

Research Article

Digitalization Sequencing for IPSAS-Oriented Public Sector Reform: Evidence from Southeast Europe

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Abstract

Public accounting reforms toward accrual-based reporting and International Public Sector Accounting Standards (IPSAS) have advanced unevenly across the Balkans. Passing legislation and setting deadlines is not the same as building the systems, data structures, and professional skills reform requires, and this gap between formal adoption and working practice remains poorly understood. This study examines how digitalization relates to IPSAS implementation gaps across Southeast European countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Montenegro, North Macedonia, Romania, Slovenia, and Serbia. Drawing on structured documentary coding and non-parametric statistical analysis, the study assesses country-level differences in reform maturity and digital capacity. While prior research has identified barriers to IPSAS and digital public financial management reform, little attention has gone to sequencing reform efforts by maturity, capacity, and country context. To close this gap, the study introduces the Digital-IPSAS Sequencing Maturity Model (DISM), which scores five dimensions - accounting framework, recognition and measurement, disclosure and reporting, technical systems, and human capacity - on a common five-point gap scale. Spearman's rank correlation, Kendall's tau, Mann - Whitney U tests, and hierarchical cluster analysis reveal a strong negative association between digital maturity and overall implementation gaps, alongside three distinct reform pathways and four digital priorities. DISM offers a practical framework for sequencing reform by institutional readiness rather than by calendar alone.

Keywords: IPSAS; IFMIS; Digitalization; Public Financial Management; Digital-IPSAS Sequencing Maturity Model.

INTRODUCTION

Governments around the world have committed to accrual-based reporting and International Public Sector Accounting Standards (IPSAS) alignment. Many have passed

legislation, created road maps, and set deadlines. What they have not done is build the systems, data structures, and professional skills that reform requires.

The gap between formally adopting accrual-based standards and embedding them in practice is not a minor issue confined to few countries; it is the biggest challenge of public sector accounting reform in transitional contexts that remains poorly understood.

The Balkan area exemplifies this situation well. Member and non-member states of the EU face the same external pressures, from EU standards to donor conditionality and international standard setting, but the results, however, differ greatly. While Slovenia and Croatia have progressed with the real implementation of accrual-based methods, Bosnia and Herzegovina is stuck at a very early stage, while Albania, Kosovo, Montenegro, North Macedonia, and Serbia represent a big middle ground that is completely unique. The fact that similar external pressures have led to completely different results indicates that there are certain underlying differences regarding the accounting infrastructure, governance, institutional maturity, and administrative capacity that stage-based models of reform simply cannot capture.

Digitalization has a significant impact on this topic. Financial management information systems, workflow automation, data validation tools and interoperable reporting systems can all help to improve accrual reporting. The evidence that digital infrastructure facilitates IPSAS progress is growing. What the literature has not addressed is the sequencing issue. What digital skills should be prioritized first? Under what institutions are the conditions? A country's fragmented government across large jurisdictions has a different reform problem than one that is institutionally consistent.

This study aims to address the gap. The subject of this study is ten Balkan countries – Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Montenegro, North Macedonia, Romania, Slovenia and Serbia. The purpose of this study is to examine through a comparative desk-research design. Systematic documentary analysis and structured focused comparison produce gap assessments across five dimensions: accounting framework, recognition and measurement, disclosure and reporting, technical systems and human capacity. Non-parametric validation tests whether the observed patterns are statistically consistent. The Digital-IPSAS Sequencing Maturity Model (DISM) then translates those patterns into operational sequencing guidance by combining gap severity, dependency effects and implementation feasibility into a single prioritization framework.

The study makes three contributions. Conduct a comparative examination of IPSAS-oriented reforms in the Balkans, moving beyond the stage to describe the multidimensional structure of the implementation gap. Offers DISM as a framework that connects implementation maturity, digital enabling capability and sequencing priority over a single operational maturity, digital enabling capability and sequencing priority. Propose a policy-oriented sequencing logic that changes by institutional setting, distinguishing between sequenced integration, modular progression and interoperability solutions based on governance and capacity circumstances of each scenario.

The main point is straightforward. The benefits of digitalization for IPSAS reform are greatest when the proper capacity is introduced at the right time and focused on the actual binding restrictions, rather than when technology is deployed before the institutional circumstances need to exploit it effectively. The reform order is more than just a detail. In the situations reviewed here, it affects whether accrual reporting becomes standard administrative practice or remains a formal commitment that practice has yet to meet.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

IPSAS Implementation as Public Sector Accounting Reform and Institutional Change

The transition to accrual-based public sector accounting and IPSAS implementation is perceived as a broader institutional and organizational reform rather than a narrow technical improvement to accounting rules [1-3]. According to institutional theory, the fact that states adopt the same accounting standards across borders, regardless of their institutional capacities, can be linked to their lack of implementation abilities [4]. The implementation of IPSAS in Balkan countries is influenced by coercive constraints from the European Union and donor conditionality, normative pressures from professionalization and standard-setting, and mimetic pressure from peer reform curves. However, the influence of these elements is insufficient for successful implementation [5].

The implementation of IPSAS and accrual accounting reforms depends on the implementation of the needed infrastructure for the implementation of accrual accounting systems [5, 6]. This means development of IPSAS-compliant chart of accounts, creation of up-to-date records of assets and liabilities, clear definitions of consolidation boundaries, establishment of effective valuation procedures, and sufficient professional skills for consistent usage of the recognition, measurement, and disclosure procedures. While these factors are absent, it is still possible for the governments to declare compliance with the standards only on paper while failing to create proper operational conditions for their implementation. In addition, there are some works which describe digitalization of sectoral public financial management that can also be used as a prerequisite for success in relation to accounting processes. The relevance of Financial Management Information System (FMIS) and Integrated Financial Management Information Systems (IFMIS) that can shift from the accounting point of view to efficient utilization of the resources and receiving the income [7-9].

A digital platform from an accountant's viewpoint goes beyond being simply part of a recent trend; it becomes a set of facilitators making it possible to implement IPSAS in reality. Connected ledgers, simplified processes, embedded validation mechanisms, and compatible reporting outputs decrease the dependence on manual solutions and double accounting systems [7, 9, 10]. At the same time, the research has clearly demonstrated that digitalization does not resolve the problems of reform by itself: the efficiency of digital solutions depends on the quality of governance, adequacy of the data discipline, stability of the organizational structures, and availability of human resources [11, 12].

Unfortunately, poor management of digital investments might entail the emergence of the same problems but in a different and more complex fashion. This is especially true for reforms related to IPSAS since accrual-based accounting is very much reliant on coherence in enterprise structures and ongoing harmonization between them. While technology can facilitate these processes, it cannot replace governance clarity, methodological consistency, and the need for capacity-building [11, 13]. In this respect, modern literature indicates that gap analysis can serve as a foundation for moving away from generic assertions about digitalization that support the IPSAS reform process and toward providing practical suggestions on how IPSAS reform should be designed.

