NETWORK STRUCTURE OF RELIGIOUS NARRATIVE ACTORS AND THEIR ROLES IN *PESANTREN*-BASED ECONOMIC EMPOWERMENT: A SOCIAL NETWORK ANALYSIS APPROACH

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Article received April 10th, 2026; Article revised October 18th, 2026; Article approved November 16th, 2026

Abstract

This study examines the network structure of religious narrative actors and their roles in pesantren-based economic empowerment in Indonesia using Social Network Analysis (SNA). The study employed a hybrid Systematic Literature Review-SNA (SLR-SNA) design based on 55 articles published between 2018 and 2025. Actor-program relationships were extracted and coded into a relational matrix comprising 47 nodes and 134 edges, which was analyzed using Gephi 0.10.1. The network exhibited a moderately sparse structure (density = 0.124, average path length = 3.72, clustering coefficient = 0.421) and a high modularity score (Q = 0.511), revealing four distinct communities: C0 Kyai/Religious Leadership, C1 Santri/Alumni Actors, C2 Economic Program Actors, and C3 External Partners. The Pengasuh Pesantren had the highest degree centrality (18) and betweenness centrality (108.4), highlighting kyai authority as the primary structural broker in disseminating religious narratives. Pengurus Alumni (BC = 0.74, Degree = 8) and Santri Wirausaha (BC = 0.71, Degree = 9) had the highest bridging coefficients despite their low-to-moderate degree centrality, illustrating an "alumni bridging paradox." Seventeen structural holes were identified: eight between C0 and C2, six between C1 and C3, and three between C0 and C3. These gaps indicate underutilized connections between religious narrative authority and operational economic programs. The study argues that institutionalizing alumni networks and establishing co-governance arrangements between kyai and economic actors to bridge these structural holes offer a viable pathway to more structurally resilient pesantren-based economic empowerment.

Keywords: *Kyai Authority, Pesantren Economic Empowerment, Religious Narrative Actors*

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INTRODUCTION

Pesantren, Indonesia's indigenous Islamic boarding schools, occupy an ambivalent position in the country's development landscape. On the one hand, they preserve centuries-old religious authority, epistemic traditions, and community legitimacy. On the other, they are increasingly expected to drive grassroots economic empowerment among communities long marginalized by formal economic institutions. This dual role as custodians of sacred knowledge and catalysts for productive economic activity raises a question that has received limited systematic scholarly attention: how do the relational networks through which religious narratives circulate among *pesantren* actors shape, enable, or constrain economic empowerment programs? (Ismail, 2018; Muary, 2019; Safe'i, 2020).

This question matters because economic empowerment in *pesantren* involves more than financing, technical capacity, or market access; it also depends on legitimacy. Within *pesantren* communities, economic initiatives gain credibility not primarily through business plans or government endorsement, but through the *kyai*'s blessing and narrative framing, the integration of Islamic jurisprudential principles governing halal business practices, and the relational trust fostered by longstanding networks of religious learning and communal reciprocity. Programs that bypass or contradict these relational dynamics tend to fail, regardless of their technical soundness, whereas those that work through them tend to achieve deeper community engagement than externally designed interventions (Nurhasanah et al., 2024; Syafi'i et al., 2023; Winarno, 2023).

Despite the structural importance of religious narrative networks, existing scholarship on *pesantren* economic development tends to discuss network dynamics descriptively or anecdotally. Field studies document how particular *kyai* inspire economic initiatives (Muary, 2019; Turmudi, 2006) and how alumni networks sustain intercity business relationships (Aidulsyah, 2023; Nasution, 2017). However, these studies rarely map network structures systematically, identify the most centrally positioned actors, examine structural gaps that impede the flow of economic legitimacy, or determine which cross-community connections are most important for building resilient and inclusive *pesantren* economic ecosystems.

Social Network Analysis (SNA) provides a methodological framework for addressing this gap. By representing actors as nodes and their relationships, such as program co-facilitation, mentoring, institutional partnerships, and shared organizational memberships, as edges, SNA quantifies structural properties that qualitative descriptions alone cannot systematically capture. Applied to *pesantren* religious narrative networks, SNA can identify the primary brokers of economic legitimacy, reveal structural holes that impede resource flows between religious and economic communities, and help identify governance arrangements that may foster resilient and inclusive empowerment networks. Studies of Islamic institutions (Usman, 2015; Wahid & Wardatun, 2023) and religious narrative networks more broadly (Borgatti et al., 2009; Freeman, 2004; Zuhriy, 2011) have demonstrated the analytical value of this approach. In Indonesian *pesantren* research, however, network-based studies remain relatively limited and tend to focus on specific actors or domains, including digital fatwa networks (Wahid & Ridwan, 2023), *kyai* centrality in economic mobilization (Ulum & Arifin, 2023), and local religious authority networks (Muary, 2019).

This study addresses four interrelated research questions. First, what is the overall structure of the *pesantren* religious narrative actor network? Second, which actors occupy the most central

structural positions, and which function as brokers between religious narrative and economic program communities? Third, how is the network divided into structural communities, and what patterns of cross-community connections characterize them? Fourth, what structural gaps and bridging opportunities exist, and which governance interventions could most effectively address them?

Combining a systematic review of 55 peer-reviewed articles published between 2018 and 2025 with SNA of a 47-node, 134-edge network constructed from extracted actor-program relationships, this study provides an initial quantitative map of network structures represented in the reviewed literature. It complements, rather than replaces, earlier network-oriented studies of digital fatwa authority (Wahid & Ridwan, 2023), *kyai* centrality in economic mobilization (Ulum & Arifin, 2023), and local religious authority networks (Muary, 2019). The findings have implications for practitioners, policymakers, and scholars seeking to understand how religious authority and economic agency intersect and how deliberate network design might foster more inclusive and resilient pathways to *pesantren*-based economic empowerment.

