# Adaptive Innovation Paradigm in Archipelagic Governance Analysis of Civil Servants' Perceptions in Pangkajene and Kepulauan Regency, Indonesia

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### ABSTRAK

*Studi ini mengkaji persepsi pegawai negeri sipil tentang inovasi layanan publik dalam konteks tata kelola kepulauan di Kabupaten Pangkajene dan Kepulauan, Sulawesi Selatan. Dengan menggunakan stratified random sampling, 121 pegawai negeri sipil dari empat kecamatan kepulauan menyelesaikan kuesioner 57-item yang telah divalidasi yang mengukur lima dimensi inovasi. Hasilnya mengungkapkan persepsi inovasi yang tinggi dengan karakteristik khas yang berbeda dari paradigma teknokratis daratan. Strategi Implementasi Berbasis Komunitas mendapat skor tertinggi, sementara Manajemen Tantangan Struktural mendapat skor terendah, dengan perbedaan yang signifikan di antara tipe pulau. Akses infrastruktur, tingkat posisi, dan lama layanan merupakan prediktor utama, yang menjelaskan 54,7% varians. Analisis klaster mengidentifikasi tiga tipologi: Adaptor Pragmatis, Inovator Komunitas, dan Praktisi Seimbang. Analisis komparatif menunjukkan kesenjangan besar dalam orientasi teknologi dan integrasi kearifan lokal versus respons daratan yang diharapkan, yang menunjukkan perbedaan paradigma. Pegawai negeri sipil kepulauan mengembangkan pendekatan inovasi adaptif sistematis yang menekankan fleksibilitas, kolaborasi komunitas, dan hasil relasional daripada modernisasi teknologi. Temuan ini menantang prinsip-prinsip manajemen publik universal dan menunjukkan kebijakan inovasi spesifik konteks diperlukan untuk tata kelola kepulauan yang efektif.*

### ABSTRACT

This study considered civil servants' perceptions of public service innovation in archipelagic governance contexts in Pangkajene and Kepulauan Regency, South Sulawesi. By adopting stratified random sampling, 121 civil servants from four island sub-districts completed a validated 57-item questionnaire measuring five innovation dimensions. The results revealed high innovation perceptions with distinctive characteristics differing from mainland technocratic paradigms. Community-Based Implementation Strategy scored highest, while Structural Challenge Management scored lowest, with significant differences across island types. Infrastructure access, position level, and service length were key predictors, explaining 54.7% of variance. Cluster analysis identified three typologies: Pragmatic Adapters, Community Innovators, and Balanced Practitioners. Comparative analysis showed large gaps in technology orientation and local wisdom integration versus expected mainland responses, indicating paradigmatic differences. Archipelagic civil servants developed systematic adaptive innovation approaches emphasizing flexibility, community collaboration, and relational outcomes over technological modernization. These findings confronted universal public management principles and suggest context-specific innovation policies are necessary for effective archipelagic governance.

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## INTRODUCTION

Archipelagic countries deal with different governance challenges than mainland countries. Indonesia, with over 17,000 islands and a population of approximately 277 million, is the world's largest archipelagic country (Badan Pusat Statistik Indonesia, 2022). Geographic fragmentation creates disparities in access to public services, particularly between urban centers and remote areas (Amalia et al., 2023; Ma et al., 2023; Romero-Subia et al., 2023; Veginadu et al., 2023). Similar situations are also found in the Philippines (Andriesse, 2017), the Maldives (Suzana & Chongsuvivatwong, 2015), and Fiji (Sikivou, 2023), where the archipelagic nature of the archipelagic region complicates the distribution of basic services, transportation, and the implementation of public administration innovations (Madubun, 2024). Public governance studies have extensively addressed issues of decentralization (Engdaw, 2022), bureaucratic effectiveness (Judijanto et al., 2024; Purna & Didin, 2022; Sumartono & Hermawan, 2020), and institutional models (Arora & Chong, 2018; Chohan et al., 2023; Wang et al., 2022), but limited attention has been paid to the experiences of civil servants (ASN) in an archipelagic context.

The Pangkajene and Kepulauan Regency (Pangkep) in South Sulawesi provides a concrete example of the challenges of archipelagic governance. Of the total area of 12,362.73 km², approximately 92.7% is sea, with more than 120 islands (Pangkep Regency Government, 2024). The majority of the population, 80.6% or 288,574 people, lives on the mainland, while 19.4% or 69,272 people live on small islands. This geographic situation creates a stark contrast in the provision of public services: the mainland benefits from the Trans-Sulawesi Highway and proximity to Makassar (Rahmayanti, 2021), while the island region deals with unreliable sea transportation, limited infrastructure, and minimal digital connectivity (Palutturi et al., 2022). These differences create two opposing bureaucratic ecosystems within one district, where civil servants on the mainland enjoy easy access to transportation and infrastructure, while civil servants in the island regions face the limitations of unreliable sea transportation, minimal infrastructure, and limited digital connectivity. This situation certainly affects how civil servants view and implement innovation in public services, which not only relies on technological advances but also utilizes a more contextual, community-based, and flexible adaptive approach in responding to existing challenges.

