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INNOVATING AGAINST THE ODDS: UNVEILING THE PRODUCTION PROCESS AND CRITICAL FACTORS BEHIND ROTE NDAO'S STUNTING PREVENTION INNOVATIONS

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Abstract: : *This study investigates the production process of public sector innovation in addressing stunting prevalence in Rote Ndao Regency, a topic that remains underexplored by public sector innovation scholars. Employing a qualitative approach with a multiple case study method, this research involved in-depth interviews with 20 informants directly engaged in two innovation initiatives: the Ka'a Fadi Innovation implemented by the PMD Office and the Mama Bo'i Innovation developed by the Health Office. The study identifies four key stages in the innovation production process: idea production, idea transformation into a prototype, championing for support, and integrating the prototype into formal policy. The findings reveal distinct differences in the production process and critical factors influencing the realization of these innovations. The Ka'a Fadi Innovation follows three stages of the production process. Four critical factors influence it, while the Mama Bo'i Innovation progresses through all four stages, supported by the same four critical factors. These determinants include transformational leadership, resource management, innovation characteristics, and external environment. The novelty of this research lies in its identification of unique production processes and key determinants that facilitate public sector innovation in resource-constrained local government settings. This study offers valuable insights into strategies for fostering public innovation in regions with limited resources, contributing to the broader discourse on public sector innovation.*

Keywords : *public sector innovation; critical factors; local government; innovation process; stunting.*

INTRODUCTION

Public sector innovation (PSI) has emerged as a crucial mechanism for enhancing public service delivery, improving administrative efficiency, and fostering citizen participation. This trend is particularly evident in several East Asian nations, such as China, Japan, South Korea, and Taiwan, which have demonstrated notable advancements in participatory governance and local government performance (Borins, 2018; Stewart-Weeks & Kastelle, 2015). PSI has increasingly become a key strategy for overcoming administrative challenges and improving public service outcomes by enhancing accessibility, responsiveness, and accountability (De Vries, Bekkers, Tummers, et al., 2016; Pradana et al., 2022a).

Research on PSI has expanded significantly over the past decade, with notable contributions examining innovation processes across diverse organizational and national contexts. De Vries et al. (2016) conducted a comprehensive review of PSI literature, identifying key determinants such as leadership, organizational climate, and employee involvement. Their study highlighted that PSI success often depends on an organization's ability to foster creativity

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and maintain commitment to innovation. However, this study primarily focused on developed countries, limiting its applicability to resource-constrained regions like NTT.

Osborne and Brown (2012) examined PSI success in public organizations, emphasizing that successful innovation processes rely on robust internal capabilities, cross-sector collaboration, and leadership that supports innovation. While their study offered important insights, it lacked specific references to innovation production processes in developing regions.

Kusumasari et al. (2019) explored PSI determinants in Yogyakarta City and Teluk Bintu, emphasizing that leadership commitment, organizational readiness, and environmental responsiveness are key to innovation success. However, this study was limited to resource-abundant contexts and did not address the complexities of PSI production in resource-constrained regions such as NTT.

Pradana et al. (2022a) highlighted PSI dynamics in Kupang City, showing that financial incentives and strong leadership facilitated innovation outcomes. However, the study lacked insights into innovation initiation processes in underdeveloped local government environments.

Pradana et al. (2023) examined the institutionalization of innovation in Yogyakarta City and Kupang, identifying nine critical factors that influence innovation success: political leader commitment, public manager commitment, technical team capacity, financial resources, program coordination, performance incentives, collaborative partnerships, and lobbying efforts. While these findings provided valuable insights, they primarily focused on PSI implementation rather than the early stages of innovation production.

Few previous studies have examined the factors behind the innovation production process in local government contexts in remote island areas with significant problems and small organizational capacities in terms of human and natural resources. Most previous research has focused on innovation in Java or western Indonesia, where governments benefit from more excellent institutional stability and resource availability.

Despite the growing body of literature on PSI, research exploring the factors determining the successful innovation production process in developing regions with constrained resources, such as Eastern Indonesia, remains underdeveloped. Prior research has extensively covered innovation practices in resource-abundant contexts. Nevertheless, there is limited understanding of how PSI can thrive in local governments with financial instability, minimal policy frameworks, and limited human resources. Furthermore, a lack of comprehensive analysis combines organizational, social, and political factors that shape successful innovation production processes in these challenging environments.

This research seeks to fill this gap by investigating the key factors contributing to PSI's successful production process in resource-constrained local governments such as the Rote Ndao Regency. By examining the innovation processes in this context, this study aims to uncover the unique factors that enable local governments to innovate successfully despite limited capacity and resources.

In Indonesia, PSI gained momentum following the post-1999 reform period, yet its development was initially slow. This stagnation was mainly due to the absence of a legal framework for fostering innovative practices until the second decade following the reform (Pradana, 2024; Pradana et al., 2022b). Regulatory efforts such as the Joint Regulation of the Minister of Research and Technology No. 3 of 2012 and the Minister of Home Affairs No. 36 of 2012 on Regional Innovation Systems, along with Minister of PANRB Regulation No. 30 of 2014 on Public Service Innovation Guidelines, sought to accelerate innovation by requiring every government agency to develop at least one innovation annually (MENPANRB RI, 2019).

