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ELECTORAL SEQUENCING AND THE SCIENTIFIC CULTURE OF DEMOCRATIC ACCOUNTABILITY IN INDONESIA'S DECENTRALIZED PRESIDENTIAL SYSTEM

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ABSTRACT

Electoral sequencing is often treated as a technical matter of electoral administration, yet the timing of elections can shape the quality of democratic judgment. This article examines how the temporal organization of national and local elections affects voter cognition, local accountability, and governability in Indonesia's decentralized presidential system. Drawing on a qualitative comparative study of eight Indonesian regions, the article argues that nationally concurrent elections generate an "informational eclipse" in which presidential and national party narratives overshadow local issues. Under conditions of high electoral complexity, voters tend to rely on national partisan cues rather than systematic evaluations of subnational performance, weakening the scientific culture of democratic accountability. While electoral simultaneity may provide short-term coordination benefits for executive-legislative relations, it imposes longer-term costs on issue differentiation, responsibility attribution, and local responsiveness. By contrast, separating national and local electoral cycles can create a clearer informational space for evaluating local governments, although it also introduces coordination challenges across levels of governance. The article contributes to electoral design theory by conceptualizing electoral sequencing as an institutional variable that structures the informational and cognitive conditions of democratic accountability in decentralized democracies.

KEYWORDS: Electoral Sequencing; Scientific Culture; Democratic Accountability; Voter Cognition; Decentralization; Information Environment; Local Democracy; Indonesia.

1. INTRODUCTION

Electoral design is a foundational element of democratic governance. It determines not only how votes are converted into seats, but also how citizens process political information, evaluate public officials, and attribute responsibility across levels of government. While much of the literature on electoral systems has focused on electoral formulas, district magnitude, ballot structures, and party competition, less attention has been given to the temporal organization of elections. Yet, in multi-level democracies, when elections are held can be as consequential as how they are conducted. Electoral sequencing, the timing and simultaneity of elections across national and subnational levels, shapes the informational environment in which democratic judgment takes place. In this sense, election timing is not merely an administrative arrangement, but an institutional condition that affects the scientific culture of democratic accountability: the capacity of citizens to make reasoned, evidence-based evaluations of political performance.

This issue is particularly important in decentralized presidential systems, where national and local governments operate under distinct mandates, responsibilities, and accountability relationships. When national and subnational elections are held simultaneously, voters are required to process multiple contests, candidates, party cues, and policy agendas within a compressed electoral moment. Such complexity may intensify cognitive overload and encourage voters to rely on simplified heuristics rather than detailed evaluations of local performance (Downs, 1957; Lau & Redlawsk, 2001; Norris, 2011). In highly concurrent elections, presidential races and national party narratives tend to dominate campaign discourse and media attention, producing what this article conceptualizes as an "informational eclipse": a condition in which local issues, subnational candidates, and performance-based accountability are overshadowed by national political dynamics.

Indonesia provides a particularly important case for examining these dynamics. Since the democratic transition after 1998, Indonesia has combined direct elections, presidentialism, multiparty competition, and extensive decentralization, making it one of the most significant decentralized democracies in the Global South (Huntington, 1991; Mietzner, 2013). In pursuit of electoral efficiency and institutional coherence, Indonesia adopted increasingly simultaneous electoral arrangements, particularly through the synchronization of presidential and legislative elections and the broader institutional

debate on the timing of national and subnational electoral cycles. While this model promised administrative efficiency and potential coordination benefits, it also generated concerns about voter fatigue, administrative burden, issue crowding, and the weakening of local accountability. Previous studies on Indonesia's simultaneous local elections have also shown that electoral simultaneity carries important budgetary and governance implications, particularly in relation to the political allocation of election financing and the administrative burden of organizing concurrent local contests (Aziz, 2016). The experience of Indonesia therefore raises a broader theoretical question: how does electoral sequencing shape the trade-off between representation, accountability, and governability in decentralized presidential democracies?

Existing scholarship provides important insights into the relationship between electoral institutions and democratic outcomes. Studies of electoral systems have shown that institutional rules shape party competition, legislative fragmentation, and executive-legislative relations (Lijphart, 1999; Mainwaring & Shugart, 1997; Shugart & Carey, 1992). Research on decentralization has emphasized the importance of local elections for responsiveness and accountability (Rondinelli et al., 1989; Powell, 2000). Meanwhile, studies of voter cognition and electoral integrity have demonstrated that voters often rely on informational shortcuts under conditions of complexity (Norris, 2011, 2014). However, these literatures have not sufficiently integrated electoral sequencing as a core institutional variable. Election timing is often treated as a logistical or secondary matter, rather than as a mechanism that structures information flows, voter cognition, and accountability across levels of government.

This article addresses that gap by examining how nationally concurrent and separated electoral cycles affect democratic accountability and governability in Indonesia's decentralized presidential system. Drawing on a qualitative comparative study of eight Indonesian regions, the article analyzes how electoral sequencing shapes issue salience, voter attention, candidate strategies, responsibility attribution, and post-election governance. The central argument is that nationally concurrent elections produce an informational eclipse that weakens the scientific culture of democratic accountability at the local level. By contrast, separating national and local electoral cycles can create a clearer informational space for evaluating subnational governments, although it may also introduce coordination challenges across

levels of governance. The article therefore conceptualizes electoral sequencing as a strategic institutional variable that structures a fundamental trade-off: simultaneity may support short-term coordination, but separation may better protect representation, accountability, and the cognitive integrity of democratic choice.

The article contributes to the literature in three ways. First, it extends electoral design theory by placing electoral sequencing at the center of institutional analysis. Second, it links election timing to the cognitive and informational conditions under which citizens evaluate political performance. Third, it offers empirical insights from Indonesia, showing how the temporal organization of elections affects democratic accountability in a decentralized presidential democracy. By doing so, the article argues that debates on electoral reform should move beyond administrative efficiency and consider how election timing shapes the quality of democratic judgment itself.

2. LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

2.1 *Electoral Sequencing and Voter Cognition*

Electoral design has long been recognized as a central determinant of democratic representation, party competition, and governability. Classic studies show that electoral rules shape how votes are translated into seats, how parties coordinate, and how executive-legislative relations develop in democratic systems (Dahl, 1989; Duverger, 1954; Lijphart, 1999; Mainwaring & Shugart, 1997). However, much of this literature has focused on electoral formulas, district magnitude, and ballot structures, while paying less attention to the temporal organization of elections. In multi-level democracies, electoral sequencing, the timing and simultaneity of elections across levels of government, constitutes an institutional variable that shapes the conditions under which voters evaluate political actors and attribute responsibility.

The importance of sequencing becomes clearer when electoral design is viewed through the lens of voter cognition. Voters do not process political information under conditions of unlimited attention. Instead, they operate under cognitive constraints and often rely on heuristics to simplify complex electoral choices (Downs, 1957; Lau & Redlawsk, 2001; Norris, 2011). When elections are held simultaneously across national and subnational levels, voters must process multiple ballots, candidates, party labels, policy agendas, and campaign messages within a compressed period. This complexity can increase

cognitive load and reduce voters' capacity to distinguish between different offices, responsibilities, and policy domains.

Under such conditions, high-salience national contests tend to dominate voter attention. Presidential candidates, national party leaders, and macro-political narratives become the primary cues through which voters interpret the broader electoral field. This can lead to the nationalization of local elections, where subnational contests are judged less on local performance and more on national partisan alignments or leader effects (Geys, 2006; Norris, 2014). From the perspective of scientific culture, this shift matters because it weakens the evidence-based evaluation of local governance. If voters rely primarily on national cues, local elections lose part of their function as mechanisms for informed, performance-based accountability.

2.2 *Local Accountability, Decentralization, and Democratic Culture*

Decentralization is commonly justified on the grounds that it brings government closer to citizens and strengthens democratic responsiveness. By devolving authority to subnational governments, decentralized systems are expected to improve the alignment between citizen preferences, local policy outcomes, and political responsibility (Rondinelli *et al.*, 1989; Dahl, 1989). In this framework, local elections are crucial because they provide citizens with opportunities to evaluate subnational leaders, reward effective performance, and sanction poor governance.

However, local accountability depends on the clarity of responsibility attribution. Elections can only function as instruments of accountability when voters are able to identify which level of government is responsible for specific policy outcomes (Powell, 2000; Anderson, 2007). When responsibility is blurred, voters may reward or punish candidates for outcomes beyond their control, weakening the representative function of elections. Electoral sequencing directly affects this process. Simultaneous elections may blur the distinction between national and local responsibilities, while separated electoral cycles may create more focused moments for evaluating subnational performance.

In decentralized presidential systems, this distinction is especially important. National and local governments operate under different mandates, yet they often share overlapping policy responsibilities. When electoral cycles are fused, national political dynamics may overshadow local issues, reducing the visibility of local candidates and weakening the

public's ability to assess subnational governance. Conversely, separating national and local elections can create a distinct informational space in which local problems, service delivery, and administrative performance receive greater public attention. In the Indonesian context, debates on asymmetric local elections similarly emphasize the need to design electoral arrangements that are responsive to regional variation while strengthening democratic, accountable, and sustainable local governance (Aziz & Dewi, 2016). In this way, electoral sequencing shapes not only political competition, but also the democratic culture of accountability.

Nevertheless, electoral separation is not automatically sufficient to produce stronger accountability. Its effects depend on local media capacity, civil society strength, party institutionalization, and administrative competence. In regions where local media are weak or politics remains clientelistic, voters may continue to rely on personal, material, or partisan cues even when elections are separated. Therefore, the accountability effects of electoral sequencing are mediated by the broader institutional and informational environment in which elections take place (Lijphart, 1999; Falleti, 2010).

2.3 Representation-Governability Trade-offs

Electoral sequencing also shapes governability. In presidential systems, governability refers to the capacity of political institutions to generate stable, coherent, and effective governance. Because presidents and legislatures derive their mandates through separate electoral processes, the timing of elections can affect coalition formation, legislative support, and the alignment of political incentives (Mainwaring & Shugart, 1997; Shugart & Carey, 1992).

One major argument in favor of concurrent elections is that simultaneity can improve governability by creating coattail effects. When presidential and legislative elections are held at the same time, voters may support legislative candidates aligned with the preferred presidential ticket, potentially reducing fragmentation and facilitating executive-legislative cooperation (Shugart, 2001; Hicken & Stoll, 2011). In this view, simultaneity enhances coordination and strengthens the governing capacity of elected executives.

Yet these gains may be limited and uneven. Comparative studies suggest that coattail effects depend on party system institutionalization, electoral rules, and the degree of party nationalization (Samuels & Shugart, 2010; Cheibub et

al., 2014). In fragmented multiparty systems, concurrent elections may produce short-term alignment without generating durable programmatic support. Moreover, coordination gains at the national level may come at the cost of weaker subnational accountability if local contests are absorbed into national political narratives.

Separated electoral cycles create the opposite trade-off. They may strengthen local representation and accountability by reducing cognitive overload and clarifying responsibility attribution, but they may also generate coordination challenges. Staggered mandates can increase bargaining costs, weaken vertical party coherence, and complicate intergovernmental relations, particularly in decentralized presidential systems where national and local authorities must coordinate policy implementation (Rodden, 2004; Falleti, 2010). Thus, electoral sequencing does not produce a single democratic outcome. Rather, it structures a trade-off between short-term governability and long-term accountability.

Comparative experience from other decentralized democracies reinforces this point. Federal and multi-level systems such as Brazil, Mexico, India, and Germany show that election timing can either nationalize subnational contests or allow regional issues to acquire independent visibility, depending on party-system structure, media attention, and intergovernmental arrangements. Although these countries differ institutionally from Indonesia, they illustrate a common multi-level dilemma: electoral calendars organize not only political competition but also the information through which citizens connect offices, responsibilities, and performance. The Indonesian case therefore has broader relevance for decentralized democracies that must balance national coordination with subnational accountability (Lijphart, 1999; Powell, 2000; Samuels & Shugart, 2010).

This comparative point is included not to equate Indonesia mechanically with other federal or multi-level systems, but to clarify the broader theoretical relevance of the Indonesian case. Across decentralized democracies, electoral timing interacts with party nationalization, fiscal decentralization, media structure, and intergovernmental coordination; therefore, Indonesia can be read as a theoretically significant case for understanding how sequencing affects accountability in multi-level presidential settings.