Literature Review

Religious Narrative and Economic Authority in *Pesantren*

In this study, religious narrative refers not simply to doctrinal content, such as Quranic verses, hadith, and fatwas, but also to the relational practices through which such content is produced, transmitted, and applied to social problems. In *pesantren* contexts, religious narrative is fundamentally a relational achievement that depends on the *kyai*'s authority, the *santri*'s receptivity, the credibility of the institutional setting, and the networks through which narrative legitimacy flows across communities. Burt's (2005) structural holes theory provides one lens for understanding how narrative authority translates into economic influence. Actors who bridge gaps between separate communities can control the flow of information and legitimacy, gaining disproportionate influence over how economic ideas are framed and received (Burt, 2005). Provan and Kenis's (2008) network governance theory offers another perspective, distinguishing three forms of governance: participant-governed networks, in which authority is distributed among member actors; lead-organization networks, in which authority is concentrated in a single dominant actor; and network administrative organizations (NAOs), in which a separate entity is established specifically to coordinate the network. This distinction applies directly to *kyai*-dominated, community-led, and externally administered governance arrangements in *pesantren* economic initiatives (Provan & Kenis, 2008).

Historically, *kyai* authority over economic life in communities surrounding *pesantren* has been exercised primarily through religious narratives. These include framing economic activity as *ibadah* (worship), legitimizing certain business practices through fatwas, and mobilizing communal resources through religious exhortation concerning *zakat*, *infaq*, and *waqf*. These functions did not require formal institutional structures; they operated through the informal trust networks of *pesantren* communities. In the contemporary period, however, formal institutional mechanisms, including BUMPes, cooperatives, BMT, and OPOP programs, have emerged, creating new relational requirements. These institutions must connect with external regulatory bodies, banking institutions, and market systems that operate according to different logics from those governing *pesantren* religious authority networks. This study therefore examines how the religious narrative actor network is positioned to bridge these two institutional worlds

(Hazin & Rahmawati, 2021; Kasim et al., 2023; Najah, 2022).

Social Network Analysis in Islamic Educational Institutions

The application of Social Network Analysis (SNA) to Islamic educational and institutional settings has expanded since 2018, generating methodological insights relevant to this study. Wahid and Ridwan (2023) mapped digital fatwa networks among Indonesian *kyai*, demonstrating that religious authority in online spaces is concentrated among a small number of highly connected actors whose bridging positions span theological schools (*mazhab*). Ulum and Arifin (2023) examined *pesantren* networks in economic mobilization and found that program effectiveness was strongly associated with the centrality of the *kyai* who initiated the programs. This finding directly motivates the present study's focus on the structural positions of leadership actors (Aidulsyah, 2023; Scott, 2017; Saputra et al., 2023). Muary (2019), in an article published in *Al-Qalam*, examined local religious authority networks, while Syafi'i et al. (2023), also published in *Al-Qalam*, investigated *pesantren* economic empowerment and community governance. Together, these studies demonstrate that network and governance perspectives are already part of the scholarly discussion on *pesantren*. The present study differs in scope and design: rather than focusing on a single actor type or setting, it maps actor-program relationships across religious, *santri*/alumni, economic, and external communities within a single network derived from the reviewed literature.

In the broader SNA literature, Wasserman and Faust (1994) established the foundational methodological framework for relational analysis adopted in this study, including the centrality measures used in the analysis: degree, betweenness, closeness, and bridging coefficient. Newman (2018) provides the graph-theoretic foundations for modularity-based community detection, which underpins the Louvain algorithm used in this study. Freeman (2004) traces the intellectual history of SNA, situating the present study within a methodological tradition spanning sociology, information science, and organizational theory. Although the application of SNA to religious institutions is more recent, it has an established methodological basis (Scrivano, 2025; Wijaya et al., 2024).

The hybrid SLR-SNA design employed in this study builds on the methodological approach demonstrated by Purbasari, Widayat, and Gandasari (2023) in research on digital innovation ecosystems and adapted by Widayat et al. (2023) to urban policy actor networks. These studies demonstrate how actor relationships documented in selected articles can be coded into a relational matrix to construct networks from systematic literature review data. This approach provides a means of mapping ecosystem structures when primary network survey data are unavailable or impractical to collect at scale (Wijaya et al., 2024).

Conceptual Framework

This study integrates three conceptual strands. First, religious narrative is understood as a relational practice rather than merely doctrinal content. It is produced, transmitted, and applied to economic life through relationships among *kyai*, *santri*, alumni, institutions, and programs. Second, structural holes theory (Burt, 2005) explains why actors who bridge otherwise disconnected communities gain brokerage advantages in the flow of information and legitimacy. Third, network governance theory (Provan & Kenis, 2008) distinguishes lead-organization and participant-governed arrangements, providing a framework for interpreting the governance implications of the findings. SNA connects these strands empirically:

kyai authority is examined through degree and betweenness centrality, brokerage across communities through the bridging coefficient, and structural holes through the absence of ties between Louvain communities.

Three working concepts guide the analysis. A *religious narrative actor* refers to any individual, institution, or program identified in the selected articles through which religious narrative is produced, transmitted, or applied to economic activity. The *legitimacy-structure gap* refers to a condition in which an economic program invokes *kyai* authority symbolically but lacks a direct structural connection to it in the network. The *alumni bridging paradox* refers to actors with a bridging coefficient above 0.60 and a degree of 9 or lower, whose bridging potential may therefore remain underutilized. The operational thresholds are specified in the Research Method section.

RESEARCH METHOD

Research Design

This study employs a hybrid research design combining Systematic Literature Review (SLR) and Social Network Analysis (SNA). The SLR phase produces a systematically screened corpus of peer-reviewed literature documenting actor-program relationships in *pesantren*-based economic empowerment and religious narrative systems. The SNA phase translates these relationships into a quantifiable network structure for centrality analysis, community detection, and structural hole identification. The design builds on methodological precedents established by Purbasari et al. (2023) and Widayat et al. (2023), adapted to the religious and economic context of Indonesian *pesantren*.

To support the reliability of actor extraction and relationship coding, two independent coders (N = 2) coded a random sample of 20% of the retained articles (11 articles). Intercoder agreement was high (Cohen's $\kappa = 0.86$; raw agreement = 91.3%). Discrepancies were resolved through a consensus meeting with a senior third coder.