In response to these regulations, central and local governments pursued innovation strategies aligned with their resources. While Java-based local governments excelled due to better organizational capacity and resources, globalization trends have enabled PSI to emerge

in less-developed regions such as NTT (Pratama, 2019). Although the NTT Provincial Government and Kupang City achieved notable PSI successes, Rote Ndao emerged as an example of PSI success in a resource-constrained local government setting.

Despite facing significant resource constraints, Rote Ndao Regency achieved remarkable recognition by securing second place in the 2020 Innovation Government Award for Indonesia's most innovative underdeveloped region. The success was attributed to a substantial reduction in stunting prevalence, which decreased from 30.15% in 2019 to 25.83% in 2020. This reduction resulted from integrated interventions conducted through multisectoral collaboration across national, regional, and village administrative levels. Among the key innovations introduced in Rote Ndao were the Ka'a Fadi innovation by the PMD Office and the Mama Bo'i innovation by the Health Office.

The Ka'a Fadi innovation involved collaboration between civil servants, village heads/lurah, regional contract workers, private sector actors, and the broader community, organized under the "foster sibling" initiative. Meanwhile, the Mama Bo'i innovation established partnerships with sub-district heads, village heads/lurah, religious leaders, and traditional leaders, referred to as "*so soak*" partners. Data illustrating stunting rates and foster sibling figures between 2021 and 2023 are shown in Table 1.

Table 1. Stunting and Foster Sibling Data for 2021-2023

Year	Period I (February)	Period II (August)	Stunting Reduction	Foster Sibling
2021	Weighing: 13,373	Weighing: 1,993	0.60%	1,993
	Stunting: 3,220	Stunting: 3,103		
	Percentage: 24.08%	Percentage: 23.48%		
2022	Weighing: 13,485	Weighing: 2,618	3.78%	2,618
	Stunting: 3,513	Stunting: 3,011		
	Percentage: 26.05%	Percentage: 22.27%		
2023	Weighing: 13,554	Weighing: 634	1.20%	634
	Stunting: 2,938	Stunting: 2,674		
	Percentage: 21.70%	Percentage: 20.50%		

Source: Health Office and PMD Office of Rote Ndao Regency, 2023

The data reveals that the number of foster siblings increased significantly in 2022 before experiencing a sharp decline in 2023. Meanwhile, stunting rates steadily declined throughout the period, with the most notable reduction occurring in 2022 when the Ka'a Fadi innovation earned first place in the Rote Ndao Regency innovation competition and ranked among the top 10 pioneering innovations in NTT Province.

The Mama Bo'i innovation contributed substantially to reducing maternal and infant mortality rates by improving maternal health support systems. The initiative introduced a referral system ensuring that pregnant women and mothers received timely medical support at healthcare facilities, mitigating potential risks. The data on maternal and infant mortality rates in Rote Ndao between 2021 and 2023 are presented in Table 2.

Table 2 Maternal and Infant Mortality Rates in Rote Ndao Regency, 2021-2023

Year	Maternal Mortality (MMR)	Infant Mortality (IMR)	Total
2021	10	53	63
2022	6	22	28
2023	1	18	19
Total	27	196	223

Source: Health Office of Rote Ndao Regency (September 2023)

Moreover, innovation sourced from leaders, managers, and politicians (top-down) has regulatory and resource support from top to bottom, driven by global and local policy trends or social discourse (Kusumasari et al., 2019; Pradana et al., 2022a). Innovation also originates from the bottom up by providing consultation space for staff, institutionalizing formal environments and informal recognition for innovators, promoting innovators, and protecting successful and popular innovators (Osborne & Brown, 2013; Walker, 2014). After passing the production process with various success determinants, the innovation is implemented to execute previously established decisions or agreements through basic policies, laws, or executive orders (Pradana et al., 2023).

To investigate critical factors in the innovation production process, this study applied four dimensions influencing the success and failure of innovation production as stated by prior studies. They are leadership dimension, resource management, innovation characteristics, and external environment. First, leadership includes leadership style, leader commitment, and regulatory support; second, management includes human resources, teamwork, coordination, and technology access capabilities; third, innovation characteristics; and fourth, external environment (innovation partnerships).

Transformational leadership style with strong leader commitment plays a role as an example by inspiring innovation (Siyal et al., 2020; Wijayanti & Pradana, 2024). Regulatory support as an innovation foundation strengthens the innovation pillars. Good human resource management, teamwork formation, internal and external organizational coordination, and technology access capabilities supported by public sector innovation characteristics facilitate innovation (De Vries, Bekkers, & Tummers, 2016; Muluk & Pratama, 2021).

Innovation characteristics need attention in designing innovation, whether it meets needs, is beneficial, simple/easy, is accepted by the public, and has visible results (Rogers, 2003). An innovation should gather and process information as reasons driving its emergence. External environment involvement strengthens innovation because partnerships can reduce public organization's resource burdens (De Vries, Bekkers, Tummers, et al., 2016; Walker, 2014).

Innovation involving the community with local socio-cultural support can drive innovation (Clausen et al., 2020). As the network governance paradigm emphasizes, active roles from the community or external actors, such as citizens, businesses, universities, interest groups, and the mass media, are needed in the innovation cycle (Joris van der Voet, Tamyko Ysa, 2015). The research framework is depicted as follows.