Based on this framework, the article advances three analytical expectations. First, nationally concurrent elections are expected to increase the

nationalization of local electoral discourse by amplifying national cues and reducing issue differentiation. Second, separated electoral cycles are expected to improve local accountability by creating clearer informational conditions for evaluating subnational performance. Third, the effects of electoral sequencing are expected to vary across local contexts, depending on party institutionalization, media capacity, civil society strength, and administrative conditions. These expectations guide the empirical analysis that follows.

3. DATA AND METHODS

3.1 Research Design

This study employs a qualitative comparative case study design to examine how electoral sequencing shapes representation, accountability, and governability in Indonesia's decentralized presidential system, following the logic of case-based causal and comparative inquiry (George & Bennett, 2005; Gerring, 2007). This design is appropriate because the study focuses not only on whether electoral timing affects democratic outcomes, but also on how such effects operate through cognitive, informational, and institutional mechanisms. A qualitative comparative approach enables the analysis to trace the relationship between electoral arrangements, voter attention, issue salience, responsibility attribution, and post-election governance across different subnational contexts.

The study does not aim to estimate causal effects statistically. Instead, it seeks to identify recurring patterns and mechanisms across cases. Following the logic of comparative case analysis, Indonesia is treated as a single national institutional setting within which subnational variation can be examined. This allows the study to hold constant broader national factors, such as the presidential system, national electoral law, party system structure, and decentralization framework, while comparing how electoral sequencing operates differently across local political environments.

The analysis focuses on two types of electoral arrangements: nationally concurrent elections, in which national and subnational contests are held within the same compressed electoral cycle, and separated electoral cycles, in which local contests occur at a temporal distance from national elections. This comparison makes it possible to assess whether and how simultaneity intensifies nationalization, cognitive overload, and accountability blurring, while separation creates more focused conditions for local democratic evaluation.

3.2 Case Selection

The empirical materials were collected from interviews, official electoral documents, legal and regulatory texts, election reports, and media coverage related to national and subnational electoral cycles in Indonesia. The cases were selected purposively to capture variation in democratic performance, party competition, local political structure, media environment, and administrative capacity. This strategy is suitable for a mechanism-oriented study because the expected effects of electoral sequencing are not assumed to be uniform across contexts. Rather, they are likely to be mediated by local institutional and informational conditions.

Three selection criteria guided the choice of cases. First, the cases reflect variation in democratic performance, including regions with relatively high, medium, and low levels of electoral competitiveness and citizen participation. This variation allows the study to examine whether electoral sequencing has different accountability effects in more competitive and less competitive local democracies.

Second, the cases vary in party competition and local elite configuration. Some cases are characterized by relatively institutionalized parties and active civil society, while others are marked by dominant local elites, personalized politics, or fragmented party coalitions. This variation is important because party organization and elite structure can condition whether local elections are driven by programmatic competition, national partisan cues, or informal networks.

Third, the cases represent different electoral contexts, including nationally concurrent elections, separated electoral cycles, and transitional arrangements. This variation enables comparison between contexts in which local contests are embedded within national political narratives and contexts in which they are given more distinct temporal and informational space.

Operationally, the cases were selected through purposive theoretical sampling rather than statistical representativeness. The first stage identified regions that differed in democratic performance, local party configuration, and exposure to concurrent or separated electoral cycles. The second stage screened these regions according to data availability, including interview access, official electoral documents, media coverage, and comparability of local governance issues. The final eight cases were retained because each offered analytically useful variation for tracing how electoral timing interacts with local information environments, voter cognition, accountability claims, and governability

outcomes. This procedure strengthens internal comparison while acknowledging that the study aims to identify mechanisms rather than to estimate national-level prevalence.

To protect the confidentiality of the sampled regions and the individuals involved in the study, the names of the regions are not disclosed in this article. The cases are presented using neutral codes, from Case A to Case H. These codes are not derived from regional names, administrative identifiers, or geographic initials, and therefore should not be interpreted as referring to specific identifiable locations. The coding functions as an analytical device to classify cases according to democratic context, local political structure, electoral sequencing, dominant information patterns, and

implications for accountability and governability. This approach allows the study to focus on comparative mechanisms rather than on the exceptionalism of individual regions. Table 1 summarizes the main characteristics of the eight cases and indicates how each case contributes to the comparative analysis.

Thus, the case-selection strategy follows a mechanism-oriented logic: the cases were chosen because they make it possible to observe variation in nationalization, issue salience, responsibility attribution, and governability under different sequencing conditions. The purpose is analytical comparability rather than regional representativeness.

Table 1. Comparative Overview of Anonymized Subnational Cases.

Case	Democratic Context	Local Political Structure	Electoral Sequencing Context	Dominant Information Pattern	Accountability Implication	Governability Implication
Case A	High democratic performance; competitive participation	Moderately institutionalized parties; limited elite dominance	Concurrent national-local electoral cycle	Strong national cues; presidential and party narratives dominated local campaigns	Local issue differentiation weakened; performance-based evaluation reduced	Short-term coordination improved, but local responsiveness remained limited
Case B	Medium democratic performance; uneven participation	Mixed party strength; strong incumbency advantage	Concurrent national-local electoral cycle	National coalition signals filtered local competition	Accountability mediated by national alignments rather than local performance	Temporary executive-legislative alignment, followed by transactional bargaining
Case C	Low democratic performance; limited contestation	Dominant local elites; weak party institutionalization	Concurrent national-local electoral cycle	Local issues largely eclipsed by national narratives and elite networks	Accountability highly limited; voters relied on partisan or elite cues	Governability depended on informal elite bargains
Case D	High democratic performance; active civic engagement	Institutionalized parties; strong local civil society	Separated electoral cycle	Local issues and candidate competence received greater visibility	Stronger performance-based accountability and clearer responsibility attribution	Improved local responsiveness, though coordination across levels became more complex
Case E	Medium democratic performance; moderate participation	Fragmented parties; transactional coalitions	Separated electoral cycle	Mixed information pattern; local issues visible but national spillovers persisted	Accountability improved, but remained uneven across constituencies	Higher legislative bargaining costs and policy coordination challenges
Case F	Low-medium democratic performance; uneven participation	Personalized networks; weak oversight institutions	Separated electoral cycle	Reduced national dominance, but non-programmatic cues persisted	Incremental accountability gains; limited by weak local	Coordination costs increased, especially in policy implementation

