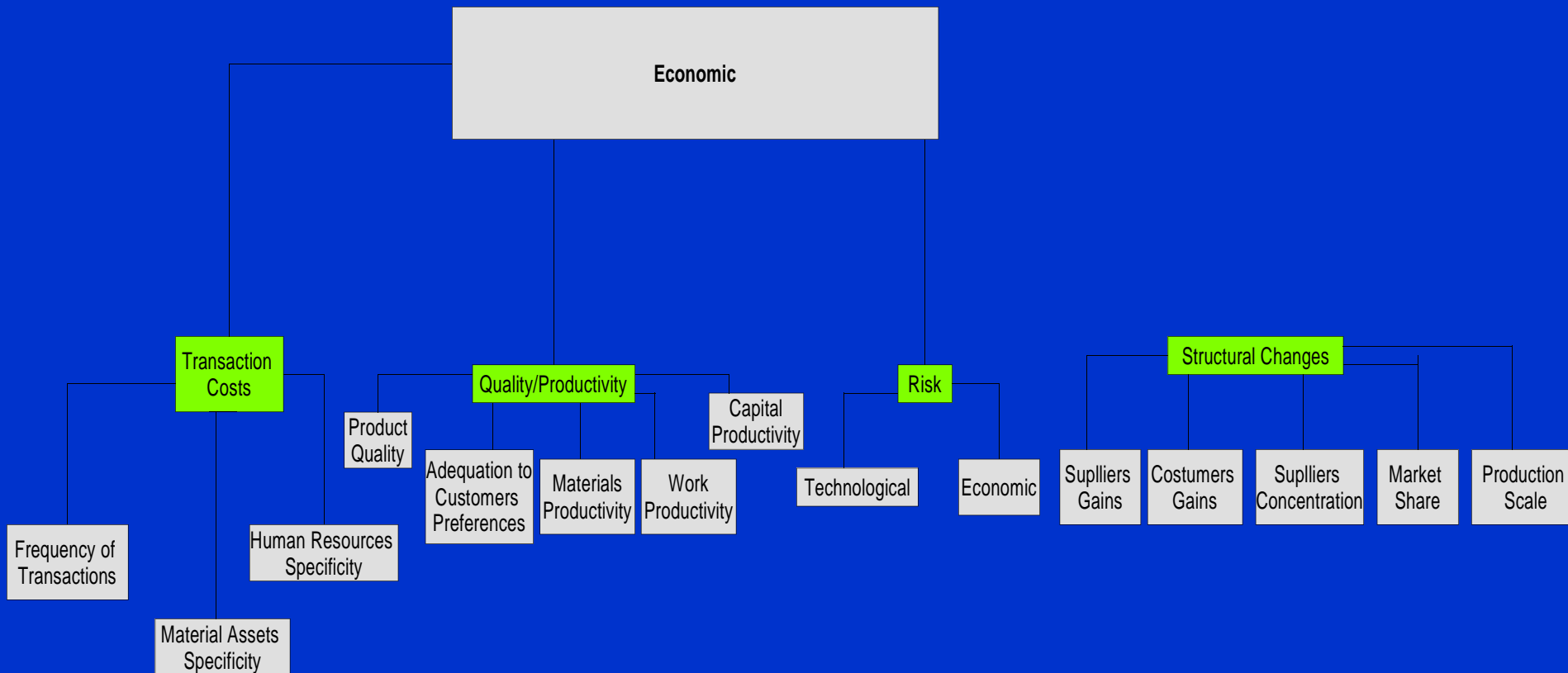
In force since July 2000; around 10 million dollars invested until 2003

Evaluation: interviews with projects coordinators (research center) and users of the projects (refineries). Different perceptions on technology impacts.