Gap analysis helps identify the distance between current practice and target standards, making it possible to diagnose institutional legal, technical data and capacity constraints more systematically [14-16]. This is especially valuable in transitional settings where resource constraints heighten the importance of sequencing and where not all reform deficiencies can be addressed at the same time.

Seen from this perspective, the main question is not simply whether digitalization helps but which digital capabilities should be prioritized first to address the most binding implications and constraints. Integration, automation, validation, analytics and scalable interoperability may all support IPSAS reforms, but their relevance depends on the maturity profile of the institutional setting in which they are introduced. Combining a gap-analysis perspective with a digitalization lens, therefore, creates a basis for thinking more explicitly about sequencing [8, 10, 14].

What remains less clear is how digital interventions should be prioritized and sequenced across different institutional contexts. IPSAS implementation is not simply a matter of legal adoption, but a multidimensional reform process shaped by institutional pressures, governance structures and operational capacity. Digitalization can support that process, but only when backed by human capability, reliable data and administrative readiness. What remains less clear is how digital interventions should be prioritized and sequenced across different institutional contexts.

The literature on public financial management and accounting reform offers valuable but incomplete perspectives on the issue examined in this study. PEFA provides system-level diagnostics, but it does not offer a sequencing logic that can identify institutional and technical deficiencies, nor can it determine which digital capacities should be addressed first. Similarly, SIGMA assesses governance readiness but does not translate this assessment into resource-constrained implementation priorities. PULSAR supports the transition to accrual accounting, but it does not treat digital enabling capacity as a variable for sequencing reform. As a result, none of these frameworks provides an operational basis for linking digital capacity intervention priority and implementation maturity within a unified model.

As Table 1 shows, existing frameworks provide valuable diagnostic governance implementation support and system views, but each address only part of the problem. Similarly, the FMIS/IFMIS literature demonstrates the operational value of integrated

systems. Still, it does not connect system-level capabilities to specific IPSAS implementation gaps or translate them into a sequencing logic that can guide the order of interventions. Neither of these approaches base their comparative assessment on ordinal documentary coding that can be applied consistently across cases.

DISM solves these restrictions by combining implementation maturity, digital enabling capabilities and intervention priority into a unified operational sequencing paradigm based on structured evidence.

Table 1. Comparative Assessment of Analytical Frameworks for Digital IPSAS Reform

Framework	Purpose	Scope	Readiness focus	Digital–IPSAS integr.	Sequencing logic	Prioritization support	Empirical grounding
PEFA	Assess PFM performance	System-level diagnostics	Moderate to high	Indirect	Weak	Limited	System-level aggregate data
SIGMA/OECD	Evaluate governance and reform readiness	Institutional coordination and implementation capacity	High	Indirect	Weak	Limited to moderate	Institutional self-assessment
PULSAR/WB	Support accrual transition	Accounting reform and institutional support	Moderate	Partial	Moderate	Moderate	Project-level implementation reports
FMIS/IFMIS	Explain digital system effects on PFM	Technical systems and interoperability	Moderate	Partial	Moderate	Moderate	System technical audit data
DISM ^a	Sequence IPSAS-oriented digital reform	Multidimensional maturity framework	Moderate to high	Direct and explicit	Strong	Strong	Ordinal documentary coding (this study)

Identified Research Gaps

Existing research identifies many of the obstacles that retard reforms, but it is less clear about how those obstacles should be translated into reform priorities, especially in transitional settings where institutional conditions differ significantly.

The IPSAS literature successfully highlights implementation-related obstacles, including poor accrual methods, fragmented governance, limited institutional capacity and unstable reporting. Once these limitations are recognized, however, literature typically stays descriptive and does not offer precise recommendations for the sequence in which

reform initiatives should be implemented. There is currently an operational framework that converts multifaceted implementation shortcomings into a transparent reform-prioritization logic.

Literature emphasizes the significance of integration, automation, validation and interoperability when discussing digital modernization and transformation in public finance. However, these elements are usually treated as enabling conditions rather than as priorities linked to specific IPSAS implementation challenges. As a result, current frameworks can explain modernization trends when weaknesses emerge in the accounting framework disclosure practices, technical systems and human capacity, but they do not clearly define which digital capability should be prioritized first.

There is still no comparative data on IPSAS-oriented reform in the Balkan and transitional regions. Studies that are now available are frequently country-based or rely on broad implementation stages, which are beneficial for description but less helpful for setting priorities. Countries classified at the same formal stage may still face very different combinations of accounting weaknesses, systems fragmentation, disclosure problems and capacity constraints.

Approaching its task from this perspective, the research proposes five empirical propositions regarding consistency, each dealing with a specific statistical test. These propositions should not be considered the same as hypotheses in their classical definitions. They do not make any predictions that can be tested independently. At the same time, they do not claim to test any causal relationships with the help of proof of statistical significance. Ultimately, they define the patterns that should hold true provided that the coding system in question has been developed properly and that its rank-order correlation is based on the real-life situation and not on the coding entity. Therefore, the proposals aim to verify that the framework's result is consistent within itself across different scenarios, which is a prerequisite for any sequencing logic based on those results rather than to make causal assertions or evaluate hypotheses from separate theories.

The empirical analysis is structured around the following propositions:

- ECP1: Countries with higher digital maturity are expected to exhibit lower overall IPSAS implementation gaps across cases.
- ECP2: Countries with greater technical system gaps are expected to exhibit greater accounting framework gaps across cases.
- ECP3: Countries with greater technical system gaps are expected to exhibit greater disclosure and report gaps across cases.
- ECP4: Countries with greater human capacity gaps are expected to exhibit greater overall IPSAS implementation gaps across cases.
- ECP5: EU member states in the sample are expected to exhibit overall lower IPSAS implementation gaps and higher digital maturity than non-EU cases. s in this geographical sample.

Spearman's ρ is used to assess ECP1-ECP4, while Kendall's τ is reported as a robustness check for rank-based association under small-N conditions and possible tied ranks. These

tests assess whether the directional patterns encoded in each proposition are statistically consistent across the sample. ECP5 is assessed using the Mann-Whitney U test, which evaluates whether EU and non-EU cases differ systematically in their distributions of IPSAS implementation gaps and digital maturity. Hierarchical cluster analysis is employed as an exploratory extension to determine whether the case form interpretable groupings are based on their five-dimensional implementation profiles. Taken as a whole, confirmed ECPs indicate that the diagnostic framework is internally coherent; they do not constitute causal evidence and should not be interpreted as such.

Given the limited sample size ($N = 10$) and ordinal composite scores, the quantitative analysis is employed for robustness testing rather than explanation: “it confirms whether the directional patterns encoded in each empirical consistency proposition are systematically present across cases and whether the rank-order relationships generated by the coding framework are internally coherent, but it does not by itself establish causal relationships or support broader inferential claims”.