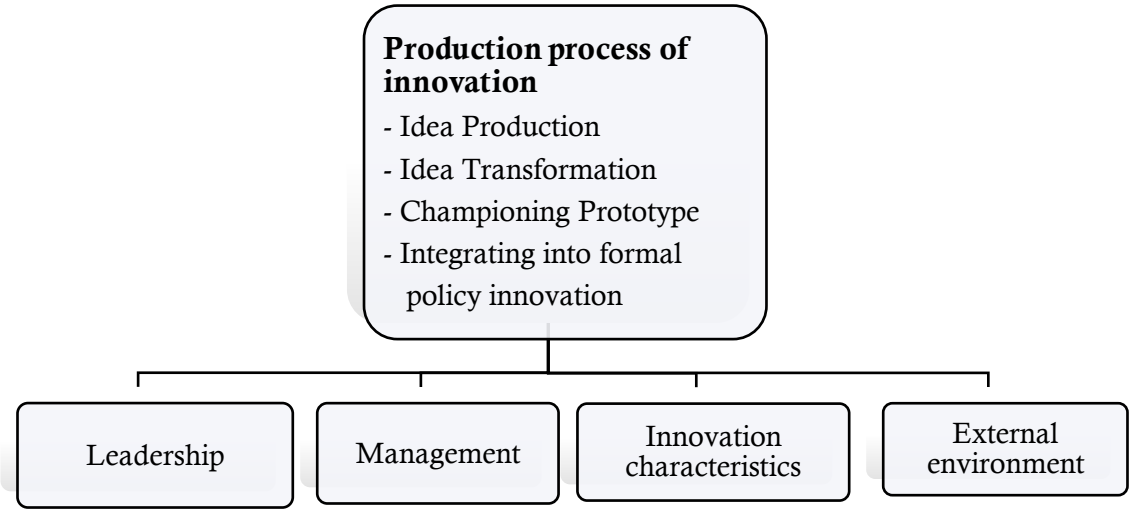

Figure 1. Research Framework
Source: Adapted from Pradana (2023), De Vries (2014), Walker (2014)

Thus, this study differs from previous studies in terms of research context and innovation production process, aiming to fill this gap by examining the Ka'a Fadi and Mama Bo'i innovations in Rote Ndao Regency. This research aims to answer the question: *What are the critical factors behind the production processes and critical factors of the Ka'a Fadi and Mama Bo'i innovations in Rote Ndao Regency?*. This research contributes to increasing readers' knowledge and understanding of the innovation production process through various determinants of the realization of the Ka'a Fadi and Mama Bo'i innovations and serves as a reference for the community or future researchers.

METHODOLOGY

This research used a qualitative approach with a multiple case study type because it examines more than one case to investigate the innovation production process and the determinants of innovation realization (Creswell & Clark, 2018; Yin, 2017). The research location is in Rote Ndao Regency at the PMD Office for the Ka'a Fadi innovation and the Health Office for the Mama Bo'i innovation. The selection of research informants used a purposive technique involving individuals who understand or are involved in the activities being studied (Bungin, 2021).

The informants include department heads, secretaries, heads of divisions, administrative staff, innovation designers, and innovation partners from KF and MB, a total of 20 people, as shown in the following Table 3.

Table 3 Research Informants

Category	Informant Office	Total
Department Heads	PMD & Health Offices	2
Secretaries	PMD & Health Offices	2
Heads of Divisions	PMD & Health Offices	2
Staff/Innovation Admin	PMD & Health Offices	2
Subdivision Heads	PMD	1
Subdistrict Heads	Loaholu & Lobalain	2
Village Heads	Balaoli Village	1
Religious Leaders	Balaoli Village	2
Health Workers (midwives)	Health Office/Ba'a Puskesmas	1
Foster Siblings	Distan Perkim & BKPSDMD	3
Application Designers	Bapelitbang PMD & Kominfo	3
Total		21

Source: Researchers (2024)

This study employed interviews, document studies, and observations to ensure comprehensive data collection. Semi-structured interviews involved 20 informants, including government officials, program implementers, and community leaders engaged in the Ka'a Fadi and Mama Bo'i innovations. Each session lasted 45 to 90 minutes, discussing innovation production stages such as idea generation, prototyping, championing support, and policy integration. Interviews were recorded with consent and transcribed verbatim.

Document studies collected secondary data, including government reports, policy documents, and media publications, to identify key milestones and strategies shaping the innovations. Observations were conducted during community engagement sessions, awareness campaigns, and implementation activities, providing insights into real-time interactions and stakeholder involvement.

Data analysis followed Miles and Huberman's interactive model, involving transcription, data reduction, presentation, and conclusion drawing. Data was coded into emerging themes related to innovation production and critical success factors. Source triangulation enhanced

validity by cross-checking data from multiple informants to ensure consistency and minimize bias (B.Miles et al., 2014).

RESULTS AND DISCUSSION

Production Process of Ka'a Fadi and Mama Bo'i Innovations

The innovation production process encompasses idea production, idea transformation into prototype, championing prototype, and integrating prototype into formal policy innovation. Idea production investigates the source of ideas or innovators and the background of the idea's emergence. Idea transformation into prototype investigates the process of drafting innovation model designs. Championing prototype investigates the process of convincing leaders to accept the innovation design. Integrating prototypes investigates the integration of innovation into the organization's work program.

