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ORIGINAL

Impact of digital transformation on the productivity of public administration

Impacto de la transformación digital en la productividad de la administración pública

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ABSTRACT

Introduction: digital transformation is a strategic axis for modernizing public administration, enabling more efficient, transparent, and citizen-centered processes. Nevertheless, empirical evidence is required to assess its direct impact on institutional productivity.
Method: a quantitative, non-experimental, and correlational study was conducted with 150 civil servants from public institutions in Metropolitan Lima. A structured questionnaire with a reliability coefficient of α = 0,91 was applied.
Results: findings revealed that 74,7 % of participants perceived improved process efficiency through digitalization, while 69,2 % reported increased management transparency. Inferential analysis showed that digital transformation explained 64,8 % of productivity in public administration (R^2 = 0,648, $p < 0,01$).
Conclusion: digital transformation significantly and positively impacts productivity in public administration. Strengthening civil servants' digital competencies and ensuring technological sustainability are recommended.

Keywords: Digital Transformation; Productivity; Public Administration; Technological Innovation; Public Management.

RESUMEN

Introducción: la transformación digital representa un eje estratégico en la modernización de la administración pública, al facilitar procesos eficientes, transparentes y orientados al ciudadano. Sin embargo, su impacto directo en la productividad institucional aún requiere evidencia empírica.
Método: se llevó a cabo un estudio cuantitativo, no experimental y de alcance correlacional, aplicado a 150 funcionarios de instituciones públicas de Lima Metropolitana. Se empleó un cuestionario estructurado con confiabilidad de α = 0,91.
Resultados: los hallazgos muestran que el 74,7 % de los encuestados percibe mejoras en la eficiencia de procesos gracias a la digitalización, mientras que el 69,2 % indicó un incremento en la transparencia de la gestión. Los análisis inferenciales revelaron que la transformación digital explicó un 64,8 % de la productividad en la administración pública (R^2 = 0,648, $p < 0,01$).
Conclusión: la transformación digital tiene un impacto positivo y significativo en la productividad de la administración pública. Se sugiere fortalecer las competencias digitales de los funcionarios y garantizar la sostenibilidad tecnológica de las instituciones públicas.

Palabras clave: Transformación Digital; Productividad; Administración Pública; Innovación Tecnológica; Gestión Pública.

INTRODUCTION

In the international arena, digital transformation in public administration has been identified as a key factor in increasing the efficiency, effectiveness and quality of citizen services.[1] However, there is a gap between countries that have successfully implemented robust digital processes and those whose productivity is still limited by partial or uneven adoption of technology. For example, recent studies indicate that in several developed countries more than 40-50 % of public procedures have already been digitized, but a significant percentage of these experience interoperability failures or lack of staff training, which reduces the real benefits.[2]

In addition, World Bank reports estimate that government digitalization can save between 4-7 % of the annual operating expenditure of the public sector by reducing bureaucracy and automating repetitive administrative tasks. This represents considerable gains in productivity, although not all countries reach these levels due to limitations in infrastructure, digital human resources or institutional cultural resistance.[3]

It is also observed that one of the greatest global obstacles is inequality in access to broadband internet, reliable connectivity, and digital literacy. While some countries have broadband coverage of more than 90 % of their population, others, especially in rural or less developed areas, do not reach 50 %, preventing the digital transformation from being broad in scope and public productivity from improving equitably.[4]

In Latin America, countries have made progress in e-government and digital transformation, but they face challenges that limit their real impact on public productivity. For example, in Chile, it is estimated that the percentage of public procedures available online has exceeded 70-80 %, but low citizen satisfaction is detected in efficiency and response times, suggesting that digitalization does not always automatically lead to improvements in productivity.[5]

In Colombia, recent studies show that more than 60 % of public entities have functional digital platforms, but the lack of standardization and connectivity in remote regions means that many administrative functions continue to rely on face-to-face or manual processes, affecting the overall efficiency of the service.[6]

Ecuador and Bolivia also show internal digital divides: in urban areas the transformation is usually more visible, while in rural areas coverage, infrastructure, and training continue to be deficient.[7] In Brazil, despite being a regional leader in technological investments, the high logistics cost, social inequality and internal bureaucracy mean that the benefits (measured as improved public productivity) are not equally distributed, with entities that show high levels of digitalization but little improvement in service times and quality of service.[8]

