

Review

Measuring ICT Adoption and Institutional Performance in Public Sector Organizations: Development of a Conceptual Measurement Framework

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Abstract: The measurement of Information and Communication Technology (ICT) adoption and institutional performance in public sector organizations remains a persistent methodological challenge in information systems and public administration research. Despite increasing digital transformation initiatives in developing economies, there is limited consensus on standardized indicators for evaluating ICT integration and its impact on institutional outcomes. This paper develops a conceptual measurement framework for assessing ICT adoption and institutional performance in public sector organizations. Drawing on Technology Acceptance Model (TAM), DeLone and McLean Information Systems Success Model, and institutional theory, the study synthesizes existing literature to propose multidimensional constructs for ICT adoption and performance measurement. ICT adoption is conceptualized across dimensions of system usage, accessibility, digital competence, and integration level, while institutional performance is operationalized through efficiency, service delivery quality, transparency, and employee productivity. The paper contributes a structured framework that enhances measurement consistency and supports future empirical validation in developing country contexts. The study concludes that robust measurement design is critical for advancing ICT-related governance research and improving comparability across studies.

Keywords: ICT adoption, institutional performance, measurement framework, public sector, digital transformation, developing economies.

1. Introduction

The increasing integration of Information and Communication Technology (ICT) into public sector organizations has generated significant interest in understanding its impact on institutional performance. Governments across developing economies have invested heavily in digital systems to improve service delivery, administrative efficiency, and governance outcomes. However, a recurring challenge in ICT-related research is the absence of standardized measurement frameworks. Studies often adopt inconsistent indicators for ICT adoption and institutional performance, making comparison across contexts difficult and limiting the accumulation of generalizable knowledge.

In many public sector studies, ICT adoption is treated as a binary concept, either present or absent, without adequately capturing its multidimensional nature. Similarly, institutional performance is frequently measured using narrow indicators that fail to reflect its complexity. This raises a key methodological question: How can ICT adoption and institutional performance be systematically and consistently measured in public sector research? This paper addresses this gap by developing a conceptual measurement framework grounded in established theoretical models.

2. Conceptual Foundations

2.1 ICT Adoption

ICT adoption refers to the extent to which digital technologies are integrated, accepted, and utilized within organizational processes. It is not limited to installation but includes actual usage and organizational embedding.

2.2 Institutional Performance

Institutional performance refers to the effectiveness of public organizations in achieving their objectives, including service delivery efficiency, transparency, responsiveness, and employee productivity.

2.3 Measurement in Public Sector ICT Studies

Measurement in ICT research involves translating abstract constructs into observable indicators. However, inconsistencies in operational definitions have led to fragmented findings in the literature.

3. Theoretical Foundations

3.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (Davis, 1989) emphasizes perceived usefulness and perceived ease of use as determinants of technology adoption behavior. These constructs provide a foundation for measuring user-level ICT acceptance.

3.2 DeLone and McLean IS Success Model

The DeLone and McLean (2003) model identifies system quality, information quality, service quality, use, and net benefits as key dimensions of information system success. This model is central to evaluating ICT effectiveness in organizations.

3.3 Institutional Theory

Institutional theory (DiMaggio & Powell, 1983) highlights the influence of organizational norms, rules, and structures on behavior, providing context for ICT adoption variability across institutions.

4. Proposed Measurement Framework

This paper introduces a multidimensional framework, specifically developed for measuring the adoption of information and communication technology (ICT) and institutional performance within public sector organizations. In order to assess digital transformation within public bureaucracy, a different approach should be taken than merely considering the number of computers acquired or the approximate speed of an office internet connection. Rather, a balanced assessment of the impact should focus on how much technology is embedded in everyday civil servant practices and how it is likely to have a systematic impact on work results. The regulatory requirements, accountability mechanisms and political climates that guide the actions of public agencies are quite different from those of the private sector, and are often established and enforced through strict political environments. Thus, this measurement framework not only has two separate but well operationalized constructs but also reflects the entire digital governance life cycle. The first construct sets the operational conditions for technological integration and the second helps create a set of clear and useful indicators to measure the resulting changes in institutional capability.

4.1 ICT Adoption Construct

The information and communication technology adoption construct is taken up in the following four dimensions, which represent the depth, the breadth and the usefulness of the digital tools in an agency. The first dimension is the usage of the system, which involves how frequently the software is used on a daily basis, the extent of the system's use and the degree of dependency on digital systems to perform core functions. The higher the level of system usage, the more the digital platforms have successfully transitioned from the trial stage to being the main destination for civil service labor. The second dimension is accessibility, which assesses the availability of modern hardware tools, ease of user access to secure software platforms, and overall technical infrastructure's soundness. Accessibility enables that all cadres of staff have the necessary entry points to engage in the digital ecosystem without having physical or technical access restrictions.

Digital competence is the third dimension, measuring basic information technology skills of workers, their past experience in professional training on information technology and their confidence in operating complex software platforms. Digital competence dictates if workers can make the most

of the analytical power of advanced systems or if they are held back by the fear of technology. The fourth dimension is system integration, which is the degree of data sharing between different departments, the interoperability of different software networks and the full automation of cross-departmental processes. Highly integrated systems help to avoid the creation of separate data silos and enable the secure and immediate exchange of data throughout the institutional network.