Phase 1: Systematic Literature Review

Literature was retrieved from Scopus (www.scopus.com) and Google Scholar between January 15 and 20, 2026, using the following search string in both databases:

> *("pesantren" OR "Islamic boarding school" OR "kyai" OR "santri") AND ("economic empowerment" OR "economic development" OR "social enterprise") AND ("religious narrative" OR "religious authority" OR "social network" OR "actor network") AND ("Indonesia")*

The initial search yielded 648 articles (Scopus: 312; Google Scholar: 336). A five-stage screening process was applied. First, the publication year filter (2018–2025) reduced the corpus to 421 articles. Second, restricting the document type to journal articles yielded 298 articles. Third, the English-language filter reduced the corpus to 187 articles. Fourth, title and abstract screening excluded 83 articles that were off-topic or lacked sufficient data, leaving 104 for full-text assessment. Finally, the full-text eligibility review excluded 49 articles: 28 lacked relational data, 14 did not focus on *pesantren* economics, and 7 used duplicate datasets. The final corpus comprised 55 articles.

The search was restricted to Indonesia, consistent with the geographic criterion in Table 1. The screening process followed the PRISMA 2020 statement (Page et al., 2021) and its flow diagram guidance (Haddaway et al., 2022). The literature selection process, including the screening stages and the final corpus of 55 articles, is summarized in Figure 1.

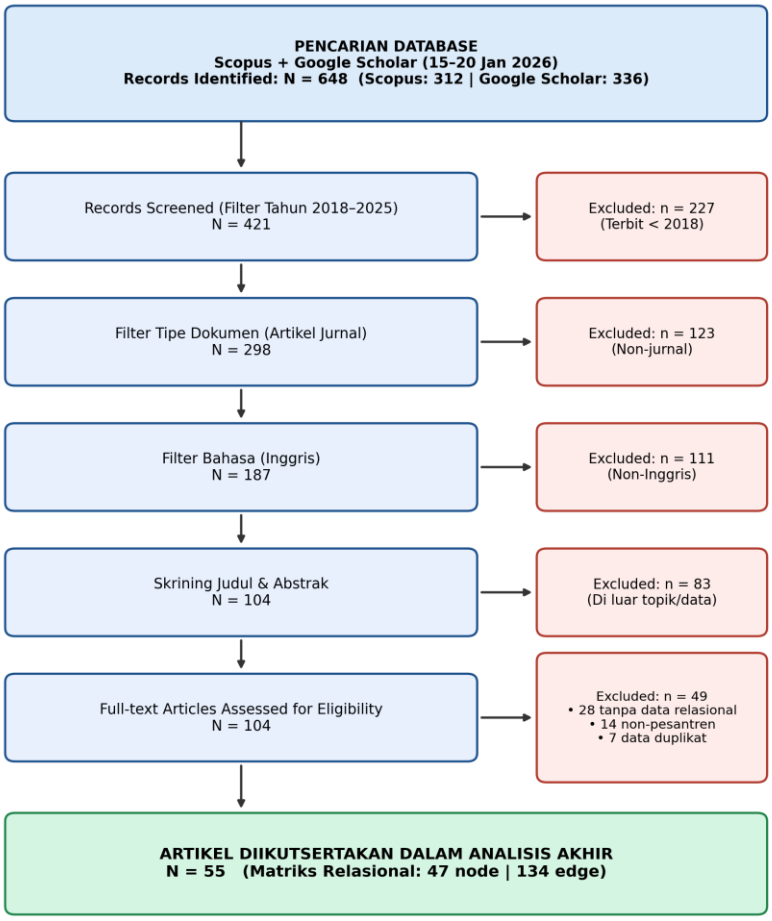
The inclusion and exclusion criteria are presented in Table 1.

Table. 1: Criteria for Inclusion and Exclusion in Literature Selection

Criterion	Inclusion	Exclusion
Publication Year	2018–2025	Before 2018
Document Type	Peer-reviewed journal articles	Conference papers, book chapters, theses
Language	English	Non-English
Thematic Focus	*Pesantren*, religious narrative, economic empowerment, SNA	Unrelated to *pesantren* economics or religious actor networks
Methodological Fit	Empirical, field-based, or relational data available	Pure philosophical/theological without actor analysis
Actor Coverage	Identifiable religious or economic actors	Policy documents without actor-level analysis
Geographic Scope	Indonesia	Studies conducted outside Indonesia

Source: Authors' compilation (2026)

Figure 1. PRISMA Flow Diagram of the Literature Selection Process



Source: Adapted from Haddaway et al. (2022)

Phase 2: Network Construction and SNA

Following the SLR phase, actor-program relationships identified in the 55 retained articles were coded into a relational matrix. The actors included *kyai* and religious leaders, *santri* and alumni, economic programs (BUMPes, BMT, cooperatives, and OPOP), and external partners (government agencies, banks, and NGOs). These actors were represented as nodes. Relationships involving program co-facilitation, mentoring, institutional partnerships, and shared membership in governance bodies were encoded as undirected edges. The resulting network comprised 47 nodes and 134 edges across four communities: 13 nodes in C0, 12 in C1, 13 in C2, and 9 in C3. The coding codebook, node list, and edge list are provided in Supplementary Material B.

Actor normalization: Before coding, actor labels were standardized by institutional role, with different names for the same role merged into a single node. For example, "Kiai," "Kyai," "Pengasuh," and "Kyai Sepuh" were standardized as *Pengasuh Pesantren*. Distinct institutional roles, such as *Kyai*/*Ulama Senior* and *Kyai Kampung*, were retained as separate nodes. The normalization rules are documented in the codebook (Supplementary Material B).

Edge construction and weighting: An undirected edge was created between two actors when at least one retained article documented their joint involvement in facilitating, governing, or managing an economic or religious narrative program. The edge weight ((w)) represents the number of retained articles documenting the relationship; thus, every edge has a weight of at least 1. The full network ($w \geq 1$) was analyzed in the main text, while higher edge-weight thresholds were examined in the sensitivity analysis (Supplementary Material C).

Formulas: Network density was calculated as ($D = 2E/[N(N-1)]$). For ($N = 47$) and ($E = 134$), density was ($D = 2(134)/[47(46)] = 0.124$).