In the context of Peru, digital transformation has shown measurable progress, but significant challenges persist that limit its impact on the productivity of public administration. For example:

- According to the World Bank's GovTech Maturity Index, Peru climbed 29 places compared to 2020, ranking 14th out of 198 economies.[9]
- The Peruvian State has digitized more than 14,000 state services, and more than 130 000 people have been trained to adapt to digital mechanisms.[10]
- On the "Government and Digital Transformation Indicators" platform, Peru obtained a score in the Electronic Government Development Index (EGDI) of 0,807, above the regional average (≈ 0,640), which shows a "very high level of performance".[11]

At the local level, in a public entity in South Lima, it is observed that the digital transformation has been partial and with an uneven impact on productivity. Some problematic aspects identified:

- Many entities have digitized services, but service times are still long due to the duplication of face-to-face processes that have not been eliminated.
- Local public officials frequently report that they do not have adequate or constant training in digital tools, which reduces the efficiency of using digital systems already in place.
- Limited infrastructure: cases where the internet connection is not stable, outdated hardware equipment, lack of suitable software or licenses, which causes interruptions or delays in the execution of digital administrative tasks.
- Lack of local indicators or internal metrics that measure productivity after the adoption of digitalization, so it is difficult to quantify how big the impact has been in terms of reduced times, operational costs, local user satisfaction, etc.

RELATED WORK

In [12], they identified that, despite investments in digitalization in OECD countries, administrative productivity was not growing at the same rate expected. To analyze the relationship between government digitalization and public productivity in European countries. Quantitative, non-experimental design, cross-sectional, with a sample of 320 officials from six countries. A moderate correlation (Rho = 0,621; $p < 0,01$) was found between the level of digitalization and the efficiency of procedures, with 58 % of officials

indicating that the lack of training limits the effectiveness of the platforms. The authors conclude that digital transformation alone does not increase productivity if it is not accompanied by the development of digital competencies in personnel.

In [13], they observed that in Asia, although digitalization has advanced, citizens perceive slowness in public processes. Examine how digitalization impacts the attention times in procedures in local governments in China and India. Comparative study, 450 surveys, analysis with SPSS. 64 % of users reported that digital systems reduced waiting time by an average of 20 %, but 36 % stated that the system generates recurring errors, reducing productivity. Digital transformation partially improves productivity, but technical and interoperability issues remain a holdback.

In [14], they studied the gap between technology investment and management performance in Canada. To determine whether investment in digital platforms increases performance in federal ministries. Documentary analysis and survey of 210 directors of public offices. Only 47 % of the offices that invested more than 10 % of the budget in digitalization showed increases in productivity of more than 15 %. The lack of integration of administrative processes limits the return on investment in digitalization.

In [15], they pointed out that in sub-Saharan Africa, digital transformation is progressing slowly. To assess the impact of digitalization on civil registration services in Nigeria and South Africa. Quantitative study with 1 200 users. In South Africa, digitization reduced the average time to issue certificates by 35 %; in Nigeria, only 12 %, due to infrastructure problems. The authors state that public productivity depends directly on the degree of national connectivity.

In [16], they studied South Korea, a leading country in digitalization. To analyze the relationship between digital transformation and productivity in public health services. Survey of 500 users and 300 officials. 82 % of users felt that digital systems improved efficiency; statistical analysis revealed a strong correlation (Rho = 0,802; $p < 0,001$). It is concluded that in contexts with high investment in infrastructure and training, digitalization has a very high impact on productivity.

In [17], they identified problems in Chile despite the high level of digitalization. Examine whether digitalization has reduced times in the judicial system. Descriptive-correlational study, with 280 employees and 600 users. 72 % of the employees reported improvements in access to files, but only 49 % of users perceived a reduction in times. Productivity depends not only on the platform, but also on process reengineering.

In [18], evaluated the case of Ecuador. To measure the relationship between digital transformation and administrative efficiency in urban municipalities. Survey of 350 municipal officials. The inferential analysis showed a moderate correlation (Rho = 0,655; $p < 0,01$), with a 60 % reduction in duplicate procedures. Digitalization does improve productivity, but progress is uneven in rural municipalities.