Design of questionnaires/definition of actors: workshops with specialists and Petrobras staff

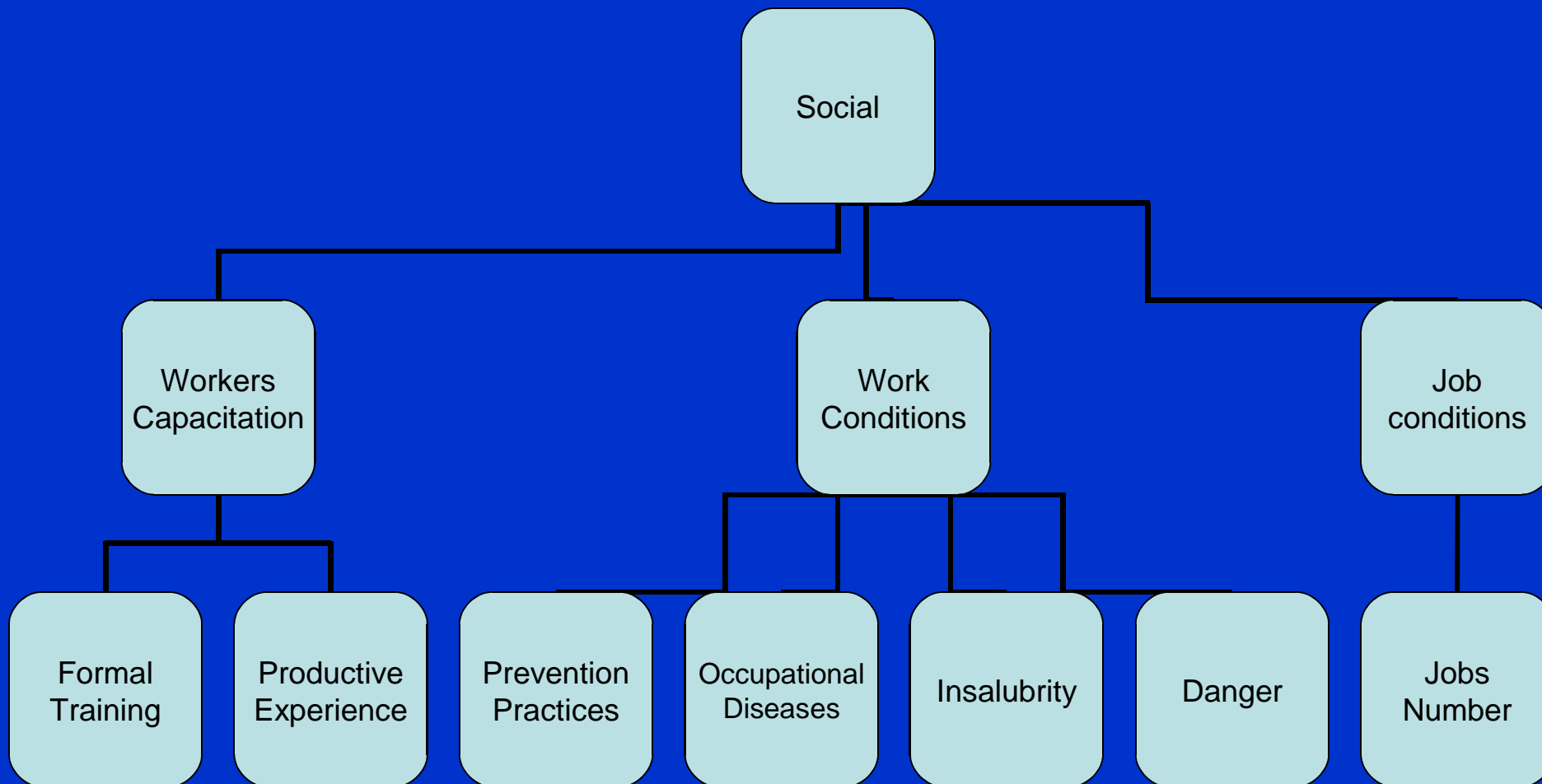
THE ESAC EVALUATION: THE ECONOMIC DIMENSION

Qualitative/quantitative impacts: transaction costs, quality/productivity, structural transformations (criteria)