The bridging coefficient of actor (i) was calculated as the weighted proportion of its ties connecting to actors in other communities: $BC_i = \Sigma_{j \notin c(i)} w_{ij} / \Sigma_j w_{ij}$, where c(i) denotes the Louvain community to which actor i belongs, and w_{ij} denotes the weight of the tie between actors i and j.

Structural holes were examined following Burt (1992, 2005). The proportion of actor i's relational investment in contact j was calculated as $p_{ij} = w_{ij} / \Sigma_k w_{ik}$. Dyadic constraint was calculated as $C_{ij} = (p_{ij} + \Sigma_{q \neq i,j} p_{iq} p_{qj})^2$, and actor i's overall constraint index was calculated as $C_i = \Sigma_{j \neq i} C_{ij}$. A structural hole was operationally defined as a dyad (i, j) belonging to different communities, $c(i) \neq c(j)$, with a dyadic constraint value below 0.15 ($C_{ij} < 0.15$), indicating limited direct or indirect redundancy between the actors. Seventeen such dyads were identified: eight between C0 and C2, six between C1 and C3, and three between C0 and C3.

Network analysis was conducted using Gephi 0.10.1. The analytical procedures comprised (a) centrality analysis, including degree, betweenness, closeness, and harmonic closeness centrality, as well as the bridging coefficient; (b) modularity-based community detection using the Louvain algorithm (resolution $\gamma = 1.0$); and (c) structural hole analysis to identify intercommunity gaps that may represent strategic bridging opportunities. These procedures draw on established methods in network analysis (Wasserman & Faust, 1994; Scott, 2017; Blondel et al., 2008).

Operational Definitions and Thresholds

The following operational definitions were applied throughout the analysis. Low degree refers to a degree of 9 or lower, a threshold below the mean degree of the ten highest-ranked nodes (11.6; Table 4). The alumni bridging paradox refers to an actor with a bridging coefficient above 0.60 and a degree of 9 or lower. Symbolic invocation refers to coded instances in which an economic program cites endorsement by a *kyai* or a fatwa but has no operational edge connecting it to a node in the *Kyai*/Religious Leadership community (C0). A modularity score of ($Q > 0.30$) was used as a benchmark for meaningful community structure. This is a modularity threshold, not an edge-weight threshold. Edge-weight thresholds ($w \geq 1$, $w \geq 2$, $w \geq 3$) were tested separately in the sensitivity analysis (Supplementary Material C).

Scope and Limitations

The analyzed network was derived from the literature rather than from a primary social network survey. Its ties therefore reflect relationships reported in the retained articles. The findings are subject to publication bias, the restriction to English-language journal articles, and potential imbalances in actor

representation, as some actors receive more scholarly attention than others. Accordingly, the results should be interpreted as a structural map of the literature-documented *pesantren* ecosystem rather than as a representation of any single *pesantren*. The edge-weight sensitivity analysis ($w \geq 1$, $w \geq 2$, $w \geq 3$; Supplementary Material C showed that modularity remained between 0.488 and 0.511 and that the four-community partition persisted. However, at $w \geq 3$, the network contracted to 34 nodes and 51 edges.

DISCUSSION

Mapping Religious Narrative and Economic Programs in *Pesantren* Networks

The systematic extraction of 55 retained articles identified 16 distinct forms of religious narrative and economic programs across the four communities identified in the subsequent SNA phase. Table 2 presents the mapping of these forms and programs, along with their associated actor communities and key references. The mapping suggests that religious narratives and economic programs are not separate domains within the *pesantren* ecosystem but are closely interconnected. The economic programs documented in the reviewed literature are linked to religious narratives that provide legitimacy, while many religious narrative practices also have discernible economic implications (Nurhasanah et al., 2024; Saputra et al., 2023; Syafi'i et al., 2023).

Table. 2: Mapping of Religious Narrative Forms and Economic Programs in *Pesantren* Networks

No.	Community	Religious Narrative Form / Economic Program	Key References
1	C0: *Kyai*/ Leadership	Friday sermon (*khutbah*) networks promoting a halal economy and entrepreneurial ethics among *santri* and community members	Bruinessen (2018); Horikoshi (2019)
2		*Kyai*-led *pesantren* economic vision: integrating narratives of *zakat*, *waqf*, and productive asset management into daily *ta'lim*	Dhofier (2020); Azra (2021)
3		Fatwa-based guidance on the digital economy, halal fintech, and cooperative governance delivered through *dewan syuro* channels	Hasan (2022); Wahid and Ridwan (2023)
4		Religious framing of poverty as a collective social responsibility (*fardhu kifayah*), mobilizing *kyai* networks to support productive *waqf* programs	Nurhasanah et al. (2024); Azhari (2022)
5	C1: *Santri*/ Alumni	*Santri* entrepreneurship mentoring through *halaqah usaha*, linking Quranic teachings on *rizq* with practical business skills	Turmudi (2019); Amin and Fadhil (2022)
6		Alumni networks (*rabithah alumni*) serving as relational infrastructure for intercity business collaboration and collective investment	Asy'ari (2021); Sulthon (2023)
7		OSPA-organized economic literacy programs, cooperative savings units, and student-run digital marketplaces within *pesantren*	Nugroho et al. (2024); Fathurrahman (2023)
8		*Santri Wirausaha* programs providing structured business incubation through Islamic entrepreneurship curricula linked to academic credentials	Khoiri (2022); Bastomi (2024)

No.	Community	Religious Narrative Form / Economic Program	Key References
9	C2: Economic Actors	BUMPes (Village-*Pesantren* Enterprise), combining village assets with *pesantren* management capacity under a hybrid governance model	Nurhasanah et al. (2024); Mutohar (2023)
10		BMT (*Baitul Maal wat Tamwil*), Islamic microfinance institutions operating under *pesantren* supervision and benefiting from religious legitimacy	Rodoni and Ali (2021); Setiawan (2022)
11		OPOP (One *Pesantren* One Product), a state-supported product innovation program linked to *pesantren* religious identity	Sahid et al. (2023); Kemenag RI (2022)
12		*Pesantren*-based agricultural cooperatives, organic farming, and agro-religious tourism integrating economic and spiritual activities	Affandy (2023); Tafsir (2020)
13	C3: External Partners	Kemenag RI regulatory frameworks supporting *pesantren* economic autonomy under Law No. 18/2019 on *Pesantren*	A'thoina and Al-Aboosi (2024); Rokhmad (2021)
14		Bank Syariah Indonesia (BSI) partnerships providing sharia-compliant financing and business development services to *pesantren*-linked cooperatives	Rahma et al. (2024); Huda (2023)
15		BAZNAS-*pesantren* productive *waqf* programs linking religious narratives of charitable giving with structured endowment investment	Maulana and Manullang (2024); Ibrahim (2022)
16		NGO-facilitated capacity building, market linkages, and advocacy for *pesantren* entrepreneurs at district and provincial levels	Ambarita et al. (2024); Suharto (2023)