Research findings on the innovation production process according to these phases include:

Idea Production: The Ka'a Fadi innovation came from the Head of the PMDPSD Division at the PMD Office, driven by the stunting issue often discussed in organizational meetings. The division head believed that policies to address stunting should be preceded by direct problem identification at the target stunting children. Policies are challenging to make without knowing the children's condition, living environment, and family's economic status. This idea was strengthened by the PMD Head's request for each division to create one innovation, as indicated by the following interview excerpts:

> "I asked each division to produce one innovation, and the division head proposed the Ka'a Fadi innovation to help reduce stunting prevalence." (1/JMKT)
> "The innovation idea emerged during internal meetings related to stunting frequently held. I stated that if we keep meeting without directly addressing stunting in the field, it would be difficult to discuss policies. I invited forming an internal team to select stunting children to gather information on their condition, living environment, and family's economic status." (3/JKP)

Informants' statements indicate that the idea's background was the high number of stunted children in Rote Ndao, who needed interventions to reduce stunting through visits and information gathering as inputs for policy-making. The Ka'a Fadi innovation originated from the bottom up, a technical idea emerging from identifying operational issues (Herwanto, 2015). Bottom-up innovation sometimes receives strategic attention from leaders but needs more operational attention.

*Idea Production***:** The Mama Bo'i innovation idea came from the General Administration Assistant during evaluation meetings with the Health Office to identify the high MMR and IMR and stunting prevalence in Rote Ndao. The evaluation found that health workers were slow in managing data and information for policy-making, necessitating innovation, as described in the following interview excerpts:

> "The Mama Bo'i innovation was initiated to prevent MMR and stunting prevalence. The idea emerged during evaluations with Bapelitbang and the Health Office." (1/NRF)
> "Midwives managing maternal and child health data manually during services at Posyandu, Pustu, and PKM. Manual processes took much time, were hard to analyze, and retrieving old data was difficult, with books easily damaged. Assistant 3 called all midwives to the Ti'i Langga Auditorium to create and input data from cohort books into Google forms." (5/SMRU)

Informants' statements indicate that the Mama Bo'i innovation idea's background was the high MMR and stunting rates and the government's slow manual data analysis, necessitating electronic data processing through work system digitalization. Therefore, the Mama Bo'i

innovation is a top-down innovation from the leader. This phase finds that innovation is both top-down and bottom-up.

The initial Ka'a Fadi innovation model design by the PMDPSD Division Head at the PMD Office started as a Google form. The design was updated to an application by the Informatics Division Head at the Kominfo Office, named Ka'a Fadi. The innovation content design involved Bapelitbang and the Health Office to refine its narrative, as indicated by the following interview excerpts:

> "The initial innovation design by the PMDPSD Division Head, Mr. Jeki Patola, with staff." (2/LAZR)
> "The design was refined with the Kominfo Office to create the Ka'a Fadi application in use." (3/JKP)
> "The design process involved cross-sector collaboration with Bapelitbang and the Health Office to refine narratives." (1/JMKT)

Informants' statements indicate that the PMD Office team designed the initial innovation model. The design evolved from a Google form to an application involving cross-sector collaboration. Similarly, the Mama Bo'i innovation model design involved cross-sector collaboration with the Health Office, Bapelitbang, and Kominfo Office, starting from a Google form, as stated by the following interview excerpts:

> "The Mama Bo'i innovation model design involved cross-sector collaboration with Bapelitbang, Kominfo Office, and Health Office/Puskesmas." (3/LMH)
> "In mid-May 2021, the draft design was available, needing senior midwives to complete technical data, so I was asked to join with Bapelitbang and Kominfo Office." (4/MS)

Interview results indicate that innovation model designs were not independently done by the initiating offices but through collaborative cross-sector efforts. This research finds that innovation models were designed collaboratively due to limited human resources in the agencies.

Championing Prototype: The Ka'a Fadi innovation involved internal organizational discussions, leading to its implementation as an intervention to reduce stunting prevalence through attention and diaconia to stunting children. The PMD Office initiated the program, conducting socialization to civil servants/contract workers and the public to gain support from potential foster siblings, as indicated by the following interview excerpts:

> "We discussed with colleagues, agreeing on the Ka'a Fadi innovation with the spirit of mutual cooperation inherent in the Rote culture. We socialized to employees in each regional apparatus, inviting them to join and register as foster siblings, view profiles, and choose foster children. Foster siblings visit foster children with diaconia." (1/JMKT)
> "To strengthen the innovation and encourage civil servant participation, the head instructed the issuance of a regent's instruction. The Ka'a Fadi innovation was launched during the 2021 regional development planning forum." (3/JKP)

Interview results indicate that the PMD Office Head approved the Ka'a Fadi innovation proposal for implementation, believing many civil servants and other parties involved would ensure its success due to the mutual cooperation culture of the Rote community.

Championing Prototype: The Mama Bo'i innovation involved partners, championing the innovation for partner support through socialization, as indicated by the following interview excerpts:

> "We first socialized to inputers to understand and input data, then to others. At the launch by the regent, all partners were invited: religious leaders, traditional leaders, community leaders, sub-district heads, and village heads/lurah." (4/MS)
> "Mama Bo'i was continuously socialized at every opportunity." (3/LMH)

> "There was socialization to us as the leading sector in the sub-district and village that the system would inform us if there were pregnant women not checking their pregnancy or delivery issues." (8/JOA)

Interview results indicate that innovation introduction focused on innovation operators managing the innovation system. Socialization was done to the public, partners, and stakeholders at the innovation launch. Therefore, the research finds that the Ka'a Fadi and Mama Bo'i innovations received approval from political and institutional leaders.

