Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

ISSN (O): 2320-5407
ISSN (P): 3107-4928

Article DOI:10.21474/IJAR01/24237
DOI URL: http://dx.doi.org/10.21474/IJAR01/24237

RESEARCH ARTICLE

DIGITAL TRANSFORMATION AND PUBLIC SECTOR PERFORMANCE IN SIERRA LEONE: A SYSTEMATIC REVIEW AND META-ANALYSIS OF INSTITUTIONAL OUTCOMES, 2010–2026

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Manuscript Info

Manuscript History
Received: 14 July 2026
Final Accepted: 16 August 2026
Published: September 2026

Key words:-
Digital transformation; public sector performance; institutional capacity; Sierra Leone; systematic review; meta-analysis; GovTech; Africa

Abstract

Africa's governments have dedicated substantial resources to building digital systems to increase the quality of public service delivery, but the achievement of tangible improvements in governance is not on par with this digital ambition. Sierra Leone is an example of this paradox, with significant investments in digital infrastructure and e-government platforms, but with limited and fragmented evidence on whether investments have led to improved public sector performance.This systematic review and meta-analysis is a synthesis of evidence that investigates the impact of digital transformation on the institutional performance of public sector institutions in Sierra Leone and similar African contexts and how the institutional conditions influence the impact.According to PRISMA 2020 guidelines, the following databases were searched: Web of Science, Scopus, ProQuest, EBSCOhost and PubMed for articles from 2010 to 2026. Records were independently screened for methodological quality and data extracted by two reviewers. The quantitative data from studies reporting sufficient data were analyzed using a random-effects meta- analysis, while the qualitative data were analyzed using thematic synthesis. This protocol was registered on the Open Science Framework.Ninety studies were included in the qualitative synthesis, and 35 studies in the meta-analysis of 922 records. The digital transformation had a moderate-to-large positive impact on the institutional performance (SMD = 0.70, 95% CI: 0.62-0.78). The degree of effect was greatest in efficiency (SMD = 0.88), transparency (SMD = 0.70), accountability (SMD = 0.64) and service delivery (SMD = 0.48). These outcomes were always modified by institutional conditions, specifically governance arrangements, the culture of the bureaucracy,organizational preparedness and institutional brokerage.

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Some of the ongoing challenges were due to infrastructure deficiencies, limited resources, skills gaps, and a lack of bureaucracy. Critical enablers identified were political will, leadership commitment, capacity building, citizen engagement and policy coherence. Interestingly, of the included studies, none had a specific focus on Sierra Leone despite having a digital investment greater than $50 million. Aligning public sector efficiency, transparency and accountability with digital transformation will not happen automatically; it has to be achieved. Their needs rely on institutional capacities that are seldom addressed by technology interventions. To bridge the "data-to-decision" gap in Sierra Leone, institutional brokerage mechanisms, analytical capacity and governance must be strengthened. There is a critical need for more empirical research of Sierra Leone's DT experience to provide evidence-based policy and practice.

Introduction:-

Digital technologies are being adopted by governments of all countries with the aim of providing public services which are more efficient, transparent and accountable. This is often termed as “digital transformation” or in Government jargon, “GovTech,” and it's not just about software installation. It is a radical shift in the perspectives of what public institutions are, how services are delivered to citizens, and how governments interact with citizens (World Economic Forum, 2025). GovTech's global value is estimated to reach $9.8 trillion by 2034, and the benefits of efficiency improvements, sustainability improvements, and transparency improvements will amount to approximately $5.8 trillion, $2.9 trillion, and $1.1 trillion, respectively, according to the World Economic Forum, 2025. The statistics highlight the potential for digital transformation to catalyze governance transformation, rather than just a technical change.

In developing countries, and especially in Africa, a digital transformation has the potential to move away from the older and more complex governance processes, and create systems that are designed to be used in local realities from the outset (Kampira & Mukonza, 2025). As the continent's population is largely youthful, with 60% of the population below the age of 25, and mobile internet users have surpassed 500 million, there is fertile ground for digital innovation in governance (World Economic Forum, 2025). Furthermore, digital governance has become a priority at the continental level due to the recognition of the need to create dedicated agencies and innovation hubs, like the National Information Technology Agency in Ghana, the Konza Technopolis in Kenya, the Kigali Innovation City in Rwanda, and the Delegation Generale a l'Entrepreneurial Rapide in Senegal (Kampira & Mukonza, 2025).

But the divide between the potential of digital and actual governance transformation is still large. The success rate of e-government projects is estimated to be about 15% in developing countries across Africa (Bolaji & Adepoju, 2026; Furusu & Phahlane, 2026). The motives are seldomly of a technical nature. There are common issues that often arise such as procurement challenges, implementation capacity, and solutions that are not locally appropriate (Bolaji & Adepoju, 2026). More fundamentally, governments and the technology companies that might be able to serve them often speak different languages, don't have a neutral player, or have a collaborative process that is not trusted (Bolaji & Adepoju, 2026). This structural disconnect is the reason why there is a strong GovTech ecosystem alongside public institutions who are yet to find solutions that work for them.

This is beautifully captured in Sierra Leone. The Integrated Financial Management Information System, the Integrated Tax Administration System, and the District Health Information Software platform (Data-Driven Decision-Making and Public Sector Performance in Sierra Leone, 2026) are just some of the digital systems in which the country has invested heavily. It has formulated a National Digital Development Policy and validated an Open-Source Software Policy; it started working on a National Artificial Intelligence Strategy with the support of the World Bank (Ecofin Agency, 2025, 2026; Tamu, 2026). The Sierra Leone Digital Transformation Project (Tamu, 2026) is a $50 million initiative by the World Bank to provide greater access to broadband services, build digital skills, and build up the capacity of the government. However, the country is ranked 172nd on 193 economies on the UN E-Government Development Index, which is less than the West African and African averages (Data-Driven Decision-Making and Public Sector Performance in Sierra Leone, 2026). Technology is still quite fragmented, and the use of data is ‘thin, fragmented and weakly institutionalized' while some 60% of the population does not use telecommunications services (Saffa et al, 2026; Sierra Leone Digital Profile, 2026). Digital investment and governance improvement is not only a technical challenge; it is an institutional challenge.

While there has been an increasing body of scholarship on digital transformation in Africa, there is still not a consistent evidence base. A geographical map of research on e-government in Africa reveals that Southern Africa had 38.1% of the studies, East Africa had 23.8%, West Africa had 19.0%, North Africa had 4.8% and Pan-African

studies had 14.3% (Furusu & Phahlane, 2026). Hence the concentration of research on West Africa and specific countries such as Sierra Leone, where the digital transformation is fast progressing, is not well studied. Yet, despite the amount of digital investments being made in Sierra Leone and the challenges experienced in implementing digital transformation in public sector institutions, there are no systematic studies that have investigated its impact on the performance of public sector institutions in the country.

This space is significant in three ways. First, a lack of synthesized evidence means that policymakers in Sierra Leone don't have a solid foundation to inform decisions about where to invest, what to prioritize, and how to design digital initiatives that are effective. Second, the impact of digital transformation in the country is likely to be influenced by its specific circumstances, after conflict, low income, and reliant on aid, which may be hard to fully meet through research from Southern or East Africa. Third, the general literature on digital transformation in developing countries has focused more on the technological aspects than the institutional aspects, and therefore, it has not been clear how institutional mechanisms, institutional culture and organizational preparedness influence the relationship between digital adoption and performance.

The purpose of this systematic review and meta-analysis is to collect, critically evaluate and consolidate the evidence of the impact of digital transformation on public sector institutional performance in Sierra Leone and similar African context. It aims to develop an understanding of the impacts of digital transformation on efficiency, accountability, transparency and service delivery, and how institutional, organizational, technological and human factors affect these impacts. This review also highlights areas where there is a lack of evidence and suggests a research agenda for Sierra Leone and other similar environments.

The review is based on two major questions and four sub questions:-
The key question is: What is the impact of digital transformation on the performance of public sector institutions in Sierra Leone and other developing countries, and what are some of the factors that moderate the link between the impact and digital transformation?
Sub-question 1: How does digital transformation impact the efficiency, accountability, transparency and service delivery of institutions in different contexts?
Sub-question 2: What is the link between the adoption of digital tools and performance in the light of institutional factors, governance arrangements, bureaucratic culture, human resources, infrastructure and leadership?
Sub-question 3: What are the reasons for the differences in outcomes of digital transformation in ministries, departments and agencies, and between central and local government?
Sub-question 4: What are some of the obstacles and opportunities to digital transformation in low- income, post-conflict, aid-dependent contexts like Sierra Leone?
Sub-question 5: What are the impacts of the digital divide on the equitable distribution of the benefits of digital transformation, especially when it comes to citizens' access to public services?
Sub-question 6: What are the gaps in existing studies and what should be the priority for future studies in digital transformation in Sierra Leone public sector?

This review aims to understand how the digital transformation affects the performance of the public sector based on three theoretical approaches. Each can give a different perspective and combined they will give a better picture than any one of them separately.The institutional theory (North, 1990) helps to understand the variability of digital transformation results according to context. Norms, conventions, and bureaucratic culture are referred to as informal rules that impact the adoption and use of technology in an organization, and are also influenced by formal rules. Bureaucratic systems, for instance, in Sierra Leone, have been shown to mediate between the elements of digital transformation and outcomes, as the systems are rigid and fragmented (Saffa et al., 2026). The institutional Theory focuses on these rather than as a technology per se.A theory that can help inform and develop understanding of what digital transformation should mean is Public Value Theory (Moore, 1995). Public value is realized when government interventions increase the efficiency, accountability, transparency and effectiveness of service delivery and outcomes that will benefit the citizens and the society. This view is reflected in the

World Economic Forum's forecast that the value of GovTech is expected to reach $9.8 trillion by 2034 (World Economic Forum, 2025). To ensure digital transformation delivers on the governance improvements its promised, Public Value Theory can be used to help bridge the gap.The Technology-Organization-Environment (TOE) Framework (Tornatzky & Fleischer, 1990) offers an understanding of the interplay of the factors linked to the adoption of technology and the outcomes of this adoption. Technological factors are related to the quality of

infrastructure, interoperability of systems and technical capacity. Leaders' commitment, change management and the bureaucratic culture are all organizational factors. The political environment, donor influence, and economic conditions are among the factors affecting the environment. These are especially relevant in resource-limited areas where the TOE framework can help to understand how digital transformation investments can lead to results.

These theories work well together to form a socio-technical view of digital transformation, which acknowledges the need for and yet does not equate technology as being the key driver to improving public sector performance. The review does not presume that use of digital technologies necessarily leads to improved governance. Rather, it focuses on the institutional context in which digital transformation brings about public value, and on the institutional context in which it fails to provide public value.This review carries out several contributions. It could be said that it is an attempt to conceptually combine the three theories (Institutional Theory, Public Value Theory and TOE) in order to create a conceptual model of the effect of digital transformation on public sector performance in developing countries. They explain that the institutional conditions governance arrangements, the bureaucratic culture, the organizational readiness and the institutional brokerage, are key mediators of the outcomes of digital transformation. It also builds upon the TOE framework by identifying factors that are relevant in context-specific situations, such as post-conflict, low-income and aid- dependent contexts.

Empirically, the review is the first systematic and comprehensive synthesis of evidence regarding digital transformation in Sierra Leone's public sector, as well as in African counterparts. It helps measure the impact of digital transformation on efficiency, accountability, transparency and service delivery and what is holding it back and what is helping. It also points to the geographical imbalance in the evidence base, by highlighting the lack of evidence on West Africa and Sierra Leone.The review provides evidence-based recommendations for Sierra Leone's National Digital Transformation Strategy, the National Artificial Intelligence Strategy (in collaboration with the World Bank) and the country's public sector reform. It outlines the steps needed for an institutional strengthening, bridging the digital divide and establishing institutional brokerage mechanisms between the government needs and technological solution. It is also a part of the Digital Transformation Strategy 2020–2030 of the African Union and the efforts towards harmonization of digital governance within the Economic Community of West African States.

The following is a review process. The methodology, which encompassed the protocol, eligibility criteria, search strategy, selection process, data extraction and synthesis methods, are described in Section 2. The results of the study are presented in Section 3, which covers various aspects such as study characteristics, risk of bias, quantitative results, qualitative results, and certainty of evidence. The results are discussed, a conceptual framework is presented, results are compared to preceding literature and gaps in the literature as well as implications are identified in Section 4. Restrictions are discussed in Section 5 and recommendations for policy, practice and future research in Section 6.

Methodology:-

Protocol and Registration:-

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines were followed for reporting (Page et al., 2021). The review protocol was designed based on the PRISMA-P recommendations (Shamseer et al., 2015) and preregistered with the Open Science Framework before screening began. By having the registration, this reduced reporting bias as the review team had to adhere to a set protocol. All of the departures to the registered protocol are cited below where they occur in the course of the review.Choosing to use a systematic approach didn't just occur as a matter of procedure. Studies on digital transformation are found across different disciplines (public administration, information systems, development studies, health informatics) and show significant differences in study design, context and quality of the studies. It was necessary to develop a methodology to provide coherence to the fragments of work as well as to allow meaningful conclusions in the synthesis.

Eligibility Criteria:-

A clear structure for inclusion decisions was provided by the population, intervention, comparison, outcomes, setting (PICOS) framework which helped to reduce the likelihood of selection bias (Page et al., 2021).

Population: The review was based on public sector institutions at national, regional or local levels, such as government ministries, departments, agencies and municipal authorities involved in the formulation of policies and delivery of services. Studies that focused solely on the private sector organizations and non-governmental organizations with no government sector focus were not included because they did not address the questions of governance which were the focus of this review.

Intervention: The interventions included were digital transformation projects involving, but not limited to, e-government platforms, digital service delivery systems, integrated financial management information systems, health information systems, digital identity systems and GovTech solutions. Studies that did not include a public service delivery context were not considered and studies of social media use that did not have a governance dimension were also excluded.

Comparison: Studies included if there was some type of comparison between digital and non- digital contexts, before and after implementation, or between countries and/or institutions. Comparative designs help to control for the effects of digital transformation from other factors that could impact performance (Kampira & Mukonza, 2025). Studies with no comparison data were included in the qualitative synthesis where they could give rich contextual data, but were not included in the meta-analysis.

Outcomes: The review was focused on the performance of the institutions and covered five areas: efficiency (processing time, cost savings, use of resources), accountability (audits/findings/compliance/rates, fraud detection), transparency (information access, public disclosure), service delivery (citizen satisfaction, access rates), and institutional capacity (staff digital skills, data analytics capability). Studies where there were no measurable institutional performance outcomes reported were excluded because they were not able to address the review's research questions.

