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Research article

Strategies for Developing Civil Servant Competencies through a Collaborative Ecosystem

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Abstract

Civil servant competency development in Indonesia remains fragmented across competency-needs assessment, learning delivery, organizational support, technology utilization, learning transfer, and impact measurement. The principal research gap lies in the absence of an integrated framework capable of connecting these elements within a multilevel collaborative ecosystem. This study aims to formulate a civil servant competency-development strategy that integrates actor configuration, learning and knowledge orchestration, data-driven digital infrastructure, and the evaluation of organizational performance and public value. A systematic literature review was conducted using the PRISMA 2020 procedure on 39 publications issued between 2020 and 2026. The quality of empirical studies was assessed using the Mixed Methods Appraisal Tool, while conceptual articles, systematic reviews, and scholarly books were appraised according to transparency, relevance, argumentative consistency, and source adequacy. The data were examined through open coding, axial coding, selective coding, and thematic synthesis. The findings produce a strategic model comprising five interrelated dimensions: strategic alignment, collaborative governance, learning and knowledge orchestration, digital and data infrastructure, and continuous impact evaluation. These dimensions form a cyclical process linking competency-gap diagnosis, collaborative design, formal and experiential learning, workplace transfer, behavioral-change assessment, and strategic improvement. The findings demonstrate that digitalization and institutional partnerships do not automatically strengthen competencies without collaborative leadership, inter-actor trust, a learning culture, supervisory support, data interoperability, and shared accountability. The conceptual contribution lies in repositioning the Civil Service Corporate University or competency-development unit as an ecosystem orchestrator that connects actors, knowledge, technology, and impact evaluation to strengthen organizational capability and public value creation.

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1. Introduction

Civil servant competency development in Indonesia is gradually shifting from classroom-based training toward digital, blended, and collaborative learning, yet this transition has not been fully accompanied by strengthened institutional governance. (Irawati et al. 2020) found that training institution accreditation has not adequately captured leadership, organizational commitment, and continuity in data management as foundations for quality assurance. In contrast to this emphasis on quality control, (Ella et al. 2024) demonstrated that blended learning requires clearly defined actors, role allocation, stages of interaction, and enabling conditions for collaboration to prevent it from becoming merely a change in training modality. Meanwhile, the implementation of Flexible Micro Learning has demonstrated relatively positive outcomes but continues to face constraints related to time, the availability of instructional technology developers, budget limitations, and the absence of detailed standard operating procedures (Widaningsih, 2026). These findings indicate that the modernization of civil servant learning has not always been accompanied by a mature system capable of integrating quality assurance, resources, technology, and collaboration.

Bureaucratic transformation has also generated increasingly diverse competency requirements according to regional characteristics, hierarchical positions, and data-driven work arrangements. (Lande et al. 2024) noted that civil servant transformation in West Papua has been supported by planning, training, computer-assisted selection, and performance management systems, yet it continues to face disparities in personnel distribution, budget constraints, and placement practices that are not yet fully merit-based. At the managerial level, (Monang et al.2022) found that competency requirements vary across hierarchical levels, although achievement orientation and innovation distinguish high-performing officials. This complexity is further compounded by data-driven government, which requires a combination of data literacy, critical thinking, analytical skills, substantive expertise, collaboration, stakeholder engagement, innovation, and political awareness (Dingelstad et al., 2022). National policy therefore requires a contextual and role-based approach to competency development rather than standardized programs applied uniformly across government institutions.

A prominent empirical problem lies in the absence of a coherent relationship between learning activities, competency transfer, behavioral change, and organizational outcomes. (Setijowati and Darto 2025) found that post-development monitoring has not been conducted systematically, while existing evaluations have not fully measured learning effectiveness and impact. These findings are consistent with (Mehale et al. 2021), who emphasized that training evaluation should compare performance before and after an intervention and assess the application of competencies in the workplace rather than merely measure participant satisfaction. (Nor.2025) further demonstrated that training does not directly improve public service effectiveness; instead, its effect operates through improvements in personnel

performance as a mediating variable. These findings indicate that the primary challenge in civil servant competency development is not merely a shortage of training opportunities but a broken chain of outcomes connecting learning processes to performance and public service quality.