Within framework analysis, rank correlations that are nearly perfect or completely perfect are seen as indicators of diagnostic coherence, not as standalone findings. The importance of this distinction lies in the fact that composite scores derived from overlapping or conceptually adjacent sub-dimensions will tend to co-vary partly by construction and partly by genuine empirical association, and the two sources of co-variation cannot be fully disentangled in a small- N ordinal setting. The Spearman $\rho = 1.00$ in the case of ECP3 is therefore used to demonstrate the coherence of the coding rubric and to show that the two dimensions are not assessed in contradictory ways across cases. It is not intended to demonstrate that the relationship is deterministic in the real world or that it would necessarily be reproduced in a different sample.

These empirical consistency propositions ultimately do more than validate the coding framework. They highlight precisely the analytical vacuum that DISM is intended to fill, the lack of a systematic foundation for integrating implementation maturity, digital enabling capabilities and intervention priority into an operational sequencing logic that can be applied across different institutional contexts.

Conceptual Framework and the DISM Model

The Digital IPSAS Sequencing Maturity Model (DISM) is built around five core dimensions: accounting framework, recognition and measurement, disclosure and reporting, technical systems, and human capacity. Each dimension is assessed using the five-point gap scale, where the first shows no material gap and the last shows a critical gap.

The equation (1) is:

$$M_j = 6 - G_j \quad (1)$$

Where G_j denotes the gap score for the dimension j , while M_j denotes the corresponding maturity level for the dimension j . Subsequently, the model constructs a Digital-IPSAS Maturity Index (DIMI), which summarizes the overall level of a country's maturity across the five dimensions. The index is expressed via equation (2):

$$DIMI_i = \sum_{j=1}^5 w_j M_{ij} \quad (2)$$

Where $DIMI_i$ shows the maturity index for the country i , while M_{ij} the corresponding maturity level for the dimension j , and w_j is the weight assigned to that dimension. $\sum w_j = 1$ means that the sum of the weights equals 1.

The Digital-IPSAS Maturity Index (DIMI) is used as a comparative measure of reform maturity across countries. Within the Digital-IPSAS Sequencing Maturity Model (DISM), four types of digital capability are identified: process automation and workflow control (PA), data validation and analytics (DV), scalable infrastructure and interoperability (SI) and IFMIS/FMIS integration (DI). In this respect, DISM is designed not only to classify countries by their level of maturity but also to determine the priority of digital interventions as subsequent stages of reform. To operationalize this sequencing logic, DISM introduces a second construct: the Sequencing Priority Score (SPS). This score establishes the priority of digital intervention based on three criteria: gap severity, dependency effect and implementation practicality. The used sequencing equation (3) is:

$$SPS_{ik} = \alpha S_{ik} + \beta D_k + \gamma F_{ik} \quad (3)$$

Where SPS_{ik} denotes the sequencing priority score for the intervention k in country i , while S_{ik} shows the gap severity of the intervention k in country i . D_k reflect the dependency effect associated with the intervention k . F_{ik} denote the usefulness of the intervention k in country i . The coefficient α , β , and γ denote the relative weights assigned to each component, subject to the condition that $\alpha + \beta + \gamma = 1$.

The Digital-IPSAS Sequencing Maturity Model (DISM) is the study's principal analytical contribution. Its distinctive value lies in transforming a descriptive gap analysis into an operational sequencing framework that brings together implementation maturity, digital enabling capacity and intervention priority. Rather than viewing digitalization as a general reform trend, DISM offers a structured basis for identifying which digital interventions should be prioritized first, under which institutional conditions and for what reform purpose. It therefore contributes to a decision-oriented dimension that is not explicitly provided by existing IPSAS and digital public financial management frameworks.

DATA AND QUANTITATIVE VALIDATION

Data Sources and Documentary Basis

Analysis of documents is a reliable base for qualitative research, particularly when evidence comes from diverse documents and is evaluated by means of system comparison [17]. In line with this reasoning, the mentioned research has used desk research of available information and documents on IPSAS transition, public sector reform, FMIS/IFMIS modernization, and public financial management capabilities. Country profiles were created with a three-way documentary analysis that involved using national documents,

such as laws, treasury regulations, accounting and legislative documents, reform concepts, and roadmaps, as well as assessing information from internal reports on implementation and effectiveness, and evidence from international organizations such as IFAC, IMF, World Bank, CEF/PULSAR, SIGMA/OECD [18-20].

Moreover, articles from peer-reviewed journals were utilized to ensure validity of the theoretical framework and results of the study. To ensure the quality of the evidence, only relevant operational information was used in evaluations, while wide reform statements that were not confirmed by practice were omitted [17].

Coding Framework and Scoring Logic

This study has used a structure of five dimensions by covering:

- (1)-accounting framework,
- (2)-recognition and measurement,
- (3)-disclosure and reporting,
- (4)-technical systems, and
- (5)-human capacity.

The aim is to analyze IPSAS-oriented reforms and digitalization. For each dimension, scores are anchored by explicit threshold conditions spanning five implementation levels: 1 (no material gap, confirmed by independent audit or external evaluation), 3 (partial but functional implementation with material weaknesses remaining) and 5 (dimension substantially nonexistent or nonfunctional in operational terms). The important distinctions are between the scores 4 and 5, with the forms assigned when a formal framework exists, but operational implementation is absent or at the pilot level. Scores were allocated based on convergent documentary evidence rather than single-source claims, with operational sources given priority over policy declarations and self-reported reform narratives.

Throughout the coding process, operational evidence was given priority over policy statements. Audit reports, treasure system outputs, budget execution reviews, system assessment and programmed evaluation were treated as primary sources. Meanwhile, the government reforms narrative and broad financial statements were given less analytical weight. Where sources diverge, for example, when government reports strong progress, but Supreme Audit assessments identify serious weaknesses, the independent verification document was treated as authoritative. This hierarchy reflects the principle that evidence produced through independent review carries greater analytical weight than self-reported reform accounts.

Each country's dimension score was assigned after reviewing sources assessing the convergence of evidence rather than relying on any single document. The dimension level scores produced through this procedure are subsequently incorporated into the Digital IPSAS Sequencing Maturity Model (DISM) introduced above, where they provide the empirical basis for assessing implementation maturity, identifying reform gaps and linking those gaps to the sequencing logic developed in the later stages of the analysis.

Reliability, Reproducibility, and Sensitivity Checks

As the process is based on organized documentation coding, the validity of the methodological approach needs guidelines for the scoring and the coding procedure to be repeated. To ensure this reliability, a common rubric, the hierarchy of evidence, and a set of decisions were utilized in the same manner in all cases, while the criteria of each dimension were formulated in advance. First, a variety of documents were checked for compliance with coding dimensions, then the value of evidence was determined. Amounts of the reports on the implementation, audit results, system description, and obstacles were considered as having greater potential for analytical value than simply a financial document. Before assigning a score to any dimension, several pieces of evidence were analyzed and evaluated based on pre-defined criteria. The most essential criteria are mentioned below.