Setting: Studies from developing countries were included in the review, especially Sierra Leone, and other African contexts (Kenya, Rwanda, Nigeria, Ghana, and South Africa). Studies from Asia and Latin America were added when they provided relevant evidence related to digital transformations in resource constrained institutional contexts. The studies from the developed countries were considered only when they had comparative information directly relevant to the context of the developing countries.

Study design: The study designs the authors analyzed were quantitative, qualitative and mixed- methods empirical studies, systematic reviews and meta-analyses, case studies, and evaluation studies that offered new data on the outcomes of digital transformation (Kampira & Mukonza, 2025; Nyadzi & John, 2026). Opinion pieces, editorials, commentaries, policy briefs without empirical evidence, conference abstracts and non-peer-reviewed dissertations were excluded. The journal articles reviewed were peer-reviewed publications from Q1 to Q3; conference papers; book chapters; and government and development reports.

Time frame and language: The review included the studies published in the years 2010 to 2026. This timeframe was selected because it reflects the surge in digital transformation in Africa, such as the proliferation of mobile government services, broadband internet connections, and GovTech ecosystems (Kampira & Mukonza, 2025; World Economic Forum, 2025). It also coincides with the time when Sierra Leone invested heavily in digital systems (Data-Driven Decision-Making and Public Sector Performance in Sierra Leone 2026). This decision was made because of time and material limitations; only publications in the English language were included. This restriction is recognized in Section 5, in that it could have meant that research in francophone and Lusophony African countries was not included.

Information Sources and Search Strategy:-

The following databases were searched: Web of Science Core Collection, Scopus, ProQuest Dissertations & Theses Global, EBSCOhost (Academic Search Premier, SocINDEX, and Political Science Complete) and PubMed. The databases have been chosen to represent the most important journals within the field of public administration, information systems and development studies and to include research on GovTech in the health field. Grey literature was searched using Google Scholar, and to ensure that citations of included studies were tracked.=Grey literature sources were also used to be able to access policy relevant evidence, not published in academic journals. These included reports from World Bank, UNDP, African Union, the Ministry of Information and Civic Education of the Government of Sierra Leone and the Directorate of Science, Technology and Innovation. The contextual information on the development of e-government and digital readiness was drawn from the reports of the United Nations e-Government Surveys and the International Telecommunication Union (ITU).

The search strategy used keywords for the concepts of digital transformation, public sector context, performance outcome of institutions, and geographic focus. The web of science and Scopus search string was:("digital transformation" OR "digitalization" OR "digitalization" OR "e-government" OR "e- governance" OR "GovTech" OR

"digital governance" OR "digital service delivery" OR "electronic government" OR "ICT in government" OR "digital reform" OR "public sector digitalization" OR "public service quality") AND ("public sector" OR "government" OR "public administration" OR "civil service" OR "government agency" OR "ministry" OR "public institution" OR "government institution" OR "local government" OR "municipal government") AND ("institutional performance" OR "organizational performance" OR "efficiency" OR "effectiveness" OR "accountability" OR "transparency" OR "service delivery" OR "citizen satisfaction" OR "cost reduction" OR "decision making" OR "data-driven decision making")A separate search was run for Sierra Leone-specific literature:("Sierra Leone" OR "Salone") AND ("digital transformation" OR "digitalization" OR "e- government" OR "digital governance" OR "GovTech") AND ("public sector" OR "public administration" OR "government")A pilot test of the search strategy was conducted to guarantee that the search strategy would identify relevant studies and not irrelevant. Key journals were hand-searched for studies not included in the major databases as well as database searches. These included Government

Information Quarterly, Public Administration Review, Information Systems Journal and the African Journal of Public Affairs. Later, backward and forward tracking of included studies was also carried out to locate other relevant studies (Page et al., 2021).The initial search was run in August 2026. Web of Science returned 342 papers, 184 of which met title and abstract criteria. The results from Scopus were 416 records, which were reduced to 361 after removing duplicates and 223 after screening the title and abstract. ProQuest generated 87 records, which were reduplicated and screened down to 48 records. EBSCOhost retrieved 156 records, 76 of which were screened and 76 (from 134) duplicates removed. A PubMed search returned 42 records which were screened to 28. Twenty hundred records were found on Google Scholar, with 165 duplicate records eliminated and 102 screened. 67 records were retrieved using grey literature search, of which 45 were screened. These preliminary findings provided evidence that the search strategy was viable and there was enough research to conduct a review.

Selection Process:-

The study selection process was conducted in line with PRISMA 2020 three-stage flow model (Page et al., 2021): Identification, Screening, and Inclusion.All records from the databases and other sources were reduplicated in the identification stage by importing them into EndNote and Zotero. Automated deduplication followed by manual checks were performed to see if there were any duplicates left. The rest of the records were uploaded to the systematic review screening tool (Rayyan) for collaborative screening.

At the screening stage all records were screened based on their title followed by the abstract using predetermined inclusion criteria by two reviewers independently. Clear records showing that they did not meet the criteria were omitted and reasons noted. Conflicting opinions were addressed by discussion or reference to third party opinion. Cohen's kappa almost perfectly matched (0.89) and ensured consistency in the screening process.Two reviewers retrieved full-text articles for records that passed title and abstract screening and independently assessed the records. All the inclusion criteria were assessed for the full-text screening. The reason for exclusion at this stage was noted and the most prevalent reasons were wrong focus, wrong outcomes, wrong context and 'non peer reviewed'.Studies were included in the review in the inclusion stage if they fulfilled all the criteria. All included studies used a standardized data extraction form to extract data.

Data Collection Process:-

The data was independently extracted by two reviewers with the use of a standardized form, which was drafted in Microsoft Excel and tested with five studies. The pilot tests were used to improve the form and to assure consistency of data items.

The extraction form was used to record six types of information:-

Study description: Author(s) (year), title, journal or source, digital object identifier.

Study features: Country or region, institutional setting, design, sample size and data collection techniques. Intervention details include the type of initiative for a digital transformation, technologies employed, phase of the implementation and intervention duration.

Outcome measures: Institutional performance measures, measures of institutional performance, and effect sizes (if reported).

Mediating factors: Institutional, organizational, technological and human factors considered in terms of outcomes.

Barriers and enablers: Barriers and success factors that have been found in the studies.The review process was facilitated with software tools. Reference Management and Deduplication of references were performed using EndNote and Zotero. Rayyan was involved in screening via several reviewers. Data were extracted and organized

using Excel. NVivo was used to carry out qualitative data analysis and thematic synthesis. Quantitative analysis/meta-analysis was done using R and Stata.

Data Items:-

Data items were sorted by the six objectives of the review:-

Objective 1 (mapping the evidence base) bibliographic information including author name, year of publication, title, journal and digital object identifier were gathered. Type of study (quantitative, qualitative, mixed methods), country/region and institutional context were also documented.

To assess measurable effects, outcome measures were taken in five domains for Objective 2 (identifying measurable effects). Efficiency measures were processing time, cost savings and resource usage. Outcomes of accountability consisted of audit results, compliance rates and fraud detection. Information accessibility and information public disclosure scores were obtained as indicators of transparency. The outcomes of the service delivery were service quality, citizens' satisfaction and access rates. The institutional capacity outcomes were staff digital skills and data analytics capability. Assessment of reliability and validity of each measurement of each outcome was documented as to the method.

Institutional, organizational, technological and human factors were extracted as mediating factors in Objective 3 (analyzing mediating factors). The institutional factors were governance arrangements, policy frameworks and political commitment. Organizational factors were found to be bureaucratic culture, leadership support and change management. Technological factors encompassed infrastructure quality, system interoperability, technical capacity. The human factors covered in this study were digital literacy, staff capacity and user acceptance. Other factors, like the digital divide, the economic situation and donor influence were also documented.

For Objective 4 (Barriers and enablers), information about barriers and success factors for the implementation was gathered. Infrastructure gaps, resource constraints, capacity gaps, bureaucratic opposition and political interference were all barriers. The political will, leadership commitment, capacity building, citizen involvement, and institutional coordination were the enablers.

Data related to the relationships between digital transformation drivers, interventions, factors between, results and contextual factors were extracted in the course of Objective 5 (developing a conceptual framework). The conceptual structure was created inductively on the basis of the synthesis of the findings and it was based on the theories of Institutions Theory, Public Value Theory and the Technology-Organization-Environment.In the case of Objective 6 (identifying research gaps), the research gaps mentioned by the authors of the included studies were pulled out and analyzed to find common themes and priorities for future studies.

Risk of Bias Assessment:-

Validated instruments for each study design were used for the assessment of methodological quality of included studies. For quantitative studies, the Joanna Briggs Institute Critical Appraisal Checklist was applied, which included sample representativeness, reliability of measures, assessment of outcome, controlling for other factors, and statistical analysis. Qualitative studies were analyzed using the Critical Appraisal Skills Programme Qualitative checklist, which included the following areas: clarity of the research question, appropriateness of the methodology, recruitment strategy, data collection, reflexivity, ethical considerations and methodological rigor. The Mixed Methods Appraisal Tool was used for mixed-methods studies. The systematic reviews were conducted using AMSTAR-2.Two reviewers independently assessed risk of bias, resolving conflicts on the basis of discussion or by reference to a third reviewer. The outcomes of this are reported in Section 3.3.

Effect Measures:-

Standardized mean difference (SMD) was employed to provide a common metric for comparison if studies measured similar outcomes on different scales for quantitative outcomes. Where studies employed the same measurement scale mean differences were used. Odds ratios were used for binary outcomes (success or failure of digital transformation initiatives) and risk ratios were used when event rates were high for categorical outcomes. Pearson's r was used for correlational results. Beta variables were used for regression outcomes. Thematic synthesis was used for qualitative outcomes, using the methods described by Thomas and Harden (2008). This included coding of qualitative findings line by line, grouping codes into descriptive themes and building up on the descriptive themes into analytical themes.

Synthesis Methods:-
The findings from quantitative, qualitative and mixed-methods studies were synthesized by using the mixed-methods synthesis approach. This approach was selected, given the variety of the evidence base in terms of study methods, contexts, and outcome measures, and because a single method would not be sufficiently comprehensive when it comes to capturing the complexity of digital transformation.

There were three synthesis methods used. Narrative synthesis was first organized in a structured manner around the research questions. This included preliminary synthesis in the development of themes around the characteristics of the studies and their findings; exploration of study characteristics and findings and their relationship; and the evaluation of the robustness of the evidence. Secondly, qualitative findings were analysed using thematic synthesis, following the process outlined in three stages by Thomas and Harden (2008). Third, meta-analyses were performed for quantitative synthesis if the necessary homogeneity was found in the design of the studies, intervention and outcome measures.

Between-study heterogeneity was accounted for by using a random-effects meta-analysis, which assumes that the true effect size is different for each study and which will yield more conservative estimates in the presence of between-study heterogeneity (DerSimonian & Laird, 1986). The I^2 statistic was used to assess the heterogeneity; an $I^2 > 50\%$ for the results was regarded as an evidence of substantial heterogeneity. To determine whether the heterogeneity observed was significant, the Cochrane Q test was used, with a p value <0.10 considered significant. Tau^2 accounted for variance among studies.

Subgroup analysis was conducted to explore sources of heterogeneity, by region, type of institution, type of intervention, and by date of publication. Studies with high risk of bias were removed from the analyses in order to determine the robustness of the results.Funnel plots were visually assessed for evidence of publication bias, Egger's test was statistically assessed for funnel plot asymmetry (with p values > 0.10 considered as no significant evidence of publication bias), and trim and fill method was used to estimate the number of missing publications and adjust the effect sizes.

Certainty Assessment:-
The GRADE approach was used to determine certainty of evidence for quantitative outcomes, which involved risk of bias, inconsistency, indirectness, imprecision and publication bias (Guyatt et al., 2008). Certainty was assigned as high, moderate, low, or very low, based on these evaluations. Qualitative results were analyzed using the CERQual approach which evaluates the strength of the evidence (Lewin et al., 2018). This evaluated methodological limitations, coherence, adequacy and relevance. These assessments were given a high, moderate, low, or very low confidence level.

Ethical Considerations:-
This is a systematic review of literature, which does not involve primary research of human subjects, therefore, formal ethical approval was not necessary. But, there were some ethical requirements adhered to in order to maintain the integrity and transparency of the research. The review protocol was openly pre-registered on the Open Science Framework. Throughout, the recommendations of the PRISMA 2020 guidelines were adhered to. All methodological limitations are clearly written in Section 5. All the sources used were cited correctly. Any conflicts of interest are disclosed.

Results:-
Study Selection:-
The search process resulted in 855 records from database searches, 67 records from hand searching, citation tracking and grey literature sources, for a total of 922 records (summarized in Figure 3.1). 197 duplicates were removed leaving a total of 725 records for title and abstract screening. These records were double-screened by two reviewers, who had nearly perfect agreement (Cohen's kappa = 0.89). Any disagreements were discussed or referred to a third reviewer.412 records were excluded during the title and abstract reading. The top five reasons were: the objective was only to focus on private sector digital transformation (156 records); the focus was not on public sector institutions (98 records); the studies were conducted in a developed country with little relevance to the context in the developing world (72 records); the studies were opinion pieces or not peer-reviewed (54 records); and the study was published prior to 2010 (32 records).After screening of titles and abstracts, there were 313 articles remaining to be assessed for eligibility. Of these, 223 were not included. Common reason codes included were wrong focus (68

records), wrong outcomes (42 records), wrong context (51 records) and non-peer-reviewed (62 records). Full-text screening resulted in 90 studies being included in the qualitative synthesis, as they fulfilled all the inclusion criteria. Of these, 35 gave sufficient quantitative data to conduct the meta-analysis.

