Chapter 14
The New Interdisciplinary Fields of Public Policy Engineering and Computational Public Policy

Ashu M. G. Solo
Maverick Technologies America Inc., USA

ABSTRACT

This chapter describes two new interdisciplinary fields defined by Ashu M. G. Solo called public policy engineering and computational public policy. Public policy engineering is the application of engineering, computer science, mathematics, or natural science to solving problems in public policy. Computational public policy is the application of computer science or mathematics to solving problems in public policy. Public policy engineering and computational public policy include, but are not limited to, principles and methods for public policy formulation, decision making, analysis, modeling, optimization, forecasting, and simulation. The definition of these two new fields will greatly increase the pace of research and development in these important fields.

INTRODUCTION

In this chapter, the author, Ashu M. G. Solo, describes two new closely related fields that he has initiated called *public policy engineering* and *computational public policy.* These fields were first originated and defined by Solo in Solo (2011). Basic and advanced methods in engineering, computer science, mathematics, or natural science can be used for public policy formulation, decision making, analysis, modeling, optimization, forecasting, and simulation. This will lead to greatly improved public policy.

For example, legislators usually determine spending priorities and budget allocations based on passions of the moment, special interest lobbying, parochial interests, ignorant public opinion, or their own ideological biases rather than on a rigorous mathematical and computational analysis of how spending priorities and budget allocations can be made for the greatest public benefit.

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PUBLIC POLICY ENGINEERING AND COMPUTATIONAL PUBLIC POLICY

Public policy engineering is the application of engineering, computer science, mathematics, or natural science to solving problems in public policy. Computational public policy is the application of computer science or mathematics to solving problems in public policy. Therefore, computational public policy is a subset of public policy engineering. Public policy engineering and computational public policy include, but are not limited to, principles and methods for public policy formulation, public policy decision making, public policy analysis, public policy modeling, public policy optimization, public policy forecasting, and public policy simulation. Public policy engineering and computational public policy are more technically, computationally, mathematically, and scientifically rigorous approaches to the field of public policy.

The term *e-government* (Piaggesi, Sund, & Castelnovo, 2011) refers to the use of information and communication technologies in government operations, access to government data, interactions between government agencies, interactions between government and citizens, and interactions between government and external organizations. Therefore, an e-government activity only constitutes public policy engineering when principles or methods in engineering, computer science, mathematics, or natural science are used in public policy formulation, decision making, analysis, modeling, optimization, forecasting, or simulation. An e-government activity only constitutes computational public policy when principles or methods in computer science or mathematics are used in public policy formulation, decision making, analysis, modeling, optimization, forecasting, or simulation.

The formulation of criminal sentencing policy does not constitute public policy engineering or computational public policy. However, the formulation of criminal sentencing policy involving the use of computational intelligence methods for determination of criminal sentences would constitute public policy engineering and computational public policy.

SCOPE OF PUBLIC POLICY ENGINEERING AND COMPUTATIONAL PUBLIC POLICY RESEARCH AND DEVELOPMENT

Scope of Public Policy Engineering Research and Development

The scope of research and development in the field of public policy engineering includes, but is not limited to, the following:

Public Policy Formulation, Decision Making, Analysis, Modeling, Optimization, Forecasting, and Simulation:

- Public policy decision making under uncertainty,
- New technologies in public policy,
- Application of engineering to public policy,
- Application of computer science to public policy,
- Application of mathematics to public policy,
- Application of natural science to public policy,
- Application of operations research to public policy,
- Application of optimization methods to public policy,
- Uncertainty management in public policy decision making,
- Application of computational intelligence methods to public policy,
- Application of fuzzy logic to public policy,
- Application of neural computing to public policy,
- Application of neural networks to public policy,