A score of 5 – critical gap, is given when the documentation evidence presented clearly indicates that the dimension in question is nearly absent or dysfunctional altogether. For example, missing functional accrual accounting, treasury functioning as well as the documented chart of accounts which would comply with IPSAS standards. Evidence comes from audit findings, system evaluations and implementation reviews showing that there have been serious failures in implementation or there is no implementation whatsoever. One important point in the scoring process is to differentiate between score 4 – significant gap and score 3 – moderate gap. When the evidence shows that there are some formal frameworks like road maps or regulations or promises in place, but no implementation happens or it is confined to some trials with no noticeable effect, then the score of 4 is assigned. Conversely, if the evidence shows that implementation happens but not at its fullest, score 3 is assigned. The score of 2 – minor gap, indicates that there is a slight inconsistency that can be attained when the dimension exhibits only minor errors in terms of coverage, coherence, and enforcement. The score of 1 – no gap, indicates that no major inconsistencies have been identified, and there is confirmation from the audit, peer reviews, product accountability information, budget fulfillment information, evaluation of system functioning, or program evaluation, rather than documents describing planned changes to close the gaps. If the source information contradicts each other, for example, if the government reports some achievements within its road map while the Supreme Audit reports significant issues, the audit report receives more attention in terms of the information provided.

To reduce reliance on just one reading, the overall country-dimension scores were recorded after the first round of coding, using agreements among the original and recoded scores to validate the classification. All coding was carried out by one researcher; there was no second coder. So, no discrepancies were found that were more than one scale point apart; and in cases of discrepancy, all cells were resolved by careful consideration of borderline cases. Out of the 45 cells for country-dimensions, 43 were validated without adjudication, with coding stability being 95.6%, and there was no way of calculating the

standard inter-coder reliability statistics like Cohen's κ or Krippendorff's α , which is a limitation recognized in this study.

Because the small number of observations and the ordinal nature of the coding of those observations, a modified sensitivity analysis was performed to see if the main results would be affected with reasonable variations in assignment of scores: each country-dimension combination was subjected to a ± 1 point variation whenever there was reasonable documentary evidence to support an alternative interpretation of the case. This meant that there were seven country-dimension combinations across five countries that fit this criterion of being borderline cases requiring sensitivity testing. Under upward variation (+1), the rank order correlation between digital maturity and IPSAS implementation gaps changes by $\Delta\rho = 0.000$ relative to the baseline result. Under downward variation (-1), the maximum change was $\Delta\rho = -0.004$. The substantive directional patterns described above did not change under any of the limited modifications.

Quantitative Validation Strategy

To determine whether the main cross-country patterns are statistically consistent, the analysis goes beyond descriptive comparisons and employs non-parametric techniques appropriate to the limited sample size and ordinal data structure. The primary relationships between digital maturity, overall IPSAS implementation gaps, accounting framework gaps, technical systems gaps, disclosure and reporting gaps and human capacity gaps are examined using Spearman's rank correlation coefficient. Kendall's tau is used as a robustness check because tied ranks may occur in small-N settings. To assess whether EU and non-EU countries differ systematically, the study applies the Mann-Whitney U test to compare overall gap scores, selected level gaps and digital maturity.

The weighting framework in Digit-IPSAS Sequencing Maturity Model (DISM) is informed by theory rather than statistical estimation. The weights of dimensions in the Digital-IPSAS Maturity Index (DIMI) and the weights of parameters in Sequencing Priority Score (SPS) reflect the analytical judgement made regarding the relative significance of different reform dimensions in the context of sequencing IPSAS-oriented reforms under constrained institutional conditions. Hence, these weights are proposed as a practical tool for comparative prioritization instead of being treated as rigid universal metrics or statistically refined coefficients.

RESULTS

IPSAS Implementation in Balkan Countries

Examining specific country's case within a more general comparative context by means of rank order correlation group comparison and clustering shows significant variations throughout the sample. Slovenia, Croatia, Bulgaria and Romania appear to be the most advanced cases in merging accrual accounting with greater digital public financial management capacity. On the contrary, Bosnia and Herzegovina is considered to occupy

the most structurally intermediate position, but the reform profiles of that country are evidently heterogeneous and should not be interpreted as a unified category as such.

Based on comparative table 2, we can say that IPSAS implementation does not follow a simple linear path in the region. Although countries may be in the same formal stage of implementation, each is distinguished by its unique accounting base, level of digital development, and institutional capacity limits. Thus, the study does not view the IPSAS implementation stage as the sole determinant of reform success. It outlines the implementation stage, accounting base, and digital maturity as a strategy to address both theoretical and practical parts of the reform process.

Table 2. Country's Profile of IPSAS Implementation, Accounting and Digital Maturity

Countries	IPSAS Implementation stage	Accounting basis	Digital Maturity level
Albania	Partial implementation	Modified accrual	Medium
Bosnia and Herzegovina	Initial stage	Modified cash	Low-medium
Bulgaria	Advanced implementation	Accrual	Medium-high
Croatia	Advanced implementation	Accrual	High
Kosovo	Partial implementation	Modified accrual	Medium
Montenegro	Ongoing implementation	Modified accrual	Medium
North Macedonia	Partial implementation	Modified cash	Medium
Romania	Advanced implementation	Accrual	Medium-high
Slovenia	Advanced implementation	Accrual	High
Serbia	Ongoing implementation	Modified cash	Medium

Moreover, the analysis reveals a wider regional trend; the four EU member states in the study, Slovenia, Croatia, Romania, and Bulgaria, show higher levels of accrual-based methods and IPSAS adoption than non-EU countries. This is due to stronger incentives for external alignment and better access to structured reform assistance. Non-EU countries, on the other hand, have a more varied development pattern influenced by stricter budget constraints, weaker institutions, and conflicting priorities in public financial management reform. Throughout the region, examples from the various countries reveal similar structural problems, including poorly functioning accounting infrastructure and incomplete accounting of financial data, low transparency, unevenly developed technical systems, and significant problems with human resources. Considering this, the concept of digitalization must be seen as an enabler in the modernization process because its value depends on the level of readiness for change in general.

Gap analysis for IPSAS Implementation in the Balkan

The differences in the overall IPSAS implementation gaps across the countries in the sample are illustrated in table 3. Slovenia has the lowest gap score, then Croatia, Romania, and Bulgaria have recorded slightly higher gap scores. The success of these countries in IPSAS implementation may be due to their combination of good accounting structure, lower fragmentation of the system, and better developed reporting capacities. In turn,

Bosnia and Herzegovina has the highest overall gap score, which reflects the fact that the country is the most affected by structural constraints due to the fragmentation of its system.

Albania, Kosovo, Montenegro, North Macedonia and Serbia occupy intermediate positions. Still, the average scores for the five countries do not reflect combinations of strengths and weaknesses for each gap dimension. The results for the present sample indicate that the biggest gaps can be found in recognition and measurement, disclosure and reporting, as well as human capacity. Despite the existence of some technical weaknesses in many countries, they are not as serious as another situation related to accrual accounting, disclosure readiness and professional capacity. It suggests that digital systems evolve more quickly than organizational rules and structured records require.