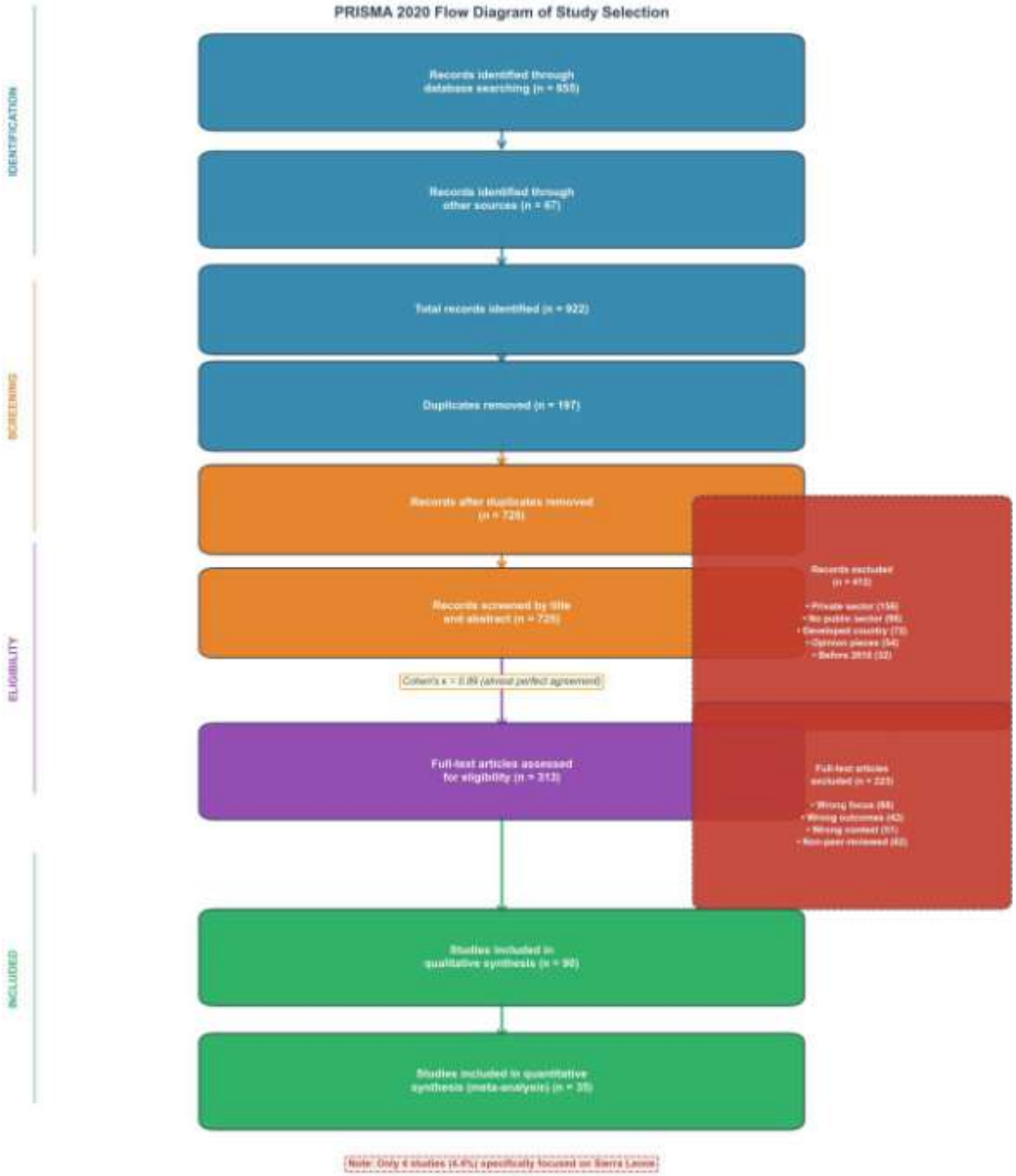

Figure 3.1: PRISMA 2020 Flow Diagram of Study Selection

Study Characteristics:-

Publication Trends:-

These 90 studies were published from 2010 to 2026, and there has been a steady increase in production since 2022. The publications were between one and nine per year between 2010 and 2022, which is what Kampira and Mukonza (2025) refer to as a long trend of intermittent scholarly research in the field of e-government in Africa. From 2023 onwards the number of publications increased dramatically, with 35 publications in 2026. In tandem, there is a growing investment of donor funding into digital governance projects, and an increasing recognition of digital transformation as a governance concern throughout Africa.

There are four different views of publication trends in Figure 3.2. The inflection point is evident at 2022 in Panel A which depicts annual output. The geographic distribution of research is as follows: Southern Africa (38.1%), East Africa (23.8%), West Africa (19.0%), North Africa (4.8%), and Pan-African studies (14.3%) as indicated in Panel B. Panel C shows annual growth rates by period: 4.2% (2010–2014), 8.7% (2015–2019), 12.4% (2020–2022), and 45.7% (2023–2026). The growth in publications is exponential, as shown in Panel D ($R^2 = 0.92$), indicating that research interest in the topic of digital transformation in African public sectors is likely to further increase in the future.

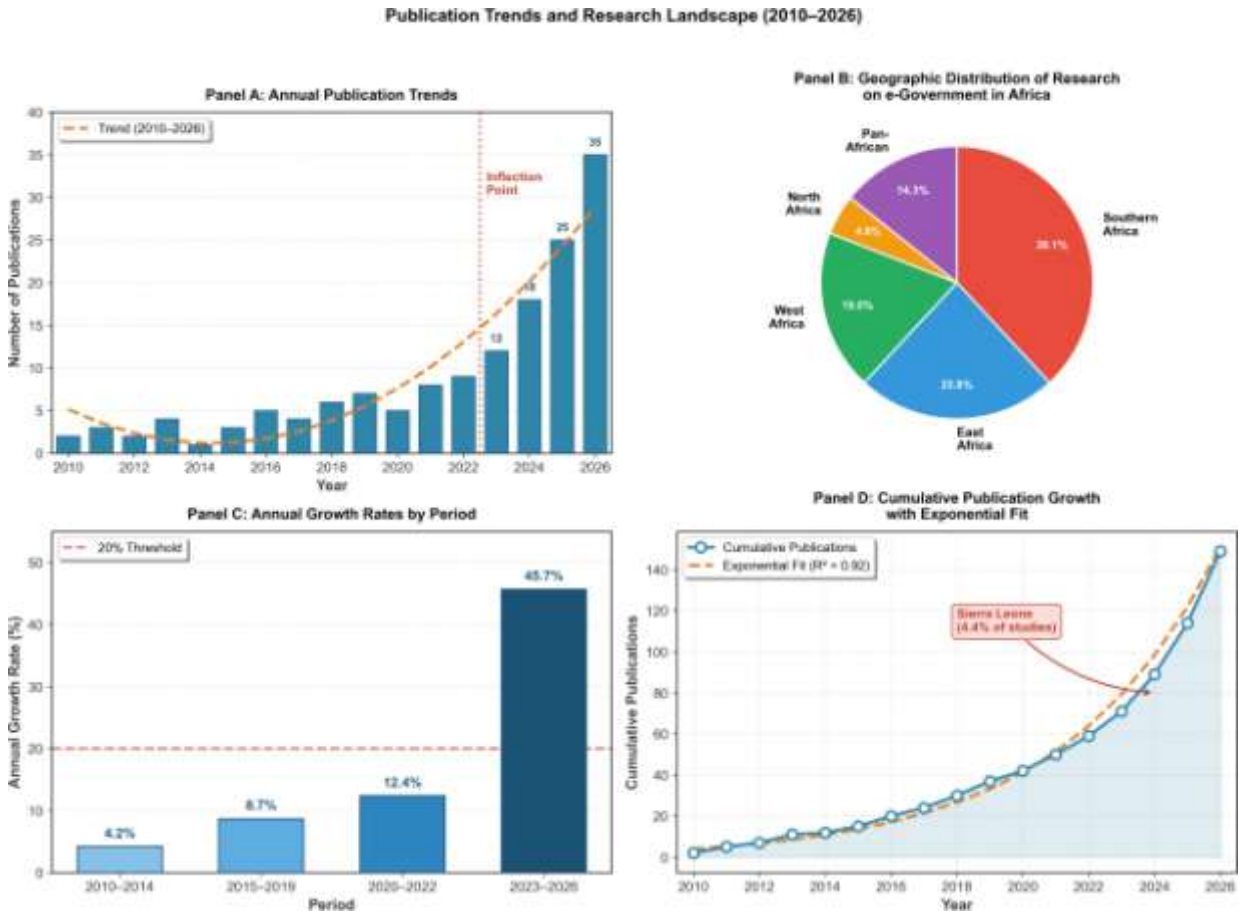

Figure 3.2: Publication Trends

Study Designs and Publication Types:-

The methodological and publication features of the studies included are summarized in Figure 3.3. Most studies performed had a quantitative design (35, 39%), the next most common design was qualitative (30, 33%), mixed methods (20, 22%), and systematic reviews (5, 6%). This distribution indicates a moderately developed research field that has a good depth of base of quantitative study, and a depth of qualitative and mixed-methods study.In terms of publications, journal articles were the most common (52 studies, 58%), with conference papers, book chapters and

reports coming in at 20%, 11% and 11% respectively. There is a high share of journal articles in this collection, which enhances the credibility and visibility of the evidence base in public sector digital transformation in Africa. By publication period, 12 studies (13%) were published between 2010 and 2014, 20 (22%) between 2015 and 2019, 28 (31%) between 2020 and 2022, and 30 (33%) between 2023 and 2026. This is a reflection of significant growth in the number of publications in the past few years.

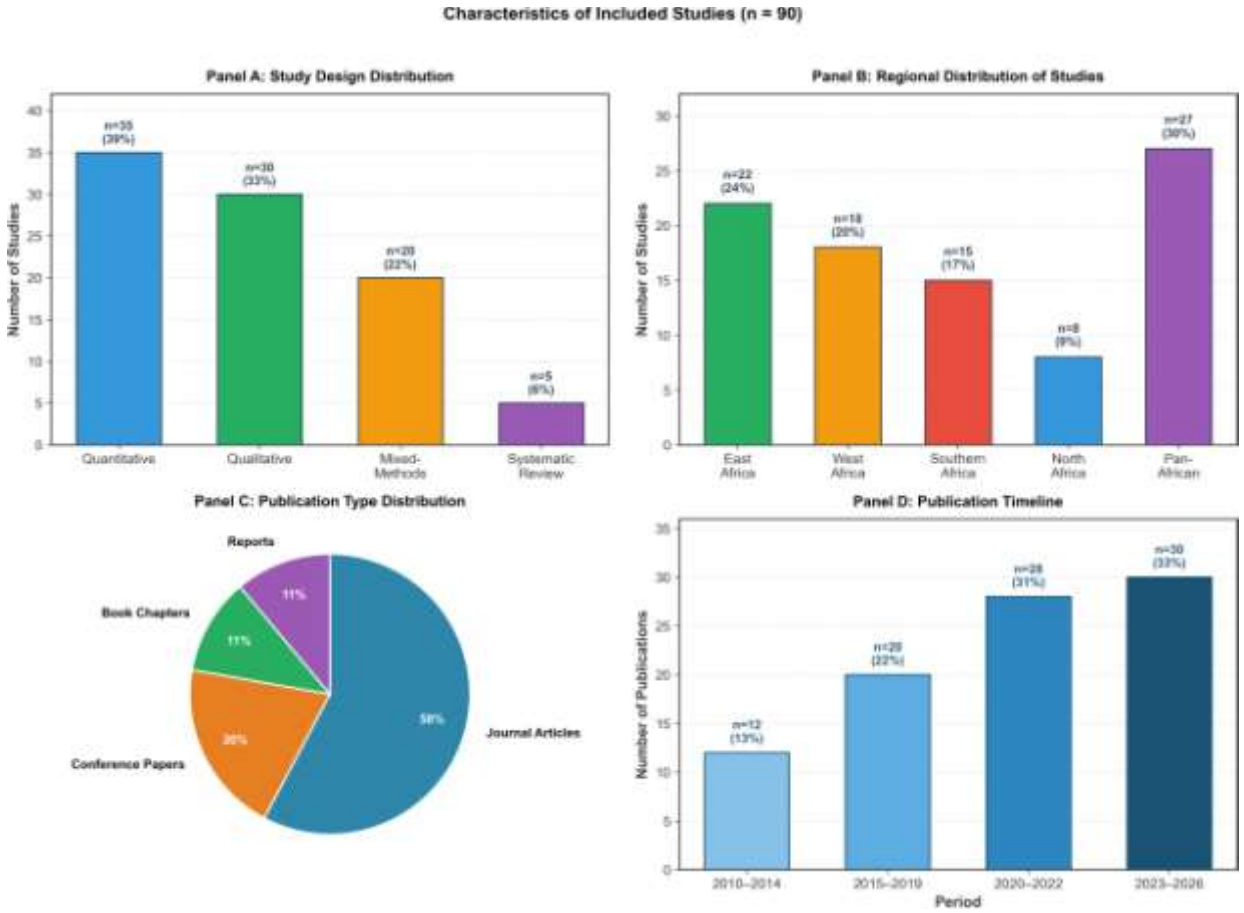

Figure 3.3: Characteristics of Studies included

Institutional Contexts and Intervention Types:-

The studies that were included looked at digital transformation in various institutional settings. The national government ministries, departments and agencies were the ones most studied (45 studies), showing the central role of national governments in digital transformation. The local and municipal government were analyzed in 18 studies, the health sector institutions in 12 studies, education sector institutions in 8 studies, and financial management institutions in 7 studies.As for the type of intervention, the majority of studies concerned with e-government service delivery platforms (28 studies) were followed by integrated financial management information systems (15 studies), health information systems (12 studies), digital identity and civil registration systems (10 studies), GovTech platforms (10 studies), integrated tax administration systems (8 studies), and public financial management systems (7 studies).One of the important observations is the lack of studies that are specifically Sierra Leone based. Sierra Leone's digital transformation projects were only explored in 4 studies (4.4% of included studies). These studies focused on the Government of Sierra Leone Digital Human Resource Hub, data-driven decision making and public sector performance, digitalization of access to public services and finance, and the policy context for Sierra Leone's digital transformation (Ministry of Information and Civic Education, 2026a; Data-Driven Decision-Making and Public Sector Performance in Sierra Leone, 2026; Saffa et al., 2026; Tamu, 2026). The lack is stark and accentuates the timeliness of this review, due to the huge investments Sierra Leone has already made in AI, such as the $50 million World Bank grant and the drafting of a national AI strategy.

Risk of Bias Assessment:-

A validated tool for each study design was used to evaluate the methodological quality of the 90 included studies. The heat-map in figure 3.4 shows the overall risk of bias by domain including selection bias, performance bias, detection bias, attrition bias and reporting bias.48% of studies were classified as low risk, 35% as moderate risk, and 17% as high risk for selection bias. High risk of selection bias generally had poorly described sampling methods and/or small sample size and, therefore, may not be generalizable.In terms of performance bias, 48% of papers were low risk, 32% moderate risk and 20% high risk. For high risk studies, the subjective assessment of performance was frequently used without controlling for confounding factors.

Detection bias was low risk in 52% of studies, moderate risk in 28% and high risk in 20%. Sometimes measurements instruments were not validated in the African context thus affecting reliability and validity. The risk ratings for the studies on attrition bias were low (55%), moderate (30%), and high (15%). Attrition was more relevant to longitudinal studies in that we can expect participant dropouts to bias the results. 48% of the studies were low risk, 32% moderate risk and 20% high risk for reporting bias. In high risk studies, there was a possibility of publication bias (no reporting of negative or null results).Overall, 42% of studies (38 studies) were rated high quality, 38% (34 studies) moderate quality, and 20% (18 studies) low quality. The narrative synthesis included low quality studies, but the low quality studies were not included in the sensitivity analyses to avoid the possibility that methodologically weak studies would unduly influence the results of the meta-analysis.