These ecosystem differences have implications for how civil servants (ASN) operate. Civil servants in the mainland operate in a more connected environment with relatively good education, health, and digital facilities. They are more quickly exposed to new policies, e-government technology, and demands for public accountability (Zhu et al., 2023). In contrast, civil servants in island regions face isolation, limited resources, and the need to adapt service procedures to suit local conditions (Abd Kadir et al., 2022; Sedik, 2021). In daily practice, these varied contexts have the potential to shape differences in civil servant perspectives and experiences in understanding and implementing public service innovation.

Research on civil servants (ASN) in Pangkep is very important considering that previous studies have focused more on institutional and structural aspects without considering the perspective of ASN as the main actors in the implementation of innovation. This study closes this gap by empirically measuring ASN perceptions of public service innovation in different geographical contexts. The urgency of this study lies in providing new insights into how geographical conditions influence ASN perceptions of public service innovation and in providing input for the development of strategies to improve ASN capacity in geographically fragmented regions.

## Literature Review

Studies on archipelagic governance emphasize that geographic fragmentation creates unique challenges in the distribution of public services. Archipelagic countries, such as Indonesia, the Philippines, and the Maldives, face difficulties in reaching remote areas due to limited transportation, high logistics costs, and reliance on maritime infrastructure (Buttigieg et al., 2016; Madubun, 2024; Muriany & Ruhunlela, 2021). In the Indonesian context, with more than 17,000 widely extended islands, distinction in public services has become a key issue for decentralization (Ishak, 2022; Kurhayadi, 2022). This literature demonstrates that the issue of archipelagic governance is not merely a technical issue of distribution but also has implications for bureaucratic capacity in delivering services (Acharya & Scott, 2022; Campbell et al., 2019; Kyle & Resnick, 2019). To understand the behaviour of civil servants in this context, public innovation theory offers a useful framework for examining the importance of innovation in improving the quality of public services, bureaucratic efficiency and responsiveness to local challenges. On the other hand, archipelago governance focuses on how geographical challenges and limited resources affect the capacity of local bureaucracies to innovate and adapt. Public innovation provides a basis for understanding how bureaucracies can adopt innovative solutions to improve services, while archipelagic governance adds a geographical dimension that shows how public innovation needs to be adapted to the limitations that exist in island regions. Thus, this study will explore how civil servants in island regions develop adaptive innovation approaches that combine creativity and local resources to overcome existing challenges.

Public sector innovation is widely assumed as a means of improving service quality, transparency, and bureaucratic efficiency (Alsafran et al., 2024; Motloung & Hofisi, 2023; Mulgan, 2023; Taylor et al., 2023; Torfing, 2023). In urban or mainland areas, innovation often takes the form of digitalization, information system integration, and institutional reform (Mariani & Bianchi, 2023; McGuirk et al., 2022; von Schnurbein et al., 2023; Vrabie & Ianole-Călin, 2020). However, in island regions, innovation more often takes the form of adaptation strategies to resource constraints, procedural improvisation, and leveraging local community social capital (Abdillah et al., 2022; Jungsberg et al., 2020; Micelli et al., 2023; Vercher, 2022). International literature on innovation in remote areas shows that bureaucratic success is often determined not by technological sophistication, but by the ability of local actors to adapt policies to geographical conditions (Crescenzi et al., 2022, 2023; Heiberg & Truffer, 2022).

Civil servants (ASN) are the backbone of the bureaucracy and play a key role in realizing public service innovation. Several studies emphasize that the success of innovation is greatly influenced by how officials interpret their role, internalize new values, and adapt to limitations (et al., 2023; Steen, 2021; Suryo et al., 2023; Tauhid et al., 2023). Studies on street-level bureaucracy (Chang, 2022; Chang & Brewer, 2023) also emphasize that frontline officials are often the decisive actors in policy implementation (Makhrojan et al., 2025; Nugroho et al., 2023), especially in areas with limited infrastructure. These findings are reinforced by recent studies showing that the adaptive capacity of local bureaucrats plays a crucial role in bridging the gap between central policies and field realities, including in the context of public service innovation (Chen et al., 2020; Cruz & Paulino, 2022; Pratama, 2020). However, most research still focuses on the institutional or policy level, with little attention being paid to the subjective experiences of civil servants, particularly in the context of geographical differences between mainland and island regions. This gap opens up space for research that positions civil servants not merely as policy

implementers but also as actors shaping the meaning and practice of innovation based on the geographic conditions they face.

The literature indicates that research on island governance largely focuses on policy aspects, decentralization, and infrastructure limitations. Meanwhile, studies of public service innovation have focused more on digital modernization and institutional reform, particularly in mainland or urban areas. This research gap arises because very few studies link civil servants' perceptions to the geographic dynamics within a single district with both mainland and island areas. Yet, these differences in geographic context have the potential to shape how civil servants perceive innovation: on the mainland, innovation tends to be perceived as modernization and digitalization, while on the islands, innovation is more closely associated with improvisation and adaptation. This gap forms the basis for this research.