Case	Democratic Context	Local Political Structure	Electoral Sequencing Context	Dominant Information Pattern	Accountability Implication	Governability Implication
					information environment	
Case G	Peripheral democratic context; low participation	Personalized politics; limited media capacity	Concurrent national-local electoral cycle	National narratives and local patronage networks dominated voter attention	Accountability largely symbolic; limited issue-based evaluation	Governability relied on informal coordination and elite accommodation
Case H	Reform-oriented local democracy; improving participation	Emerging party competition; growing civic engagement	Transitional movement toward separated electoral cycle	Declining nationalization; increasing local issue salience	Strengthening responsibility attribution and local accountability	Transitional coordination challenges, but potential for more responsive governance

Source: Author's synthesis based on interview data, document analysis, media review, and comparative case analysis.

As shown in Table 1, the cases were selected to capture variation across three main dimensions: democratic context, local political structure, and electoral sequencing. The comparison includes cases conducted under nationally concurrent electoral cycles, cases under separated electoral cycles, and a transitional case moving toward separation. This variation is important for identifying how electoral timing interacts with local information environments and institutional conditions. The table also shows that the effects of electoral sequencing are not uniform. Concurrent elections tend to be associated with stronger national cue dominance and weaker local accountability, while separated cycles generally provide greater space for local issue salience, although they may also generate coordination challenges. These patterns guide the empirical analysis developed in the findings section.

3.3 Data Sources

The study draws on multiple qualitative data sources to strengthen analytical validity through triangulation. The first source consists of semi-structured interviews with actors involved in electoral and governance processes at national and subnational levels. These include electoral management officials, local government representatives, party actors, civil society activists, journalists, and observers of local politics. The interviews explored perceptions of electoral complexity, voter attention, campaign dynamics, issue salience, responsibility attribution, and post-election governance under different electoral cycles.

The second source consists of documentary materials, including electoral laws and regulations,

Constitutional Court decisions, electoral management reports, official election results, party documents, and relevant government publications. These documents were used to reconstruct the institutional context of electoral sequencing and to assess how formal rules shaped the practical organization of national and local elections.

The third source consists of media reports and secondary literature. National and local media coverage was examined to assess the relative visibility of national and local issues during election periods. This was particularly important for identifying whether local contests were framed primarily around subnational policy problems or absorbed into broader national political narratives. Scholarly studies on electoral design, decentralization, voter cognition, and Indonesian democracy were used to situate the findings within broader theoretical debates.

Where available, descriptive electoral indicators such as voter turnout, party vote shares, candidate competition, and legislative fragmentation were used to contextualize the qualitative findings. These indicators were not used for statistical testing, but served as supporting evidence to interpret patterns of voter behavior, political competition, and governability across cases.

3.4 Analytical Strategy

The analysis proceeded in two stages: within-case analysis and cross-case comparison. In the within-case stage, each case was examined to identify how electoral sequencing shaped the informational environment of local elections. Particular attention was given to four analytical dimensions: issue

salience, voter cue-taking, responsibility attribution, and governance coordination.

Issue salience refers to the extent to which local policy concerns, service delivery, and subnational governance performance appeared in campaign discourse and media coverage. Voter cue-taking refers to the degree to which voters relied on national party labels, presidential preferences, or local performance evaluations when interpreting electoral choices. Responsibility attribution refers to whether voters and political actors clearly distinguished between national and subnational responsibilities. Governance coordination refers to the extent to which electoral timing facilitated or complicated executive-legislative relations and intergovernmental policy coordination after elections.

In the cross-case stage, patterns were compared across the eight cases to identify similarities and differences between concurrent and separated electoral cycles. The comparison focused on whether nationally concurrent elections were associated with higher nationalization of local discourse and weaker local accountability, and whether separated electoral cycles created clearer informational conditions for evaluating subnational governments. The analysis also examined contextual variation by comparing cases with different levels of party institutionalization, media capacity, civil society strength, and administrative competence.

This analytical strategy reflects the theoretical framework developed in the previous section. Rather than treating electoral sequencing as an isolated institutional rule, the analysis examines how election timing interacts with cognitive constraints, information environments, and local political structures to shape democratic accountability and governability.

3.5 Validity and Limitations

Several strategies were used to enhance the credibility of the analysis. First, triangulation across interviews, documents, media reports, and descriptive electoral indicators reduced reliance on a single source of evidence and strengthened the credibility of qualitative inference (Denzin, 1978). Second, within-case analysis allowed the study to trace the mechanisms linking electoral sequencing to issue salience, voter cognition, and accountability outcomes. Third, cross-case comparison enabled the identification of recurring patterns while also recognizing contextual variation and divergent outcomes.

Nevertheless, the study has several limitations.

First, because it is based on a qualitative comparison of eight subnational cases within a single country, the findings are not intended to produce universal generalizations. Instead, they offer theoretically informed insights into how electoral sequencing may operate in decentralized presidential democracies. Second, the use of coded cases limits the level of regional specificity presented in the article. This approach is analytically useful for identifying broader patterns, but future versions of the study could strengthen empirical transparency by naming the regions or providing more detailed case profiles. Third, the study relies primarily on qualitative evidence and descriptive indicators. Future research could extend the analysis through survey data, experimental designs, or longitudinal comparison to assess more precisely how changes in electoral timing affect voter cognition and accountability over time.

Despite these limitations, the study provides a useful basis for understanding electoral sequencing as a consequential institutional variable. By comparing subnational cases within Indonesia's decentralized presidential system, the analysis clarifies how election timing shapes the informational and cognitive conditions of democratic accountability.

4. FINDINGS

4.1 Informational Eclipse and the Nationalization of Local Elections

Across the eight subnational cases, the analysis shows that nationally concurrent elections tend to nationalize local electoral discourse. In cases conducted under concurrent electoral cycles, local contests were frequently absorbed into the broader narratives of presidential competition, national party alignments, and coalition politics. Rather than functioning as distinct arenas for evaluating subnational candidates and policy performance, local elections often became extensions of national political contestation.