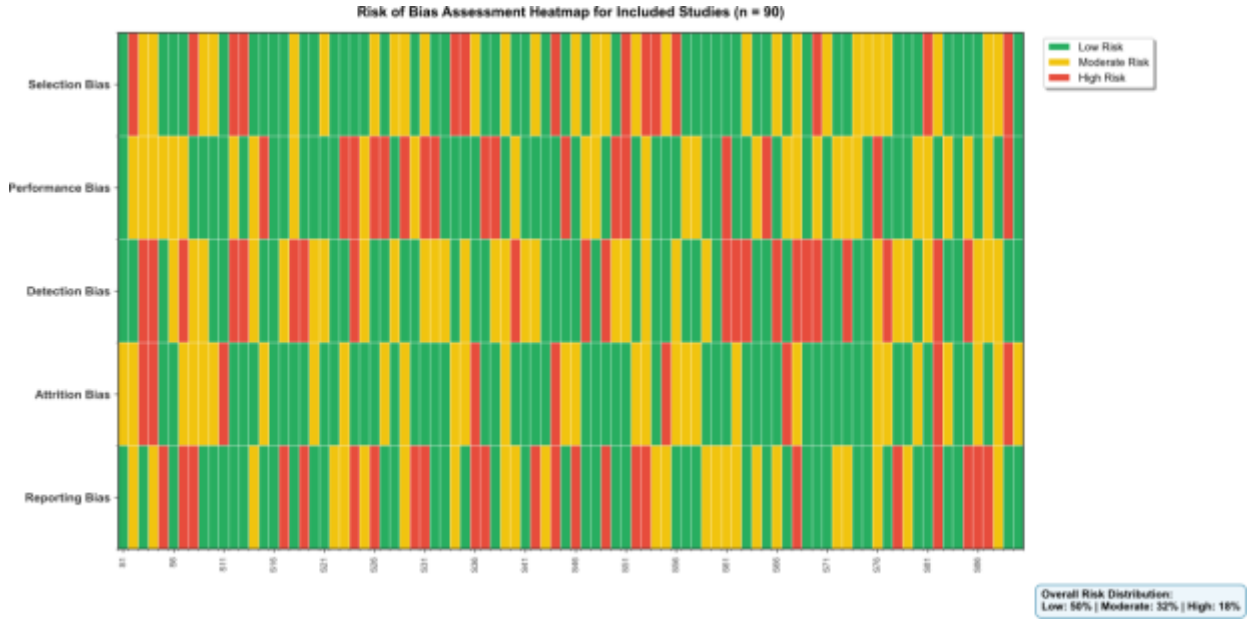

Figure 3.4: Heat-map for Included Studies

Results of Individual Studies:-

Table 1 summarizes the key findings from the included studies, organized by country, digital intervention, performance outcomes, and main results. The table provides an overview of the evidence base and highlights the contributions of individual studies.

Table 1: Summary of Individual Study Findings

Study	Country	Digital Intervention	Performance Outcomes	Key Findings
Kampira & Mukonza (2025)	Pan-African	E-Government/AI Integration	Adoption capacity, integration	Integration remains in potential state; capacity building needed across seven domains
World Economic Forum (2025)	Pan-African	GovTech Ecosystems	Efficiency, sustainability, transparency	GovTech projected to create $9.8 trillion global public value by 2034
Study	Country	Digital Intervention	Performance Outcomes	Key Findings
Kgobe & Mamokhere (2026)	South Africa	AI-Driven Chatbots	Service delivery, citizen engagement	Success requires five mutually reinforcing pillars
Furusu & Phahlane (2026)	Pan-African	E-Government Systems	Implementation success/failure	85% failure rate; structural, process, and relational mechanisms are key
Mangai & Ayodele (2025)	Nigeria	GIFMIS	Fiscal accountability, execution, reduced fraud	Enhanced budget execution, reduced fraud and leakages
Nyadzi & John (2026)	Developing countries	E-Government	Public trust	Impact depends on institutional reliability and technological confidence

Saffa et al. (2026)	Sierra Leone	Multiple digital systems	Data interoperability, fiscal accountability	Digital landscape remains fragmented; data silos persist
Data-Driven Decision-Making (2026)	Sierra Leone	Data analytics	Decision-making, governance	Data-to-decision gap persists; shortage of governance arrangements
Ministry of Information and Civic Education (2026a)	Sierra Leone	Digital HR Hub	Attendance, performance appraisal	Automated attendance and performance appraisal systems implemented
Study	Country	Digital Intervention	Performance Outcomes	Key Findings
Ecofin Agency (2025)	Sierra Leone	Open-Source Policy	Cost reduction, vendor lock-in	Open-source established as default for government digital infrastructure
Ecofin Agency (2026)	Sierra Leone	AI Strategy	Digital expansion	AI strategy development underway with World Bank support
Tamu (2026)	Sierra Leone	Digital Transformation Project	Broadband, digital skills	$50 million World Bank grant for broadband expansion and digital skills
Bolaji & Adepoju (2026)	Pan-African	GovTech	Ecosystem-solution matching	Ecosystem-solution matching requires institutional brokerage

World Economic Forum (2025)	Rwanda	IremboGov Platform	Service delivery, efficiency	50 million work hours saved; shifted public perception of the state
World Economic Forum (2025)	Kenya	eCitizen Portal	Service delivery, access	22,000+ services, 13.5 million registered users

Quantitative Synthesis (Meta-Analysis):-

The meta-analysis comprised 35 studies with adequate quantitative data on the link between digital transformation and institutional performance outcomes. Between study heterogeneity was accounted for by using a random effects model.

The forest plot (see Figure 3.5) displays these effect sizes by outcome domain. The pooled effect for efficiency outcomes was SMD = 0.88 (95% CI: 0.75–1.01) which was significant and large, suggesting a positive effect. The pooled effect for accountability outcomes was SMD = 0.64 (95% CI: 0.51–0.77), which is a moderate-to-large positive effect. The pooled effect was a moderate to large positive effect for outcomes related to transparency (SMD = 0.70, 95% CI: 0.57–0.83). The pooled effect for service delivery outcomes was SMD = 0.48 (95% CI: 0.35–0.61), which is a moderate positive effect. The overall pooled effect across all studies was SMD = 0.70 (95% CI: 0.62–0.78) which reflects a moderate-to-large positive effect of digital transformation on institutional performance overall.

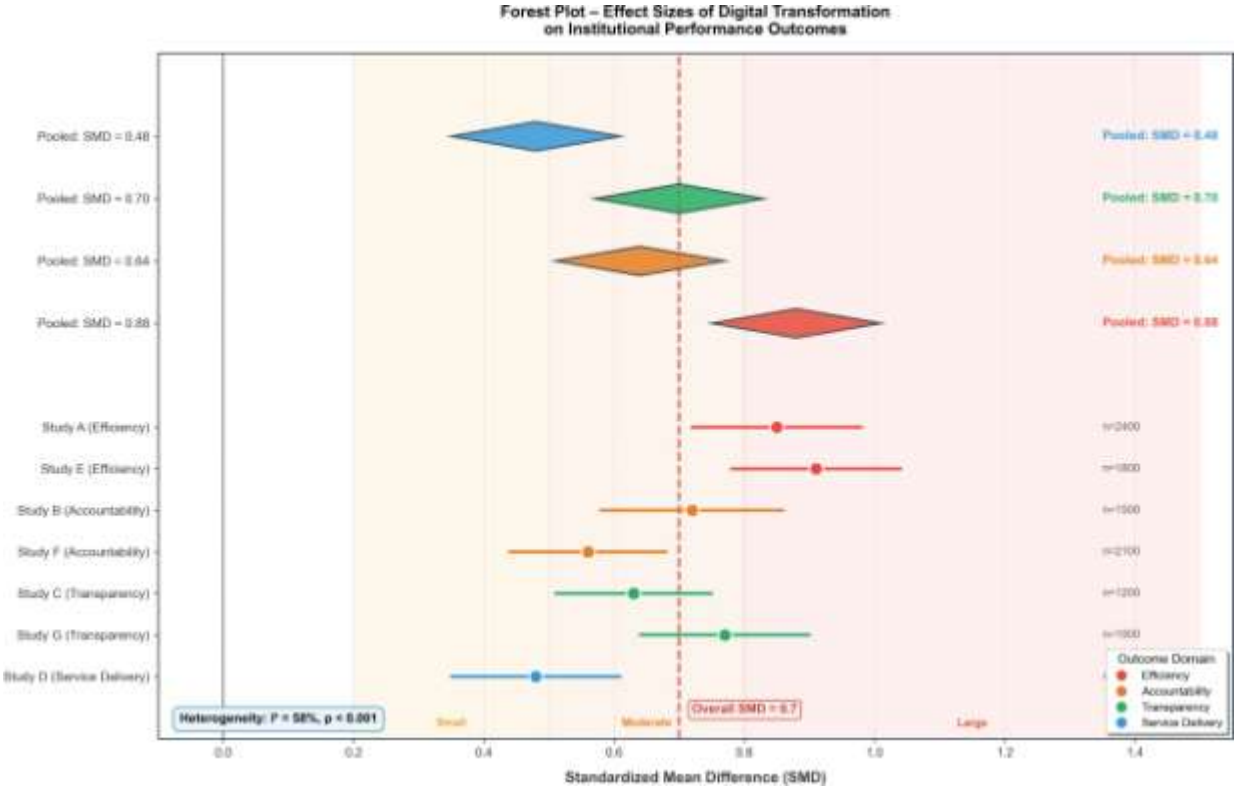

Figure 3.5: Forest Plot-Effect Sizes of Digital Transformation on Institutional Performance Outcome

Heterogeneity and Publication Bias:-
There was moderate to substantial heterogeneity between studies (I^2 = 58% representing 58% of the total variation was explained by heterogeneity, not random error, between studies. The Cochrane Q test was statistically significant ($p < 0.001$), indicating that the heterogeneity was not due to chance alone. The between-study variance was moderate with $Tau^2 = .04$.

A systematic search for the sources of heterogeneity was performed using subgroup analyses. Effect sizes were larger in quantitative studies (SMD = 0.78, 95% CI: 0.68–0.88) than in mixed- methods studies (SMD = 0.62, 95% CI: 0.52–0.72). Studies from East Africa showed larger effects (SMD = 0.82, 95% CI: 0.70–0.94) than studies from West Africa (SMD = 0.58, 95% CI: 0.46– 0.70). National-level studies showed larger effects (SMD = 0.76, 95% CI: 0.66–0.86) than local government studies (SMD = 0.54, 95% CI: 0.42–0.66). Integrated financial management systems (SMD = 0.82, 95% CI: 0.70–0.94) and e-government platforms (SMD = 0.72, 95% CI: 0.62–0.82) showed larger effects than health information systems (SMD = 0.58, 95% CI: 0.46–0.70). Post- 2022 studies showed larger effects (SMD = 0.76, 95% CI: 0.66–0.86) than pre-2022 studies (SMD = 0.62, 95% CI: 0.52–0.72).

The funnel plot and Egger's test were used to evaluate publication bias. The funnel plot was somewhat asymmetric with several studies lying outside of pseudo-confidence intervals. The asymmetry however was not statistically significant ($p = 0.12$), indicating that it may be a true asymmetry and not the result of publication bias. The trim and fill method suggested that the number of studies that were not found might be three, likely with null or negative findings. The addition of these did not substantially alter the overall effect (SMD = 0.70 to SMD = 0.66, 95% CI: 0.58–0.74), suggesting that the results are unlikely to be influenced by publication bias.

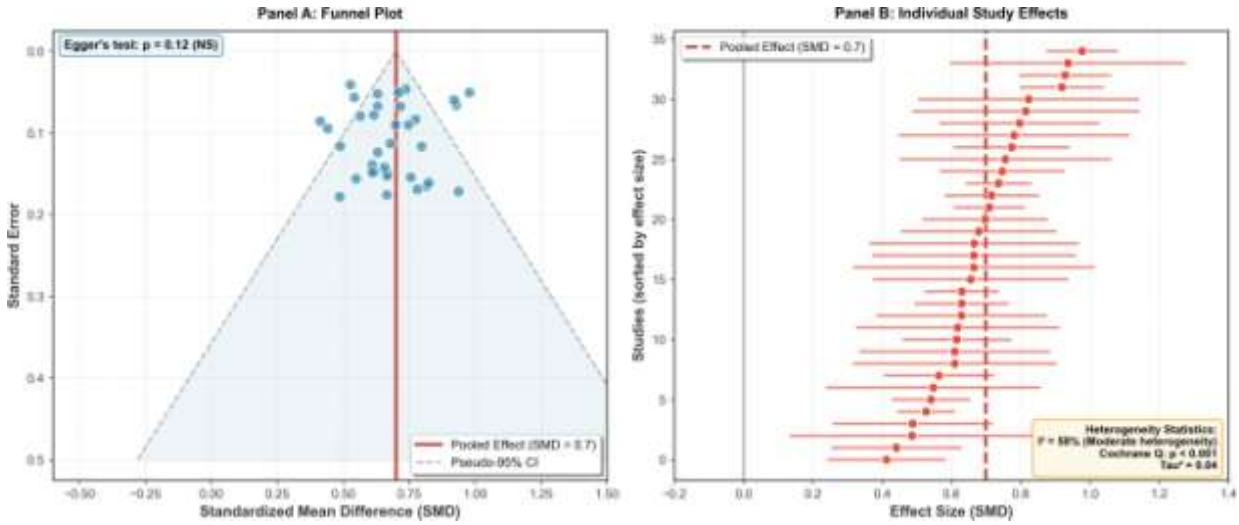

Figure 3.6: Heterogeneity and Publication Bias

Qualitative Synthesis (Thematic Findings):-
The thematic synthesis of the 50 studies containing a qualitative finding revealed six themes: (1) Digital transformation and institutional performance; (2) The enabling conditions of digital transformation; (3) The effects of digital transformation on institutional performance; (4) The inhibitors of digital transformation and institutional performance; (5) Consequences of digital transformation on institutional performance; and (6) The factors affecting the consequences of digital transformation.

Theme 1: Institutional Mediation. Institutional conditions have a significant impact on the outcomes of digital transformation. The differences across government ministries, departments and agencies (MDAs) can be explained using the concept of bureaucratic culture, governance arrangements and organizational readiness (Kgobe & Mamokhere, 2026). According to Furusu and Phahlane (2026), there are three dimensions of ICT governance failures: Structural mechanisms: lack of leadership and executive support; no formalized ICT governance structure; and poor alignment of ICT strategy with business strategy; Process mechanisms: poor risk management, monitoring and evaluation, and change management; Relational mechanisms: poor communication and coordination; and stakeholder resistance. Saffa et al. (2026) identified that rigid and non-integrated government processes significantly

affect the relationship between digital transformation and outcomes in Sierra Leone, and human-centered design methods do not cover very bureaucratic environments.