Source: Authors' systematic extraction from SLR analysis (2018–2025)

Network-Level Structure

The network, comprising 47 nodes and 134 edges, has a density of 0.124, indicating relatively sparse connectivity. This pattern is consistent with the organizational structure of *pesantren* ecosystems, where relationships are shaped by hierarchical trust rather than uniform integration. Actors do not connect freely with one another but interact through hierarchical pathways of religious authority and institutional affiliation. The average path length of 3.72 indicates that any two connected actors can reach each other in approximately four steps, suggesting a network that is neither highly fragmented nor tightly integrated. The clustering coefficient of 0.421 indicates substantial local clustering, with actors more likely to be connected to one another's connections than would be expected by chance. This pattern is particularly evident in the *Kyai*/Leadership community (C0), where dense internal ties reflect the overlapping roles of *kyai* as teachers, religious authorities issuing fatwas, and economic patrons. Table 3 presents the network-level statistics.

Table. 3: Network-Level Statistics of the *Pesantren* Religious Narrative Actor Network

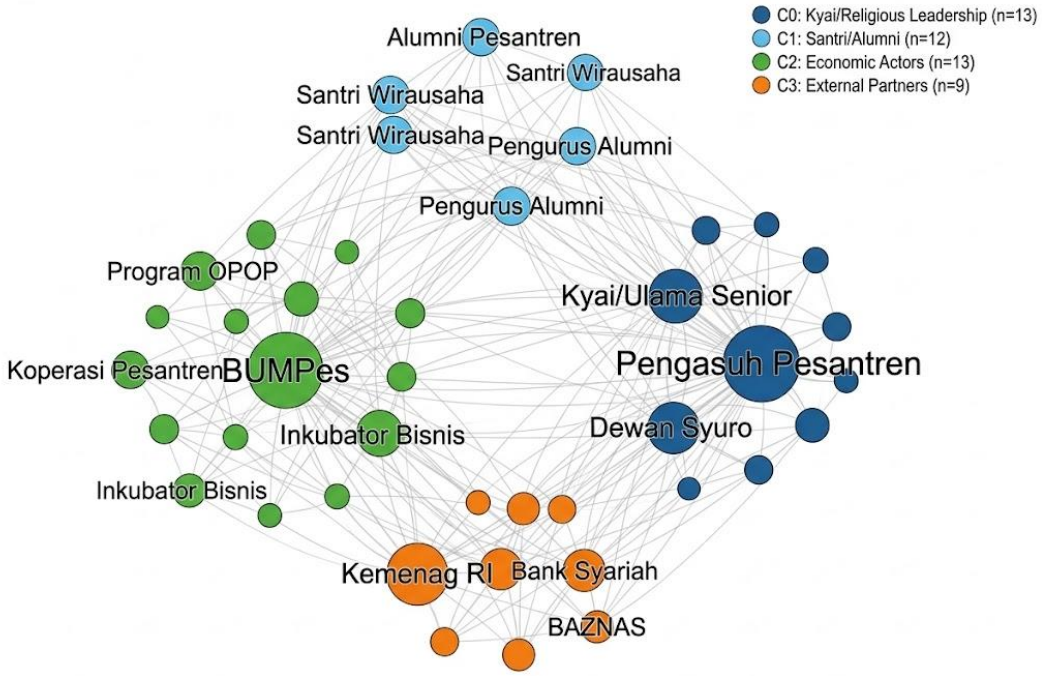
Metric	Value	Interpretation
Number of Nodes	47	C0 *Kyai*/Leadership (13), C1 *Santri*/Alumni (12), C2 Economic Actors (13), C3 External Partners (9)
Number of Edges	134	Relational ties involving co-facilitation, mentoring, institutional partnership, and program participation
Network Density	0.124	$D = 2E / [N(N - 1)] = 2(134) / [47(46)]$; relatively sparse connectivity
Average Path Length	3.72	Moderate separation among connected actors; approximately four steps between actors on average
Clustering Coefficient	0.421	Substantial local clustering within the network
Modularity Score (Q)	0.511	Pronounced community structure, exceeding the conventional ($Q > 0.30$) benchmark

Metric	Value	Interpretation
Number of Communities	4	Identified using the Louvain algorithm at resolution (γ = 1.0)
Structural Holes Identified	17	Dyads with C_ij < 0.15: C0–C2 (8), C1–C3 (6), C0–C3 (3)
Giant Component Size	44 / 47	Most nodes belong to the giant component; three nodes lie outside it

Source: Gephi 0.10.1 analysis

The modularity score ((Q = 0.511)) indicates a pronounced community structure, exceeding the conventional (Q > 0.30) benchmark. This suggests that the network is meaningfully divided into distinct communities with limited but consequential connections between them. Seventeen structural holes were identified: eight dyads between C0 (*Kyai*/Leadership) and C2 (Economic Actors), six between C1 (Santri/Alumni) and C3 (External Partners), and three between C0 and C3. These dyads met the operational criterion of a dyadic constraint value below 0.15 (C_ij < 0.15; see Research Method). They represent potential structural vulnerabilities as well as opportunities to strengthen connections across communities.