This study fills a significant gap in public administration literature by conducting the first quantitative analysis of civil servants' perceptions of public service innovation, particularly in the context of island governance. While previous studies have focused more on policy-level analysis or innovation paradigms on the mainland, this study pioneers the empirical measurement of perceptions of adaptive innovation among civil servants working on islands using validated psychometric instruments. The focus of this research is to provide a conceptual framework and empirical evidence for adaptive governance and contextual policy innovation in geographically fragmented regions. The research introduces novel theoretical contributions through the identification of three distinct typologies of archipelagic civil servants and the quantification of paradigmatic differences between island and mainland innovation approaches through gap analysis. Methodologically, the study develops and validates the first context-specific instrument for measuring innovation perceptions in geographically fragmented governance systems, advancing both measurement theory and comparative public administration research in understudied archipelagic settings.

## RESEARCH METHODS

This study employs a quantitative approach with a descriptive survey design to analyze the perceptions of Civil State Apparatus (ASN) in archipelagic regions toward public service innovation in Pangkajene and Kepulauan Regency, South Sulawesi. The research population consists of 156 ASN serving in four archipelagic sub-districts (Liukang Tupabbiring, Liukang Kalmas, Liukang Tangaya, and Liukang Tuppabiring Utara). The sampling technique used stratified random sampling based on island size, location, and length of service, with the sample size calculated using the Yamane formula (n=112, increased to 135 to anticipate non-response)(Taro Yamane, 1967). The Yamane formula was chosen because this formula model is very practical and easy to apply in determining the main sample when the population size is known and limited.

The dependent variable is the perception of public service innovation operationalized into five dimensions: conceptualization of adaptive innovation, community-based implementation strategies, structural challenge management, experiential learning, and relational success indicators. Independent variables include demographic characteristics, island geography, and job characteristics. The instrument consists of a structured questionnaire with 60 items using a 6-point Likert scale, validated through expert validation (CVI=0.94) and reliability testing ($\alpha$>0.85 for all dimensions).

The comparison between the island and mainland paradigms is based solely on literature, not direct field data. The comparison between innovation paradigms in island and mainland regions

is based more on existing literature than on field data obtained from this study. Therefore, this comparison is not intended to show causal inferences, but rather as a reference to enrich understanding of the dynamics of innovation in a fragmented geographical context.

**Table 1.**
**Sample Distribution by Archipelagic Sub-Districts**

| Sub-District | Target Sample | Achieved Sample | Response Rate (%) | Island Characteristics |
|---|---|---|---|---|
| Liukang Tupabbiring | 38 | 35 | 92.1 | Large Island |
| Liukang Kalmas | 35 | 31 | 88.6 | Medium Island |
| Liukang Tangaya | 31 | 27 | 87.1 | Small Island |
| Liukang Tuppabiring Utara | 31 | 28 | 90.3 | Remote Island |
| Total | 135 | 121 | 89.6 | - |

Source: Author Processed

**Table 2.**
**Variable Operationalization of Innovation Perception**

| Dimension | Number of Items | Key Indicators | Cronbach's α |
|---|---|---|---|
| Conceptualization of Adaptive Innovation | 14 | Flexibility, creativity, contextual adaptation | 0.91 |
| Community-Based Implementation Strategy | 16 | Social capital, traditional collaboration, bottom-up | 0.89 |
| Structural Challenge Management | 12 | Geographic isolation, infrastructure limitations | 0.88 |
| Experiential Learning | 10 | Direct experience, knowledge sharing | 0.87 |
| Relational Success Indicators | 8 | Qualitative impact, community responsiveness | 0.85 |

Source: Author Processed

**Table 3.**
**Content Validity Index (CVI) Test Results**

| Dimension | Number of Items | Number of Experts | Valid Items (CVI ≥ 0.78) | Invalid Items | Dimension CVI |
|---|---|---|---|---|---|
| Conceptualization of Adaptive Innovation | 14 | 5 | 13 | 1 | 0.93 |
| Community-Based Implementation Strategy | 16 | 5 | 15 | 1 | 0.94 |
| Structural Challenge Management | 12 | 5 | 12 | 0 | 1.00 |
| Experiential Learning | 10 | 5 | 9 | 1 | 0.90 |
| Relational Success Indicators | 8 | 5 | 8 | 0 | 1.00 |
| Total Instrument | 60 | 5 | 57 | 3 | 0.95 |

Source: Author Processed

**Table 4.**
**Cronbach's Alpha Reliability Test Results**

| Dimension | Cronbach's α | Cronbach's α if Item Deleted | Number of Items | Interpretation |
|---|---|---|---|---|
| Conceptualization of Adaptive Innovation | 0.912 | 0.908-0.915 | 13 | Highly Reliable |
| Community-Based Implementation Strategy | 0.889 | 0.885-0.892 | 15 | Reliable |
| Structural Challenge Management | 0.884 | 0.879-0.887 | 12 | Reliable |
| Experiential Learning | 0.874 | 0.870-0.878 | 9 | Reliable |
| Relational Success Indicators | 0.851 | 0.847-0.855 | 8 | Reliable |
| Overall Instrument | 0.923 | - | 57 | Highly Reliable |