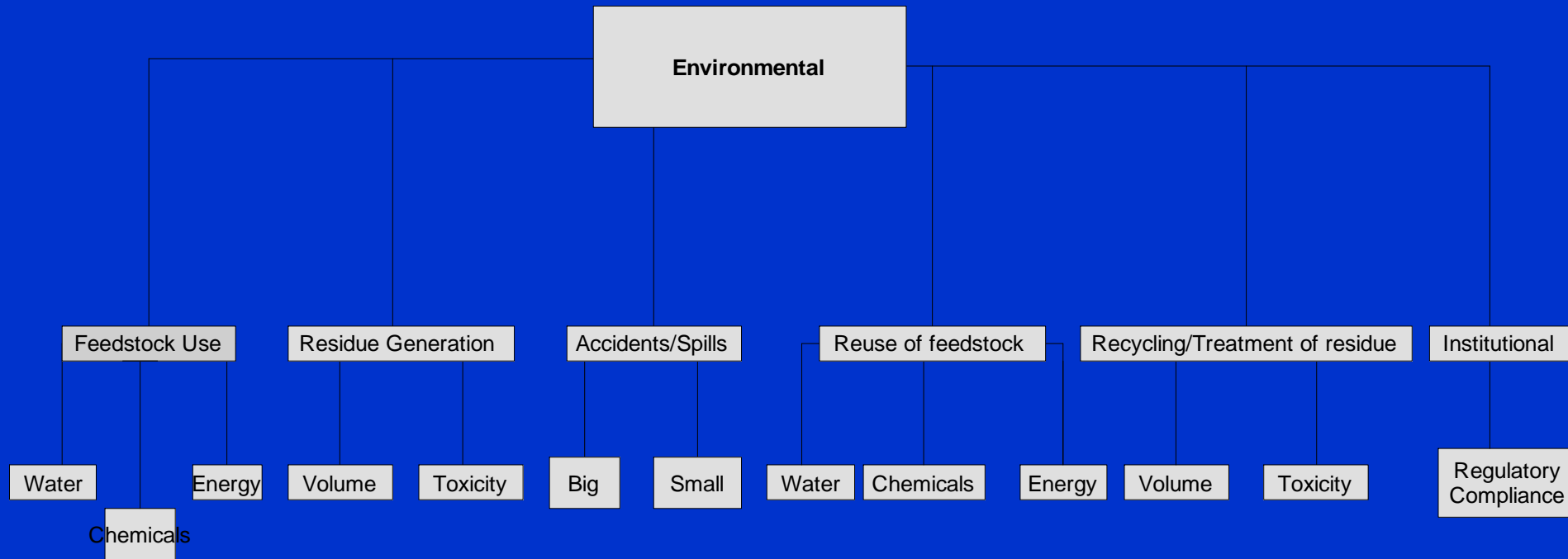
THE ESAC EVALUATION: THE SOCIAL DIMENSION

Measurement of impacts on social conditions, underlooked on conventional analysis



THE ESAC EVALUATION: THE ENVIRONMENTAL DIMENSION

Measurement of impacts on environmental conditions due to the application of the projects (commonly overlooked)



THE ESAC EVALUATION: THE CAPACITATION DIMENSION

Underlooked for conventional analysis: Learning (even in project failure)

Capacitation	Networking	Partnerships
		Hardware sharing
		R&D Meetings Frequency
		Partners Confidence
		Technology Transfer
	Organizational Scientific & Technological	Multifunction Teams
		Organizational Changes
		Management Methods
		Quality Control Methods
		Equipments/Facilities
	Scientific/Technological	Critical Knowledge Learning
		Knowledge Diversity
		Scientific Production
		Events/Training Participation
		Reading activity
		External knowledge absorption
		Human Resources Capacitation

IMPACTS OF PROREC: THE FOUR DIMENSIONS

Economic: Low aggregate positive impact (0.07), mostly in risk/productivity indicators.

Social: Also low (0.25) Mainly in the Productive Experience indicator. Assymetry in work conditions (0.42 for project coordinators, 0.25 for refineries (users))

Environmental: Low impact (0.24). Mainly in Accidents/Spills

Capacitation: Medium impact (0.52): Mainly in Networking

CONCLUSIONS

Beyond traditional evaluations (sum-up of accumulated results, numeric values obtained from individual sources: input/output descriptive models

Multidimensional evaluation method: gathers qualitative information and presents it in quantitative and comparable terms impacts underlooked by traditional methodologies (specially technological learning/social impacts).

Variety of actors (interests, perceptions): step forward, broader perception of heterogeneous impacts of R&D programs

Limited: range of actors consulted and impacts measured

Difficulty of communication with actors (specially economic dimensions)- software for online questionnaire application is limited- low data reliability

Tendencious answers (specially related to capacitation)

THANK YOU

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