Table 3. Gap Analysis of IPSAS Implementation Across the Balkan Countries

Countries	Accounting framework gap	Recognition & measurement gap	Disclosure requirements gap	Technical systems gap	Human capacity gap	Overall gap score
Albania	3	4	4	3	4	3.6
Bosnia and Herzegovina	5	5	5	4	5	4.8
Bulgaria	2	3	3	2	3	2.6
Croatia	1	2	2	1	2	1.6
Kosovo	3	4	4	3	4	3.6
Montenegro	3	3	4	3	4	3.4
North Macedonia	4	4	4	3	4	3.8
Romania	2	2	3	2	3	2.4
Slovenia	1	1	2	1	1	1.2
Serbia	3	3	4	4	3	3.4

Moreover, the findings confirm that there is a difference between three reform contexts. The advanced countries (Slovenia, Croatia, Romania, and Bulgaria) demonstrate less variation and more even differences in gap profiles.

The intermediate countries (Albania, Kosovo, Montenegro, North Macedonia, and Serbia) show greater variability in progress, often engaging in moderate system development but also having weaknesses in disclosure, recognition, and human capacity. Bosnia and Herzegovina stands out as a country with a more immature system due to its fragmented governance and poor harmonization process.

Figure 1 depict the gap analysis of IPSAS Implementation across the Balkan countries. Across the Balkan countries, IPSAS implementation is best understood as a multidimensional capacity building in which digital systems matter but do not operate independently from accrual accounting, disclosure readiness and human capacity.

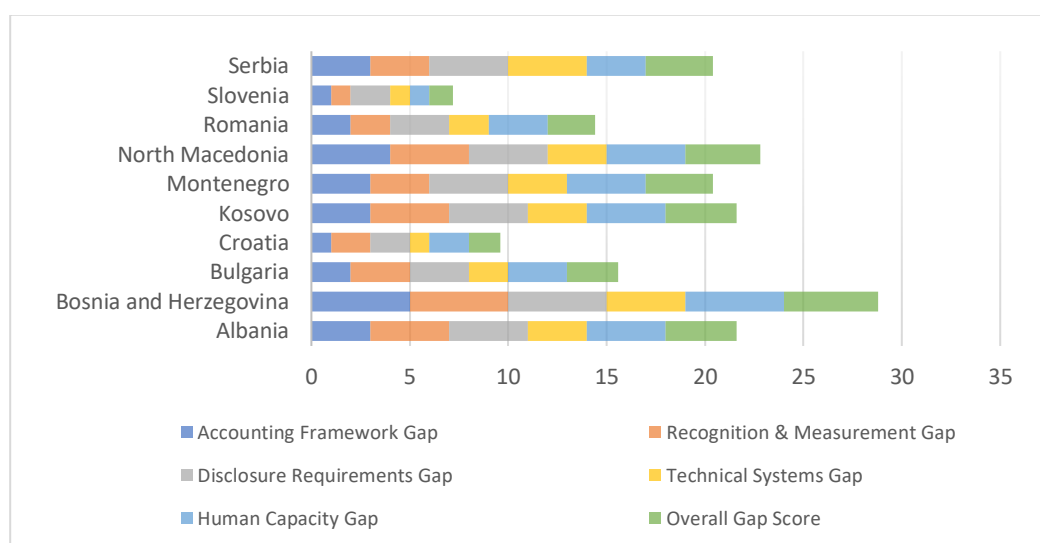


Figure 1. Gap analysis of IPSAS Implementation Across the Balkan Countries

Statistical Validation of the Main Cross-Country Patterns

To move beyond descriptive comparison, the analysis tests whether the main cross-country patterns reported in tables 4 and 5 are statistically consistent. Given the small sample size and nature of the variables, Spearman's rank correlation is used with Kendall's tau as a robustness check. The aim is not to estimate causal effects but to assess whether the rank order associated with empirical consistency propositions holds across the ten-country sample.

The results support ECP1. Countries with higher digital maturity tend to have a lower overall IPSAS implementation gap. This is illustrated with a strong negative relation ($\rho = -0.937$; $\tau = -0.876$). This confirms that stronger digital public financial management capacity is associated with more advanced IPSAS implementation conditions. These findings should not be interpreted as evidence that the digitalization system determines reform outcome. ECP2 is also confirmed. Technical systems gaps are strongly and positively related to accounting framework gaps ($\rho = 0.951$; $\tau = 0.920$). Countries with fragmented systems also tend to show weaknesses in classification structures, reporting boundaries and consolidation processes. This suggests that the technical system and accounting framework are closely connected to implementation readiness. ECP3 is fully supported, but with caution. Technical system gaps and disclosure/reporting gaps show an identical rank order ($\rho = 1.000$; $\tau = 1.000$). In a small-N ordinal design, this should be read mainly as evidence of internal coding consistency rather than a real relationship. Briefly, the result still supports the view that disclosure quality depends heavily on upstream systems and structured data. ECP4 is confirmed as well. Human capacity gaps are strongly related to wider overall IPSAS implementation gaps ($\rho = 0.940$; $\tau = 0.889$). This indicates that the limited IPSAS expertise, uneven training and weak institutional support remain major constraints, regardless of the development of the digital system. In general, digitalization supports reform most effectively when combined with capacity building.

The additional results show a strong relation between overall IPSAS implementation gaps and digital maturity ($\rho = 0.922$; $\tau = 0.853$). This reinforces the finding that IPSAS implementation and digital maturity tend to evolve together without causality.

Viewed together, these results confirm that all four empirical propositions are supported by the rank order. The patterns encoded in ECP1-ECP4 held systematically across the sample are internally consistent within the coded implementation profiles. Combined with framing, these results confirm the coherence of DISM framework in the direction of sequencing logic requirements rather than supporting generalization beyond the regional sample. Their interpretation should remain cautious, given the small sample size and robustness of orientation rather than the role of quantitative analysis.

Table 4. Correlation Results

Variables	Spearman ρ	Kendall τ	p -value	Interpretation
Digital maturity vs the overall gap	-0.937	-0.876	<0.001	Strong negative association
Technical systems vs accounting frameworks	0.951	0.920	<0.001	Strong positive association
Technical systems vs disclosure	1.000	1.000	<0.001	Perfect alignment
Human capacity vs overall gaps	0.940	0.889	<0.001	Strong positive association
Implementation gaps vs digital maturity	0.922	0.853	<0.001	Strong positive association

Group Differences: EU and non-EU cases

The descriptive analysis suggests that EU members in the sample display more favorable implementation conditions than the non-EU ones. To verify this, used the coded evidence. The study has used Mann-Whitney U-test to compare the four EU countries in the sample (Slovenia, Croatia, Romania and Bulgaria) with the six non-EU cases. This test is the most appropriate one since the sample is small and the variables are ordinal. The test aims to analyze whether the two groups differ systematically in their distribution.