Source: Author Processed

**Table 5.**
**Construct Validity Test - Factor Loading**

| Item | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Communalities |
|---|---|---|---|---|---|---|
| KIA01 | 0.782 | 0.124 | 0.089 | 0.156 | 0.067 | 0.654 |
| KIA02 | 0.758 | 0.098 | 0.112 | 0.134 | 0.089 | 0.612 |
| SIK01 | 0.089 | 0.743 | 0.156 | 0.098 | 0.112 | 0.592 |
| SIK02 | 0.112 | 0.721 | 0.089 | 0.134 | 0.156 | 0.573 |
| MTS01 | 0.156 | 0.089 | 0.798 | 0.112 | 0.089 | 0.674 |
| PE01 | 0.134 | 0.112 | 0.089 | 0.765 | 0.134 | 0.622 |
| IKR01 | 0.089 | 0.156 | 0.112 | 0.089 | 0.789 | 0.667 |

Source: Author Processed

## RESULTS AND DISCUSSIONS

The sample represents a balanced demographic distribution with predominantly middle-aged civil servants (43.0% aged 36-45 years) and moderate gender representation (60.3% male, 39.7% female). Most respondents hold diploma/bachelor's degrees (64.5%) and have 5-15 years of service in archipelagic areas (47.9%), indicating experienced personnel familiar with island governance challenges.

**Table 6.**
**Demographic Profile of Respondents (N=121)**

| Characteristics | Frequency | Percentage |
|---|---|---|
| **Age Group** | | |
| 25-35 years | 34 | 28.1% |
| 36-45 years | 52 | 43.0% |
| 46-55 years | 28 | 23.1% |
| >55 years | 7 | 5.8% |
| **Gender** | | |
| Male | 73 | 60.3% |
| Female | 48 | 39.7% |
| **Education Level** | | |
| High School | 31 | 25.6% |
| Diploma/Bachelor | 78 | 64.5% |
| Master's Degree | 12 | 9.9% |
| **Position** | | |
| Sub-district Head | 8 | 6.6% |

| Characteristics | Frequency | Percentage |
|---|---|---|
| **Age Group** | | |
| Village/Kelurahan Head | 35 | 28.9% |
| Sub-district Staff | 78 | 64.5% |
| **Length of Service in the Islands** | | |
| <5 years | 41 | 33.9% |
| 5-15 years | 58 | 47.9% |
| >15 years | 22 | 18.2% |

Source: Author Processed

**Innovation Perception Dimensions**

The results of the study indicate that civil servants in the archipelago have a high perception of public service innovation overall, with an average innovation score of 4.33 (SD = 0.51). Among the dimensions measured, Community-Based Implementation Strategy received the highest score (M = 4.51, SD = 0.58), indicating that civil servants are more likely to adopt innovative approaches based on collaboration with local communities and the use of social networks in overcoming public service challenges. This was followed by Relational Success Indicators with a very high score (M = 4.67, SD = 0.55), indicating that ASNs assess the success of innovation more in terms of interpersonal relationships and community acceptance than in terms of quantitative indicators such as service speed or efficiency. Conversely, Structural Challenge Management received the lowest score (M = 3.89, SD = 0.74), indicating that although civil servants are aware of challenges related to infrastructure and geographical isolation, they tend to focus more on adaptive approaches rather than seeking more technical or systematic structural solutions. This dimension illustrates the difficulties faced by civil servants in overcoming existing physical and logistical challenges.

The dimensions with the highest scores, namely Community-Based Implementation Strategy and Relational Success Indicators, show a strong tendency towards innovative behaviour among civil servants based on flexibility, community collaboration and the strengthening of social relationships. This indicates that in the context of fragmented archipelagos, civil servants prioritise innovation approaches that emphasise social sustainability and community involvement over high technology or formal procedures, which are often the focus of innovation in mainland areas. These findings show that the success of innovation in archipelagic regions is determined more by local and social factors than by structural or technological factors.

**Table 7.**
**Descriptive Statistics of Innovation Perception Dimensions**

| Dimension | Mean | SD | Min | Max | Interpretation |
|---|---|---|---|---|---|
| Conceptualization of Adaptive Innovation (CAI) | 4.23 | 0.67 | 2.31 | 5.85 | High |
| Community-Based Implementation Strategy (CIS) | 4.51 | 0.58 | 3.12 | 5.94 | Very High |
| Structural Challenge Management (SCM) | 3.89 | 0.74 | 2.08 | 5.67 | Moderate-High |
| Experiential Learning (EL) | 4.35 | 0.62 | 2.89 | 5.78 | High |
| Relational Success Indicators (RSI) | 4.67 | 0.55 | 3.45 | 5.89 | Very High |
| Overall Innovation Perception | 4.33 | 0.51 | 3.21 | 5.73 | High |

*Scale: 1-2 (Very Low), 2-3 (Low), 3-4 (Moderate), 4-5 (High), 5-6 (Very High)*
Source: Author Processed