Another problem concerns the weakness of the organizational environment that supports the application of learning outcomes. (Kravariti et al. 2023) demonstrated that developmental support from direct supervisors constitutes an important mechanism linking talent management to improved employee performance in the public sector. From an institutional perspective, (Blom et al. 2024) found that autonomy in human resource functions is insufficient to improve performance unless human resource policies are integrated with organizational strategy. (Otoo. 2024) extended this argument by demonstrating that organizational learning culture mediates the relationship between training practices and employee competency development. Collectively, these studies explain why competency development loses its effectiveness when training is disconnected from line leadership, talent management, career development, learning culture, and the strategic needs of government institutions.

Previous studies remain limited in terms of generalizability and sensitivity to specific institutional contexts. (Midhat Ali et al. 2021) developed a generic competency framework validated by experts, yet the framework still requires adaptation to different types of work, organizational cultures, and institutional dynamics. (Wessels. 2022) proposed a training and development model for frontline service employees, but the model was developed through a single case study in one municipal government, limiting its applicability to other categories of public servants and governance systems. Meanwhile, (Bannykh et al. 2024) compared civil service training practices across post-Soviet countries, focusing primarily on the continuity of centralized education models and variations in digitalization across countries. Consequently, previous studies have not sufficiently explained how competency frameworks can be translated into learning ecosystems suited to Indonesia's governmental structures, diverse occupational positions, and varying institutional capacities.

Further limitations are evident in the fragmentation of research on competency, talent management, and digital transformation. (Kruyen and Van Genugten. 2020) argued that public sector competencies remain a "black box" because the concepts, contexts, and relationships between competencies and workplace behavior have not been explained consistently. (Kravariti and Johnston. 2020) likewise found that public sector talent management literature continues to face problems involving definitional ambiguity, the transfer of private-sector concepts, and limited empirical validation across diverse public administration contexts. Meanwhile, the review by (Haug et al. 2024) found that public sector digital transformation research continues to conflate process digitalization with institutional transformation and tends to examine drivers, processes, and outcomes separately. This fragmentation has

prevented the development of a multilevel explanation linking individual competency needs, learning processes, organizational support, technology, and public service outcomes.

Public collaboration literature has identified various mechanisms for creating shared value, yet these mechanisms have not been specifically positioned as an architecture for civil servant competency development. (Scognamiglio et al. 2023) demonstrated that co-creation under turbulent conditions requires institutional integration, adaptability, the utilization of cross-organizational resources, and learning throughout the collaboration process. Conteh and (Harding. 2023) further argued that public value creation in multilevel governance depends on boundary-spanning actors capable of connecting horizontal relationships between organizations with vertical coordination across levels of government. (Hardyman et al. 2022) showed that co-creation programs can develop capacity, learning networks, and innovative mindsets among public service practitioners. Nevertheless, no established model has translated these collaborative mechanisms into a civil servant competency development cycle encompassing needs diagnosis, co-design, implementation, learning transfer, and impact evaluation.

The next operational gap concerns the lack of integration among portfolio governance, ecosystem orchestration, and digital learning infrastructure. (Mikkelsen and Røiseland, 2024) demonstrated that the simultaneous implementation of multiple collaborative projects requires metagovernance to manage competing objectives, resources, and initiatives as a unified portfolio. (Degen et al. 2025) found that digital education ecosystems face tensions concerning the distribution of public and private value, actor roles, data control, and the government's capacity to act as an orchestrator. Meanwhile, (Gong and Li ,2023) demonstrated that boundary resources on digital platforms are necessary to maintain a balance between openness and control, stability and flexibility, and innovation and accountability. Nevertheless, no validated framework has yet connected these three elements with knowledge flows, competency development, civil servant performance, and public value creation.