Integrating Prototype: The Ka'a Fadi innovation was implemented, though not integrated into the core duties and routines of the PMD Office. The Ka'a Fadi innovation aligns with the PMDPSD Division's duties related to social services. However, it is not specifically supported by the budget in the office's program, making it an additional task rather than a routine, as indicated by the following interview excerpts:

> "The PMDPSD Division's duties relate to stunting, health, and human development, so it fits within our tasks." (1/JMKT)
> "The division's task is to ensure all social services reach the community. To include it in the program, there is no funding as it's a social activity, so we work on a social basis. I once submitted a staff review, but it was not accommodated. It should become routine during registration or reporting visits." (3/JKP)
> "It's not routine. The innovation aligns with our tasks but is an additional activity related to supplementary feeding in villages." (4/YD)

Informants' statements indicate that the Ka'a Fadi innovation needs to be integrated into the PMD Office's core duties and routines within the office's budget. The Mama Bo'i innovation is integrated into the Health Office's program and has become routine for midwives with budget support, as indicated by the following interview excerpts:

> "The activities are already in the office's budget and those not yet, we still implement. After launching Mama Bo'i, we continuously evaluate our needs." (1/NFR)
> "The innovation aligns with the Rote BERMARTABAT program related to stunting and MMR/IMR." (2/CBL)
> "It has become the village midwives' core duties; if there are pregnant women, they input basic data, and every check-up is recorded. Previously, manual data could be lost, especially if pregnant women moved addresses." (7/TLR)

Informants' statements indicate that the Mama Bo'i innovation was created to support the Rote Ndao Regency government's work program, specifically maternal and child health, to reduce stunting prevalence and MMR/IMR. This research finds that the Mama Bo'i innovation integrated into core duties, while the Ka'a Fadi innovation did not.

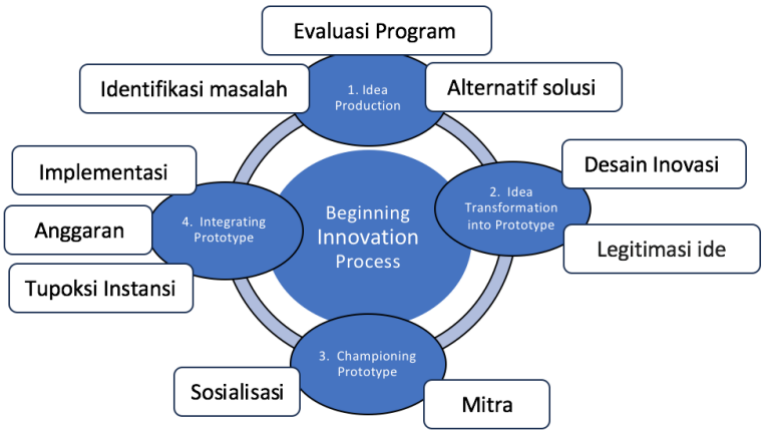

Figure 2. Ka'a Fadi Innovation Production Process Model
Source: Author's construction, 2024

The models below illustrate the innovation production process for Ka'a Fadi:

1) Idea production is triggered by the stunting issue in Rote Ndao, leading to partnership-based intervention involving government and private sectors.
2) Idea transformation involves designing the innovation model and legitimizing rules for the innovation.
3) Championing prototype involves leader approval of the innovation proposal and socialization to gain public support, as the innovation does not have regional budget support.
4) Integrating prototype involves the implementation of the innovation, though not integrated into the core duties and routines of the PMD Office.

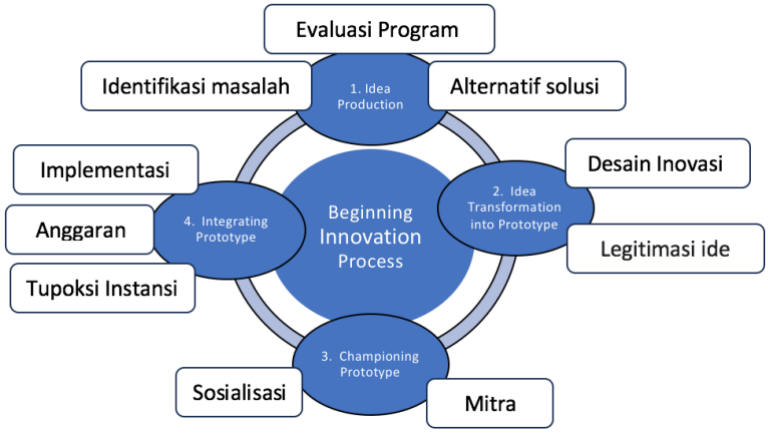

Figure 3. Mama Bo'i Innovation Production Process Model

Source: Author's construction, 2024

The models below illustrate the innovation production process for Mama Bo'i:

1) Idea production involves program evaluation, problem identification, and finding alternative solutions.
2) Idea transformation involves designing the innovation model and legitimizing rules for the innovation.
3) Championing prototype involves gaining approval, conducting socialization, and involving partners.
4) Integrating prototype involves integrating the innovation into core duties supported by the budget and implementing it.