**Inter-Island Comparison Analysis**

**Table 8.**
**One-Way ANOVA Results: Innovation Perception by Island Type**

| Dimension | Large Island (n=35) | Medium Island (n=31) | Small Island (n=27) | Remote Island (n=28) | F-value | p-value | $\eta^2$ |
|---|---|---|---|---|---|---|---|
| CAI | 4.12±0.71 | 4.28±0.65 | 4.31±0.58 | 4.21±0.73 | 0.67 | 0.573 | 0.017 |
| CIS | 4.35±0.62 | 4.58±0.51 | 4.67±0.48 | 4.52±0.65 | 2.14 | 0.099 | 0.052 |
| SCM | 4.15±0.68[a] | 3.92±0.71[ab] | 3.71±0.79[b] | 3.78±0.78[b] | 3.28* | 0.023 | 0.077 |
| EL | 4.28±0.65 | 4.41±0.59 | 4.38±0.58 | 4.34±0.67 | 0.34 | 0.794 | 0.009 |
| RSI | 4.52±0.58 | 4.73±0.49 | 4.78±0.51 | 4.65±0.59 | 1.86 | 0.141 | 0.045 |

*Note: Different superscript letters indicate significant differences (p<0.05) in post-hoc Tukey test *p<0.05, **p<0.01, **p<0.001*
Source: Author Processed

Significant differences were found only in Structural Challenge Management (F=3.28, p=0.023, $\eta^2$=0.077). Post-hoc analysis reveals that large islands (M=4.15) show significantly better challenge management compared to small (M=3.71) and remote islands (M=3.78). This suggests that island size and accessibility directly impact civil servants' ability to manage structural constraints, with larger islands having better infrastructure and resources.

**Correlation Analysis**

**Table 9.**
**Correlation Matrix of Innovation Perception Dimensions**

| Variable | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| CAI | - | | | | |
| CIS | 0.623*** | - | | | |
| SCM | 0.458** | 0.512*** | - | | |
| EL | 0.681*** | 0.594*** | 0.389** | - | |
| RSI | 0.571*** | 0.748*** | 0.423** | 0.632*** | - |

***p<0.001, **p<0.01, *p<0.05*
Source: Author Processed

Strong positive correlations exist between all dimensions, with the strongest relationship between Community-Based Implementation Strategy and Relational Success Indicators (r=0.748, p<0.001). This suggests that civil servants who favor community-based approaches also emphasize relationship-centered success metrics. The moderate correlation between Structural Challenge Management and other dimensions indicates that infrastructure limitations influence but don't determine other aspects of innovation perception.

**Multiple Regression Analysis**

**Table 10.**
**Predictors of Overall Innovation Perception**

| Predictor Variable | B | SE B | β | t | p | 95% CI |
|---|---|---|---|---|---|---|
| Demographic Factors | | | | | | |
| **Age** | 0.008 | 0.012 | 0.067 | 0.67 | 0.506 | [-0.015, 0.031] |
| Education Level | 0.156 | 0.089 | 0.151 | 1.75 | 0.082 | [-0.020, 0.332] |
| Length of Service | 0.234 | 0.098 | 0.218* | 2.39 | 0.018 | [0.040, 0.428] |
| **Geographic Factors** | | | | | | |
| Island Size | -0.089 | 0.067 | -0.118 | -1.33 | 0.186 | [-0.221, 0.043] |
| Distance from the Mainland | -0.145 | 0.071 | -0.176* | -2.04 | 0.044 | [-0.285, -0.004] |
| Infrastructure Access | 0.278 | 0.085 | 0.289** | 3.27 | 0.001 | [0.110, 0.446] |
| **Job Characteristics** | | | | | | |

| Predictor Variable | B | SE B | β | t | p | 95% CI |
|---|---|---|---|---|---|---|
| Position Level | 0.198 | 0.076 | 0.225** | 2.61 | 0.010 | [0.048, 0.348] |
| Training Frequency | 0.167 | 0.082 | 0.168* | 2.04 | 0.044 | [0.005, 0.329] |

*$R^2 = 0.547$, Adjusted $R^2 = 0.515$, $F(8,112) = 16.89$, $p<0.001$ \*\*\*p<0.001, \*\*p<0.01, p<0.05*
Source: Author Processed

The model explains 54.7% of the variance in innovation perception ($R^2$=0.547, p<0.001). Key significant predictors include: Infrastructure Access (β=0.289, p=0.001) as the strongest predictor, Position Level (β=0.225, p=0.010), Length of Service (β=0.218, p=0.018), and Training Frequency (β=0.168, p=0.044). Interestingly, Distance from the Mainland negatively predicts innovation perception (β=-0.176, p=0.044), suggesting that greater isolation reduces innovation orientation.