The results in table below confirm clear group differences between EU and non-EU cases. EU member states have significantly lower overall gap scores than non-EU countries ($U = 0.0$, $p = 0.014$). They also record significantly lower gaps in technical systems ($U = 0.0$, $p = 0.008$), accounting framework ($U = 0.0$, $p = 0.012$), disclosure and reporting ($U = 0.008$) and human capacity ($U = 0.0$, $p = 0.009$). In addition, EU members display significantly higher levels of digital maturity ($U = 24.0$, $p = 0.008$). These findings are consistent with comparative patterns identified earlier.

These findings are consistent with the descriptive premises that EU member states in the Balkans display more favorable implementation conditions. They also explain why the lower gap reforms identified earlier are concentrated mainly among EU members,

meanwhile non-EU ones exhibit greater heterogeneity and more persistent constraints in technical system and human capacity.

Table 5. Mann-Whitney U Test (EU vs. Non-EU)

Variables	U statistic	p-value	Interpretation
Overall gap score	0.0	0.014	Lower overall gaps in EU
Technical systems gap	0.0	0.008	Lower systems gap in EU
Accounting framework gap	0.0	0.012	Lower accounting framework gaps in EU
Disclosure gap	0.0	0.008	Lower disclosure gaps in EU
Human capacity gap	0.0	0.009	Lower human capacity gap in EU
Digital maturity	24.0	0.008	Higher digital maturity in EU

Hierarchical Clustering and Reforms Profiles

To assess whether the cases from reform groupings, the study applies hierarchical cluster analysis using the five-dimension level gap scores as clustering variables. The purpose is to explore rather than to predict if countries with similar implementation profile cluster consistently with reform pathway.

The clustering results provide further support for the result that the regional reforms are different rather than uniform, see Table 6.

Table 6. Hierarchical Cluster Analysis

Cluster	Countries	Characteristics	Reform profile
1	Croatia, Slovenia	Lowest gaps, high digital maturity	Advanced sequenced integration
2	Bulgaria, Romania	Moderate-low gaps, strong systems	Structured progression toward advanced reform
3	Albania, Kosovo, Montenegro, North Macedonia, Serbia	Intermediate gaps, uneven capacity	Modular progression under constraints
4	Bosnia and Herzegovina	Highest gaps, fragmented governance	Coordination-driven interoperability

The analysis identifies a lower gap cluster composed of Slovenia, Croatia, Bulgaria and Romania. This cluster demonstrates more coherent accounting framework, lower levels of technical system fragmentation and more developed capacity. The other intermediate cluster with Albania, Kosovo, Montenegro, North Macedonia and Serbia has a higher gap. The last cluster where Bosnia and Herzegovina is part demonstrates the most structural constrained case.

Interpretation of the Validated Patterns

The data does not generate its own meaning on its own. In this context it is worth noting that the four ECP indicate that the ranking patterns produced with the help of DISM coding structure support the idea that digitalization both facilitates the development of the IPSAS

and influences the particular dimension which drives reform results. Putting these patterns in perspective is necessary for establishing reasons behind the strong dependencies. And on the other side, for discovering under which conditions the sequencing logic continues to work and where it fails.

The strength of association between digital maturity and overall IPSAS implementation gaps ($\rho = -0.937$) is not coincidental. Where these digital foundations are absent, accrual reporting depends on manual reconciliation and expert judgement. Digital maturity does not merely accompany IPSAS progress; it also reduces manual reconciliation. The almost perfect alignment between technical systems gaps and disclosure gaps (ECP3, $\rho = 1.000$) is consistent with this mechanism: weak upstream data structures make downstream disclosure incomplete by construction, not by choice.

The DISM sequencing framework works most reliably under three conditions: institutional coherence with a single governance structure, sufficient capacity to support digital investment and implementation reform that is not externally driven. Removing any of these conditions, the sequencing model becomes harder to apply. The DISM framework argues that the impact of first sequencing is more realistic than full backbone integration. After that, the model can deepen recognition and measurement, then close disclosure gaps. A second result from DISM mechanism strengthens the failure of reform when it is donor-driven rather than institutionally owned. When external funding cycles determine which systems get built and in what order, the sequencing logic through DISM is bypassed entirely. This predicts that any application of DISM outside a coherent readiness of governance will fail the system.

Read together, the validation patterns point to four findings. Higher digital maturity is related to lower IPSAS gaps. Technical systems and accounting frameworks are mutually reinforced, not parallel ones. Human capacity is not a post-technology consideration; it is a condition of digital effectiveness. The regional sample requires different applications of sequencing frameworks rather than a uniform prescription.

DIGITAL ENABLERS OF IPSAS IMPLEMENTATION

Digital Enablers of IPSAS Implementation: A Literature Review

Recent studies have treated IPSAS implementation as a multidimensional reform process. According to the literature, customization should be viewed as a supplement to institutional capabilities rather than a substitute, as it cannot compensate for inadequate regulatory frameworks, methodological ambiguity, or a lack of professional expertise [10-12]. Data validation analytics capabilities have also emerged as critical digital enablers of public-sector reporting. High-quality reporting depends not only on transaction processing but also on validation logic, reconciliation and traceability. In the IPSAS context, this is especially important because disclosure production, consolidation, and note completeness require structured and verifiable data rather than end-stage manual compilation. In this sense, digital maturity encompasses not only processing capacity but also the ability to generate auditable and decision-useful financial information [10, 12].

Three conclusions can be drawn from recent literature. First, IPSAS implementation is increasingly recognized not simply as a technical accounting shift, but as a capability-driven reform. Second, digitalization works best when it combines systems integration, process control, validation and interoperability with human capability [7, 9, 10]. Third, the advantages of digitalization are contingent; they are strongest in environments characterized by governance coherence and implementation readiness and weak where technology is introduced into fragmented or weakly institutionalized settings [11, 12]. However, literature remains less specific about how these digital enablers should be prioritized and sequenced across differing institutional contexts, which is the gap addressed by the present study.

Country Digital Approaches to IPSAS Implementation

This section explains why the country's cases reflect district digital reform logics and how those logics relate to the reform pathways identified in international literature. The findings support a three-part interpretation: sequenced integration, modular progression and coordination-driven interoperability.

Croatia: Sequenced Integration in an Advanced Reform Setting

Croatia provides a clear example of sequencing integration in which a very developed technical backbone appears to have preceded or strongly supported more complex IPSAS-aligned procedures. Croatia has the best descriptive performance in the sample. More analytically, the crucial issue is the structure of its low gap profile, rather than its positive position at the top of the rankings. This country has extremely few technical systems and accounting framework limitations, as well as relatively small gaps in recognition, disclosure and capability. This configuration is significant because it closely resembles the path recommended in SOTA, FMIS and accrual-transition guidance. As the first step, this model establishes transaction discipline, standardized classification, and an integrated reporting architecture. As the second step, this model is deepened in asset management, accrual accounting and disclosure quality. All these provide useful outputs.

The Croatian instance thus serves as more than a favorable example. It shows what is achieved when digitalization is sequenced as a foundation rather than placed over inadequate underlying procedures. This means that the explanation is based not merely on "better technology" but also on the joint functioning of accounting policy, system modeling, and organizational application. In this regard, digitalization serves in the process of implementation of standardized techniques that would otherwise rely solely on experts. The case also has an empirical basis for the assumption that a developed digital infrastructure is not merely associated with the advancement of IPSAS application in terms of innovation but also serves as an element of the infrastructure providing for a practical application and maintainability of accrual-based reporting.