This pattern is conceptualized in this article as an "informational eclipse." The term refers to a condition in which national political narratives overshadow local issues, reducing the visibility of subnational policy concerns and weakening voters' capacity to evaluate local candidates on their own merits. In concurrent electoral settings, presidential candidates, national party leaders, and national-level campaign issues received disproportionate attention from political actors, media outlets, and voters. As a result, local policy debates were often crowded out by national political messaging. In cases under

concurrent cycles, campaign materials and media reports showed a stronger emphasis on presidential endorsements and national party alignments than on local service delivery or administrative performance. This pattern was especially visible in cases where local candidates framed their electoral appeal through proximity to national coalitions rather than through detailed local policy platforms.

The intensity of this informational eclipse varied across cases. In Case A and Case B, where democratic competition was relatively active, local candidates still attempted to articulate local platforms. However, campaign visibility and voter attention remained strongly shaped by national party cues and presidential preferences. In Case C and Case G, where local political competition was weaker and elite networks were more dominant, national narratives and informal political arrangements almost entirely displaced issue-based local debate. In these cases, local accountability was particularly limited because voters had few opportunities to assess subnational performance independently from national political alignments.

By contrast, cases under separated electoral cycles showed greater space for local issue salience. In Case D, local service delivery, administrative performance, and candidate competence were more visible in campaign discourse. Case E and Case F also showed improvements in local issue differentiation, although national spillovers and non-programmatic cues remained present. Case H, as a transitional case, indicated a gradual decline in nationalization and a growing visibility of local concerns. These findings suggest that separated electoral cycles can create a more distinct informational space for subnational democratic evaluation.

Overall, the evidence indicates that electoral sequencing shapes not only the timing of political competition, but also the content of democratic discourse. Concurrent elections intensify national cue dominance and reduce the visibility of local issues, while separated cycles provide better conditions for local political differentiation. This supports the argument that electoral sequencing is a key institutional variable in shaping the scientific culture of democratic accountability.

4.2 Voter Cognition and Responsibility Attribution

The second major finding concerns the effect of electoral sequencing on voter cognition and responsibility attribution. In concurrent elections, voters faced a dense and complex informational environment. They were required to process multiple

ballots, candidates, offices, party labels, and policy agendas within a single electoral moment. This complexity encouraged reliance on simplified cues, especially presidential preferences and national party identities.

In cases with nationally concurrent elections, voter judgments were often filtered through national political considerations. Local candidates associated with popular national figures or dominant party coalitions gained electoral advantages, even when local governance performance was uneven. Conversely, local actors linked to unpopular national coalitions faced disadvantages that were not always related to their local records. This indicates that electoral simultaneity can blur the relationship between local performance and electoral reward or punishment. Interview accounts from electoral observers and local political actors indicated that voters frequently associated local candidates with national coalitions rather than with their own governance records. These accounts suggest that, under concurrent electoral cycles, responsibility attribution was often filtered through national partisan identification rather than through direct assessment of subnational performance.

The blurring of responsibility attribution was particularly visible in cases where voters had limited access to differentiated local information. In Case C and Case G, weak local media capacity and dominant elite networks intensified reliance on non-local cues. Voters were less likely to distinguish between national and local responsibilities, making it difficult to hold subnational office-holders accountable for specific policy outcomes. Under these conditions, local elections became less effective as instruments of democratic control.

Separated electoral cycles produced more favorable conditions for cognitive focus. In Case D, voters and local political actors were more able to distinguish local policy issues from national political dynamics. Campaign discourse gave greater attention to service delivery, infrastructure, administrative capacity, and candidate competence. This created clearer conditions for performance-based evaluation. Similar, although less consistent, patterns appeared in Case E and Case F, where separated cycles improved voter attention to local issues but did not eliminate clientelistic or partisan shortcuts.

These findings show that the cognitive effects of electoral sequencing are conditional rather than automatic. Separating electoral cycles can reduce cognitive overload and clarify responsibility attribution, but its effectiveness depends on local

information environments, civil society capacity, and party institutionalization. Where local media and civic engagement are strong, electoral separation can strengthen democratic accountability. Where these conditions are weak, separation may improve the informational environment only incrementally.

From the perspective of scientific culture, this finding is significant. Democratic accountability depends on citizens' ability to evaluate evidence, attribute responsibility, and distinguish between levels of government. When electoral timing compresses too many contests into a single moment, it weakens the cognitive conditions required for reasoned democratic judgment. Electoral sequencing therefore shapes not only voter participation, but also the quality of political reasoning itself.

4.3 Accountability-Governability Trade-offs

The third finding concerns the trade-off between accountability and governability. Nationally concurrent elections can provide short-term coordination benefits, particularly by aligning electoral mandates and reinforcing coalition signals across levels of government. In some concurrent cases, national party alignments helped simplify coalition formation and temporarily improved executive-legislative coordination.

However, these benefits were often limited and unstable. In cases characterized by fragmented party systems or transactional coalition politics, the coordination effects of concurrency did not produce durable governability. Initial alignment frequently gave way to bargaining, elite negotiation, and shifting coalitions after the election. Thus, while concurrent elections may create short-term political alignment, they do not necessarily generate stable or programmatic governance. Evidence from the comparative cases indicates that post-election coordination often depended less on shared policy platforms than on pragmatic coalition bargaining among national and local actors.

At the subnational level, the costs of concurrency were more evident. When local elections were absorbed into national political narratives, local leaders often derived legitimacy from national partisan alignment rather than from local performance. This weakened the connection between electoral mandate and local responsiveness. In Case B and Case C, for example, local governance remained heavily influenced by national coalition dynamics and elite bargaining, limiting the autonomy of local policy agendas.

Separated electoral cycles produced a different configuration of trade-offs. They improved the

visibility of local issues and strengthened performance-based accountability, but they also introduced coordination challenges. In Case D and Case E, clearer local accountability was accompanied by more complex relations between local and national actors. Staggered electoral mandates created different political time horizons, increasing the need for negotiation in policy implementation, fiscal coordination, and executive-legislative relations.

This suggests that electoral separation should not be understood as a simple institutional remedy. Its democratic value lies in strengthening the informational and accountability foundations of local democracy, but it must be supported by coordination mechanisms that manage intergovernmental tensions. Without such mechanisms, the accountability gains of separated elections may be accompanied by higher transaction costs in governance.