This study aims to analyze actor configurations, role allocation, governance mechanisms, knowledge, data and technology support, and institutional conditions in civil servant competency development based on a collaborative ecosystem. The analysis seeks to formulate a strategy that integrates competency-gap mapping, collaborative learning design and delivery, the transfer of learning outcomes to the workplace, and the evaluation of behavioral change and organizational performance within a continuous development cycle.

The novelty of this study lies in the formulation of a multilevel collaborative ecosystem framework integrating four layers: actor governance, learning and knowledge orchestration, data infrastructure and digital platforms, and impact evaluation at the individual, unit, and organizational levels. Unlike the system-based learning effectiveness model that primarily

connects context, learning processes, and organizational outcomes (Garavan et al., 2020), this study incorporates mechanisms of co-creation, collaborative portfolio management, digital boundary resources, and data-driven feedback. The framework repositions the competency development unit or ASN Corporate University from a training provider to an ecosystem orchestrator connecting government institutions, training organizations, universities, professional communities, the private sector, and other learning partners.

Building on the empirical conditions and research gaps identified above, this study seeks to develop a contextual, integrated, and outcome-oriented strategy for civil servant competency development based on a collaborative ecosystem. Theoretically, the study extends competency development scholarship by integrating strategic human resource management, organizational learning, collaborative governance, and digital ecosystems within a multilevel framework. Practically, the findings are expected to provide an actor and role map, collaboration mechanisms, data and knowledge governance arrangements, and evaluation indicators that government institutions can use to ensure that competency development leads to learning transfer, improved organizational performance, and public value creation.

2. Method

This study employed a systematic literature review (SLR) design using the PRISMA 2020 reporting procedure to ensure the traceability of the identification, screening, eligibility assessment, and synthesis processes. The study population consisted of scholarly publications on civil servant competency development, organizational learning, ASN Corporate University, collaborative governance, public sector innovation ecosystems, public value creation, and digital transformation published between 2020 and 2026. Searches were conducted in Scopus, Web of Science, ProQuest, Google Scholar, and Garuda/SINTA using the following keyword combinations: ("ASN" OR "civil servant" OR "public servant") AND ("competency development" OR "capacity building" OR training OR learning) AND (ecosystem OR collaboration OR "collaborative governance" OR "interorganizational learning" OR "corporate university" OR "public value*"). Searches were conducted in the titles, abstracts, and keywords of publications written in Indonesian or English. Scopus yielded the largest number of records (n = 38), followed by Google Scholar (n = 31), Web of Science (n = 21), Garuda/SINTA (n = 14), and ProQuest (n = 8).

A total of 112 records were identified and managed using Zotero. Deduplication was performed by matching DOIs, titles, authors, and publication years, followed by manual verification. This process resulted in the removal of 18 duplicate records, leaving 94 records for title and abstract screening. At this stage, 36 records were excluded because they were irrelevant to civil servant competency development, fell outside the specified publication period or language criteria, or were not scholarly publications suitable for analysis. The full

texts of 58 documents were assessed, of which 19 were excluded because of an unsuitable focus (n = 7), inadequate methodological quality or clarity (n = 4), unavailable full texts (n = 4), or outdated versions or substantial duplication (n = 4). Consequently, 39 documents were included in the final synthesis. The inclusion criteria comprised peer-reviewed articles or reputable scholarly books, direct relevance to the research questions, publication between 2020 and 2026, full-text availability, and empirical findings or conceptual arguments that could be extracted. Editorials, opinion pieces, news articles, conference proceedings without peer review, and publications with insufficient methodological or conceptual information were excluded.