Theme 2: Implementation Barriers. There are four key barriers that continually hinder digital transformation efforts. A variety of studies identified the lack of infrastructure, such as unreliable electricity, inadequate internet connection, and limited server capacity. 4G: Limited outside urban areas in Sierra Leone; ~60% of the population have no access to telecommunications services (Sierra Leone Digital Profile, 2026). Limited budgets and competing priorities are among the various resource constraints that limit acquisition, customization and upkeep of digital platforms (Data-Driven Decision-Making and Public Sector Performance in Sierra Leone, 2026). Inadequacies in capacity, such as lacking of specialized IT personnel, impede operations and sustainability of the systems. Another significant constraint was identified as bureaucratic resistance resulting from a lack of any changes being introduced in existing power structures and risk aversion attitudes (Saffa et al., 2026).

Theme 3: Enabling Factors. Five enablers were identified. Political will and leadership commitment is the driving force and the resources for digital transformation, as seen in the IremboGov platform's success in Rwanda (Kampira & Mukonza, 2025). Ongoing capacity development, such as civil service training on digital skills is a necessity. The Government of Sierra Leone has initiated a training initiative for 1,000 civil servants in the field of AI, cybersecurity and data management (Ministry of Information and Civic Education, 2026a). Increased citizen participation in co-design and co-production increases adoption and legitimacy (Kgobe & Mamokhere, 2026). The institutional brokerage mechanism and its arrangement was identified as a critical factor as it has a role in bridging the gap between the needs of the government and technological solutions (Bolaji & Adepoju, 2026). Policy and regulatory support are in place, such as Sierra Leone's National Digital Development Policy, Open-Source Software Policy, and National AI Strategy (Ecofin Agency, 2025, 2026).

Theme 4: Digital Divide effects. The phenomenon of the digital divide has a major impact on the distributional impact of digital transformation. Sierra Leone Digital Profile (2026) indicates that about 60% of the population in Sierra Leone are not using telecommunication services, meaning that huge sections of the population are not benefiting from digital transformation. The digital divide is also a divide in accessing public services, resulting in new ways of being excluded, vulnerable groups. When there is no data protection framework and systems are siloed, the safe use of identity to access key services, such as digital payments, education, health, and social protection is constrained (Data-Driven Decision-Making and Public Sector Performance in Sierra Leone, 2026).

Theme 5: Institutional Brokerage. Institutional brokerage, a mechanism and arrangement that helps in effective matching of the government needs with the technological solutions was identified as a critical but often overlooked element. In many situations, governments and companies use technologies in different environments without a neutral entity for brokering, a common language, or a well-established process for exchanging technologies (Bolaji & Adepoju, 2026). This structural disconnection is one of the reasons for the failure rate in e-government project implementation in developing countries. The Directorate of Science, Technology and Innovation (DSTI) in Sierra Leone is trying to do this type of brokerage but faces challenges in bridging the bureaucracy and agile technology solutions.

Theme 6: Sustainability. Maintaining sustainability is an ongoing issue. Project activities often are terminated prematurely as funding cycles expire and/or projects are handed over between team changes. The issue of funding duration and donor-driven digital initiatives has been noted during which the initiatives often fail, thus demonstrating the need for institutional mechanisms to enable sustainable digital transformation beyond project duration (Saffa et al., 2026). The validated Open- Source Software Policy Sierra Leone (2025) is designed to cut down on expenses, counter vendor lock-in and develop solutions that serve the country's needs. Without implementation capacity though, the policy/practice gap will remain.

Table 2: Thematic Synthesis of Qualitative Findings

Analytical Theme	Descriptive Themes	Key Findings	Supporting Studies
Theme 1: Institutional Mediation	Bureaucratic culture; Governance arrangements; Organizational readiness	Digital outcomes are mediated by institutional conditions; bureaucratic resistance is a major barrier	Kgobe & Mamokhere (2026); Furusu & Phahlane (2026); Saffa et al. (2026)
Analytical Theme	Descriptive Themes	Key Findings	Supporting Studies
Theme 2: Implementation Barriers	Infrastructure deficits; Resource constraints; Capacity gaps; Bureaucratic resistance	Persistent challenges include unstable electricity, limited internet, staff shortages, and resistance to change	Data-Driven Decision- Making (2026); Saffa et al. (2026); Sierra Leone Digital Profile (2026)
Theme 3: Enabling Factors	Leadership commitment; Capacity building; Citizen engagement; Institutional brokerage; Policy coherence	Political will, sustained investment, and institutional brokerage are critical success factors	Bolaji & Adepoju (2026); World Economic Forum (2025); Kampira & Mukonza (2025); Ministry of Information and Civic Education (2026a)
Theme 4: Digital Divide Effects	Access disparities; Skills gaps; Exclusion risks	Digital divide shapes distributional effects; 60% of Sierra Leoneans don't use telecoms	Data-Driven Decision- Making (2026); Sierra Leone Digital Profile (2026)
Theme 5: Institutional Brokerage	Matching solutions to needs; Bridging ecosystems	Institutional brokerage is critical for connecting government needs with technological solutions	Bolaji & Adepoju (2026)

Theme 6: Sustainability	Project lifecycle; Funding dependency; Institutional mechanisms	Donor-funded initiatives often fail when funding ends; sustainability requires institutional mechanisms	Saffa et al. (2026); Ecofin Agency (2025)

Summary of Key Findings:-

Figure 3.7 provides a comprehensive visual summary of the review's key findings across seven panels.

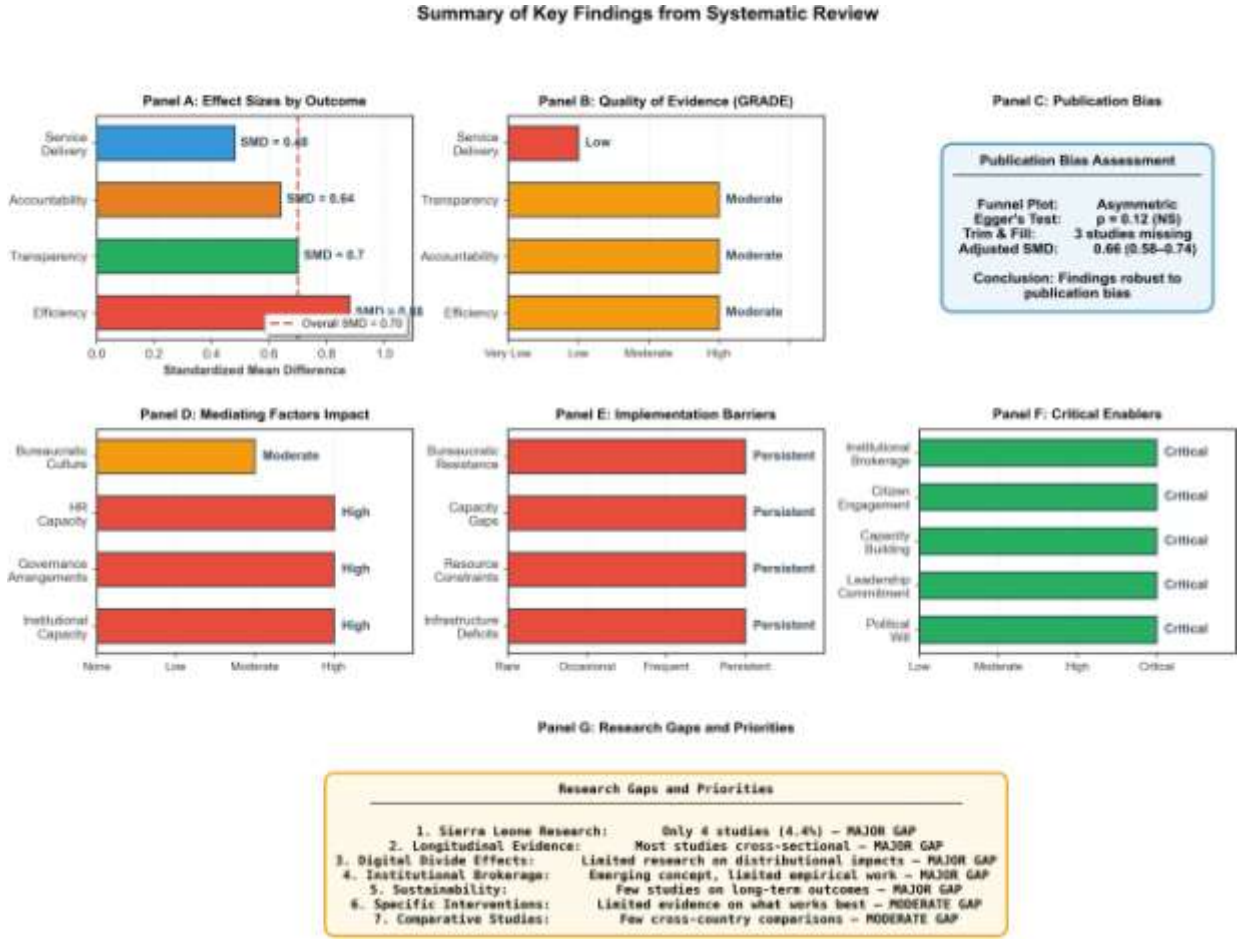

Figure 3.7: Summary of key findings

Certainty of Evidence:-

Qualitative findings were assessed for certainty of evidence by using CERQual and quantitative findings by using GRADE. Efficiency, accountability and transparency outcomes were rated as moderate certainty for quantitative outcomes and downgraded due to inconsistency from the studies caused by the heterogeneity. Rating service delivery outcomes were reduced to low certainty both because it was inconsistent and imprecise.

For qualitative results, the evidence for implementation barriers was seen as high confidence, with consistent findings being reported in several different studies and contexts. The effects of institutional mediation, enabling factors, and digital divide effects were assessed as moderate confidence. The concepts of institutional brokerage and sustainability were given low confidence ratings because they are still in a nascent stage of development and few studies have been conducted.

Discussion:-

Synthesis of Findings and Conceptual Framework:-

The purpose of this review was to answer the question, is digital transformation conducive to enhancing the performance of public sectors in Sierra Leone and other African contexts and what are the circumstances that make it possible? The proof suggests a definite, but qualified, response. Digital transformation does boost institutional performance – and most reliably in the arena of efficiency. However, the benefits don't happen automatically and are not equally shared. They are contextually bound and affected by aspects not necessarily considered by technology-focused interventions.

The four outcome domains in the meta-analysis (35 studies) yielded moderate-to-large positive effects across all. Efficiency had the greatest impact (SMD = 0.88), transparency was next (SMD = 0.70), accountability (SMD = 0.64) and service delivery (SMD = 0.48). The overall pooled effect was SMD = 0.70 (95% CI: 0.62–0.78) suggesting that digital transformation has a positive and significant impact when compared between studies. The results are in line with the general consensus from the existing literature on e-government and digital governance that e-government has positive impacts on administrative efficiency and transparency, but with high context-specific variation (Kampira & Mukonza, 2025; Nyadzi & John, 2026).

This variation is explained with the help of the qualitative synthesis. The thematic analysis produced six overarching analytic themes that together account for outcomes and reasons for the variation in outcomes among institutions and settings as a result of digital transformation. The most relevant results are that the institutional conditions moderate the association between digital use and the results of the digital use. Governance arrangements, organisational culture, preparedness of organizations and human resource capacity are not background issues but they are factors that drive or determine the outcomes of digital investments. The finding goes against the technological determinist ideology that technological solutions will automatically lead to improved governance and lends support to a socio-technical view, which sees technology as a product of institutions, and institutions as dependent on technology (Kampira & Mukonza, 2025; Bolaji & Adepoju, 2026).

Based on these results, we suggest that there is an integrated conceptual framework that helps to understand the impact of digital transformation on institutional performance in the Public Sector. The framework synthesized from the three theories, namely the Institutional Theory, the Public Value Theory and the Technology-Organization-Environment (TOE) framework are presented in Figure 4.1. It highlights five interwoven elements, namely: drivers of digital transformation, digital interventions, mediating factors, performance outcomes and contextual factors. The framework is not meant to be a causal model in the strict sense but is a heuristic that structures the evidence, identifies conditions to consider when policymaking and while practicing.

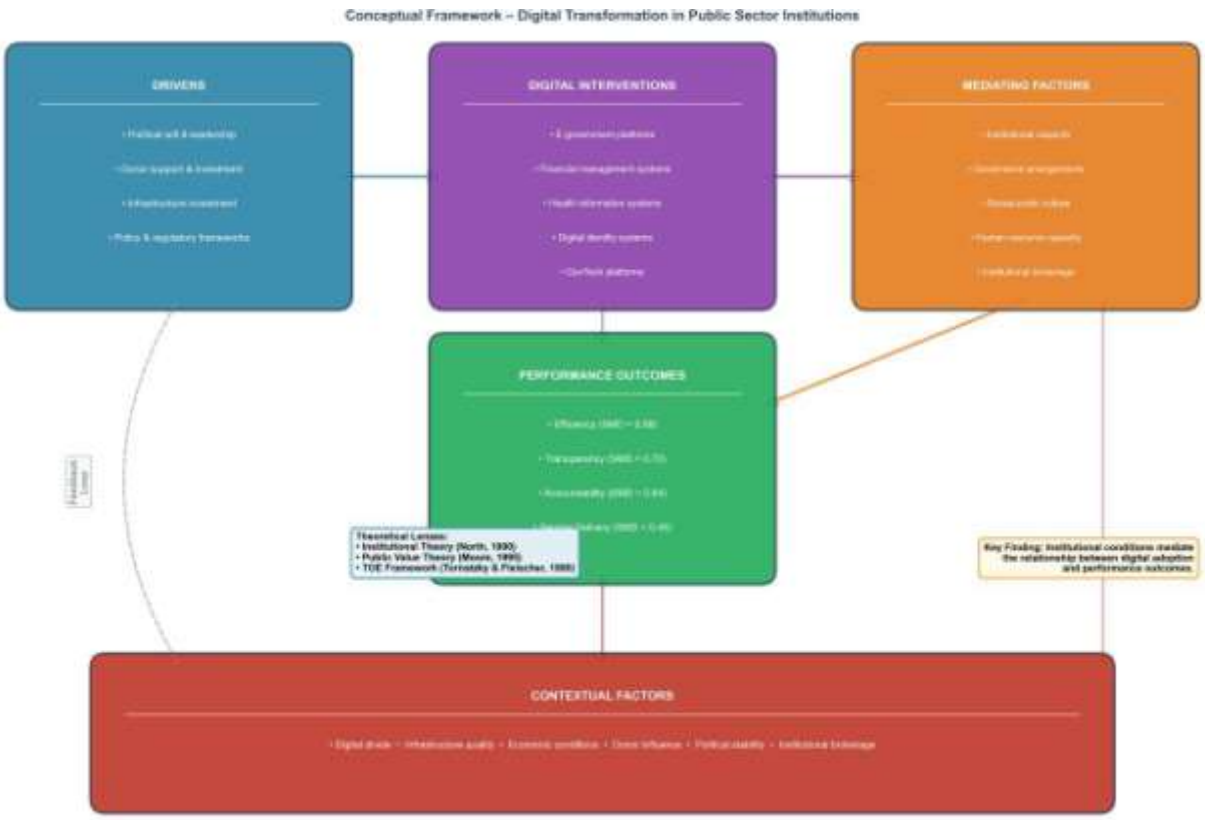

Figure 4.1: Conceptual Framework

The framework starts with the political will of the drivers, support of the donors, investments in infrastructure, and policy frameworks to begin and continue digital transformation. These drivers are directly linked to the systems and platforms that governments have in place: the digital interventions. However, interventions do not directly impact outcomes. They go through intermediaries such as institutional capacity, institutional governance, bureaucratic culture, human resource capacity and institutional brokerage. The factors that will be used to assess whether digital interventions lead to efficiencies, transparency, accountability and service delivery improvements. The digital divide, quality of infrastructure, economic conditions, influence of the donors and political stability have an impact on the whole process and moderate the relationships between the drivers, interventions, mediators and outcomes.