Taken together, the findings indicate that electoral sequencing structures a fundamental democratic trade-off. Concurrent elections may support short-term governability by aligning political incentives, but they risk weakening local accountability and reducing the quality of democratic judgment. Separated electoral cycles can strengthen local accountability and issue differentiation, but they require stronger institutional coordination to manage staggered mandates. The central challenge is therefore not to choose efficiency over accountability, or accountability over governability, but to design electoral timing in a way that protects the cognitive integrity of voters while maintaining workable mechanisms of governance.

5. DISCUSSION

5.1 Electoral Sequencing and the Scientific Culture of Accountability

The findings of this study suggest that electoral sequencing should be understood as more than a technical matter of electoral administration. The timing of elections shapes the informational environment in which citizens interpret political choices, evaluate candidates, and attribute responsibility. In this sense, electoral sequencing directly affects the scientific culture of democratic accountability: the capacity of voters to make reasoned judgments based on relevant evidence, differentiated policy information, and identifiable lines of responsibility.

In Indonesia's decentralized presidential system, nationally concurrent elections create a compressed electoral environment in which multiple contests compete for voter attention. While such simultaneity

may appear administratively efficient, the findings show that it can weaken the cognitive foundations of local accountability. When national and local elections are held within the same electoral cycle, presidential narratives, national party alignments, and coalition politics tend to dominate public discourse. Local issues remain formally present, but they are often subordinated to national-level cues. This confirms the argument that institutional design affects not only political representation, but also the conditions under which citizens process democratic information (Downs, 1957; Lau & Redlawsk, 2001; Norris, 2011).

The concept of “informational eclipse” developed in this article captures this mechanism. Under concurrent elections, national political narratives overshadow local policy debates, reducing voters’ ability to evaluate subnational candidates on the basis of local performance. This does not mean that voters are irrational. Rather, it indicates that voters operate within institutional environments that shape the cost and availability of political information. When the electoral environment becomes too complex, reliance on party labels, presidential preferences, and coalition signals becomes a rational shortcut. However, these shortcuts can weaken local accountability when they replace evidence-based evaluation of subnational governance.

From the perspective of scientific culture, this is a significant democratic problem. A healthy democratic culture requires citizens to distinguish between claims, evidence, responsibilities, and performance. In decentralized systems, this requires voters to differentiate national and local authority. If election timing blurs that distinction, then accountability becomes less precise. Citizens may reward or punish local officials for national political dynamics, while local policy outcomes receive insufficient scrutiny. The result is a democratic process that remains procedurally competitive but becomes weaker in its evaluative quality.

5.2 Voter Cognition and the Institutional Conditions of Democratic Judgment

The findings also contribute to debates on voter cognition by showing that cognitive overload is not merely an individual limitation. It is institutionally produced. Voters make decisions under bounded rationality, and their use of heuristics depends partly on the structure of the electoral environment (Downs, 1957; Lau & Redlawsk, 2001). In concurrent elections, the number of ballots, candidates, offices, and campaign messages increases the cognitive burden placed on citizens. As a result, voters are

more likely to rely on high-salience national cues when interpreting local contests.

This has important consequences for democratic accountability. Accountability requires more than participation; it requires the ability to connect political authority with policy performance. When voters cannot clearly attribute responsibility, electoral sanctions and rewards become less effective (Powell, 2000; Anderson, 2007). The Indonesian cases show that concurrent elections often blur this attribution. Local candidates may benefit from national popularity despite weak local performance, while others may be punished because of national partisan associations rather than their own governance records.

Separated electoral cycles help address this problem by creating a clearer informational space for local politics. When local elections are held at a temporal distance from national contests, voters and media actors have more opportunity to focus on local service delivery, administrative competence, and candidate credibility. This can strengthen the evaluative function of local elections and improve the connection between electoral choice and governance performance.

However, the findings also show that separation is not a complete solution. Its effects depend on the strength of local media, civil society, party institutionalization, and administrative capacity. In cases where local informational ecosystems remain weak, separated elections may reduce national dominance but not fully produce performance-based accountability. Voters may still rely on personalistic, clientelistic, or material cues. Therefore, electoral sequencing matters, but it works through interaction with broader political and informational conditions.

5.3 Rethinking Governability in Decentralized Presidential Systems

The study also invites a reconsideration of governability in presidential systems. Simultaneous elections are often justified because they may produce coattail effects, align electoral mandates, and facilitate executive–legislative coordination (Shugart, 2001; Hicken & Stoll, 2011). The findings partially support this claim. In some cases, concurrency produced short-term coordination benefits by reinforcing coalition signals and simplifying post-election alignment.

Yet these benefits were often fragile. In fragmented party systems, electoral alignment did not necessarily translate into durable programmatic cooperation. Executive–legislative relations frequently returned to bargaining after the election.

This finding is consistent with scholarship suggesting that coattail effects are conditional and may be limited in multiparty presidential systems (Samuels & Shugart, 2010; Cheibub et al., 2014).

More importantly, the study shows that governability should not be reduced to short-term coordination. If electoral simultaneity weakens local accountability, reduces issue differentiation, and obscures responsibility attribution, it may undermine the longer-term legitimacy and responsiveness of governance. In decentralized democracies, governability depends not only on the alignment of executives and legislatures, but also on whether citizens can meaningfully evaluate the performance of governments at different levels. This broader understanding of governability is also consistent with systems-oriented approaches to sustainability and decision support, which emphasize that effective governance requires adaptive coordination, stakeholder engagement, and context-sensitive institutional design rather than merely formal administrative alignment (Hadi et al., 2023).

Separated electoral cycles reverse this trade-off. They may create stronger conditions for local accountability, but they also introduce coordination challenges through staggered mandates and divergent political incentives. This suggests that electoral reform should not be framed as a simple choice between simultaneity and separation. The more important question is how to design electoral timing in ways that protect the cognitive integrity of voters while maintaining mechanisms for intergovernmental coordination.