The data collection instrument consisted of a structured extraction form recording the authors, publication year, country, research design, theory or theme, principal findings, implications, and quality appraisal results. Empirical studies were assessed using the 2018 Mixed Methods Appraisal Tool (MMAT), according to their respective research designs. Systematic reviews, conceptual articles, and books were assessed using an adapted checklist covering clarity of objectives, methodological transparency or the basis of argumentation, adequacy of sources, analytical consistency, and relevance to the research questions. The appraisal classified 31 documents as high quality and eight as moderate quality; no low-quality documents were included. Coding was conducted by the lead author through open coding to identify units of meaning, axial coding to establish relationships between categories, and selective coding to integrate categories into themes. Since the manuscript was prepared by a single author, formal intercoder agreement was not calculated. Analytical reliability was maintained through an audit trail, repeated verification of codes against the original sources, codebook updates, and peer debriefing on selected coding results. Thematic synthesis produced five interrelated dimensions: strategic alignment, collaborative governance, learning and knowledge orchestration, digital and data infrastructure, and continuous impact evaluation.

Figure 1. Literature selection flow diagram based on PRISMA 2020.

Aspect	Number/Category	Aspect	Number/Category	Aspect	Number/Category
Number of documents	39	Publication period	2020–2026	Language	Indonesian and English
Source types	Scholarly articles and books	Countries	Indonesia and international	Quality	31 high; 8 moderate
Predominant methods	Qualitative, quantitative, and review	Largest source	Scopus	Synthesis	Multilevel thematic map

Source: Author's own elaboration.