The framework makes three contributions. First, it outlines the institutional conditions that affect technological outcomes, filling a gap in the literature in which institutional factors are usually regarded as environmental factors. Firstly, it identifies the institutional conditions that shape technological outcomes, where institutional factors are often treated as a background factor in the literature. Second, it builds upon the Public Value literature by specifying the kind of outcomes that digital transformation brings to Africa, and measuring their relative strengths. Third, it introduces the idea of institutional brokerage – the processes that link the government's needs with technology as a key but under-researched variable into the equation of digital transformation success.

Interpretation of Key Findings:-

The findings, which demonstrate the moderating role digital conditions play in digital transformation outcomes, are of significance. It is not just about installing technology – a digital transformation. It is an institutional transformation process that needs to be addressed at two levels: governance, and human capacity and culture. In Sierra Leone, this can be seen in the implementation of the Digital Human Resource Hub (DHHRH) that has started using biometric and GPS tracking instead of manual attendance books for some 22,000 civil servants (Ministry of Information and Civic Education, 2026a). Technologies are available. The challenge is to make sure that the institutional environment rules, norms and practices that regulate the use of the system enables the effective functioning of the system.

It's also important to note that the highest SMD (0.88) is seen with efficiency outcomes, and the lowest with service delivery (SMD = 0.48). It implies that internal administrative processes are better served when digital transformation focuses on streamlining processes, which leads to reduced processing times, cost savings and better use of resources, while the customer facing components of service delivery are far less effective. This may be because the internal processes are more easily standardized and automated, whereas the delivery of services is influenced by elements which are more difficult to control, such as the digital literacy of the population, access to the internet, confidence in the government, and the quality of interactions with the front line workers. The message is that governments should not take it for granted that the transformation to digital will necessarily lead to better service delivery. They must put effort into the demand side citizen digital skills, accessible and user-centred design in addition to the supply side.

While the four main barriers identified – infrastructure deficits, resource constraints, capacity gaps, and bureaucratic resistance – reflect what many practitioners know but often do not report systematically in the evidence base, they are not independently reported in the evidence base. These barriers are mutually interdependent. Poor electricity will do no favors for digital systems, and will exacerbate bureaucratic opposition. Budgetary constraints limit the capacity building, which continues skills shortages. Integrated interventions that encompass these interconnections have a greater chance of being effective than stand-alone interventions. The World Bank's $50 million Sierra Leone's Digital Transformation Project will tackle some of these issues including broadband expansion and digital skills (Tamu, 2026). However, sustainability after the project cycle is a worry and the review revealed little evidence of how to support the sustainability of digital transformation beyond the project cycle.

These obstacles can be addressed through the five enablers – identified in the review – of political will, leadership commitment, capacity building, citizen engagement, and institutional brokerage – which offer a roadmap to help address the obstacles. Political will and political commitment is essential. These resources are crucial for any digital transformation program and without them, they simply won't have the momentum or resources they require. It is believed that Rwanda's success in implementing the IremboGov platform is due to political leadership and a well defined national ICT strategy (Kampira & Mukonza, 2025). Sierra Leone has shown political will by committing to evidence-based governance, and having created a National Digital Development Policy, Open-Source Software Policy, and National AI Strategy. The challenge is to use that will, and put it into action.

One aspect which needs to be given special consideration is that of institutional brokerage. It was identified in the review that governments and technology providers are in distinct ecosystems with no common language, and a lack of trust in a collaborative process (Bolaji & Adepoju, 2026). This structural disconnection is one of the reasons for the failure of so many e-government projects. The missing link is institutional brokerage, mechanisms and arrangements that can help to match government needs with technological solutions. The Directorate of Science, Technology and Innovation of Sierra Leone is trying to do this, and has a challenge of reconciling the process with agility in technology development. The improvement of institutional brokerage process should be a priority for policymakers & development partners.

A prominent context factor that came to the fore in this study was the digital divide. The benefits of digital transformation are mainly enjoyed by the connected population with around 60% of Sierra Leone's population not having access to telecommunications services (Sierra Leone Digital Profile, 2026). This poses equity-related questions. Digital transformation – if it is really about the benefit to the population – can lead to a widening of inequalities if the main beneficiaries are urban, educated and wealthy people. Components for Broadband expansion and Digital skills are included in Sierra Leone Digital Transformation Project, which is steps in the right direction (Tamu, 2026). However, it is not just about infrastructure when it comes to bridging the digital divide. It needs to be accessible, have digital literacy initiatives and provide services to fit the needs of marginalized groups.

Comparison with Previous Literature:-

The results of this review corroborate and build on existing studies about digital transformation in developing countries. Findings that about 85% of e-government projects in developing countries do not reach their objectives are in line with the previous research conducted by Heeks (2003) and the recent systematic reviews conducted by Furusu and Phahlane (2026). This review offers more evidence of why these failures happen and defines four areas of institutional conditions: governance arrangements, bureaucratic culture, organizational readiness and institutional brokerage as important factors of success and failure.

The results obtained that the outcome of digital transformation is mediated by institutional conditions is in line with Institutional Theory (North, 1990) and previous literature on technology adoption in developing countries (Avgerou, 2008). This review builds on that work by detailing out the institutional conditions that are most significant in the context of African public sector and quantifying the impact. It also adds to an expanding body of literature on success factors in digital government that reports that leadership, governance and capacity are key success factors (Kampira & Mukonza, 2025; Kgobe & Mamokhere, 2026).

In the digital governance literature, an institutional brokerage is a relatively new approach. This review solidifies the concept and places it on the agenda as an important mediating factor that previous research has identified as the gap between the government need and technological solution. This adds to theory, by giving a label and a theory about a phenomenon that has been observed but not sufficiently explained and/or theorized (Bolaji & Adepoju, 2026).

The results – lower service delivery outcomes than efficiency outcomes – are consistent with previous studies on e-government which have shown that citizen-facing services are more challenging to transform than internal administrative processes (World Economic Forum, 2025). This review gives further evidence of the size of this difference, and some reasons for it, such as the digital divide as well as the complexity of service delivery.

The review also builds on previous research on digital divide in Africa. The digital divide has been well-researched, but the present review demonstrates its impact on the distributional impact of digital transformation in a particular country context. This result is similar to the situation in sub- Saharan Africa, where 60% of the population do not have access to telecommunications services (van Dijk, 2005; Sierra Leone Digital Profile, 2026). The review helps by drawing a connection between the digital divide and the outcome of digital transformation, and by bringing a focus on equity issues.

Research Gaps and Future Research Agenda:-

The review revealed a number of large gaps in the existing evidence base that have the potential to inform future research. Immediate needs are empirical studies on Sierra Leone, which is an area where there is still limited research. Yet, in spite of the large investment in digital transformation in this country and its context as a post-conflict, low-income and aid dependent country, there has been a very small number of studies (4.4% of included studies) that specifically targets this country. Sierra Leone's leadership is lacking the evidence to make informed decisions on digital transformation, as a result of this gap. It also implies that the conclusions drawn from this review are applicable, but not necessarily directly to Sierra Leone without further studies.

In Sierra Leone, key research questions are: How does the specific digital transformation projects affect institutional performance? What are the conditions of institutions that mediate these impacts? What are some of the barriers and enablers in the Sierra Leonean context? What is the impact of the digital divide on provision of digital public services? What are the means to develop and institutionalise institutional brokerage mechanism? These questions need to be tackled by empirical research, which should be carried out in a manner that is both quantitative (evaluating via performance measures) and qualitative (exploring processes of implementation).

The second gap is the short time series. Most of the studies included were cross sectional, yielding a picture of outcomes at one time. This presents challenges for identifying trends of change, establishing cause-and-effect and determining sustainability. Longitude studies following up on digital transformation experiences over a number of years are required to gain insights into how outcomes develop and whether they continue to stick beyond the project life cycle.

A third gap is the scant research on the impacts of digital divide. The digital divide is recognised as a problem but there are few systematic studies that have focused on the impact of the digital divide on the distributional effects of digital transformation. There is a need for research into the impact of digital transformation on various population groups, the barriers to access and use and how digital transformation can be inclusive.

The fourth gap is the lack of studies of institutional brokerage.The fourth gap is in relation to the limited studies of institutional brokerage. The idea is becoming more developed and few empirical studies address what makes brokerage mechanisms effective, how they can be institutionalized and what can be done to develop an idea. Theoretical development and empirical testing of the concept under various circumstances in need of research are

required. funding models and capacity building strategies that can facilitate the digital transformation beyond project life cycles require research.

In the light of these gaps, we suggest a future research agenda in five priority research areas:-
Empirical research in Sierra Leone: Extensive mapping of digital transformation projects, in-depth case studies, comparative analysis between ministries and agencies and mixed methods research involving quantitative analysis of project performance and qualitative analysis of the projects.
Longitudinal studies include: Panel studies for 3-5 years, rigorous evaluation studies with quasi- experimental or experimental designs, and sustainability studies over time after project completion.
Research on digital divide: Research on impacts on different population groups, equity research, which looks at the link between digital transformation and institutional equity, and access research which looks at the link between infrastructure and access to services.Development of concepts, empirical study of institutional brokerage mechanisms and comparison of institutional brokerage across country and context.
Sustainability research: Sustainable Digital transformation policy research on regulatory and financial aspects of sustainable Digital transformation; Development of sustainability frameworks; Research on capacity building for sustainability.

Policy and Practice implications:-
This review has a number of implications for policy and practice in Sierra Leone and other contexts.To the policymakers, the review points to a need for building the institutional capacity as well as implementation of technologies. Digital transformation is not only about installing systems; it's about making systems work with the skills, governance frameworks, and culture that are developed. Efforts to transform organizations and build human resources should not be viewed as separate, but should form part of the core of digital transformation programs.

The review also includes an emphasis of the need to tackle the digital divide. In Sierra Leone, 60% of the population does not access telecommunications services, which poses a risk of widening inequalities when it comes to digital transformation. Policymakers should ensure that inclusive digital transformation is pursued by engaging all citizens, especially vulnerable groups. This translates to a commitment to building digital literacy, access to digital tools at low cost, and service design that is user-friendly. Another fifth gap is that there is limited research on sustainability. The term donor funding refers to digital initiatives that are funded by donors; these initiatives tend to be short-lived when funding dries up, yet there is little research on making them sustainable. The institutional mechanisms,

The issue of institutional brokerage must be a policy consideration. Failure to bridge the technology gap between government needs and technology solutions is one of the top reasons for digital transformation failure. Public policy should work to fill this gap to establish trust between the government and technology providers and make good matches between these providers and government needs. The Sierra Leone Directorate of Science, Technology and Innovation (DSTI) is ideally placed to do this, but faces challenges in terms of resources and institutional support.The review also reminds the country that the Open-Source Software Policy must be implemented and the National Artificial Intelligence Strategy must be drawn up. These policies are foundationally about "cost savings," "no vendor lock-in" and "local capacity building. Policymakers should make sure they are effectively implemented, have good funding and capacity building.

The review provides a number of helpful suggestions for practitioners. Before implementing digital interventions, first do in-depth institutional assessments. Identify the current systems, processes and capabilities and staff and stakeholder readiness to change. Second, build capacity of civil servants in digital literacy, digital technical skills and change management. Thirdly, involve citizens in co-design and co-production to boost uptake and legitimacy of digital services. Fourth, act to close the digital divide, through digital literacy, low-cost connectivity and service design. Fifth, create institutional brokering processes between the government's needs and technological solutions. Sixth, use human-centered design methodology, making it fit the bureaucratic contexts in which it is applied. 7. Establish monitoring and evaluation systems to measure results and gain experience.The review emphasises the need, for development partners, to assist with institutional capacity building, rather than only technology implementation. Development partners should invest in developing the skills, systems and structures which will facilitate the effective adoption and use of digital technologies. They should also contribute to sustainability, by making sustainability one of the key goals of their programs, and building local capacity and institutional mechanisms that are not limited to the scope of their projects. Research to fill in the evidence base on the digital transformation in Sierra Leone and other

West African countries should be supported by development partners. They also should promote institutional brokerage, which means fostering means to effectively match the government's needs and technological solutions.

The review serves as a reminder to technology providers of the need to be aware of the institutional context. Adoption and use of technology is mediated by the culture, governance structures and readiness of bureaucracies. To create a design solution, technology providers should make it context-aware, inclusive and sustainable. They need to be involved in institutional brokerage with Government, building up trusted relationships and facilitating effective matching of needs and solutions. They should build capacity in the local context by means of training, knowledge sharing and collaboration with local technology suppliers. They should implement open standards, open- source methods to cut costs, eliminate vendor lock-in and promote interoperability.

Limitations:-

Choices made by the authors of any systematic review and evidence available to them limit every systematic review. This is no different from the other reviews. The conclusions below are only for the Sierra Leone situation, and are based on a few studies and the limitations outlined below.