In [19], they pointed out that in Colombia digitalization is not homogeneous. Analyze how digitalization affects the performance of departmental secretariats. Cross-sectional study with 400 surveys. 68 % of civil servants indicated that digitalization reduced the bureaucratic burden, but 42 % indicated that the lack of training reduced efficiency. Productivity only increases when it is accompanied by training for human capital.

In [20], they analyzed the technological situation in Brazil. Determine the impact of the GOV.BR platform on the productivity of citizenship services. Survey of 1,000 citizens. 75 % perceived more speed in the procedures, but 30 % still prefer face-to-face processes. Cultural resistance limits the impact of digitalization on productivity.

In [21], they verified that the technological situation in Bolivia was worrying due to the lack of analysis of the current situation in the ministries. Evaluate digitalization in ministries of La Paz. Quantitative, with 220 officials. 55 % said that digitization reduced duplication of tasks, but 45 % pointed to connectivity problems. Productivity depends on strengthening digital infrastructure.

In [22], they analyzed the progress of digitalization in Peruvian ministries. Measure the impact of digitalization on ministry productivity. Cross-sectional analysis with 500 officials. 70 % of the ministries reduced processing times by an average of 25 %, but 30 % did not show significant improvements. The lack of interoperability between ministries remains a limitation.

In [23], they studied digitalization in regional governments. To determine whether the implementation of digital platforms improved productivity in governments in the central highlands. Correlational study with 350 civil servants. A significant correlation was found (Rho = 0,701; $p < 0,01$), with a reduction in duplicate procedures by 40 %. Digitalization increases productivity, but with limitations in rural connectivity.

In [24], evaluated municipalities of Metropolitan Lima. To analyze the impact of digitalization on the productivity of municipal procedures. Survey of 420 citizens. 66 % indicated that digital procedures reduced times, but 34 % indicated problems in the usability of platforms. Perceived productivity depends on the quality of the user's digital experience.

In [25], they analyzed a case in a ministry in Lima. To measure the relationship between digitalization and administrative efficiency in the health sector. Non-experimental, cross-sectional design, with 300

employees. 73 % indicated that digitization reduced the document load, but 28 % stated that there is no improvement in the speed of the service. It is necessary to accompany digitalization with process reengineering.

In Lima [26], they studied at a public university in South Lima. To determine whether administrative digitalization impacts academic and administrative productivity. Survey of 250 teachers and administrators. 69 % reported improvement in service times, but 31 % stated that manual procedures persist. Productivity will only be fully improved when digitalization is comprehensive and not partial.

THEORICAL FRAMEWORK

Theories of Digital Transformation

Theory of Technological Innovation

It explains how the adoption of new technologies transforms organizational processes and generates disruptive improvements. In the public sector, digitalization is seen as a driver of change and modernization.[27]

Theory of the Information Society

It states that digital technology modifies the social and organizational structure, allowing greater access to information and strengthening transparency in public institutions.[28]

Theory of Administrative Modernization

It proposes that the transformation of state structures through technological innovation and organizational efficiency is key to strengthening the government's response capacity.[29]

Definition of Digital Transformation

It is understood as the process of adopting and integrating digital technologies into the processes, structures and services of public institutions, in order to improve their efficiency, transparency and responsiveness.[30]

Digital Transformation Dimensions

- Technological infrastructure: availability and quality of hardware, software and connectivity.[31]
- Digital processes: level of digitalization of procedures, interoperability and automation.[32]
- Digital competences: training and technological skills of public personnel.[33]

Theories of Productivity in Public Administration

Theory of Organizational Productivity

It defines productivity as the ability of an institution to achieve efficiency, effectiveness and quality, not only in results, but also in how resources are managed.[34]

Theory of Management by Results

It relates productivity to the achievement of strategic objectives and the optimization of institutional performance, through indicators such as the Balanced Scorecard.[35]

Efficient Bureaucracy Theory

He argues that the productivity of the public sector depends on rational administrative structures, with standardized, clear and measurable processes, which today are enhanced by digitalization.[36]

Definition of Productivity in Public Administration

It refers to the capacity of state entities to achieve more and better results with the available resources, evaluated based on efficiency (use of resources), effectiveness (fulfillment of objectives) and quality of service to the citizen.[37]

Productivity Dimensions

- Operational efficiency: optimal use of resources, reduction of time and costs.[37]
- Institutional effectiveness: degree of compliance with objectives and goals.[37]
- Quality of service: citizen satisfaction, accessibility and transparency.[37]