Critical Factors in the Innovation Process

The innovation process includes four dimensions. *First*, *leadership dimension***.** Transformational leadership suits current leadership demands involving leader participation in innovation. Leaders also act as innovation sources, as in the case of Mama Bo'i from the General Administration Assistant. Political leader commitment to innovation is strong, as evidenced by the following interview excerpts:

> "The regent's support is very good, giving freedom to innovate. The regent herself has a foster child." (2/LAZR)
> "The regent's support is very strong, not only in the form of instructions but also in internal group reminders for everyone to be involved. However, we still struggle to implement policies effectively." (3/JKP)

Informants' statements indicate that the political leader/regent, with a transformational leadership style, is strongly committed to supporting the Ka'a Fadi innovation. However, civil servants and the innovation implementation team struggle to execute the regent's policies.

Similarly, the Mama Bo'i innovation is implemented with strong political leader commitment, supporting the regent's mission. Leader commitment is shown through innovation control via group messages and the Regent's Regulations. Assistant III will conduct daily evaluations in 2021 and bi-weekly evaluations in 2022. Additionally, the regent visits high-risk pregnant women during work visits, as indicated by the following interview excerpts:

> "The leader supports and evaluates. Initially, Assistant III requested daily evaluations until December 2021, then bi-weekly evaluations until now. With commitment, the innovation continues as it aligns with the regent's vision/mission." (4/MS)
> "From a policy perspective, the regent gives directions at every opportunity, provides assistance to high-risk pregnant women. From a regulatory perspective, there are Regent Regulations on Stunting and MMR/IMR Reduction Teams, and the regent monitors through group messages." (5/SMRU)

Informants' statements indicate that the Mama Bo'i innovation supports the regent's mission, showing strong political leader commitment.

Second, resource management dimension. Resource management involves task allocation to innovation managers by agency leaders for smooth innovation implementation. Additionally, forming a work team ready to implement innovation. Competent human resources facilitate the innovation process through teamwork and coordination.

Competent but limited human resources exist in the Ka'a Fadi innovation, according to the PMD Office Head's decision. The PMDPSD Division Head stated that many people are not needed for the innovation as they work using a system, without involving external teams, and assistance from other divisions when needed, as indicated by the following interview excerpts:

> "In our team, if there are issues, all departments are involved. The division is more focused unless there are problems, then other divisions help." (2/LAZR)
> "There is the PMD Office Head's decision for the Work Team. We don't need many people as we work with a system, just paying for WA Plus, and it's running." (3/JKP)
> "The Ka'a Fadi innovation work team is from the PMD Office itself, without involving other offices." (5/RWM)

Informants' statements indicate that the Ka'a Fadi innovation does not involve external work teams. The work team, formed by the agency leader, feels capable and does not require many teams in the innovation as monitoring and control use the system.

The Mama Bo'i, innovation work team, consists of internal and cross-sector partners. Collaboration with partners, such as village cadres, village heads/lurah, sub-district heads, and traditional and religious leaders, runs smoothly, as indicated by the following interview excerpts:

> "The Mama Bo'i innovation involves a cross-sector work team, mainly from the Health Office." (2/CBL)
> "Since this innovation, we collaborate extraordinarily with cross-sector teams, so there are no more deliveries outside health facilities. Midwife visits, village cadres, traditional and religious leaders, village heads/lurah, and sub-district heads are very high." (7/TLR)

Informants' statements indicate that the Mama Bo'i innovation has a supportive cross-sector work team. High team cooperation supports the innovation process, and coordination is also needed for smooth innovation.

Coordination skills contribute to innovation realization. The Ka'a Fadi innovation coordinates regarding stunting data, foster sibling registration, distance issues, and service barriers to stunting children at health facilities, especially Posyandu, as indicated by the following interview excerpts:

> "For instance, 10 foster children in Mokdale Village selected by 20 foster siblings, we coordinate to transfer by offering foster siblings to choose foster children in other villages." (1/JMKT)
> "Monitoring issues, such as the community not bringing children to Posyandu, we coordinate with village government/security to pick them up." (2/LAZR)
> "Coordination with the Health Office regarding foster children who have outgrown stunting and with Bapelitbang for weighing results." (5/RWM)

Informants' statements indicate that the Ka'a Fadi innovation coordinates internally and with external partners for innovation implementation. Similarly, the Mama Bo'i innovation coordinates through meetings, group messages, and application notifications. Coordination among teams, such as inputs and admins, cross-sector coordination, and partners like sub-district heads and village heads/traditional leaders, is indicated by the following interview excerpts:

> "We build coordination through meetings and notifications from the application." (1/NFR)
> "There are groups including cross-sector, such as sub-district heads, village heads/lurah, religious leaders. Sub-district heads are always instructed to follow up on leader instructions." (2/CBL)
> "Inputers usually coordinate directly or through group messages." (4/MS)

Informants' statements indicate that the Mama Bo'i innovation builds internal coordination with innovation partners through face-to-face meetings or communication media such as phone calls, group messages, and application notifications.