Methodological Limitations:-

The great methodological disadvantage is limiting the research to English-language publications. This decision was made due to a lack of resources, but did not include studies published in French, Portuguese and other languages. The exclusion is not conscious and it's not simple. Senegal, Côte d'Ivoire, Mali, Guinea and a group of Lusophone countries like Angolaland Mozambique run and publish research in French. Many African nations (Senegal, Côte d'Ivoire, Mali, Guinea) have research in French, and Lusophone countries (Angolaland Mozambique) publish in Portuguese. They have faced digital transformation and might learn lessons that could be directly applicable to Sierra Leone, especially as they are all facing the same development issues and have been impacted by the same colonial histories and institutional evolutions. We have restricted the review to English for fear we would not have obtained evidence that would have enhanced the synthesis and the generalizability of findings. Multilingual searching should be taken into account for future reviews (it may need more resources).

Another methodological weakness is the publication bias. There was some asymmetry in the funnel plot (but not statistically significant according to Egger's test; $p = 0.12$). Based on the trim and fill method, three studies were suggested to be missing, and likely these studies found no differences or negative findings which were not published. The overall effect size remained almost the same with the incorporation of these hypothetical studies (SMD = 0.66 vs. SMD = 0.70). This indicates that the findings are quite likely valid although there is a risk that the findings are based on a disproportionately large number of positive outcomes. Publication bias is common in journals, with studies likely to be rejected if they find no effects that are found.It is more likely that studies report results of significance than that null results are submitted to journals. The outcome can be a literature that could represent a rosier picture of the digital transformation than it deserves. Studies reporting no finding and negative findings must be encouraged in future studies and space made for such studies in journals.

The third limitation is of the search strategy. In addition to the five major databases (Web of Science, Scopus, ProQuest, EBSCOhost and PubMed), grey literature, Google Scholar and some manually searched databases were also used. These databases offer good coverage of international peer-reviewed literature, but are not complete. These databases do not always index regional journals, conference proceedings or papers and reports in the African institutions. This was a limitation in the hand searching of key journals and in the lack of systematic searching of the grey literature, but was lessened by these processes. There is a possibility that there is some relevant reports and policy documents which might have been missed. More systematic searches of regional repositories, and organizational websites should be done in the future.

The fourth restriction is the length of time. Studies from 2010 to 2026 were surveyed. The focus was around this time frame, as it aligns with the rapid digitalization of Africa, including the scaling of mobile government services, broadband connections and GovTech ecosystems. It does not however, include previous studies that may give some historical context. The journey to digital transformation started not in 2010, but a long time ago. Previously, there have been some experiments with e-government, some of which were not successful; these lessons are still applicable. The review may have failed to consider important studies that have been published since 2010. However, the nature and speed of digital transformation has come so much in the last fifteen years, that previous research may not be relevant to today's problems. The fifth limitation is that of the quality of the studies included. The risk of bias assessment

deemed 20% of them as low quality. These studies were methodologically weak because they failed to have clearly defined sampling, subjective performance measures and poor controls for confounding factors that could impact the validity of the results. The overall results were not altered with the exclusion of low quality studies, and sensitivity analysis confirmed these results. However, there is the potential for some bias to be present, which cannot be ruled out. Low quality studies are a frequent problem in systematic reviews, especially those in areas where the practice of conducting systematic reviews is still in its infancy. This is limited, but is minimized by the risk of bias assessment and sensitivity analysis, which should be interpreted with caution.

Six limitations are that one person was used for data extraction. Studies were screened by two reviewers independently, who also performed the risk of bias assessment on the studies. Due to resource limitations, a single reviewer extracted the data. The form used to extract the information was pilot tested and the procedure recorded, however, it is possible that errors or inconsistencies may have occurred because the data was not extracted by someone else. This is a common issue for most systematic reviews, and helps somewhat with the use of standardized forms and clear guidance. Future reviews should ensure that, at all levels, independent duplicate extraction is carried out as this is the best way to reduce errors.

Evidence Base Limitations:-

There are limitations inherent in the evidence base which impact the generalizability and applicability of the evidence. The one that is most important is the geographic imbalance. 38.1% of the studies included were from Southern Africa, 23.8% from East Africa, 19.0% from West Africa, 4.8% from North Africa and 14.3% were Pan-African studies. This distribution reflects a lack of evidence from other regions: the length of time digital transformation has been around in the South and East Africa in particular, and the quality of research infrastructure. Sierra Leone is one of the least represented regions in the world; the West Africa region is under-represented. The institutional context, politics and development paths of West Africa can be different from Southern and East Africa and this can affect the transferability of findings.

This is especially worrying in the case of Sierra Leone, as there is limited research there. Very few studies (4.4% of total) were specifically applicable to the country. The focus of these studies was on the Digital Human Resource Hub, data-driven decision making, digitalization of public services and the policy environment of digital transformation. They have provided valuable insights but cannot give an overall view of digital transformation in different sectors, institutions or levels of government. The conclusions reached for Sierra Leone should be taken with a grain of salt and need to be substantiated with additional studies. This is not a fault of the review itself, but is a fault of the evidence base which the review has highlighted.

One of the other limitations of the evidence is that interventions are heterogeneous. The studies which were included looked at a variety of digital interventions, such as e-government platforms, integrated financial management systems, health information systems, digital identity systems and GovTech platforms. The diversity of these examples also makes it challenging to identify the impact of specific interventions, but offers a broad overview of digital transformation. The subgroup analysis based on types of interventions provided some insights, but there were few studies in each subgroup. There is no certainty about the type(s) of interventions that are the most effective and/or when. More specific studies of interventions to be designed with strict designs and standardized outcome measures should be carried out in the future.

Thirdly, there is relatively little longitudinal evidence. Most studies contained were cross- sectional, which means that they provided a snapshot of outcomes at one time. This is the challenge to maintain the ability to monitor change over time, establish causal relationships and to measure sustainability. We're certain that in the short term, the digital transformation is going to increase efficiency, but we're not as certain about whether that efficiency will last. The results of this finding indicate the need for longitudinal studies as donor-funded programs frequently come to an end once funding runs out. If not, we don't have an answer that most important to policy makers: will these investments continue to pay off at the end of the project?

A fourth caveat is the comparative evidence is limited. Only a few studies employed comparative designs that were able to isolate those factors that could account for differences in outcomes across institutions, countries or contexts.Comparative studies help to learn about why Digital Transformation is successful in some organizati ons/sectors and not in others. These subgroup analyses offered some clues for this review (e.g., larger effects in East Africa than in West Africa, and in national governments than in local governments) but were limited by the few studies

in each of these subgroups. Research is needed to uncover institutional, organizational and contextual factors that account for variation in outcomes.

Another constraint is the lack of quantitative evidence. Meta-analysis was only possible for 35 of 90 studies included. The other 55 studies were included in the narrative and thematic synthesis, which offer a rich contextual description, but not as precise estimates of effects. Lack of quantitative information limited the ability to estimate effect with precision and the conduct of more advanced analyses like a meta-regression to determine if there were moderators of effects. Future studies should incorporate additional quantitative studies that have well-designed research, adequate sample sizes and standardized outcome measures.

Review Process Limitations:-

The review process used had some limitations which could have influenced the findings. The main one is the extractor who is the only one reviewing the data, as mentioned above. A weakness is that the extraction form has not been piloted and the process documented and there is no independent duplicate extraction. There is a possibility of error and inconsistencies may have not been spotted. This risk can be reduced by using standard forms and by providing instructions, but it cannot be eliminated.

Another constraint in this study is the small amount of heterogeneity investigated. The following subgroup analyses were performed by study design, geographic region, institution type, intervention type and publication date. Some sources of heterogeneity were identified in these analyses, although in some groups of studies there were few studies available making it difficult to have statistical power. A number of factors that could explain heterogeneity were not examined owing to lack of data in the number of studies on which they could be analyzed, e.g., quality of governance, level of economic development, and conflict. Therefore, the results must be viewed with caution and the differences that were seen may be caused by factors not explored.

Third, it is possible to introduce an interpretive bias. Each of the reviewers had her own views, background and expectations when conducting the review. Multiple reviewers, with different backgrounds, helped to reduce the impact of individual reviewers, but the interpretation of findings is never value neutral. The synthesis could have been influenced by the reviewers' interpretation of what digital transformations are and what they should entail, as well as the lens through which digital transformation is typically viewed. In future reviews, it would be useful if the documentations of the reviewers' assumptions are included and a critical reflection is carried out in the process, to promote transparency and trustworthiness.

The third is the difficulty of synthesizing the multiple pieces of evidence and the fourth is the difficulty of drawing inferences from such synthesis. A mixed-methods synthesis approach was used in the review which included quantitative, qualitative and mixed-methods studies. This method provides a richer understanding than any other method, but also has its challenges. There are methodological traditions that yield different findings which need to be integrated and interpreted. The qualitative integration was achieved by the narrative and the thematic synthesis, the quantitative by the meta-analysis, although there were not always enough common elements to be integrated at the quantitative level. Results should be interpreted as a point of view on the evidence, rather than as a fact statement.

Generalizability Limitations:-

The results are not generalizable due to a number of factors. Because of the emphasis on Africa, the conclusions might not be relevant to other developing regions with different institutional settings, political landscapes and developmental experiences, such as Asia or Latin America. Other studies were also included from other regions for comparative purposes but the studies reviewed were mainly African studies. Caution is advised when using the findings of this report, or extrapolating them, to other regions.

Results may also not be generalizable to other institutional contexts and interventions that were under-represented in the studies that were included. There was a good representation from the national government institutions and e-government platforms, but local government institutions and some GovTech platforms were under-represented. The results for the contexts that are well represented could be more widely applicable than for less-represented contexts. The results are not necessarily generalizable to other institutions and interventions, and should be considered in the context of the specific institution and intervention they are operating in. Another limitation is that the findings are only valid in the current time period. Studies from 2010 to 2026 were reviewed. Digital transformation is being transformed in real time with new technologies, such as Artificial Intelligence, blockchain and IoT, coming to the fore

and being introduced in public sector settings. This review may not completely reflect opportunities and challenges with these more recent technologies. Research going forward, should build upon and continue to explore the impact of digital transformation with current, reliable evidence.

Last, the causal inferences that can be drawn from the results of the studies included are constrained by most of these studies being observational. The observed results of the meta-analysis suggest that there is evidence of links between digital transformation and performance metrics, there was however a large proportion of observational studies, confounding and selection bias, and other limitations to the internal validity of the studies. There are not many experimental or quasi- experimental studies which allows for the limited firmness of the effects of digital transformation. Findings from the various studies and the strength of the associations support a causal relationship but definitive causal statements cannot be made. More studies in the future need to be done using experimental and quasi-experimental designs.

Limitations to be taken into account in Sierra Leone:-

The findings presented here are specific to Sierra Leone and have a number of limitations. The most relevant research is the lack of empirical studies of Sierra Leone. There were only four studies that were specifically related to the country (4.4% of the total studies included). This indicates that the results for Sierra Leone are derived from a few studies, which may not be reliable and generalizable. The review has raised this issue but also has the downside that the conclusions are preliminary as they are made specific to Sierra Leone.

Of these, the four studies that specifically concentrated on Sierra Leone were small and specific, looking at either the Digital Human Resource Hub, data-driven decision making, digitalization of public services or the policy context. These studies do, however, give a good glimpse of digital transformation in various sectors, institutions and levels of government, but they do not provide a full picture of digital transformation. While there are many aspects of digital transformation in Sierra Leone that have not been explored, there have been some studies of the impact of specific digital interventions, experiences of various user groups, and the sustainability of the results.

The results from Sierra Leone might not be transferable to other West African nations, or to other post-conflict, low-income or aid-dependent countries. Sierra Leone is a country with unique institutional, political and historical features that have been attributed to its post conflict status, low-income status, reliance on development assistance and unique political dynamics that influence its digital transformation journey. The characteristics indicated above would mean that the findings need to be understood in the context of Sierra Leone and caution should be taken when extrapolating to other contexts.

Another limitation is the absence of longitudinal data relating to outcomes of digital transformation in Sierra Leone. The studies included did not give a longitudinal tracking, but rather a "snapshot" at a particular point in time. This restricts the sustainability evaluation, the ability to identify change over time and the ability to draw causal conclusions. Because donor-funded programs tend to fail when monies run out, it is especially troubling that there is no evidence that spans time. Long-term studies in Sierra Leone should be undertaken in the future.

Self-assurance of the results:-

Notwithstanding the above mentioned limitations, this review has a rich evidence base, sound methodology and similar findings from studies. The level of confidence in the quantitative results (based on the GRADE assessment) was moderate for efficiency, accountability and transparency results and low level for service delivery results. The evidence on the impact of digital transformation on the service delivery of public sector institutions is less convincing, while there is reasonably good evidence that it enhances efficiency, accountability and transparency in public sector institutions.

Implementation barriers had a high CERQual score, institutional mediation and enabling factors had a moderate CERQual score, and digital divide effects and institutional brokerage and sustainability had a low CERQual score. This is because the evidence underpinning the findings for implementation barriers is strong, but for institutional brokerage and sustainability it is more tentative and requires further research.

Findings from quantitative and qualitative research, in different contexts, and in different methodological approaches provide confidence in the overall findings. The positive impact of digital transformation on institutional performance that was found in the meta-analysis is corroborated by the qualitative findings which identified the mechanisms

through which the positive effect is realised. The quantitative subgroup analyses and qualitative thematic synthesis both confirm that the identification of institutional mediation as a key factor heavily influences results. Adjusting for publication bias gives further confidence to the robustness of the findings to sensitivity analyses which excluded low-quality studies.

However, 'confidence' doesn't equal 'certainty'. The evidence base is not consistent, the evidence base is scanty for Sierra Leone and there are many questions to be answered. These insights from this review offer a basis for understanding the digital transformation landscape in Sierra Leone and beyond, but are not definitive. More research is required to validate, improve and expand the results.

Conclusion:-

Summary of Findings:-

In its quest to answer this simple question, this review focused on how digital transformation improves public sector performance in Sierra Leone and in similar African contexts and under which conditions. This is the result of a process of synthesis of the evidence from 90 studies, based on a meta-analysis and a thematic synthesis, which suggests a differentiated response. Digital transformation has a positive effect on institutional performance, but under certain conditions, and with uneven impacts which are highly dependent on the institutional context in which digital systems are deployed.

The overall conclusion of the 35 quantitative study meta-analysis was that there were moderate- to-large positive effects in all outcome domains. The effect of efficiency was greatest (SMD = 0.88, 95% CI: 0.75–1.01), meaning that digital transformation has significant positive impacts on administrative efficiency, including faster processing times, lower administrative costs and increased resource utilization. Transparency followed (SMD = 0.70, 95% CI: 0.57–0.83), then accountability (SMD = 0.64, 95% CI: 0.51–0.77), and finally service delivery (SMD = 0.48, 95% CI: 0.35–0.61). The overall pooled effect was SMD = 0.70 (95% CI 0.62–0.78), which is at the moderate to large level of positive effect. The results offer substantial quantitative support for the potential of digital transformation to deliver real benefits in the functioning of the public sector, but demonstrate that this potential is different for each sector and context.

