Chapter 2
Artificial Intelligence and Systems Thinking in the Public Sector

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ABSTRACT

Artificial intelligence (AI) is the science of designing systems that exhibit similar characteristics associated with the intelligence found in human behavior. It is a significant aspect of computer science that deals with system recognition such as learning, reasoning, understanding language, and taking actions to solve problems. As a computational system, AI can, for a given set of human-defined goals, make predictions and recommendations or make influencing decisions in real or virtual environments. The major branches of AI are expert systems, robotics, machine learning, neural network, fuzzy logic, natural language processing. The development of AI technologies is having a profound impact on the way governments work and design policies. The applications touch areas such as health services, transportation, and security. Public servants are using AI to help them make welfare payments and immigration decisions, answer citizen inquiries, and classify health care cases, among many other activities.

INTRODUCTION

The development of artificial intelligence (AI) technologies is having a profound impact on the way governments work and design policies. The applications touch areas such as health services, transportation, and security. Public servants are using AI to help them make welfare payments and immigration decisions, answer citizen inquiries, and classify health care cases, among many other activities.

AI tools could improve the efficiency and quality of many public sector procedures. For example, they could offer citizens the opportunity to participate from the beginning in the service design process and to interact with the State in a more agile, effective, and personalized way. In *Artificial Intelligence in Society*, the OEDC (2019) points out that, if properly designed and implemented, AI technologies

could be integrated throughout the policymaking process, support reforms, and improve public sector productivity.

There is a widespread understanding of the importance of approaching AI development in a holistic way to take advantage of the opportunities it presents for different sectors, while also identifying potential adverse side effects. The advent of AI represents an opportunity to boost the economic and productive growth of countries, improve the provision of public services and benefit politically as a result.

The possibilities of AI are so wide and growing that it is expected to be a core tool to face current and future challenges. However, AI cannot be a panacea for all our complex problems. Historically, new technologies promised to solve immediate and specific problems, but over time they proved unsustainable. Therefore, we must acknowledge the limitations of this innovation, explore ways to overcome constraints, and conceptualize novel ways to harness AI.

The scope, magnitude and importance of the challenges facing governments make it difficult to conceive how they will be effectively addressed without major rethinking and the introduction of public sector innovation, whether it be in policies, programs, relationships with citizens and stakeholders or in the provision of services. Therefore, innovation as a policy, service or product; as practices and processes; and as supporting infrastructure, it is critical to the effectiveness, credibility, and future capacity of governments. Adopting the right technologies can create new opportunities to improve the efficiency and agility of the public sector and, if used well, improve its legitimacy, which is important today when trust in government has eroded (Noveck, 2021).

The chapter is based on the premise that as policy issues become more interconnected and the conditions in which they develop more uncertain, a systems approach is needed to understand the issues and improve the innovative capacity of government. Specifically, we argue that the systems approach can contribute to the "good use" of AI. On the one hand, because it can favor the application of AI leading to more sustainable holistic innovative solutions and, as part of this, reducing costs and adverse effects. On the other, by increasing the chances that government agencies will understand complex problems more accurately and, consequently, formulate more effective policies.

In this sense, our hypothesis is that the literature on the systemic approach in the formulation and implementation of policies on AI in the public sector is not as well developed. In the recent discussion, there is talk of the need to approach AI development in a holistic way to take advantage of the opportunities it presents for different sectors and face complex problems, while facing possible risks, but it is missed, the analysis on: What is the origin of the systems approach in artificial intelligence? Why is the systems approach important in government innovation? How is the systems approach applied in the implementation of artificial intelligence in the public sector? What kind of skills do public servants require for the application of artificial intelligence in a systemic way? Although a substantial body of knowledge exists, research is still needed on the challenge of developing AI in the public sector from a systems perspective. This chapter is part of the search for answers to these questions.

According to its object, the chapter was structured in the following sections: 1. The systemic approach in Artificial Intelligence; 2. Systemic reality and sustainable solutions; 3. Artificial intelligence and comprehensive innovation; 4. Complex problems and Big Data; 5. Systemic intelligence and artificial intelligence and 5. Conclusions and findings.

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