Third, innovation characteristics dimension. The Ka'a Fadi innovation uses digital technology accessible to Android users. Its simplicity makes it easy to replicate, as indicated by the following interview excerpts:

> "The innovation link is easy to access and works well. Visit schedules are informed through groups, and during visits, foster siblings document and fill in the report link." (2/LAZR)
> "The strength of the Ka'a Fadi innovation lies in its simplicity, making it easy to replicate." (6/MAP)

Informants' statements indicate that the Ka'a Fadi innovation uses technology that is accessible to the public with a simple system. Similarly, the Mama Bo'i innovation uses web-based technology that village midwives can easily access in each village. Innovation simplifies and speeds up midwives' tasks as services are conducted electronically using Android, as indicated by the following interview excerpts:

> "There are no issues in using Mama Bo'i technology. It simplifies and speeds up midwives' tasks as all data is in the system and not manual anymore." (1/NFR)
> "Mama Bo'i is web-based, so data is inputted by midwives in 119 villages using Android phones." (3/LMH)

Informants' statements indicate that the technology supporting the Mama Bo'i innovation is good and easily accessible by innovation managers. Innovation simplifies and speeds up midwives' services. This research finds that resource management factors contribute to the innovation production process in Rote Ndao.

Fourth, external environment dimension. The Ka'a Fadi innovation involves external partners as foster siblings, including civil servants, contract workers, and the public, but financial support is limited. There is hope for CSR funds from companies for stunting handling, as indicated by the following interview excerpts:

> "We first involve civil servants. If external foster siblings see foster children's profiles, they directly contact foster children or trusted intermediaries to deliver donations." (1/JMKT)

> "People outside Rote collaborate with foster siblings in Rote to channel donations. We hope companies can help through CSR as civil servants/contract workers have limited financial conditions." (3/JKP)

Informants' statements indicate that external partners, including civil servants/contract workers and the public, participate voluntarily, and there is hope for company CSR involvement.

The Mama Bo'i innovation partners are involved in handling high-risk pregnant women. Cross-sector partners work voluntarily without operational costs, helping health workers face barriers in referring pregnant women to health facilities, as indicated by the following interview excerpts:

> "If there are issues, cross-sector partners/react. The biggest challenge is that pregnant women want to give birth at home, especially if they have a relative or traditional healer." (1/NFR)
> "Partners' sio sodak' from village cadres/midwives know the field conditions. Partners are not facilitated with transport/allowances." (2/CBL)
> "'Sio sodak' partners: village cadres, village heads/lurah, sub-district heads, religious leaders/traditional leaders are involved voluntarily. The regent's wife said it's a form of love and care for mothers and children." (4/MS)

Informants' statements indicate that the Mama Bo'i innovation involves 'sio sodak' partners who work voluntarily to serve the government and community. This research finds that the Ka'a Fadi innovation involves civil servants/contract workers, the public, and private partners, while the Mama Bo'i innovation involves village cadres, village heads/lurah, sub-district heads, and religious leaders/traditional leaders voluntarily.

Table 4.4 Critical Factors Determining Innovation

No	Theme	Ka'a Fadi (TB)	Mama Bo'i (B)
1	Leadership		
	Transformational leadership	√	√
	Leader commitment	√	√
	Political leader commitment	x	√
	Political leader control	√	√
	Organizational leader rules	√	√
	Political leader rules	x	√
2	Resource Management		
	Organized work team	x	√
	Work team formed by leader	√	√
	Large work team	x	√
	Coordination through system	x	√
	Easy access and use of tech	√	√
3	Innovation Characteristics		
	Relative advantage	√	√
	Compatibility	√	√
	Complexity	√	√
	Trialability	√	√
	Observability	√	√
4	External Environment		
	Partners with social ties	x	√
	Partners with moral duty	x	√

Source: Author's construction, 2024

Discussion

The public sector innovation production process plays a crucial role in determining the success of innovation during its implementation. When designing an innovation, it is essential to consider its characteristics, ensuring that it meets public needs, provides clear benefits, is simple and easy to adopt, and demonstrates visible results (Clausen et al., 2020; Wu & Zhang, 2018). Moreover, practical innovation requires a well-informed development process that gathers and processes information as the driving force for its emergence (Clausen et al., 2020). Innovation development typically follows several stages, including idea production, idea

transformation into a prototype, championing the prototype, and integrating it into organizational routines (De Vries, Bekkers, & Tummers, 2016; Pradana et al., 2022b).

In transforming ideas into prototypes, local government innovations must replicate central government initiatives and bold and original ideas tailored to meet specific regional needs (Kusumasari et al., 2019). The Ka'a Fadi and Mama Bo'i innovations exemplify this principle, emerging as unique solutions for reducing stunting and preventing maternal mortality. Their development reflects a cross-sectoral response that combines innovative thinking with practical strategies to tackle pressing health issues in Rote Ndao Regency.

Equally important is the process of championing innovation, where innovators actively seek leadership support and approval for implementation (Pradana et al., 2023). The Ka'a Fadi innovation gained momentum through internal discussions and socialization among civil servants, contract workers, and the public. This approach fostered support from potential foster siblings, leveraging cultural and social cooperation norms as key drivers for success (Brown & Osborne, 2013). Similarly, the Mama Bo'i innovation built strong partnerships by engaging sub-district heads, village leaders, religious figures, and traditional leaders to promote the initiative. Such top-down strategies proved effective, as innovations that gain strong leadership support are more likely to succeed in hierarchical public sector environments (Pradana et al., 2022a).

For innovations to sustain impact, integration into formal organizational programs is crucial (Pradana et al., 2022a; Widodo et al., 2022). The Mama Bo'i innovation effectively achieved this by being incorporated into the Health Office's routine programs with allocated budget support, ensuring sustainability through institutionalization. In contrast, the Ka'a Fadi innovation faced sustainability challenges as it relied heavily on external partner support without integration into the PMD Office's routine activities. The absence of formal institutionalization increased its vulnerability to disruption (Pradana et al., 2023).