**Cluster Analysis**

**Table 11.**
**Archipelagic ASN Innovation Typology**

| Cluster | Size (n) | Percentage | CAI | CIS | SCM | EL | RSI | Profile Name |
|---|---|---|---|---|---|---|---|---|
| 1 | 34 | 28.1% | 3.67 | 4.12 | 3.23 | 3.89 | 4.21 | Pragmatic Adapters |
| 2 | 45 | 37.2% | 4.52 | 4.78 | 4.15 | 4.61 | 4.89 | Community Innovators |
| 3 | 42 | 34.7% | 4.48 | 4.35 | 4.12 | 4.52 | 4.67 | Balanced Practitioners |

Source: Author Processed

**Table 12.**
**Cluster Characteristics by Geographic and Demographic Variables**

| Characteristics | Pragmatic Adapters | Community Innovators | Balanced Practitioners | χ²/F | p |
|---|---|---|---|---|---|
| **Island Type** | | | | 12.34* | 0.015 |
| Large Island | 14 (41.2%) | 11 (24.4%) | 10 (23.8%) | | |
| Medium Island | 8 (23.5%) | 13 (28.9%) | 10 (23.8%) | | |
| Small Island | 7 (20.6%) | 10 (22.2%) | 10 (23.8%) | | |
| Remote Island | 5 (14.7%) | 11 (24.4%) | 12 (28.6%) | | |
| **Education Level** | | | | 8.76* | 0.033 |
| High School | 12 (35.3%) | 9 (20.0%) | 10 (23.8%) | | |
| Diploma/Bachelor | 20 (58.8%) | 29 (64.4%) | 29 (69.0%) | | |
| Master's Degree | 2 (5.9%) | 7 (15.6%) | 3 (7.1%) | | |
| Length of Service | 8.2±6.1 | 11.4±7.3 | 9.8±6.8 | 3.21* | 0.044 |

Source: Author Processed

Three distinct typologies emerged from cluster analysis are:

Pragmatic Adapters (28.1%): Score lowest across all dimensions, particularly in Structural Challenge Management (M=3.23). Predominantly from larger islands with higher education levels but shorter service periods. They focus on basic service delivery rather than innovative approaches. Indicating their focus on delivering basic services rather than innovative approaches. The majority of members of this cluster come from large islands, with higher levels of education but shorter lengths of service. Their response patterns tend to be more pragmatic, oriented towards direct and practical problem solving in accordance with local constraints.

Community Innovators (37.2%): Highest scores in Community-Based Implementation (M=4.78) and Relational Success Indicators (M=4.89). More experienced civil servants who emphasize collaborative governance and relationship-based outcomes. This indicates that they prioritise collaboration with the community and results based on interpersonal relationships. Members

of this cluster tend to be more experienced and come from islands with better access and longer periods of employment, which allows them to become more familiar with the local context and develop more effective collaboration-based solutions.

Balanced Practitioners (34.7%): Moderate-high scores across all dimensions with balanced approaches. Represent experienced civil servants who integrate multiple innovation strategies effectively. This cluster shows moderate-high scores in all dimensions, describing a balanced and integrative approach to innovation. Members of this cluster are experienced civil servants who are able to effectively combine various innovation strategies. They are more evenly distributed between large and small islands and have varying lengths of service, demonstrating flexibility in applying innovations appropriate to geographical conditions and available resources.

The differences in empirical characteristics of each cluster, such as location (large vs small islands), length of service, and education, reflect the diversity in how civil servants respond to and implement innovation in the archipelago. This pattern of response shows that work experience and geographical connectivity greatly influence the innovation approaches applied by civil servants, with civil servants on large islands tending to be more pragmatic and more experienced civil servants tending to choose community-based approaches or combine various innovation strategies.

**Comparative Analysis with the Mainland Innovation Paradigm**

**Table 13.**
**Archipelagic vs Mainland Innovation Paradigms - Theoretical Comparison**

| Innovation Aspects | Archipelagic ASN Findings (Current Study) | Mainland ASN Characteristics (Literature)* |
|---|---|---|
| Innovation Definition | Adaptive creativity within constraints (M=4.23) | Technological modernization & digitalization |
| Primary Focus | Community-based solutions (M=4.51) | Efficiency & standardization |
| Success Metrics | Relational outcomes (M=4.67) | Quantitative KPIs (service time, satisfaction rates) |
| Technology Approach | Appropriate/simple technology | High-tech digital solutions |
| Implementation Strategy | Bottom-up, collaborative | Top-down, procedural |
| Resource Utilization | Social capital & local networks | Financial & technological resources |
| Challenge Response | Contextual adaptation (M=3.89) | System optimization |
| Learning Pattern | Experience-based (M=4.35) | Formal training & certification |

*Based on original qualitative study findings and public administration literature*
Source: Author Processed

Table 8 demonstrates a fundamental paradigmatic divide between archipelagic and mainland civil servants' conceptualization of innovation. The empirical data from archipelagic ASN indicate consistently higher scores for adaptive and community-oriented approaches, contrasting sharply with literature-based mainland characteristics that emphasize technological and procedural solutions. The moderate score in Challenge Response (M=3.89) reflects ongoing struggles with structural constraints, while the high Community-based Solutions score (M=4.51) indicates successful adaptation through social capital mobilization. This suggests that geographical context fundamentally shapes innovation philosophy rather than simply constraining implementation options.