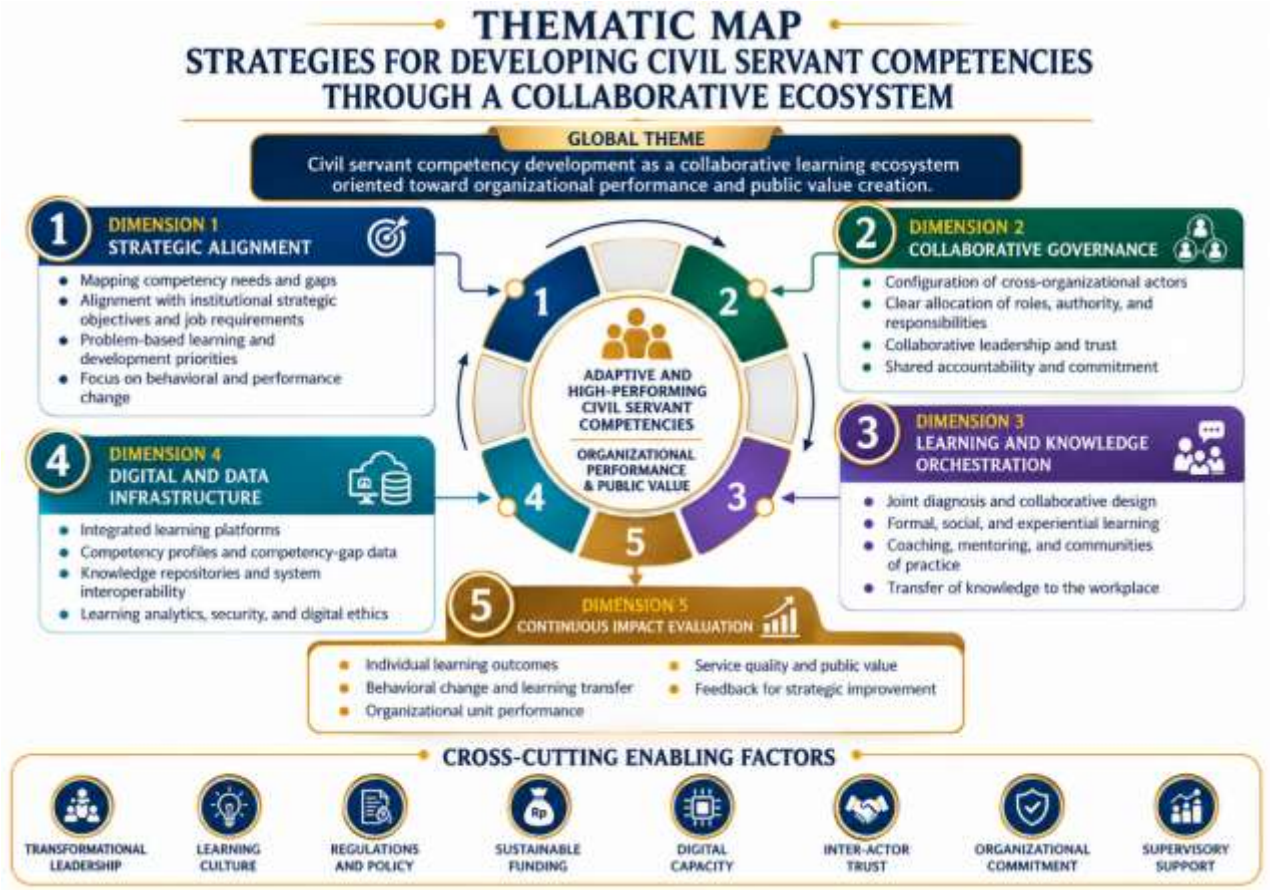
3. Results and Discussion

Result

Civil servant competency development should be managed as a collaborative learning ecosystem oriented toward organizational performance and public value. Competency

development is no longer understood as an individual activity that ends after training, but rather as a systemic process connecting institutional strategies, cross-organizational actors, knowledge resources, the work environment, and public service outcomes.

Figure 2. Thematic Map



Sumber: Source: Author's own elaboration.

The first dimension is strategic alignment, which positions competency-needs and competency-gap mapping as the foundation for all learning interventions. Competency development programs are more relevant when derived from institutional strategic objectives, job requirements, changes in the policy environment, and actual performance problems. Conversely, training designed primarily around program availability or administrative compliance tends to be less effective in generating competency application. These findings emphasize that measures of success should shift from the number of participants and learning hours toward behavioral change, problem-solving, and contributions to organizational objectives.

The second dimension is collaborative governance, which involves the participation of user institutions, the National Institute of Public Administration (LAN), the National Civil Service

Agency (BKN), regional human resource development agencies (BPSDM), universities, research institutions, professional communities, the private sector, and development partners. Relationships among these actors expand access to knowledge, technology, facilitators, and best practices that may not be available within a single institution. However, the analysis shows that having more partners does not automatically create an effective ecosystem. Collaboration requires shared objectives, clearly allocated roles and authority, coordination mechanisms, collaborative leadership, trust, and accountability to prevent partnerships from becoming merely formal arrangements or ceremonial activities.

The third dimension is learning and knowledge orchestration, defined as the capacity to connect competency needs with relevant learning resources and work experiences. Orchestration takes place through joint diagnosis, collaborative program design, formal and non-formal learning, coaching, mentoring, communities of practice, project-based assignments, and cross-organizational knowledge exchange. These findings indicate that classroom-based learning continues to serve a fundamental purpose, but its impact increases when combined with social learning and practical experience. Within this configuration, the ASN Corporate University or competency development unit acts as an ecosystem orchestrator rather than merely a training provider.

The fourth dimension is digital infrastructure and data management, which connect actors, learning processes, and decision-making. Some documents primarily position digital platforms as tools for expanding access and distributing learning materials, whereas more advanced studies emphasize the integration of competency profiles, job requirements, learning histories, assessment results, and performance data. The findings indicate that digitalization without data interoperability merely transfers administrative processes into online environments. A mature ecosystem requires knowledge repositories, learning analytics, data-driven recommendations, information security safeguards, and the application of digital ethics.

The fifth dimension is impact evaluation and continuous improvement, which connects individual learning outcomes with behavioral change and organizational performance. The document analysis indicates that evaluation often remains limited to participant satisfaction, completion rates, or fulfillment of learning-hour requirements, while competency transfer and organizational impact are not measured consistently. These findings identify supervisory support, opportunities to apply learning outcomes, task relevance, learning culture, and resource availability as determinants of learning transfer. Evaluation results should subsequently inform improvements in needs mapping, learning design, partner selection, and competency development policies.