Figure 2. Visualization of the *Pesantren* Religious Narrative Actor Network (47 nodes, 134 edges, Q = 0.511; Louvain Algorithm)



Source: Gephi 0.10.1 Software

Centrality Analysis: Identifying Key Actors

Degree centrality identifies *Pengasuh Pesantren* (*pesantren* leader) as the most connected actor in the network, with a degree of 18, indicating direct ties to 18 other nodes. Its betweenness centrality score of 108.4 further identifies this actor as the network's primary broker, linking actors and facilitating the flow of religious narratives and economic legitimacy across communities. This structural dominance reflects the institutional role of the *pengasuh* in Indonesian *pesantren*, where the leader serves as a religious teacher, institutional authority, and key decision-maker in determining which economic programs receive community endorsement. This position both reflects and reinforces the cultural authority of *kyai* leadership.

This finding is consistent with earlier network-oriented studies. Ulum and Arifin (2023) found that the effectiveness

of *pesantren* economic programs was strongly predicted by the centrality of the initiating *kyai*, while Wahid and Ridwan (2023) showed that religious authority in digital fatwa networks is concentrated among a small number of highly connected actors. Muary (2019) also highlighted the importance of local religious authority networks. The present study extends this work by examining the actor-program network as a whole. It shows that the *kyai*'s central position within the religious narrative community (C0) is not matched by equally direct structural connections to economic program governance (C2).

The most analytically significant finding concerns the distribution of bridging coefficients. *Pengurus Alumni* (alumni association officers; bridging coefficient = 0.74), *Santri Wirausaha* (student entrepreneurs; 0.71), and *Alumni Pesantren* (*pesantren* alumni; 0.67) have the highest bridging coefficients in the network, exceeding those of actors in C0 while maintaining degree centrality values of 8, 9, and 12, respectively. These results identify them as potentially important bridging actors connecting the religious narrative community (C0) with the economic program community (C2), as well as the internal *pesantren* environment with external institutions (C3). However, their relatively lower degree centrality suggests that their bridging potential may not be fully realized. Under the operational definition of the "alumni bridging paradox" (bridging coefficient > 0.60 and degree ≤ 9), only *Pengurus Alumni* (0.74; degree 8) and *Santri Wirausaha* (0.71; degree 9) meet both criteria. *Alumni Pesantren* (0.67; degree 12) exceeds the degree threshold and is therefore classified as a high-bridging actor whose potential may remain underutilized.

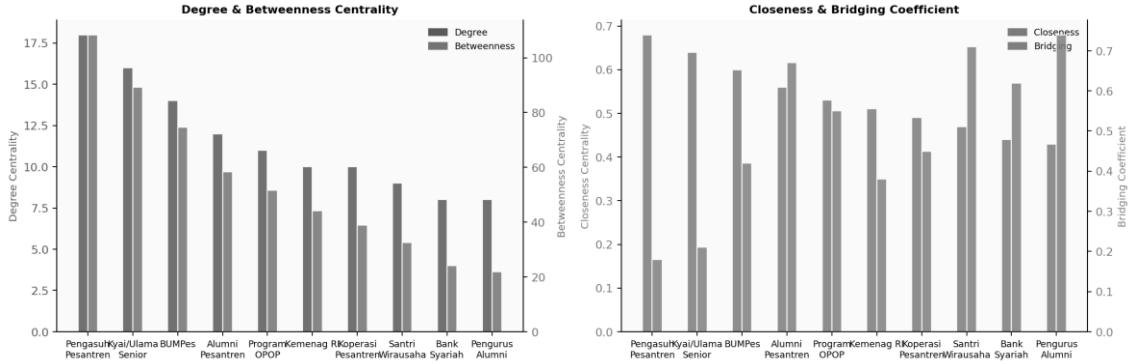
Kemenag RI and Bank Syariah Indonesia, both classified as external partners (C3), have degree centrality values of 10 and 8, respectively, and bridging coefficients of 0.38 and 0.62. These positions suggest that both actors connect the internal *pesantren* ecosystem with the formal regulatory and financial environment, although their bridging profiles differ. Bank Syariah Indonesia's higher bridging coefficient suggests that financial institutions may provide more extensive cross-community connections than regulatory institutions. This finding has potential implications for prioritizing partnerships in *pesantren* economic development. Under the operational definition, Bank Syariah Indonesia (bridging coefficient = 0.62; degree = 8) also meets the criteria for the bridging paradox. Table 4 presents the centrality measures for the ten most structurally significant nodes.

Table. 4: Centrality Measures for Top 10 Nodes in the *Pesantren* Religious Narrative Network

Node	Type	Degree	Betweenness	Closeness	Bridging Coef.	Community
Pengasuh Pesantren	Leadership	18	108.4	0.68	0.18	C0
Kyai/Ulama Senior	Leadership	16	89.2	0.64	0.21	C0
BUMPes	Economic	14	74.6	0.60	0.42	C2
Alumni Pesantren	Santri/Alumni	12	58.3	0.56	0.67	C1
Program OPOP	Economic	11	51.7	0.53	0.55	C2
Kemenag RI	External	10	44.2	0.51	0.38	C3
Koperasi Pesantren	Economic	10	38.9	0.49	0.45	C2
Santri Wirausaha	Santri/Alumni	9	32.5	0.47	0.71	C1
Bank Syariah	External	8	24.1	0.44	0.62	C3
Pengurus Alumni	Santri/Alumni	8	21.8	0.43	0.74	C1

Source: Gephi 0.10.1 analysis (2026)

Figure 3. Comparative Centrality Measures of Key Actors in the *Pesantren* Religious Narrative Network