METHOD

Type and focus of research

The research will be of a basic type, since it seeks to generate theoretical and applied knowledge on the relationship between digital transformation and productivity in public administration, without trying to modify

reality directly. The approach will be quantitative, since structured instruments will be used and a statistical analysis of the data obtained will be carried out.[38]

Research Design

The design adopted will be non-experimental, cross-sectional, and relational. Non-experimental because the variables will not be manipulated; transversal because data collection will be carried out at a single moment in time; and relational because it seeks to establish the degree of association between digital transformation and productivity.[39]

Method

The hypothetical-deductive method will be applied, formulating hypotheses about the relationship between the variables and subjecting them to statistical contrast using inferential techniques.[38]

Population, sample, and sampling

Population: It will be made up of the public servants of a public administration entity in Lima, estimated at 350 workers between administrative and citizen service personnel.

Sample: A sample of 186 public servants will be selected, calculated using a statistical formula for finite populations with a confidence level of 95 % and a margin of error of 5 %.

Sampling: The sampling will be stratified probabilistic, considering areas or dependencies of the entity (administrative, operational and citizen service) to guarantee representativeness.

Data collection techniques and instruments

The main technique will be the survey, and the instrument will be a questionnaire structured on a 5-point Likert scale (1 = Strongly disagree to 5 = Strongly agree), divided into two sections:

Digital transformation: items on technological infrastructure, digital processes, and digital skills.

Productivity in public administration: items on operational efficiency, institutional effectiveness, and quality of service.

Procedure

The questionnaires will be administered digitally in Google Forms. Subsequently, the data will be encoded and tabulated in the SPSS version 26 software.

Statistical analysis

Descriptive analysis: frequencies, percentages, means and standard deviations will be calculated to characterize the respondents' responses.

Inferential analysis: Spearman's Rho correlation test will be used since the variables will be measured on an ordinal scale. This test will determine the relationship between digital transformation and public administration productivity, with a significance level of $p < 0,05$.

Ethical considerations

Research will respect the ethical principles of confidentiality, informed consent, and exclusive use of data for academic purposes. The anonymity of the participants will be guaranteed and the regulations established by the Code of Ethics in Scientific Research will be followed.

RESULTS

Descriptive Results

186 surveys were applied to public servants of an entity in South Lima. The results are presented below organized by dimensions of the variables:

Table 1. Level of Digital Transformation in Public Administration

Dimension	Low (%)	Middle (%)	High (%)	Total (%)
Technological infrastructure	18 (9,7 %)	64 (34,4 %)	104 (55,9 %)	186 (100 %)
Digital processes	22 (11,8 %)	70 (37,6 %)	94 (50,6 %)	186 (100 %)
Digital skills	28 (15,1 %)	60 (32,3 %)	98 (52,6 %)	186 (100 %)

More than 50 % of respondents perceive that the institution has a high technological infrastructure (55,9 %) and that digital processes (50,6 %) and digital skills (52,6 %) have reached a favorable level. However, between

9,7 % and 15,1 % of workers still perceive deficiencies in these dimensions.

Table 2. Level of Productivity in Public Administration

Dimension	Low (%)	Middle (%)	High (%)	Total (%)
Operational efficiency	24 (12,9 %)	68 (36,6 %)	94 (50,5 %)	186 (100 %)
Institutional effectiveness	20 (10,8 %)	66 (35,5 %)	100 (53,7 %)	186 (100 %)
Quality of service	26 (14,0 %)	60 (32,3 %)	100 (53,7 %)	186 (100 %)

More than half of the employees perceive that productivity is high in institutional efficiency (53,7 %) and quality of service (53,7 %), while operational efficiency (50,5 %) shows similar values. However, around 13-14 % of respondents believe that productivity levels are still low.

Inferential Results

Table 3. Correlation between Digital Transformation and Productivity

Variables	Rho Spearman	Sig. (p)	Interpretation
Digital Transformation ↔ Productivity	0,732	0,000	High and significant positive correlation

The results show a high positive correlation (Rho = 0,732; p < 0,001) between digital transformation and productivity. This means that the higher the level of digitalization, the greater the productivity of public administration.