**Table 15.**
**Innovation Orientation Scale - Archipelagic vs Mainland Tendencies**

| Statement | Archipelagic ASN (Current Study) | Expected Mainland Response | Gap Analysis |
|---|---|---|---|
| "Innovation means using the latest technology." | 2.34 ± 0.87 (Low) | ~4.50 (High) | -2.16 (Large Gap) |
| "Success is measured by service speed." | 2.67 ± 0.92 (Low-Moderate) | ~4.20 (High) | -1.53 (Large Gap) |
| "Community collaboration is essential." | 4.78 ± 0.65 (Very High) | ~3.20 (Moderate) | +1.58 (Positive Gap) |
| "Flexibility is more important than standards." | 4.45 ± 0.71 (High) | ~2.80 (Low-Moderate) | +1.65 (Positive Gap) |
| "Innovation requires formal procedures" | 2.89 ± 0.83 (Low-Moderate) | ~4.10 (High) | -1.21 (Moderate Gap) |
| "Local wisdom guides innovation" | 4.67 ± 0.59 (Very High) | ~2.90 (Low-Moderate) | +1.77 (Large Positive Gap) |

*Scale: 1-6 (1=Strongly Disagree, 6=Strongly Agree)*
Source: Author Processed

Table 9 reveals stark attitudinal differences through gap analysis, with the largest divergence in technology orientation (-2.16) and local wisdom integration (+1.77). The low standard deviations in archipelagic responses (0.59-0.92) indicate consensus within the group, suggesting these are not individual preferences but institutionalized cultural patterns. The negative gaps in technology dependence and formal procedures do not represent deficiencies but alternative innovation pathways that prioritize adaptability over standardization. The positive gaps in community collaboration and flexibility demonstrate that archipelagic conditions have fostered unique governance capabilities that may be undervalued in mainstream administrative theory.

**Table 16.**
**Distinctive Features of Archipelagic Innovation Approach**

| Feature Category | Specific Characteristics | Freq (%) | Supporting Evidence |
|---|---|---|---|
| Adaptive Solutions | Flexible service delivery | 89.3% | Mobile services, home visits |
| | Weather-dependent scheduling | 76.9% | Services adapted to sea conditions |
| | Multi-functional roles | 83.5% | ASN handling multiple sectors |
| Community Integration | Traditional leader involvement | 91.7% | RT/RW as service extensions |
| | Informal reporting systems | 78.5% | Community-based information flow |
| | Cultural ceremony integration | 65.3% | Services during social gatherings |
| Resource Optimization | Facility sharing | 84.3% | Using schools and mosques for services |
| | Transportation pooling | 72.7% | Shared boats, community transport |
| | Simple technology use | 81.0% | Radio, basic phones vs computers |
| Relational Outcomes | Personal relationship emphasis | 93.4% | Face-to-face interaction preference |
| | Trust-based evaluation | 87.6% | Reputation over formal metrics |
| | Community satisfaction focus | 85.1% | Local acceptance vs external standards |

Source: Author Processed

Table 10 quantifies the distinctive operational characteristics that define archipelagic innovation, with remarkably high frequencies across all categories. The 93.4% emphasis on

personal relationships and 91.7% involvement of traditional leaders indicate deep integration of formal and informal governance structures. The high frequencies in adaptive solutions (89.3% flexible delivery, 83.5% multi-functional roles) demonstrate systematic rather than ad-hoc responses to geographical constraints. The lower frequency in cultural ceremony integration (65.3%) suggests selective rather than wholesale adoption of traditional practices, indicating strategic cultural adaptation rather than uncritical traditionalism. These patterns reveal sophisticated hybrid governance models that combine bureaucratic functionality with community embeddedness.

## Discussion

The findings acknowledge that archipelagic civil servants have developed a distinctly different innovation paradigm compared to their mainland counterparts. While mainland ASN (based on literature and theoretical frameworks) emphasize technological modernization and quantitative efficiency, archipelagic ASN demonstrate a strong preference for adaptive, community-centered approaches. The high scores in Community-Based Implementation Strategy (M=4.51) and Relational Success Indicators (M=4.67) contrast sharply with expected mainland patterns that would prioritize digital solutions and time-based metrics. High scores on community-based implementation strategies and relational success indicators confirm that innovation in island regions is more rooted in social collaboration, flexibility, and the utilisation of local social capital than in reliance on digitalisation or formal procedures. This pattern is consistent with the findings of Abdillah et al. (2022) and Jungsberg et al. (2020), which show that remote areas tend to rely on community-based innovation due to limitations in infrastructure and technical capacity. Similarly, studies by Crescenzi et al. (2022, 2023) emphasise that innovation in non-urban areas does not always depend on technology, but rather arises from the ability of local actors to adapt to geographical and social contexts.

This paradigmatic difference is not merely a matter of resource constraints but represents a fundamental reconceptualization of what constitutes effective public service innovation. Archipelagic ASN has developed what can be termed "adaptive innovation" - characterized by contextual creativity, social capital mobilization, and flexible service delivery mechanisms. The low score on technology-oriented statements (M=2.34) compared to high community collaboration emphasis (M=4.78) demonstrates this philosophical divergence. Low scores in Structural Challenge Management reinforce arguments in the archipelagic governance literature (e.g. Madubun, 2024; Buttigieg et al., 2016) that limitations in transport, infrastructure and connectivity continue to be structural barriers that limit the effectiveness of technocratic innovation in archipelagic regions. This confirms the position of this study in the literature as complementary to previous studies showing that innovation in remote areas cannot be assessed using the same indicators as urban or mainland areas.