Source: Gephi 0.10.1 Analysis

Modularity Analysis: Community Structure and Cross-Community Dynamics

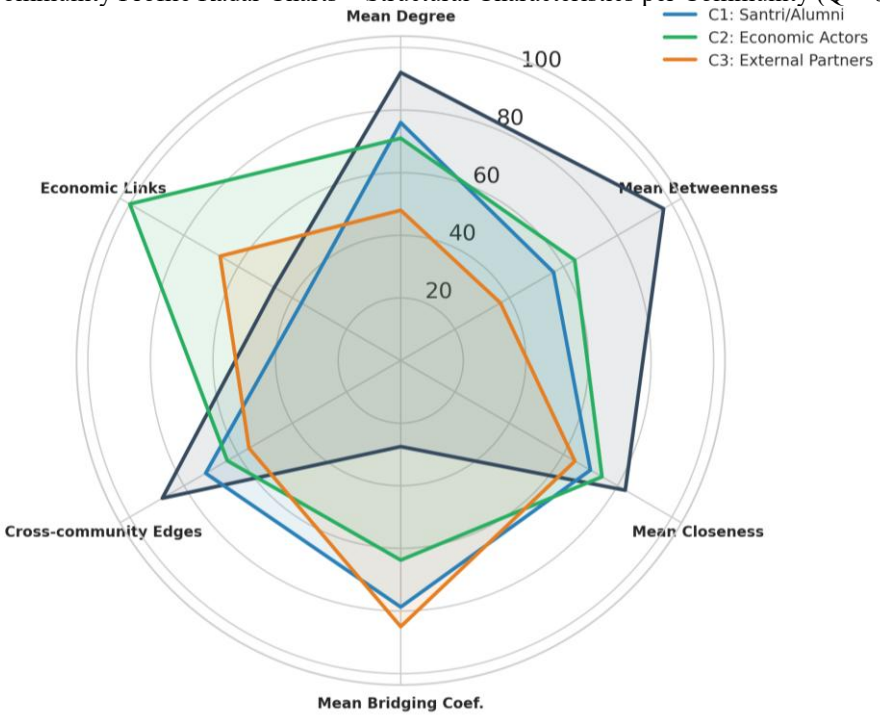
The Louvain community detection algorithm identified four structural communities, with a modularity score of (Q = 0.511). Each community exhibits distinct patterns of internal connectivity and cross-community relationships. Table 5 summarizes their structural characteristics, while Figure 4 presents radar charts comparing their multidimensional structural profiles.

Table. 5: Structural Characteristics of Four Communities in the *Pesantren* Religious Narrative Network

Community	Key Actors	n	Mean Degree	Mean Bridging	Cross-Community Edges	Economic Links
C0: Kyai/ Leadership	Pengasuh Pesantren, Kyai/Ulama Senior, Dewan Syuro, Tim Dakwah	13	9.2	0.22	22	14
C1: Santri/ Alumni	Alumni Pesantren, Santri Wirausaha, Pengurus Alumni, OSPA/OSIS	12	7.6	0.63	18	11
C2: Economic Actors	BUMPes, Koperasi Pesantren, BMT Pesantren, Program OPOP, Inkubator	13	7.1	0.51	16	30
C3: External Partners	Kemenag RI, Bank Syariah, BAZNAS, NGO, Perguruan Tinggi	9	4.8	0.68	14	20

Source: Gephi 0.10.1 (Louvain Algorithm) analysis (2026)

Figure 4. Community Profile Radar Charts – Structural Characteristics per Community (Q = 0.511)



Source: Gephi 0.10.1, Louvain Algorithm

Community 0 (*Kyai*/Leadership) comprises 13 nodes, including *Pengasuh Pesantren* (*pesantren* leaders), *Kyai/Ulama Senior* (senior *kyai* and Islamic scholars), *Dewan Syuro* (consultative council), and *Tim Dakwah* (religious outreach team). It has a mean degree of 9.2 and a mean bridging coefficient of 0.22. The community exhibits dense internal connectivity, with religious leaders linked through shared teaching activities, fatwa consultations, and institutional governance. However, its low bridging coefficient indicates limited cross-community connectivity relative to its internal connections. Although C0 has 22 cross-community edges, these connections predominantly link it to C1 (Santri/Alumni) rather than directly to C2 (Economic Actors) or C3 (External Partners). This pattern suggests a potential "narrative relay gap": *kyai* authority may influence economic programs indirectly through *santri* and alumni intermediaries rather than through direct institutional engagement.

Community 1 (*Santri*/Alumni) comprises 12 nodes, with a mean degree of 7.6 and a mean bridging coefficient of 0.63, the second-highest among the four communities after C3. Its key actors include *Alumni Pesantren* (*pesantren* alumni), *Santri Wirausaha* (student entrepreneurs), and *Pengurus Alumni* (alumni association officers), alongside OSPA/OSIS. Its 18 cross-community edges connect C1 to all three other communities, highlighting the role of *santri* and alumni as cross-community connectors. *Pengurus Alumni* and *Santri Wirausaha* are particularly well positioned in this regard. Their connections to C0 link them to *pesantren* religious traditions, while their ties to C2 and C3 connect them to economic activities and external institutions. This structural position resembles the brokerage role of student councils (OSIS) in multicultural school dialogue networks (Raihani, 2021). It also suggests that actors who cross institutional boundaries, in this case from *pesantren* education to market engagement, can occupy pivotal positions in hybrid religious-economic networks.

Community 2 (Economic Actors) has the highest number of economic links

(30), alongside a mean degree of 7.1 and a mean bridging coefficient of 0.51. Key actors include BUMPes, Koperasi Pesantren (*pesantren* cooperatives), BMT Pesantren (*pesantren*-based *baitul maal wat tamwil*, or Islamic microfinance institutions), Program OPOP, and Inkubator (business incubators). BUMPes and Program OPOP are among the key actors in this community, reflecting their roles in coordinating economic activities. The 16 cross-community edges indicate connections beyond the economic community, but the distribution also suggests a potential structural asymmetry. More connections extend toward C3 (External Partners) than toward C0 (*Kyai*/Leadership), suggesting that economic programs may have stronger institutional links with external funding and regulatory partners than with the religious authority networks that underpin community legitimacy in *pesantren* contexts.

Community 3 (External Partners) has the lowest mean degree (4.8) and the highest mean bridging coefficient (0.68). Its key actors include Kemenag RI (the Indonesian Ministry of Religious Affairs), Bank Syariah (Islamic banks), BAZNAS (the National Board of Zakat), NGOs (nongovernmental organizations), and Perguruan Tinggi (higher education institutions). This combination of low mean degree and high mean bridging coefficient indicates that actors in this community have relatively few connections overall but a high proportion of ties across community boundaries, a pattern consistent with the bridging paradox defined in this study. Kemenag RI and Bank Syariah Indonesia are among the most connected external actors. However, their moderate degree centrality relative to their bridging coefficients suggests that external partners remain less integrated into the overall network despite their potential to connect the *pesantren* ecosystem with the formal economic environment. This pattern is consistent with Nurhasanah et al.'s (2024) analysis of OPOP program stakeholders and reinforces the potential value of governance interventions designed to strengthen cross-community relationships.