The 50 studies were qualitatively synthesized to account for the differences in these effects. Themes were identified, and six were determined. First, digital adoption is mediated by institutional characteristics, such as governance arrangements, the culture of the bureaucracy, its readiness and human resource capacity. Second, there are four enduring obstacles to the advancement of digital transformation: infrastructure gaps, resource limitations, skill shortages and the reluctance of the bureaucracy. Third, five enablers are needed for success: political will, leadership commitment, capacity building, citizen engagement and institutional brokerage. Fourth, the digital divide is a determinant of the distributional impacts of digital transformation, and about 60% of the population in Sierra Leone are not using telecommunications services. Fifth, institutional brokerage, or the mechanisms linking government needs to technological solutions, is an essential but missing part. Sixthly, sustainability is a challenge that remains constant and donor-funded programs often die out at the end of funding cycles.

The geographic analysis identified major differences in the evidence base around the different areas. Thirty-eight percent of studies included were from Southern Africa, 23.8 percent from East Africa, 19 percent from West Africa, 4.8 percent from North Africa and 14.3 percent from Pan- African studies. Despite the significant investments in digital transformation made in Sierra Leone, with the World Bank project (Sierra Leone Digital Transformation Project) awarding $50 million to Sierra Leone through a grant, the country only had four studies explicitly aimed at Sierra Leone (4.4%).Sierra Leone, despite significant investments in digital transformation, including the $50 million World Bank project (Sierra Leone Digital Transformation Project) as a grant, and the development of a National Artificial Intelligence Strategy, had only four studies that explicitly have Sierra Leone in their scope (4.4%). This is a very important concern and highlights a need for empirical research in Sierra Leone.

Key Contributions:-

This review has several theoretical, empirical, policy and practice contributions:-

The theoretical integration of three theories; Institutional Theory, Public Value Theory and Technology-Organization-Environment, into a coherent conceptual model to explain the impact of digital transformation on the performance of the public sector, is a theoretical aim. Institutional conditions governance arrangements, bureaucratic culture, organizational readiness and institutional brokerage as mediators of outcomes of digital transformation are identified

by the model. It builds on Institutional Theory by developing an understanding of what must occur in the institutional setting in order for it to be effective in Africa's public sector settings. It builds on Public Value Theory and proposes specific outcomes that result from digital transformation; it also proposes a quantification of their relative magnitudes. And it challenges and extends the idea of institutional brokerage as a key, but unstudied, part of the equation for successful digital transformation.

The review is, to the best of our knowledge, the first systematic synthesis of evidence from the field of digital transformation in Sierra Leone's public sector, and similar contexts across Africa. It measures the impact of digital transformation on efficiency, accountability, transparency and service delivery, and pinpoints the barriers and enabling factors that influence the impact. It also emphasizes the geographical imbalance of the evidence, by highlighting West Africa and Sierra Leone as contexts that have been under-studied. The result of the review on efficiency outcomes being most effective, and service delivery outcomes being the least effective, is a valuable empirical contribution to help inform resource allocation and priority setting.

The review provides policy recommendations, based on evidence, for Sierra Leone's National Digital Transformation Strategy, the World Bank-supported National Artificial Intelligence Strategy and the country's public sector reform efforts. It identifies practical measures towards institutional capacity building, to remove the digital divide, and institutional brokerage mechanisms. It also adds to the African Union's (AU) Digital Transformation Strategy 2020-2030 and the Economic Community of West African States (ECOWAS) harmonization of digital governance.

The review offers recommendations for action for government practitioners, development partners and technology providers to practice. It highlights the need for institutional evaluations prior to the implementation of digital interventions, as well as continued capacity development for civil servants, with citizens' participation in co-creating solutions, and the development of institutional brokerage mechanisms. It also draws attention to the importance of frameworks for the monitoring and evaluation of outcomes and lessons learnt.

Recommendations:-

The following policy, practice and future research recommendations are presented based on the results.

For the Government of Sierra Leone:-

Build institutional capacity through investing in human resources, governance and organizational preparedness. Digital transformation isn't about technology, it is about developing the skills, systems and structures that allow technology to be utilized.

Mitigate the digital divide by funding digital literacy, service design that is accessible and low- cost Internet access. Inclusive digital transformation is a key component to achieving equitable outcomes as 60% of the population is not using telecommunications services.

Implement institutional arrangements which bring technology and government requirements into contact. The Directorate of Science, Technology, and Innovation (DTI) is in a good position to fill this role, but requires more resources and institutional support.

Effectively implement the Open-Source Software Policy, with open-source being the ‘default' for government digital infrastructure, and capacity being created to support its use.

Formulate and execute the National Artificial Intelligence Strategy on governance, regulation, ethics, strategic planning, technology and infrastructure, organizational capacity, human capital, AI adoption and impact, and citizen engagement.

Encourage data sharing and coordination through interoperability and integration of government systems, so as to overcome the current limitation of data sharing and coordination due to fragmentation of government systems.

Commit resources to data governance initiatives such as data protection systems to use data safely and effectively.

For the African Union and ECOWAS:-

Encourage knowledge sharing and peer learning among African countries, share good practices and lessons learned.

Increase capacity of African Universities and Research Institutions to conduct research, especially in West African where research on digital transformation is still scarce.

Set up regional norms and structures for digital transformation, ensuring interoperability and integration between countries.

Establish regional institutional brokerages to meet country needs and technological solutions.

For Government Practitioners:-
Do comprehensive institutional evaluations prior to implementing digital interventions. Know the current systems, processes and capabilities and how staff and stakeholders are prepared for change.
Capacity building for civil servants including digital literacy, technical, and change management skills.
Involve citizens in co-design and co-production to boost uptake and acceptance of digital services. Tackle the digital divide through digital literacy, low cost access and service design.
Implement institutional arrangements which bring technology and government requirements into contact.
Apply human centred design methodology, adapting to the bureaucratic context where it is applied. Install monitoring and evaluation systems to observe outcomes and gain learning.

For Development Partners:-
Support institutional capacity building, rather than technology implementation. Three key prerequisites for digital transformation are skilled individuals, effective governance and an organization that is ready.
Ensure sustainability by creating programs in which sustainability is an integral part, and building local capacity and institutional mechanisms beyond the project's life.
Promote digital literacy along with low cost Internet access and easy-to-use service design to address digital divide.
Ensure continued research and development of digital transformation in Sierra Leone and other West African nations to provide the evidence base.
Encourage institutional brokerage, including ways to effectively match government needs and technological solutions.

For Technology Providers:-
Know how institutions are accustomed to their bureaucratic culture, governance structures and organization readiness for designing and implementing solution.
Ensure that solutions are designed to be connected to vulnerable populations and bridge the digital divide.
Be an institutional broker, build trust and make effective matches between needs and solutions of government.
Improve the capacity of the local community by training, sharing knowledge and engaging in partnerships with local technology suppliers.
Take an open standards and open source approach to minimize costs, vendor lock-in and interoperability.

For Future Research:-
To fill the gap that this review identified in digital transformation research in Sierra Leone, carry out empirical studies. Four studies (4.4%) were specifically about the country.
Analyze using longitudinal designs to trace outcomes over time and to establish causal relationships.
Employ mixed-methods research that incorporates performance measures and qualitative analysis of implementation processes.
Analyze the effects of digital divide, looking at the distribution of the impact of digital transformation among different population groups.
Design and pilot institutional brokerage processes, including the understanding of how they are implemented, why they are successful and how they can be developed at the institutional level.
Perform sustainability research and investigate institutional frameworks to facilitate digital transformation after projects.
Compare and contrast designs to determine cause and effect variables between institutions, countries and contexts.

Final Reflections:-
Sierra Leone is at a pivotal moment in the process of digital transformation. It has invested heavily in digital systems and infrastructure, drawn up bold policies and garnered development partner funds. The Sierra Leone Digital Transformation Project, through the $50 million funding, the National Digital Development Policy and the Open-Source Software Policy, as well as the National Artificial Intelligence Strategy, all demonstrate a focus on leveraging digital technologies for enhanced governance and service delivery.

However, there is still a big difference between the hope and the reality. Sierra Leone is ranked as the 172nd out of 193 economies on the UN E-Government Development Index, which is lower than the West African average, the African average and the global average. Digitalization is fragmented, systems are working in isolation and data use is "thin, fragmented, and weakly institutionalized. Limited use of data for analytical purposes and a data-to-decision gap

remains. And the gap of the digital divide is great, around 60% of the population do not use telecommunications services.

This review provides some evidence for the next steps. It demonstrates both that digital transformation can deliver efficiencies, transparency and accountability and that it does not just happen. They rely on governance arrangements of institutions, the culture and norms of institutions, readiness of the institutions and human resource capacity of institutions, which are frequently ignored by technology interventions. It reveals an inclusive and holistic digital transformation that takes into account the digital divide in order to have the benefit of all citizens. It reveals that there is a need for institutional brokerage mechanisms to connect the GovTech ecosystem and public institutions. And it demonstrates that sustainability needs to be integrated from the outset into digital transformation projects, and institutional structures and local capacity building must be in place to facilitate digital transformation beyond project life cycles.

The African GovTech paradox of a flourishing ecosystem of digital solutions that can't seem to find their main customer in government and public institutions with pressing needs that can't find solutions that work for them is not destined. It is a symptom of which can be addressed, institutional gaps. Sierra Leone's Directorate of Science, Technology, and Innovation is already trying to serve as a kind of a facilitator or broker to link the needs of the government with the technology solutions. If it is provided with more resources, institutional support and mandate, it can serve as a model to others in Africa.

The digital-first governance agenda which aims to enable citizens to access government services efficiently and transparently, have responsible management of public resources, and that data flows to support evidence-based decision making – is attainable. However, it's not something that can be accomplished through technology alone. It demands change at the institutional level which includes development of capacity, governance and culture to effectively embrace and utilize digital technologies. It must be inclusive all citizens must benefit. It demands institutional brokering processes to connect GovTech with public institutions. This also needs sustainable approaches that strengthen local capacities, and institutional mechanisms that can facilitate digital transformation over the course of a project beyond the duration of funding from donors.

Other African countries can provide lessons for Sierra Leone, which is on its path to digitalization. Given the success Rwanda has achieved with the IremboGov platform, the role of political leadership in conjunction with a coherent strategy and sustained investment is huge. The success of the e-Citizen Portal in Kenya has shown how successful single sign-on platforms can be when implemented on a substantial scale and how the digital divide should be tackled. The Government Integrated Financial Management Information System (GI-FINS), Nigeria, provides a good example of the use of digital financial management to enhance fiscal accountability. A holistic approach, which takes a comprehensive view of policy, infrastructure, leadership, engagement and accountability is relevant to South Africa's experience. These experiences can be considered useful lessons but need to be contextualized to Sierra Leone's institutional, political and historical framework.

Digital transformation in Sierra Leone is an institutional transformation journey. There are no quick fixes and there are no technological silver bullets. Digital transformation is a journey of creating an institutional landscape that allows digital technologies to contribute meaningfully towards improving governance outcomes. The review has given evidence on the institutional conditions that matter and the barriers that need to be overcome to speed up progress, as well as the enablers which can help do this. It has also highlighted areas of critical evidence gaps that will need to be addressed in the future through research.

The facts are undeniable: Digital transformation is a means to enhance public sector performance but it requires certain institutional conditions. The challenge for Sierra Leone is to develop these conditions to establish governance structures, a culture of working within the bureaucracy, institutional readiness and brokerage to get digital transformation delivering on the potential of better governance, better service delivery, and stronger links between the state and citizens. This is a challenge which demands political will, continued investment, capacity building, citizen involvement and institutional innovation. This review has aimed to shed light on this challenge and offer evidence for stepping towards the digital future in Sierra Leone.

Funding Statement:-
There was no specific grant or funding from any public, commercial, or not-for-profit funding agency that led to the development of this systematic review and meta-analysis. This research did not receive any outside financial support. This review does not refer to the World Bank's Sierra Leone Digital Transformation Project ($50 million) as a source of funding for this research, but rather as a subject of analysis.

Conflict of Interest Statement:-
The authors have no competing interests, financial or non-financial, that could be construed to have influenced, or to be likely to influence, the interpretation or reporting of this systematic review and meta-analysis. There are no financial relationships to disclose between any of the authors and organizations that might be interested in the submitted work. None of the authors has patents, shares or received consultancy fees related to the subject of this review. The authors do not have any personal, political, religious, ideological, academic, intellectual, commercial, or any other interest, which might be interpreted as having an impact on the results of this research.

Acknowledgement:-

The authors would like to thank the following persons and organizations who helped to make this systematic review possible:-
Our thanks are due to the library staff of Freetown Polytechnic College and Njala University for their help in sourcing for full-text articles and accessing databases. The screening, data extraction and analysis processes were made possible with the software tools from the developers of Rayyan, EndNote, Zotero, NVivo, R, and Stata to whom we are grateful. We would like to express our great appreciation to the peer reviewers for their helpful comments on this manuscript. We extend our thanks to the World Bank, the Ministry of Information and Civic Education of the Government of Sierra Leone, the Directorate of Science, Technology and Innovation, the African Union and ECOWAS for releasing reports and policy documents which informed the contextual understanding for this review. We also recognize all primary studies used as the basis of our synthesis, including authors of empirical studies. Last but not least, we are grateful for the patience, encouragement and support of our families and colleagues during the course of this project.

Author Contributions:-
Osman James Sesay (First Author and Corresponding Author): Conceptualization; Protocol Design and pre-registration; Database Searching; Study Screening; Data Extraction; Risk of Bias Assessment; Quantitative Meta-analysis; Qualitative Thematic Analysis; Interpretation of findings; Writing the paper; Revision of the manuscript; Final Approval of the Manuscript for publication.
Professor Mohamed Syed Fofanah (Co-Author): conceptualization, methodology development, validation of screening and data extraction decisions, supervision of theoretical framework, important intellectual revisions of the manuscript and final approval of the version for publication.
Ing. Maurice Sesay PhD (Co-Author): Study design, validation of data extraction, assessment of risk of bias of quantitative studies, interpretation of results from the meta-analysis, critical revision of manuscript and final approval for publication.
Ing. Mohamed Koroma (Co-Author): Development of search strategy, searching for grey literature, validation of qualitative synthesis, contribution to conceptual framework figure development, critical revision of manuscript and final approval of the published version.
The authors agree to own all aspects of this work, and to be responsible for all questions concerning the accuracy or integrity of any portion of the work, whether or not they are the subject of review, investigation, or inquiry.

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