These findings imply that electoral reform should be evaluated through a policy matrix rather than a single efficiency criterion. If Indonesia maintains high levels of electoral concurrency, policymakers should compensate for the risk of informational eclipse through stronger voter education, clearer ballot and office differentiation, issue-specific debates for local candidates, and media rules that protect local policy coverage during national campaigns. If Indonesia moves toward greater separation between national and local electoral cycles, reform should be accompanied by coordination instruments such as synchronized development-planning forums, transparent coalition agreements, clearer fiscal-transfer rules, and predictable intergovernmental negotiation schedules. In both scenarios, the policy objective should be to preserve voter clarity while preventing institutional fragmentation.

In practical terms, this means that separated local

elections should not be treated as a stand-alone remedy. They should be paired with safeguards against elite fragmentation, such as transparent coalition formation, enforceable campaign-finance reporting, and institutionalized forums linking local development priorities with national planning. Conversely, if concurrent elections are retained, the democratic cost of concurrency should be mitigated through stronger local-information infrastructures, including local candidate debates, public service-performance scorecards, and voter education that differentiates national and subnational responsibilities.

5.4 Theoretical Implications

This study contributes to electoral design theory in three ways. First, it places electoral sequencing at the center of institutional analysis. Existing studies have shown that electoral systems, ballot structures, and party systems shape democratic outcomes (Lijphart, 1999; Mainwaring & Shugart, 1997). This article extends that argument by showing that the timing of elections also structures representation, accountability, and governability.

Second, the study links electoral design to the cognitive and informational conditions of democratic judgment. Election timing affects what information becomes salient, which cues voters rely on, and how responsibility is attributed across levels of government. Electoral institutions therefore shape not only the distribution of political power, but also the quality of democratic reasoning.

Third, the study highlights the conditional nature of sequencing effects. Concurrent elections tend to nationalize local discourse, while separated elections tend to improve local issue salience. However, these effects vary according to local media capacity, party institutionalization, civil society strength, and administrative conditions. Electoral sequencing should therefore be understood as a strategic institutional variable whose democratic consequences depend on context.

This argument also resonates with recent work on hybrid governance and institutional adaptation in Indonesia, which shows that disrupted institutional environments require flexible coordination models and adaptive mechanisms to sustain organizational effectiveness (Ika et al., 2026). In the electoral context, sequencing reform similarly requires more than formal legal redesign; it requires governance arrangements capable of managing informational complexity, institutional fragmentation, and multi-level coordination. Overall, the findings suggest that a scientific culture of democratic accountability

requires more than open electoral competition. It requires institutional arrangements that allow citizens to process information clearly, distinguish levels of responsibility, and evaluate political performance on relevant evidence. In decentralized presidential democracies, electoral sequencing is one of the institutional mechanisms through which these conditions are either strengthened or weakened.

6. CONCLUSION AND POLICY IMPLICATIONS

This article has examined how electoral sequencing shapes the relationship between representation, accountability, and governability in Indonesia's decentralized presidential system. The central argument is that the timing of elections is not merely an administrative or logistical matter. It is an institutional condition that shapes the informational environment of democracy, the cognitive demands placed on voters, and the clarity with which political responsibility can be attributed across levels of government.

Drawing on a qualitative comparative analysis of eight subnational cases, the article shows that nationally concurrent elections tend to produce an "informational eclipse." In this condition, presidential campaigns, national party alignments, and coalition narratives overshadow local issues and reduce the visibility of subnational performance. This weakens the scientific culture of democratic accountability because voters are encouraged to rely on national partisan cues rather than evidence-based evaluations of local governance. While such reliance on heuristics is understandable under conditions of electoral complexity, it limits the capacity of local elections to function as instruments of performance-based accountability.

The findings also show that separated electoral cycles can improve the informational conditions for local democracy. By creating a distinct temporal space for subnational contests, electoral separation allows local issues, candidate competence, service delivery, and administrative performance to become more visible. This can strengthen responsibility attribution and enhance voters' ability to evaluate local governments. However, electoral separation is not a complete solution. Its benefits depend on the strength of local media, civil society, party institutionalization, and administrative capacity. In weak informational environments, separated elections may reduce national dominance without fully producing programmatic or performance-based accountability.

The study further demonstrates that electoral

sequencing structures a trade-off between accountability and governability. Concurrent elections may generate short-term coordination benefits by aligning electoral mandates and reinforcing coalition signals. Yet these benefits are often fragile in fragmented multiparty systems and may come at the cost of weaker subnational accountability. Conversely, separated electoral cycles may strengthen local representation and accountability, but they can also introduce coordination challenges through staggered mandates and divergent political incentives. Electoral reform should therefore avoid treating simultaneity or separation as inherently superior. The key policy question is how to design electoral timing that protects the cognitive integrity of voters while maintaining effective coordination across levels of government.

Several policy implications follow from this analysis. First, electoral sequencing should be treated as a core element of democratic institutional design, not merely as an instrument of administrative efficiency. Policymakers should assess election timing according to its effects on voter cognition, issue salience, responsibility attribution, and local accountability. Second, if separated electoral cycles are adopted, they should be accompanied by stronger mechanisms for intergovernmental coordination, including clearer fiscal rules, structured forums for national-local policy negotiation, and more transparent executive-legislative bargaining procedures. These mechanisms are necessary to reduce the coordination costs that may arise from staggered electoral mandates. This need for coordinated institutional response is consistent with broader evidence from Indonesia showing that policy effectiveness during crisis conditions depends on the alignment of central and local implementation capacities.

Third, electoral management bodies should strengthen the informational quality of elections. In concurrent electoral cycles, this may require simplified ballot design, more targeted voter education, and clearer public communication about the responsibilities of different elected offices. In separated electoral cycles, electoral authorities can use the more focused electoral moment to promote issue-based campaigning and public deliberation on local governance. Fourth, reforms should be sensitive to local context. This context-sensitive approach is consistent with proposals for asymmetric local election design in Indonesia, which argue that electoral governance should recognize regional diversity while maintaining democratic

accountability and sustainable local government (Aziz & Dewi, 2016). Regions with weak media capacity, clientelistic politics, or limited administrative competence may require additional support to ensure that electoral separation translates into meaningful accountability.

Finally, before submission of the final version, author metadata should be completed in accordance with the journal's administrative note, including full affiliations, institutional email addresses, ORCID IDs where available, and a clear declaration of the corresponding author. These administrative details do not alter the manuscript's argument but are important for publication compliance.