Albania: Modular Progression Under Constrained Readiness

Albania illustrates another reform logic, modular progression under limited readiness. Unlike Croatia, Albania does not have a low gap and a fully developed system

environment; it also does not show acute fragmentation of all cases. Instead, the data suggests a calculated approach to reform where digitalization is applied carefully to consolidate the treasury, reporting, and control functions, while paving the way for future developments. Thus, it corresponds to the SOTA FMIS implementation techniques such as the one that says that countries with limited fiscal possibilities, imperfect infrastructure and with low capacities would benefit more from gradual developments rather than from bringing about great changes in the system right away.

What makes the Albanian situation analytically significant is the way intermediate reform settings should be interpreted. A descriptive reading may position Albania in the middle of the regional distribution. A closer analysis reveals that its reform logic is not one of failure but of selected stability within limits. In such circumstances, digital technologies are used first to alleviate the costliest operational bottlenecks, particularly in technical systems and reporting controls. Meanwhile, more challenging areas such as recognition, value, and advanced disclosure continue to lag. Albania is notable in the SOTA literature since it confirms the viability of modular sequencing while also revealing its limitations. Modularity can help prevent reform overload and reduce implementation risk, but it is also associated with stronger data structures, register discipline, and capacity development.

Bosnia and Herzegovina: Coordination-Driven Interoperability

Bosnia and Herzegovina exemplifies a third reform logic: coordination-based interoperability. This is both the hardest and most potentially revealing setting. The country's performance is attributed to poor digital maturity, slow adoption, and structural fragmentation, which results in non-unified accounting systems. In this case, the primary reform issue is not a lack of software or insufficient automation at the entity level. Rather, it is an issue of system-wide consistency in data definitions, classification, and reporting restrictions. To support IPSAS change, all of these must be consistent across institutional layers. This case differs significantly from the previous SOTA FMIS literature, which was primarily designed with more centralized state systems in mind. In this system, the primary digital problem is achieving interoperability under split authority. The Bosnia and Herzegovina case suggests that interoperability is above all a governance solution to coordination failures. Under these circumstances, digitalization must provide harmonization before it can increase efficiency or reporting quality.

The three countries illustrate that digitalization interacts with IPSAS reform through distinct pathways, see Table 7. In Croatia, it supports sequential integration within a mature systems environment. In Albania, it is used to stabilize high-impact functions under constrained conditions. In Bosnia and Herzegovina, it must first address coordination failure. The cases illustrate distinct reform rather than simple country narratives.

Viewed against the state-of-the-art (SOTA), this comparison suggests that although the literature identifies the main building blocks of reform, system integration, classification discipline, workflow control, data validation and training. It is less specific about how

these elements should be sequenced under different structural conditions. The findings suggest that pathway choice is shaped by three contextual factors: administration integration, resource and absorption capacity, together with governance fragmentation. These pathways should be understood as interpretive reform rather than fixed country types.

Table 7. Reform Pathways in Selected Balkan Cases

Country	IPSAS Stage	Digital Maturity	Governance Complexity	Reform Pathway
Croatia	Advanced	High	Low to medium	Sequenced
Albania	Partial	Medium	Medium to high	Modular
Bosnia & Herzegovina	Initial	Low to medium	High	Coordination-driven

DIGITALISATION PATHWAYS FOR ADDRESSING IPSAS IMPLEMENTATION GAPS

The findings show that IPSAS implementation gaps in the Balkan region are structured by recurring independence between technical systems, human capacity, accounting frameworks, recognition and measurement and disclosure capabilities. Therefore, the crucial policy question is not just whether the government should digitize, but also how digital investments should be prioritized to minimize binding limitations and facilitate subsequent reforms. Accordingly, rather than being a list of discrete technologies, IPSAS-oriented reforms are best tackled as a sequential capability-building process.

One of the main implications of the findings is that reform priorities should account for a gap's dependency effect, not only its severity. Standardized classification, integrated transaction-processing controls, and structured registers represent the basic capabilities needed to support disclosure and whole-of-government consolidation. In most constrained settings, the priority is to build a digital accounting backbone, an integrated general ledger, a standardized chart of accounts, basic workflow controls, and minimum reporting requirements. In lower-capacity or fragmented environments, this may begin more narrowly, with common data definitions, stronger ledger discipline, or interoperability routines. Once this backbone exists, the next step is recognition and measurement, which often marks the point at which formal IPSAS transition stalls, since accrual reporting depends on asset registers, liability records, repeatable routines, and controlled adjustments. The findings show that recognition and measurement gaps remain high in many intermediate cases even where system maturity is no longer weak, indicating that systems integration, while necessary, is not sufficient: countries must move from digital transaction discipline toward digital accrual discipline, supported by asset registers linked to the general ledger, receivables and payables modules, and automated depreciation and

adjustments. Such interventions reduce reliance on manual schedules and make accrual reporting more consistent and scalable.

Disclosure and reporting gaps should likewise not be treated as a late-stage formatting problem. Weak disclosures typically reflect missing upstream data structures and validation logic; if relevant information is not captured during transaction processing and subledger management, disclosure preparation remains incomplete, manual, and poorly traceable. Reporting capability should therefore be built upstream, through structured note templates, validation rules, consolidation-ready data submissions, and reporting models that treat disclosures as systems outputs rather than late compilations.

A further, persistent finding is that human capacity remains a binding constraint throughout the sequencing process. Digitalization engages with capacity limitations rather than resolving them: systems can reduce variation and embed controls, but cannot substitute for institutional support, methodological knowledge, or accounting judgment. Capacity building should therefore not be treated as a post-deployment add-on but integrated into the reform process through scalable digital learning platforms, communities of practice, and system-embedded guidance human capacity being best understood as a co-produced outcome of training, organizational design, and system architecture.

The broader policy implication is that governments should avoid one-size-fits all digital reform agendas. In relatively integrated, reform-ready settings, sequenced integration may be the most effective pathway; in more constrained but institutionally coherent settings, modular progression emphasizing high-impact core functions with gradual expansion is likely more realistic; and in fragmented governance settings, interoperability-first strategies may be necessary, since cross-entity harmonization is itself a precondition for meaningful IPSAS progress. The guiding principle, then, is that digital interventions should be prioritized according to their capacity to relax the most binding dependencies under each country's institutional conditions.

Theoretically, this sequencing framework reinforces the study's main conclusion: IPSAS-oriented reform is best understood not as a linear adoption process, nor as a purely institutional or technological shift, but as a sequenced capability-building process in which accounting architecture, digital infrastructure, workflow control, data discipline, and human capacity evolve together. Technology alone does not ensure compliance, but it is far from incidental the key reform question is therefore not simply which digital system to adopt, but which digital capability should be introduced first to relax the greatest number of binding IPSAS constraints.