4.2 Institutional Performance Construct

The four dimensions of the institutional performance construct reflect the ways in which digital adoption leads to public value. The first-dimension measures operational efficiency, defined as the overall speed of public service delivery, the systematic elimination of paper-based, manual administration, and internal cost efficiency. Real operational efficiency is achieved when the processing times are shorter and when the handling in public registers becomes more efficient in carrying out the usual operations. The second dimension is the level of the quality-of-service delivery, which is based on citizen satisfaction scores, absolute accuracy of service outputs and administrative responsiveness to public complaints. Quality service delivery also is reflected in how technology can make public interactions smoother, more reliable, and error-free as opposed to those done manually.

The third-dimension measures transparency and accountability, namely the traceability of each administrative transaction, the reduction of clerical errors systematically, the reduction of the risks of corruption and the effectiveness of audit as the whole. Digital tracking mechanisms provide an irrefutable audit trail that allows for a record of every approval, payment and file transfer, making it easy to see and difficult to do anything that might be considered an administrative decision. The fourth dimension is employee productivity, which measures individual worker task completion rates, the "true" quality of produced work, and staff time management efficiency. Using digital metrics to measure productivity enables the administration to pinpoint the obstacles in operations and give objective incentives for high performance in the civil service.

5.0 Conceptual Model

The proposed relationship between the elements in this holistic measurement framework establishes a clear, sequential path of evolution of the institutions. The path is played out slow and steady from input to output: from the use of information and communication technology to deep changes in institutional processes to final institutional performance outcomes. The progression is structured and demonstrates that going from initial software implementation to final organizational value is non-linear and depends entirely on internal transformation in the middle. Hardware or enterprise portal installation does not necessarily lead to better governance. Rather, the technological input needs to be able to successfully impact an institutional process in order to trigger the performance improvement – one in which data is used differently and decisions made differently.

There are a number of key intervening variables that strongly affect this connection, which are the main connections that can speed up or totally block the transformation journey. The first mediating factor is employee digital literacy: the basic skills of the people who will be using the newly instituted infrastructure on a daily basis. A sophisticated software platform would not be used or would be entirely ignored if the staff members don't have basic computer skills. The second factor is leadership support, which includes strategic support, long-term political will, and resource allocation from the executive stakeholders. Long-term leadership commitment also helps to provide consistent resources for project maintenance, security patching and upgrades which can lead to project abandonments when there is a change in political leadership.

Organizational culture, the third factor, is concerned with the readiness of the organization, the sense of security among employees, and the openness of the cultural environment with regard to the need to implement significant structural changes. The culture of a business can either be inhibiting the success of digital transformation at the enterprise level, or it can be supporting it. A culture that resists change or the fear of job loss can actually be a hindrance, while a culture that embraces technology can help speed up system adoption. The fourth factor is "infrastructure readiness" – the reliability of the existing infrastructure, local broadband networks, power supplies, and technical

support systems that enable the deployment. Without reliable power or network connections, the management of the public value of the system is impossible.

This conceptual model concludes that the use of information and communication technology does not directly lead to improvement in performance. They are important internal organizational characteristics that are essential for successful governance outcomes and sustainable productivity gains, and underscore how human, cultural, and structural factors are the real drivers of digital reform.

6. Discussion

The proposed framework highlights the need to move beyond simplistic measures of ICT adoption toward a multidimensional evaluation approach. Existing studies often overemphasize technology presence while ignoring usage depth, employee capability, and system integration. Similarly, institutional performance must be treated as a composite construct rather than a single indicator. Public sector performance is inherently multidimensional, involving efficiency, accountability, service quality, and productivity. By integrating the Technology Acceptance Model (TAM), the Information Systems (IS) Success Model, and institutional theory, this framework provides a more comprehensive, nuanced, and actionable approach to ICT measurement in public administration research.

7. Implications of the Framework

7.1 Theoretical Implications

The framework significantly enhances conceptual clarity in ICT adoption research by establishing distinct operational dimensions. Additionally, it successfully bridges the historical gap between behavioral user-acceptance models and system-level performance perspectives, supporting multi-theory integration in modern public administration studies.

7.2 Methodological Implications

Methodologically, this study provides standardized indicators that can guide future empirical studies and enhance the statistical comparison of findings across diverse institutional contexts and countries. Furthermore, the structured layout directly supports survey instrument development and item operationalization.

7.3 Practical Implications

For practitioners, the framework helps governments and public administrators assess ICT investment outcomes more accurately, ensuring fiscal responsibility. It also guides the long-term policy evaluation of digital transformation programs and supports comprehensive, evidence-based decision-making in public administration environments.

8. Conclusion

This paper developed a conceptual measurement framework for ICT adoption and institutional performance in public sector organizations. The framework emphasizes the multidimensional nature of both constructs and highlights the importance of integrating system, human, and organizational factors in measurement design. By addressing inconsistencies in existing literature, the study provides a foundation for more rigorous empirical research in digital governance and public sector performance evaluation.

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