The relationships among these five dimensions form an interdependent cycle. Strategic alignment determines the competencies required; collaborative governance provides actors and resources; orchestration transforms resources into learning experiences; digital

infrastructure provides data and connectivity; and evaluation generates feedback for strategic improvement. Much of the literature emphasizes learning digitalization, Corporate University implementation, learning culture, and cross-organizational collaboration. However, data interoperability, learning transfer, value distribution among actors, and multilevel impact evaluation receive comparatively less attention. Consequently, these five dimensions have rarely been analyzed as an integrated configuration.

Compared with previous studies that tend to examine training, technology, talent management, collaboration, or performance separately, these findings indicate that the effectiveness of competency development depends on the interconnectedness of all five dimensions. The results also challenge the assumption that digitalization and expanded partnerships automatically improve competencies. Without governance, orchestration, organizational support, and impact evaluation, these initiatives produce only procedural changes. Theoretically, this study extends the concept of competency development beyond an individual-centered approach toward a multilevel ecosystem framework, positioning civil servant competencies as the outcome of interactions among individual capabilities, the work environment, knowledge networks, technology, and institutional governance. This framework also addresses the research gap identified in the introduction and provides a foundation for the conceptual model discussed below.

Discussion

This study demonstrates that civil servant competency development is more effective when positioned as a learning ecosystem rather than merely a collection of training programs. Within this ecosystem, government institutions, competency development organizations, universities, professional communities, the private sector, and development partners contribute according to their respective resources and strengths. These findings reinforce (Ansell and Torfing's, 2021) argument that public value creation requires collaborative processes that mobilize knowledge, resources, and capabilities across organizational boundaries. (Lopes and Farias, 2022) complement this perspective by emphasizing that collaborative innovation does not emerge spontaneously but depends on leadership, institutional design, communication, trust, and actor capacity. Accordingly, the effectiveness of competency development depends on the quality of relationships among ecosystem components, not merely on the number of training programs delivered.

This study is motivated by the fact that the competencies required by modern bureaucracies are multidimensional and distributed across various actors, making it impossible for a single training institution to provide all the necessary capabilities. Technical, digital, managerial, sociocultural, and innovation competencies require a combination of formal learning, work experience, knowledge exchange, mentoring, and real-world problem-solving. (Danneels and Viaene, 2025) found that government success in developing platform ecosystems depends on the relationship between technological asset management, platform architecture, and

ecosystem orchestration capacity. Meanwhile, (Trein et al. 2025) demonstrated that collaborative innovation unfolds through learning loops that address substantive knowledge as well as power relations among actors. Therefore, collaborative strategies are necessary because civil servant learning is both a technical and institutional process involving diverse interests, authority structures, and knowledge resources.

The findings address the research gap by integrating aspects that have generally been examined separately: competency-needs mapping, actor configurations, cross-organizational learning, knowledge management, learning transfer, and performance measurement. (Centeno, 2025) emphasized that knowledge in co-creation processes serves not merely as an input but also has cognitive, relational, performative, and contextual dimensions that shape social innovation. Meanwhile, (Waardenburg et al. 2025) showed that measuring collaborative performance is challenging because objectives, authority, and accountability are distributed across multiple organizations. This study connects these two issues through a model that positions knowledge circulation and impact evaluation within a single competency development cycle, thereby addressing the gap between collaborative processes and organizational outcomes.

Theoretically, the findings extend competency development scholarship by positioning civil servant competencies as the outcome of interactions among individual capabilities, organizational support, knowledge networks, and ecosystem governance. Public value orientation serves as a unifying principle that aligns actor interests and prevents collaboration from being reduced to short-term resource exchange. (Geeraert and van Bottenburg, 2025) demonstrated that public value objectives can sustain motivation, external legitimacy, and consensus-building. However, (Acar et al. 2025) cautioned that co-creation does not necessarily generate all types of public value simultaneously and depends heavily on professional facilitation and the characteristics of the policy field. In practical terms, government institutions need an ecosystem orchestrator, clear role definitions, shared indicators, decision-making mechanisms, and evaluation forums to ensure that collaboration generates behavioral change and improved performance.