Resource management emerged as another critical factor in this study. Strong work teams play a vital role in fostering public sector innovation by ensuring tasks are executed efficiently and consistently (Klimentova, 2014; Wynen et al., 2014). The Ka'a Fadi innovation struggled with sustainability partly due to its small and less structured work team, whereas the Mama Bo'i innovation benefitted from an extensive and well-organized network operating across villages. Effective coordination and communication further strengthened innovation outcomes. While the Ka'a Fadi innovation maintained internal coordination directly within the organization, the Mama Bo'i innovation utilized cross-sectoral coordination strategies, leveraging formal systems and communication channels to connect its geographically dispersed team members (Pratama, 2020; Torfing & Ansell, 2017).

Characteristics of the innovations themselves also played a determining role in their success. The Ka'a Fadi and Mama Bo'i innovations demonstrated several advantages, including simplicity, observability, and compatibility with local cultural values. Both innovations effectively transformed manual services into digital processes, allowing greater accessibility for stakeholders and beneficiaries. Additionally, their success was evident through public recognition, as both innovations received awards and gained positive reception within the community and partner institutions. The Ka'a Fadi innovation's simple system further enabled its replication in other regions, demonstrating its potential for broader impact.

The study also highlights the influence of the external environment on innovation success. Partnerships are increasingly recognized as critical to driving innovation, especially in resource-constrained regions (Osborne & Brown, 2013). By involving diverse actors, partnerships reduce the burden on public organizations while enhancing innovation outcomes (Walker, 2014). The Ka'a Fadi innovation adopted an open partnership model, welcoming broad community participation as foster siblings, while the Mama Bo'i innovation relied on strategic partnerships with influential leaders and stakeholders. While the Ka'a Fadi

innovation's open partnership increased public involvement, it faced challenges controlling voluntary participation and ensuring sustained commitment. Conversely, the Mama Bo'i innovation's structured partnerships provided greater control and accountability, strengthening its implementation (Iranmanesh et al., 2021).

This study contributes to the theoretical understanding of public sector innovation by extending knowledge on the innovation production process. While previous studies have focused mainly on innovation sustainability, this research underscores the importance of identifying key production stages and critical success factors. By emphasizing transformational leadership, effective resource management, and structured coordination, this study enhances the existing framework for understanding how innovations are developed and realized in the public sector. Furthermore, the findings enrich theoretical discourse by demonstrating how these factors play out in resource-constrained environments, expanding the applicability of public sector innovation theories to less-developed regions.

From a practical perspective, the findings provide actionable insights for policymakers and public sector managers, particularly in regions facing limited resources. The study emphasizes the importance of cultivating strong leadership commitment, building structured work teams, and fostering strategic partnerships to ensure innovation success. The experiences of the Ka'a Fadi and Mama Bo'i innovations demonstrate that innovation efforts can be adapted to meet specific regional needs, addressing complex social challenges such as stunting reduction and maternal mortality prevention. Additionally, this research highlights the significance of integrating innovations into formal government programs and securing budgetary support to sustain innovation outcomes. By combining these strategies, local governments can enhance their capacity to produce impactful innovations that improve public service delivery and community well-being.

CONCLUSION

This research investigates the innovation production process, focusing on the critical factors of the Ka'a Fadi and Mama Bo'i innovations in reducing stunting prevalence in the Rote Ndao Regency. The main findings show that the Ka'a Fadi innovation production process is bottom-up, originating from the PMD Division Head's idea. In contrast, the Mama Bo'i innovation is top-down, originating from the General Administration Assistant. Both innovations receive strong leader support, facilitating approval and implementation processes.

Both innovations involve cross-sector collaboration in design and implementation, considering the agencies' limited human resources. The Ka'a Fadi innovation involves civil servants, village heads/lurah, regional contract workers, private entrepreneurs, and the general public as "foster siblings." In contrast, the Mama Bo'i innovation involves sub-district heads, village heads/lurah, village cadres, religious leaders, and traditional leaders as "sio sodak."

Critical success factors for innovation in Rote Ndao Regency include transformational leadership, good resource management, innovation characteristics meeting community needs, and external environment support. The Mama Bo'i innovation is integrated into the Health Office's program and supported by a budget, while the Ka'a Fadi innovation is not fully integrated into the PMD Office's program and relies on voluntary support.

The main limitation of this research is the data collected through interviews, which may contain memory bias from informants. Additionally, this research focuses only on two innovations in the Rote Ndao Regency, so the results may not be generalizable to other regions with different conditions. The selection of informants using purposive sampling may limit the variation of data obtained, possibly leaving some perspectives unrepresented. Another limitation is the lack of direct observation of innovation implementation in the field, which could provide a more comprehensive picture of the actual dynamics of the innovation process.

Future research should focus on broader studies on innovation production processes and their determinants in various local government contexts. It will help evaluate the generalizability of this research's findings and enrich understanding of different public sector innovation dynamics. Additionally, considering different socio-cultural conditions, future research can explore voluntary external environment involvement in innovation. Longitudinal studies tracking these innovations' development and long-term impact are also needed to understand their sustainability and effectiveness.

Future research can provide more specific and measurable recommendations for local governments to enhance innovation support and integration into formal work programs, ensuring the sustainability and effectiveness of public sector innovations. Further research can also explore the role of technology and digitalization in facilitating public sector innovation in resource-constrained areas.

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