These research findings are also in line with the study by Crescenzi et al. (2022), which shows that areas with limited access, such as small islands, rely on community-based innovation to overcome infrastructure challenges. Furthermore, the study by Jungsberg et al. (2020) emphasises the importance of social collaboration in enhancing innovation capacity in remote areas. This illustrates that community-based strategies are key to public innovation in isolated regions.

The emergence of three typologies within archipelagic ASN (Pragmatic Adapters, Community Innovators, Balanced Practitioners) indicates that even within the adaptive paradigm, there exists variation in approach intensity and sophistication. Community Innovators (37.2%) represent the most developed form of archipelagic innovation thinking, fully embracing collaborative governance and relational success metrics. This typology reinforces the idea of

street-level bureaucracy (Lipsky; Chang & Brewer, 2023) that innovation is largely influenced by civil servants' individual interpretations of their work context, especially in areas with limitations.

The significant positive gaps in flexibility orientation (+1.65) and local wisdom integration (+1.77) compared to expected mainland responses suggest that archipelagic conditions have fostered unique institutional innovations that may offer valuable lessons for adaptive governance theory. The negative gaps in technology dependence (-2.16) and formal procedure orientation (-1.21) indicate not deficiency but alternative pathways to effective governance.

The findings of this study indicate that public service innovation in island regions does not solely depend on technocratic approaches or technological modernisation, which are often relied upon in the New Public Management (NPM) paradigm. Instead, innovation in island regions tends to be adaptive, community-based, and contextual, reflecting the need to adapt to specific geographical and social challenges. The three typologies of civil servants identified—Pragmatic Adapters, Community Innovators, and Balanced Practitioners—describe the various ways in which innovation can develop, depending on the experience, location, and limitations faced by civil servants. These findings challenge the principles of NPM, which prioritise efficiency and high-tech standardisation, and offer a new perspective on the paradigm of innovation in regional governance. Innovation in the islands prioritises flexibility, community-based collaboration, and the use of local resources over advanced technology or rigid procedures. Therefore, public service innovation in the island context should be viewed as a process based on local adaptation, involving active community participation and the utilisation of social capital to achieve sustainable results that are relevant to local needs. Public service innovation policies for island regions must accommodate a more dynamic and contextual approach, which allows civil servants to innovate in ways that are more appropriate to their geographical and social conditions. Innovation in regional governance in island regions, therefore, is not only about the application of technology, but more about local capacity building that prioritises adaptation, sustainability, and community collaboration.

## CONCLUSIONS

This quantitative study confirms the existence of a distinctive adaptive innovation paradigm among civil servants in the islands, which is fundamentally different from the technocratic model on the mainland. With a high innovation perception score (M = 4.33), island civil servants prioritise community-based strategies (M = 4.51) and relational indicators (M = 4.67) over technological modernisation. These findings indicate that innovation in island regions emphasises social adaptation, community-based collaboration, and the use of local wisdom in response to geographical and infrastructural limitations. The contribution of this research to the Adaptive Innovation Paradigm of ASN in the Islands is that ASN in the islands develop innovation patterns that focus on social collaboration and strengthening interpersonal relationships as the main tools for improving the quality of public services. Meanwhile, in terms of policy implications, it emphasises that public innovation policies in island regions need to be adapted to fragmented local conditions. Policies should place greater emphasis on contextual adaptation and strengthening local capacity, rather than simply applying uniform or high-tech innovation models. Theoretically, this research introduces a typology of ASN in the islands, namely Pragmatic Adapters, Community Innovators, and Balanced Practitioners, which provides new insights into the public sector innovation paradigm, particularly in a fragmented geographical context. However, this study has several limitations, including its focus on only one district, which limits the generalisation of findings. Therefore, further research is expected to conduct longitudinal studies to understand the dynamics of ASN innovation over time, as well as to make

direct comparisons between ASN in island and mainland regions to see differences in the application of innovation. In addition, it is necessary to explore the transferability of these findings to other island contexts with different geographical backgrounds in order to enrich our understanding of island governance and contextual public innovation. The research demonstrated that geographical context shapes both innovation implementation and conceptualization. The archipelagic paradigm prioritizes sustainability, community engagement, and contextual responsiveness qualities increasingly important for adaptive governance in complex environmental and social challenges.

Although research has provided insights into public innovation in island regions, there is still scope for research that can expand and deepen existing findings, such as longitudinal studies that observe changes in civil servants' perceptions of public innovation over the long term. In addition, direct comparative research between civil servants in the islands and on the mainland will provide a clearer perspective on the differences and similarities in the application of public innovation between regions with different geographical challenges, as well as research on the development of more detailed contextual innovation policy models that take into account the differences in civil servant typology that have been found in this study.

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