The findings are consistent with studies that conceptualize collaboration as a configuration of conditions rather than a single variable. (Avoyan ,2023) found that innovative solutions emerge from combinations of collaborative processes, leadership, institutional design, and knowledge exchange; no single factor independently guarantees success. This finding is consistent with the model proposed in this study, which requires interconnected actor configurations, learning orchestration, knowledge infrastructure, and impact evaluation. (Suchitwarasan et al. 2024) also demonstrated that barriers to public sector innovation vary according to administrative contexts and forms of innovation: some are more prominent at the organizational level, while others arise through interactions among actors. These comparisons confirm that civil servant competency development strategies must be context-

sensitive and cannot be standardized across all government institutions.

Nevertheless, the findings challenge the assumption that providing collaborative technology automatically improves the quality of cooperation and learning. (Gao, 2025) found that collaborative technology alone does not guarantee improvements in processes or performance unless supported by task alignment, communication rules, participant engagement, and organizational facilitation. This finding indicates that civil servant learning platforms are technical prerequisites rather than determinants of ecosystem success. Another contradiction concerns the assumption that increasing accountability mechanisms necessarily strengthens collaboration. (Lee, 2022), in contrast, found that vertical and horizontal accountability requirements can conflict, although these tensions can become productive when managed transparently. Therefore, technology and accountability must be designed as integral components of relational governance.

The empirical conditions also do not fully conform to collaborative governance theories that assume equality, trust, and shared objectives. (Olvik, 2024) demonstrated that government strategies can simultaneously embody collaborative, hierarchical, and competitive logics, creating paradoxes in relationships between government and nongovernmental organizations. (Onyango, 2025) offered a more critical perspective, showing that interorganizational cooperation can be symbolic and remain dominated by hierarchy, jurisdictional conflicts, weak social cohesion, overlapping responsibilities, and limited actor commitment. Consequently, establishing a forum or signing a memorandum of understanding cannot be treated as sufficient evidence of a functioning collaborative ecosystem. Substantive collaboration requires trust, mutual interdependence, clearly defined contributions, and meaningful knowledge exchange practices.

This study makes a conceptual contribution by formulating a Collaborative Ecosystem-Based Civil Servant Competency Development Model consisting of four main dimensions: actor configuration and governance; learning and knowledge orchestration; digital, data, and analytics infrastructure; and multilevel impact evaluation. These four dimensions are connected through a cycle of needs diagnosis, collaborative design, learning delivery, workplace transfer, outcome measurement, and feedback. Within this model, the ASN Corporate University or competency development unit is repositioned as an ecosystem orchestrator that aligns strategic needs, connects knowledge providers and users, maintains data interoperability, facilitates learning communities, and ensures that competencies are applied to improve organizational performance and public service delivery.

Figure 3. Conceptual Model of Collaborative Ecosystem-Based Civil Servant Competency Development



Source: Author's own elaboration.

The model operates through three intermediate mechanisms: learning transfer, organizational absorptive capacity, and organizational learning. Its effectiveness is influenced by collaborative leadership, inter-actor trust, digital maturity, learning culture, clarity of authority, resource availability, and consistent policy support.

The novelty of this study lies in integrating collaborative governance, knowledge orchestration, digital infrastructure, learning transfer, and multilevel impact evaluation into a single operational model for civil servant competency development. This model goes beyond conventional training approaches by positioning collaboration as a mechanism for competency formation and the ASN Corporate University as an ecosystem orchestrator. Nevertheless, the study has several limitations, including its reliance on secondary data and conceptual interpretation, the absence of causal testing among variables, limited representation of different types of government institutions, and the inability to capture

ecosystem changes longitudinally. Organizational politics, power inequalities, funding sustainability, and data-sharing security have also not been examined in depth.

