



Leveraging AI for Predictive Analytics With Survey-Based Rubrics in the Public Service Sector in Canada and the USA


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Received: April 10th, 2025 | **Accepted:** January 29th, 2026

ABSTRACT

In developed countries, a significant gap persists in the absence of empirical, survey-based rubrics to measure AI's technical characteristics and predictive analytics in the public service sector. This study fills this gap by developing and validating survey-based rubrics through a comparison between Canada and the United States (US). Following MacKenzie, Shiau, and Huang's scale development procedures, this research utilized data from Canadian and US government AI websites twice, employing structural equation modeling (SEM) and PLS methods to examine the scale properties and test the relationships between AI's technical characteristics and predictive analytics. Findings show that supervised and unsupervised machine learning, along with deep learning, are positively associated with predictive analytics across public service sectors in both countries. Conversely, artificial neural networks are not positively associated with predictive analytics in Canada, whereas they are in the US. The relationship between artificial neural networks and predictive analytics varies across countries.

KEYWORDS

Artificial Intelligence, Artificial Neural Networks, Machine Learning, Deep Learning, Predictive Analytics, Public Sector, Developed Countries

INTRODUCTION

The interdisciplinary and multidisciplinary nature of artificial intelligence (AI) is becoming a reality worldwide (Li et al., 2022; Noordt & Misuraca, 2022; J. Ran et al., 2024; Wu & Chen, 2023; A. Xu et al., 2024). Additionally, its use has tremendous potential to improve the management of internal activities, policy-making processes, and delivery of public services (Noordt & Misuraca, 2022; Maragno et al., 2023; Wang et al., 2021). Moreover, AI has the potential to utilize resources to create value by improving public service performance (Wang et al., 2021), and the outlook is promising, as AI is expected to contribute up to \$15.7 trillion to the global economy (Wang et al.,

DOI: 10.4018/JGIM.401113

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2021). This context is crucial for understanding specific AI technologies and their applications in the public service sector, which are the focus of our research.

However, several challenges posed by AI to the public sector have been identified: technological, societal, ethical, legal (Maragno et al., 2023), concerns about anxiety (Tao et al., 2025), and privacy worries (Akakpo et al., 2025). This study suggests that many public companies require more evaluation and measurement, using survey-based rubrics, to understand the benefits and challenges that AI brings to the public service sector, enabling them to make more accurate predictions. This prompts us to pose the following two research questions (RQs):

RQ1: What are AI's most appropriate technical characteristics in the public service sector context?

RQ2: What are the most comprehensive empirical survey-based rubrics for measuring AI's technical characteristics, and what are their relationships with predictive analytics in the public service sector?

Measuring AI involves using appropriate evaluation instruments to assess the efficacy of AI's technical characteristics in the context of public service delivery, management, and administration.

Previous measures have focused on AI tests that compare machine performance with that of humans (Wang et al., 2021). Additionally, they evaluated the effects and antecedents of AI, as well as factors that contribute to its success or failure, while ignoring its technical underpinning components. Some instruments have used mathematical formulas, programming codes, benchmarks, and models to evaluate AI (Allesch, 2022; Del Pup & Atzori, 2023; Giudici et al., 2024; Hernandez-Orallo, 2016; Keiper et al., 2023; Kong et al., 2021; Peng et al., 2023). Other instruments have considered factors that influence AI development and implementation of AI systems (Di Vaio et al., 2022; Merhi, 2023). The previous measurements to evaluate AI did not include empirically developed and validated survey-based rubrics in their instruments to measure AI's intrinsic and technical characteristics, such as artificial neural networks, supervised and unsupervised machine learning, and deep learning. The existing AI literature has not studied the association between AI's technical characteristics and predictive analytics within the public service sector. However, empirical survey-based rubrics are easy to use, less challenging to understand, and easy to interpret. In the public service sector, rubrics employing Likert scales capture nuance more effectively than previous accuracy-based and benchmark-driven assessment metrics. Likert-scale rubrics allow for capturing varying degrees of agreement and disagreement with perceptions and feedback. Notably, Likert scales contribute to the reliability and validity of assessment instruments more than existing objective performance metrics.

This research aims to empirically develop and validate a scale to measure AI's technical characteristics and examine their relationships with predictive analytics in the public sector through a cross-country comparison between Canada and the United States. Hence, this study presents a novel conceptual framework for understanding the momentum of AI in society.

The primary contribution of this study is to provide AI-based empirical survey rubrics for public sector institutions and government agencies in developed countries. This study also contributes to the literature by using AI's technical characteristics to highlight an extension of cognitive theory. Additionally, this study extends the quantitative methodological approach of MacKenzie et al. (2011) and Shiao and Huang (2023) using the qualitative analytic hierarchy process (AHP) from Merhi (2023). Therefore, this study is among the first to develop empirical, survey-based rubrics for evaluating AI's contributions to the public service sector through a cross-country comparison between Canada and the United States. Moreover, these rubrics serve as measurement instruments that governments and legislative bodies can adopt to inform regulations aimed at reducing public concerns and fears associated with the use of AI in society. Furthermore, this study expands and completes the existing list of AI tests, evaluations, and measurement instruments.

The remainder of this paper is organized as follows: the second section outlines the literature review. The third section discusses the research model and the process of hypothesis development. The

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