Structural Holes and Implications for Policy

The identification of 17 structural holes across the network, comprising 8 at the C0–C2 interface, 6 at the C1–C3 interface, and 3 at the C0–C3 interface, has implications for theoretical development and policy design. This section discusses the findings theoretically before outlining policy proposals derived from the analysis rather than empirical results of the study.

From an academic perspective, the structural hole pattern extends Burt's (2005) structural holes theory to the *pesantren* context while suggesting a potential theoretical refinement. In this theory, actors who bridge structural holes may gain informational and brokerage advantages. In the *pesantren* network, however, the structural holes between C0 and C2 appear to represent not primarily informational gaps but legitimacy gaps. *Kyai* (Islamic religious leaders) may be aware of the economic programs associated with their institutions, yet the relational infrastructure through which their authority endorses, monitors, and governs these programs appears insufficiently embedded in the network. The programs thus invoke *kyai* authority symbolically without being structurally connected to it. This potential gap between legitimacy and network structure is a significant vulnerability in *pesantren*-based economic empowerment and illustrates the value of social network analysis (SNA).

The network governance framework of Provan and Kenis (2008) offers an additional explanation. The network approximates a lead-organization model, with the *Pengasuh Pesantren* (*pesantren* leader) occupying a dominant position. However, this dominance is

concentrated in the religious narrative community rather than directly embedded in economic program governance. Consequently, economic programs may depend on *kyai* authority for legitimacy without sufficient network integration to sustain coordination if that involvement diminishes. A more participant-governed model, connecting alumni actors, economic program coordinators, and external partners more directly, could strengthen network resilience without diminishing the religious authority that distinguishes the ecosystem (Raihani, 2021; Syafi'i et al., 2023; Syamsuri et al., 2023).

From a policy perspective, the findings suggest four proposals for government stakeholders and *pesantren* communities. First, the UU *Pesantren* (*Pesantren* Law; Republik Indonesia, 2019) framework could formalize co-governance arrangements between *kyai* councils (C0) and economic program bodies (C2), creating institutional channels for direct religious oversight of economic programs. This could help address the potential legitimacy-structure gap at the C0–C2 interface.

Second, the OPOP program (One *Pesantren* One Product; Kemenag RI, 2022) could strengthen alumni networks (C1) in program management, drawing on their bridging potential identified in the network analysis. Third, Bank Syariah Indonesia (an Indonesian Islamic banking institution) and BAZNAS (the National Board of Zakat) could develop co-investment arrangements with *pesantren* cooperatives and Islamic microfinance institutions, including BUMPes and BMT Pesantren. Structuring these arrangements as governance partnerships rather than solely as credit or grant mechanisms could strengthen C2–C3 connections and promote deeper institutional integration.

Fourth, Kemenag's Balitbang (research and development unit) could commission periodic network mapping of *pesantren* economic ecosystems at the provincial and district levels. Applying the methodology used in this study could help monitor structural holes and evaluate governance interventions over time. These proposals are based on a literature-derived network and should be validated against primary data and official program documents before adoption.

CLOSING

This study provides an initial quantitative map, based on a systematic literature review, of the network of religious narrative and economic program actors involved in Indonesian *pesantren*-based economic empowerment. Drawing on 55 peer-reviewed articles published between 2018 and 2025 and an SNA of a 47-node, 134-edge network analyzed using Gephi 0.10.1, the study identifies four principal findings. First, the network has a sparse-to-moderate structure (density = 0.124, Q = 0.511), with four distinct communities. Second, *kyai* and religious leadership actors (C0) have the highest degree and betweenness centrality, positioning the *Pengasuh Pesantren* (*pesantren* leader) as a primary structural broker of religious narratives and economic legitimacy. Third, *santri* and alumni actors (C1) have the highest actor-level bridging coefficients, making them potentially important cross-community connectors whose bridging roles may be underutilized. Fourth, 17 structural holes, concentrated at the C0–C2 (8), C1–C3 (6), and C0–C3 (3) interfaces, indicate potential structural vulnerabilities associated with a gap between the symbolic invocation of *kyai* authority and its structural integration into economic program governance.

These findings have implications at three levels. Theoretically, they extend Burt's structural holes framework to the religious-economic institutional context and identify a potential "legitimacy-structure gap" not explicitly addressed by the conventional framework.

Methodologically, they demonstrate the potential of a hybrid systematic literature review and social network analysis (SLR-SNA) design for mapping institutional ecosystems where large-scale primary network survey data are unavailable. Practically, they inform policy proposals concerning co-governance under the UU *Pesantren* (*Pesantren* Law), alumni network activation through OPOP, financial partnerships involving Islamic banks and BAZNAS, and ongoing network monitoring by Balitbang Agama.

For the *pesantren* community and its partners, the central message is that the relational infrastructure through which religious narratives circulate is not merely a cultural backdrop to economic empowerment; it shapes the connections through which empowerment initiatives may succeed or encounter barriers. The *kyai* who delivers a *khutbah* (sermon) on halal enterprise, the alumni who carries *pesantren* values into the market, and the BUMPes manager who navigates cooperative regulations and *pesantren* customs are not merely individuals managing institutional complexity. They are actors in a network whose structure influences what flows between them, what is blocked, and what becomes possible when connections are established. Understanding this structure is therefore important for building economic empowerment that is as durable as the religious tradition on which it draws.

Future research should complement the literature-derived network with primary social network surveys of *pesantren* communities, test the robustness of the findings using alternative community-detection parameters, and expand the literature base to include sources in Indonesian and Arabic. The sensitivity tests reported in this study cover only edge thresholds of $w \geq 1$, $w \geq 2$, and $w \geq 3$.

ACKNOWLEDGEMENT

The authors thank the State Islamic University of North Sumatra, the State Islamic University of Sunan Kalijaga Yogyakarta, the University of Muhammadiyah Malang, and Universiti Sains Malaysia for their institutional support during the preparation of this manuscript. They also thank the editorial board of *Al-Qalam Journal* for guidance on the submission process and the peer reviewers for their constructive comments. This research received no specific external funding.

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