Future research should test the model using mixed-methods designs and longitudinal studies involving central government institutions, local governments, and non-ministerial agencies with varying levels of maturity. Quantitative testing could employ structural equation modelling to analyze the effects of governance, trust, orchestration capacity, digital maturity, and learning culture on competency transfer and organizational performance. Comparative case studies and qualitative comparative analysis are needed to identify combinations of conditions associated with successful outcomes, while experimental or quasi-experimental research could test the effectiveness of co-design, communities of practice, mentoring, and project-based learning. Future studies should also incorporate power inequalities, data security, collaboration incentives, coordination costs, and public value creation as analytical variables.

4. Conclusion

The findings demonstrate that civil servant competency development cannot be adequately managed through a fragmented, administrative, and individual-centered training approach. The effectiveness of competency development is determined by the interconnectedness of institutional strategic needs, collaborative governance, learning and knowledge orchestration, data-driven digital infrastructure, and continuous impact evaluation. These findings address the identified problems, particularly the fragmentation between competency-needs analysis, learning delivery, competency transfer, and organizational outcomes. The study also confirms that collaboration generates value only when supported by clear role allocation, leadership, inter-actor trust, a learning culture, supervisory support, and shared accountability.

The resulting model positions Collaborative Ecosystem-Based Civil Servant Competency Development as a multilevel system comprising five dimensions: strategic alignment, collaborative governance, learning and knowledge orchestration, digital and data infrastructure, and continuous impact evaluation. These five dimensions form a cycle that connects competency-gap diagnosis, collaborative design, learning delivery, workplace transfer, behavioral change measurement, and strategic improvement. Within this model, the ASN Corporate University, regional human resource development agencies (BPSDM), or competency development units are repositioned as ecosystem orchestrators connecting user institutions, training organizations, higher education institutions, professional communities, the private sector, and development partners to develop civil servants who are adaptive, competent, ethical, and oriented toward public value.

This study extends the concept of competency development from an individual-centered approach toward an ecosystem perspective, positioning competencies as the outcome of

interactions among employee capabilities, the work environment, knowledge networks, technology, and institutional governance. In practical terms, government institutions need to integrate competency data with performance targets, establish cross-actor governance forums, develop problem-based and project-based learning, strengthen communities of practice, and implement evaluations that assess behavioral change and organizational performance. Implementation of the model should begin with actor mapping, the establishment of shared roles and indicators, improvements in data interoperability, and the development of feedback mechanisms to support continuous program improvement.

This study remains limited by its reliance on document synthesis and the absence of empirical testing of causal relationships among the dimensions, variations in institutional capacity, power dynamics, funding sustainability, and data-sharing security. Future research should test the model through longitudinal studies, mixed-methods approaches, and comparative analyses of central and local government institutions with different levels of ecosystem maturity. Such testing could examine the effects of collaborative leadership, trust, learning culture, digital capacity, and supervisory support on competency transfer and organizational performance. Furthermore, quasi-experimental research could be used to assess the effectiveness of co-design, mentoring, communities of practice, and project-based learning in generating behavioral change, bureaucratic innovation, and improvements in public service quality.

5. Ethics Approval

Ethical approval was not required for this study because it was based exclusively on a systematic review of previously published literature and did not involve human participants, personal data, or animal subjects.

6. Author Contributions

Handyka Oktra Rajagukguk was responsible for conceptualization, methodology, literature search and selection, data extraction and analysis, thematic synthesis, model development, and manuscript preparation and revision. The author also approved the final version of the manuscript.

7. Declaration on the Use of AI and AI-Assisted Technologies in Writing

The authors declare that AI-assisted technologies were used during the preparation of this manuscript for language editing, grammar checking, and improving the clarity and readability of the text. The use of AI-assisted technologies was limited to supporting the writing process and did not replace the authors' responsibility for the research design, data collection, data analysis, interpretation of findings, and conclusions. The authors reviewed and verified all

content generated or modified with the assistance of AI and take full responsibility for the accuracy, originality, and integrity of the manuscript.

8. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

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11. Data Availability Statement

The data supporting the findings of this study are not publicly available due to privacy and confidentiality considerations concerning the research participants. Data may be made available from the corresponding author upon reasonable request, subject to applicable ethical and confidentiality requirements.

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