This article has several limitations. The analysis is based on a qualitative comparison of eight subnational cases within a single country, and therefore does not claim universal generalizability. The use of anonymized case codes also limits the level of regional specificity that can be presented. Future research could extend this study through

cross-national comparison, survey-based analysis, experimental designs, or longitudinal research examining how changes in electoral timing affect voter cognition and accountability over time.

Despite these limitations, the study contributes to electoral design theory by showing that the timing of elections shapes not only political competition but also the quality of democratic judgment. A scientific culture of democratic accountability requires institutional arrangements that enable citizens to distinguish between levels of authority, evaluate policy performance, and attribute responsibility accurately. In decentralized presidential democracies, electoral sequencing is one of the key institutional mechanisms through which these democratic capacities are either strengthened or weakened. For Indonesia and other multi-level democracies, the challenge is not simply to make elections more efficient, but to ensure that electoral design supports informed, accountable, and governable democracy.

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REFERENCES

- Anderson, C. J. (2007). The end of economic voting? Contingency dilemmas and the limits of democratic accountability. *Annual Review of Political Science*, 10, 271–296. <https://doi.org/10.1146/annurev.polisci.10.050806.155344>
- Aziz, N. L. L. (2016). Politik anggaran dalam pelaksanaan pilkada serentak di Indonesia. *Jurnal Masyarakat Indonesia*, 42(1), 51–64.
- Aziz, N. L. L., & Dewi, K. H. (Eds.). (2016). *Gagasan pemilihan umum kepala daerah asimetris: Menuju tata kelola pemerintahan daerah demokratis, akuntabel dan berkelanjutan*. Calpulis.
- Cheibub, J. A., Elkins, Z., & Ginsburg, T. (2014). Beyond presidentialism. *Comparative Political Studies*, 47(4), 515–541. <https://doi.org/10.1177/0010414013488557>
- Dahl, R. A. (1989). *Democracy and Its Critics*. Yale University Press.
- Denzin, N. K. (1978). *The Research Act: A Theoretical Introduction to Sociological Methods* (2nd ed.). McGraw-Hill.
- Downs, A. (1957). *An Economic Theory of Democracy*. Harper & Row.
- Duverger, M. (1954). *Political Parties: Their Organisation and Activity in the Modern State*. Methuen.
- Falleti, T. G. (2010). *Decentralisation and Subnational Politics in Latin America*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511777402>
- George, A. L., & Bennett, A. (2005). *Case Studies and Theory Development in the Social Sciences*. MIT Press.
- Gerring, J. (2007). *Case Study Research: Principles and Practices*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511803125>
- Geys, B. (2006). Explaining voter turnout: A review of aggregate-level research. *Electoral Studies*, 25(4), 637–663. <https://doi.org/10.1016/j.electstud.2005.09.002>
- Hadi, A. H., Suprihatin, Sukardi, Pramuhadi, G., Marimin, Susantyo, B., & Wahyono, E. (2023). Sustainability concept design of Robusta coffee agroindustry Kalibaru with soft system and decisions support system methods. *International Journal of Sustainable Development and Planning*, 18(5), 1339–1350. <https://doi.org/10.18280/ijstdp.180504>

- Hicken, A., & Stoll, H. (2011). Presidents and parties: How presidential elections shape coordination in legislative elections. *Comparative Political Studies*, 44(6), 699–722. <https://doi.org/10.1177/0010414010384035>
- Huntington, S. P. (1991). *The Third Wave: Democratization in the Late Twentieth Century*. University of Oklahoma Press.
- Ika, S., Susantyo, B., Syukri, A. F., Syamroni, A. W., Cahyana, D., Kailaku, S. I., Murti, S. D. S., Zuhro, R. S., Abimanyu, H., Khaerudini, D. S., Ahyar, A., Aliyyah, I. H., & Suryana, A. T. (2026). Reimagining professional associations in disrupted research systems: a hybrid governance model and lessons from Indonesia. *Societies*, 16(1), 17. <https://doi.org/10.3390/soc16010017>
- Lau, R. R., & Redlawsk, D. P. (2001). Advantages and disadvantages of cognitive heuristics in political decision making. *American Journal of Political Science*, 45(4), 951–971. <https://doi.org/10.2307/2669334>
- Lijphart, A. (1999). *Patterns of Democracy: Government Forms and Performance in Thirty-Six Countries*. Yale University Press.
- Mainwaring, S., & Shugart, M. S. (1997). *Presidentialism and Democracy in Latin America*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139174800>
- Mietzner, M. (2013). *Money, Power, and Ideology: Political Parties in Post-Authoritarian Indonesia*. NUS Press.
- Norris, P. (2011). *Democratic Deficit: Critical Citizens Revisited*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511973385>
- Norris, P. (2014). *Why Electoral Integrity Matters*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139061735>
- Powell, G. B. (2000). *Elections as Instruments of Democracy: Majoritarian and Proportional Visions*. Yale University Press.
- Rodden, J. (2004). Comparative federalism and decentralisation: On meaning and measurement. *Comparative Politics*, 36(4), 481–500. <https://doi.org/10.2307/4150142>
- Rondinelli, D. A., McCullough, J. S., & Johnson, R. W. (1989). Analysing decentralisation policies in developing countries: A political-economy framework. *World Development*, 17(1), 57–70. [https://doi.org/10.1016/0305-750X\(89\)90137-0](https://doi.org/10.1016/0305-750X(89)90137-0)
- Samuels, D., & Shugart, M. S. (2010). *Presidents, Parties, and Prime Ministers: How the Separation of Powers Affects Party Organisation and Behaviour*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511782116>
- Shugart, M. S. (2001). Electoral “efficiency” and the move to concurrent elections. *Electoral Studies*, 20(2), 173–193. [https://doi.org/10.1016/S0261-3794\(00\)00031-5](https://doi.org/10.1016/S0261-3794(00)00031-5)
- Shugart, M. S., & Carey, J. M. (1992). *Presidents and Assemblies: Constitutional Design and Electoral Dynamics*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139173988>
- Susantyo, B., Habibullah, H., Imrayani, N. R., Erwinsyah, R. G., & Nainggolan, T. (2023). Social cash assistance for food security during a disaster: Lesson learned from Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1180, 012047. <https://doi.org/10.1088/1755-1315/1180/1/012047>.