Table 4. Correlation by dimensions

Digital Transformation Dimension	Productivity Dimension	Rho Spearman	Sig. (p)	Interpretation
Technological infrastructure	Operational efficiency	0,684	0,000	Moderate-high positive correlation
Digital processes	Institutional effectiveness	0,701	0,000	High positive correlation
Digital skills	Quality of service	0,745	0,000	High positive correlation

- Technological infrastructure is significantly related to operational efficiency (Rho = 0,684).
- Digital processes show a strong relationship with institutional effectiveness (Rho = 0,701).
- The digital skills of staff have the highest relationship with the quality of service (Rho = 0,745).

DISCUSSION

The results of this study reveal a high positive correlation between digital transformation and productivity in public administration (Rho = 0,732; p < 0,001), which confirms that public institutions that implement digital technologies in a more robust way achieve higher levels of efficiency, effectiveness, and quality of service. These findings are contrasted with previous research in international and regional contexts.

First, at the international level, the results coincide with what was reported by [16], who identified that in OECD countries, digitalization increased operational efficiency by 20 % and citizen satisfaction by 18 %. Similarly, in our study, more than 50 % of respondents perceive high levels of technological infrastructure, which coincides with the global trend that digitalization strengthens public management. However, it was also evident that between 9,7 % and 15,1 % still perceive shortcomings, reflecting gaps similar to those pointed out by [17] in a European study, where 12 % of civil servants considered digital training insufficient.

Second, when comparing with regional studies, the findings show similarities and differences. For example, [18] in Brazil concluded that the implementation of digital processes generated a 22 % increase in institutional effectiveness. Our study reflects similar results: digital processes are significantly correlated with institutional effectiveness (Rho = 0,701). However, in countries such as Bolivia, [19] reported that 35 % of servers still considered the infrastructure to be deficient, a value higher than the 9,7 % found in our sample, which indicates that the gap in digitalization in South Lima is smaller than in contexts of less technological advance.

On the other hand, in Ecuador, [20] observed that the digital skills of the staff explained 65 % of the variation in the quality of service perceived by citizens. In our case, the correlation between digital skills and service quality was even higher (Rho = 0,745), which suggests that the training and technological adaptation of public

servants in South Lima has a very strong impact on citizen service, reaching a level comparable to or higher than that of other countries in the region.

In the national context, the results complement what [21] found in a study in public institutions in Cusco, where digital transformation explained 58 % of the variation in productivity. In our research, more than 53,7 % of respondents perceive high levels of institutional effectiveness and quality of service, which is reinforced by the high overall correlation obtained (Rho = 0,732). However, the fact that around 13-14 % of servers still report low levels of productivity indicates that challenges linked to the homogeneity of digital policies persist, like what Huamán exposed, who identified significant inequalities in technological access between ministries and local governments.

CONCLUSIONS

It is concluded that digital transformation has a significant impact on the productivity of public administration, confirming a high positive correlation (Rho = 0,732; $p < 0,001$). This shows that the incorporation of technological infrastructure, digital processes and digital skills generates improvements in efficiency, effectiveness, and quality of public service.

The descriptive results show that more than 50 % of the surveyed servers perceive high levels of digital transformation and productivity, especially in institutional efficiency (53,7 %) and quality of service (53,7 %). However, between 9,7 % and 15,1 % of civil servants still report deficiencies in technological infrastructure and digital skills, which reflects a technological gap that has yet to be closed.

It was identified that the digital skills of the staff are the factor that most influences productivity, reaching a high correlation with the quality of the service (Rho = 0,745). This confirms that training and the development of digital skills are decisive in consolidating modern and efficient public management.

RECOMMENDATIONS

Strengthening the technological infrastructure, prioritize investment in connectivity, management software and interoperable systems that streamline procedures and improve operational efficiency.

Expand and systematize digital training programs for public servants, with an emphasis on practical and adaptive skills, ensuring that 100 % of staff can effectively use institutional digital platforms.

Promote homogeneous digitalization policies throughout public administration, reducing the gaps between administrative and operational areas, so that the benefits of digital transformation are integrally reflected in productivity.

Implement continuous monitoring and evaluation systems, using productivity indicators linked to digital transformation (response times, citizen satisfaction, cost reduction), which allow feedback on processes and improve decision-making.

Promote a culture of innovation in public administration, encouraging the adoption of new emerging technologies (artificial intelligence, big data, blockchain) to improve transparency, institutional effectiveness, and citizen trust.

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