The Digital-IPSAS Sequencing Model's (DISM) weighting structure comprises two components. The first, the Sequencing Priority Score (SPS), determines the priority of digital interventions at each reform stage based on three criteria: gap severity (Sik), weighted at 0.50 as the primary determinant of urgency; dependency effect (Dk), weighted at 0.30, reflecting an intervention's capacity to unlock downstream reforms and reduce broader implementation bottlenecks; and feasibility or readiness (Fik), weighted at 0.20,

reflecting the constraint that even highly relevant interventions must remain implementable within the existing institutional context. Together, these weights indicate that sequencing decisions should prioritize not only gap severity but also reform feasibility.

The second component, the Digital-IPSAS Maturity Index (DIMI), captures the relative importance of the five reform dimensions in assessing overall implementation maturity. Recognition and measurement (MRM) and technical systems (MTS) receive the highest weights (0.25 each), as they constitute the core operational foundations of accrual-based implementation and digital workflow discipline. Accounting framework (MAF) is weighted at 0.20, reflecting its role as the basis for classification, reporting structure, and overall accounting coherence. Disclosure and reporting (MDR) and human capacity (MHC) each receive a weight of 0.15: although essential, these are treated as enabling, output-oriented dimensions whose effectiveness depends partly on the strength of the foundational dimensions. The DIMI weighting structure thus reflects the study's broader argument that IPSAS-oriented reform depends on the interaction between accounting architecture, digital systems, operational accrual accounting, reporting capacity, and institutional capability.

Table 8 presents the DISM matrix of translating sequencing logic into an operational tool. This matrix links maturity conditions to reform priorities by showing how different stages of IPSAS-oriented reform call for different digital interventions. If all countries should follow the same linear modernization path, the matrix identifies the intervention that should be prioritized once specific maturity thresholds are reached. In this way, it operationalizes the study's central argument that digitalization contributes most effectively to IPSAS reform when aligned with the underlying dependency structure of accounting reporting and institutional capability.

Table 8. DISM Operational Sequencing Matrix

DISM stage	Trigger condition	Priority intervention	Main digital enabler
Stage 1: Foundational standardization	$M_{TS} \leq 2$ or $M_{AF} \leq 2$	Core IFMIS/FMIS, standardized COA, basic controls	DI / SI
Stage 2: Register and transaction discipline	$M_{TS} \geq 3$ and $M_{RM} \leq 2$	Asset registers, sub- ledgers, GL linkage	DI / PA
Stage 3: Accrual and disclosure operationalization	$M_{RM} \geq 3$ and $M_{DR} \leq 3$	Accrual engines, validation rules, templates	PA / DV
Stage 4: Consolidation and value realization	All core maturities ≥ 3	Consolidation, analytics, dashboards, multi- output reporting	DV / SI

Note: DI = IFMIS/FMIS integration; PA = process automation; DV = data validation and analytics; SI = scalable infrastructure/interoperability.

These sequencing priorities should be understood as an operational guide derived from comparative evidence rather than as a universal reform template. This is due to the intervention order, which may vary with institutional change, resource constraints and governance structure.

SUMMARY AND CONCLUSION

This study sets out to answer a question the existing literature identifies but does not resolve: which digital capabilities should be prioritized in supporting IPSAS reform, and in what order? The evidence shows that higher digital maturity is consistently associated with lower implementation gaps, not because technology drives reform on its own, but because integrated ledgers, standardized classification, and workflow controls make accrual recognition and disclosure less dependent on slow, inconsistent, expert-driven reconciliation. Technical systems gaps and disclosure gaps co-vary closely across the sample, indicating that upstream data discipline largely determines downstream reporting capacity, while human capacity remains a binding constraint even in the most digitally advanced cases. EU membership corresponds to systematically lower gaps and higher digital maturity, consistent with stronger alignment incentives and access to structured external support.

The Digital-IPSAS Sequencing Model (DISM) translates these patterns into operational guidance by combining gap severity, dependency effects, and implementation feasibility into a single sequencing score, but its recommendations hold most reliably where governance is coherent, institutions have sufficient absorptive capacity, and reform is internally owned rather than externally imposed. Bosnia and Herzegovina illustrates the clearest limiting case: jurisdictional fragmentation and the absence of harmonized definitions and reporting boundaries constitute a political coordination problem that must be resolved before standard sequencing logic can apply, while donor-driven funding arrangements illustrate a second failure mode, in which external timelines rather than institutional readiness produce systems that are technically built but structurally disconnected from usable data.

Three implications follow. First, sequencing is a primary condition for whether reform becomes operational, not a secondary design choice: fragmented settings should prioritize the digital accounting backbone, integrated ledgers, a harmonized chart of accounts, and basic workflow controls before deepening accrual accounting. Second, disclosure quality cannot be improved through templates or guidance alone, since weak disclosure is typically a symptom of missing upstream data structures; a reverse sequence fails by construction. Third, human capacity must be built into reform design from the outset rather than treated as a post-deployment concern, through system-embedded guidance, scalable learning platforms, and organizational arrangements that convert compliance into repeatable practice rather than expert-dependent correction. Given the study's small sample, reliance on informed coding judgment, and theory-informed rather than statistically estimated weights, DISM is best understood as a diagnostic instrument rather

than a universal template one that establishes comparative patterns rather than causal relationships. What the evidence firmly supports is the study's main claim: in IPSAS-oriented digital reform, the sequence of interventions shapes whether reform becomes operational at all.

NOMENCLATURE

AF	Accounting Framework
DI	IFMIS/FMIS Integration
DIMI	Digital-IPSAS Maturity Index
DISM	Digital-IPSAS Sequencing Maturity Model
DR	Disclosure and Reporting
HC	Human Capacity
IFMIS	Integrated Financial Management Information System
FMIS	Financial Management Information System
IPSAS	International Public Sector Accounting Standards
PA	Process Automation
PEFA	Public Expenditure and Financial Accountability
PFM	Public Financial Management
PULSAR	Public Sector Accounting and Reporting
RM	Recognition and Measurement
SI	Scalable Infrastructure and Interoperability
SIGMA	Support for Improvement in Governance and Management
SPS	Sequencing Priority Score
TS	Technical Systems
DV	Data Validation and Analytics
ρ	Spearman's rank correlation coefficient
τ	Kendall's tau rank correlation coefficient
U	Mann-Whitney U statistic
G_j	Gap score for dimension j
M_j	Maturity score for dimension j
w_j	Weight for dimension j
S_{ik}	Gap severity for intervention k in country i
D_k	Dependency effect of intervention k
F_{ik}	Feasibility score for intervention k in country i

AUTHORS' CONTRIBUTIONS

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Draft Preparation, M.N., and L.K.; Writing – Review & Editing, M.N., L.K., and O.N.; Visualization, L.K., and O.N.; Supervision, M.N.; Project Administration, M.N.

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CONFLICT OF INTERESTS

The authors confirm that there is no conflict of interest associated with the publications.

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