

**STRENGTHENING WAREHOUSE RECEIPT SYSTEM (WRS) INFRASTRUCTURE
BASED ON COMMODITY CLUSTERS AND VALUE CHAINS AS A STRATEGY TO
ENHANCE WRS IMPLEMENTATION IN INDONESIA**

By

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Abstract

Despite nearly two decades since the enactment of Law No. 9 of 2006, Indonesia's Warehouse Receipt System (WRS / Sistem Resi Gudang—SRG) has yet to reach anywhere close to its potential. According to Bappebti, (2026), cumulative WRS value stands at IDR 8.57 trillion, with financing reaching IDR 5.32 trillion—numbers that appear strikingly small against a national agricultural commodity sector whose GDP contribution reached IDR 1,626.42 trillion in 2025. This paper argues that the infrastructure dimension is the primary, and largely neglected, root cause of that underperformance. Drawing on 5 Whys causal analysis, USG problem prioritization, (Bardach & Patashnik, 2019) feasibility criteria, and cross-validation against Dunn, (2017)'s six normative criteria, the author identifies the absence of an integrated national infrastructure masterplan—one grounded in commodity cluster logic and value chain thinking—as the deepest systemic constraint. Four policy alternatives were put to a panel of five domain experts; the analysis supports a combination strategy led by commodity cluster-based infrastructure development, complemented by existing warehouse revitalization, ISWARE digital modernization, and selective Government–Private Partnership (KPBU) deployment at strategic nodes. These recommendations are directed to the Minister of Trade and the Head of Bappebti for phased implementation between 2026 and 2030, framed within the 2025–2029 National Medium-Term Development Plan (RPJMN).

Keywords: Warehouse Receipt System, Infrastructure, Commodity Cluster, Public Policy

INTRODUCTION

Indonesia holds a prominent position among the world's commodity-producing nations. The agriculture, forestry, and fisheries sector alone accounts for roughly 13 percent of GDP (Badan Pusat Statistik, 2025)—a figure that reflects not just economic weight, but also social significance, given the millions of smallholder farmers and micro, small, and medium enterprises (MSMEs) whose livelihoods depend on commodity markets. Yet this structural importance coexists with a persistent vulnerability: seasonal production patterns, fragmented supply chains, and sharp price swings consistently leave farmers and

MSMEs in a weak negotiating position vis-à-vis traders and buyers.

The WRS was conceived as a practical response to precisely these vulnerabilities. Established under Law No. 9 of 2006 (Undang-Undang Nomor 9 Tahun 2006 Tentang Sistem Resi Gudang, 2006), subsequently amended by Law No. 9 of 2011 (Undang-Undang Nomor 9 Tahun 2011 Tentang Perubahan Atas Undang-Undang Nomor 9 Tahun 2006 Tentang Sistem Resi Gudang, 2011), the system allows farmers to deposit commodities in certified warehouses, receive a Warehouse Receipt (WR) as a legal ownership document that can be traded or pledged as collateral, and—crucially—delay

selling until market prices recover (Bappebti, 2021). Over the following years, the government built a detailed regulatory architecture around this framework: Government Regulation No. 36 of 2007 (as updated by GR No. 70 of 2013) (Peraturan Pemerintah Nomor 70 Tahun 2013 Tentang Perubahan Atas PP Nomor 36 Tahun 2007, 2013) established the operational rules, while a succession of ministerial orders refined the technical standards. Most recently, Ministerial Regulation No. 14 of 2026 (Peraturan Menteri Perdagangan Nomor 14 Tahun 2026 Tentang Barang Dan Persyaratan Barang Yang Dapat Disimpan Dalam Sistem Resi Gudang, 2026) expanded the list of commodities eligible for WRS storage to 30 types.

After nearly twenty years of policy effort, the results remain disappointing. Cumulative WRS transaction value reached IDR 8.57 trillion with IDR 5.32 trillion in associated financing by 2026 (Bappebti, 2026). Against a backdrop in which the national agricultural sector generated IDR 1,626.42 trillion in GDP the previous year (Badan Pusat Statistik, 2025), these figures underline a wide implementation gap. The warehouse stock situation is similarly concerning: of 302 completed warehouse units—of which 123 were funded through the national budget (APBN), with the remainder built by private investors and regional governments—only 147 (roughly 48 percent) are currently in active operation (Bappebti, 2026). This raises at least two interrelated policy problems. One is straightforwardly a question of value for money: substantial public investment has not translated into the intended socioeconomic returns. The other is more strategic. The WRS was meant to be a stabilizing instrument—protecting farmers from price shocks, unlocking agricultural finance, and supporting commodity price discovery. With Indonesia's development agenda under RPJMN 2025–2029 (Peraturan Presiden Nomor 12 Tahun 2025 Tentang Rencana Pembangunan Jangka

Menengah Nasional Tahun 2025–2029, 2025) placing growing emphasis on commodity downstreaming, food security, and MSME development, a dysfunctional WRS is increasingly difficult to afford.

The literature on WRS underperformance broadly converges on five explanatory dimensions: physical and digital infrastructure, institutional arrangements, access to financing, human resource capacity, and farmer behavioral patterns (Bappebti, 2022; Jayani & Nugroho, 2019; Mardia, 2024; Miller et al., 2010; Ramadhan Anggara et al., 2025; World Bank, 2016). While all five matter, infrastructure occupies a logically prior position. A warehouse that is poorly located, technically inadequate, or digitally isolated cannot serve farmers effectively—regardless of how well-designed the institutional rules are or how much financing is available. In that sense, getting infrastructure right is not one priority among many; it is the enabling condition for the others.

This paper focuses on infrastructure for three overlapping reasons: its analytical priority as a root cause, the direct institutional mandate of Bappebti and the Ministry of Trade over warehouse standards and WRS governance, and the need to move beyond diagnosis toward operationally specific recommendations that policymakers can actually act on. Four questions structure the analysis: What is the current state of WRS infrastructure, and where are the most critical gaps? What underlies the persistent infrastructure deficit? What realistic policy alternatives exist? and which combination of interventions offers the most credible path forward?

METHODS

Methodologically, this paper follows the policy analysis framework described in Bardach and Patashnik (2019) and Dunn (2018), proceeding through problem identification, criteria setting, alternative development, evaluation, and recommendation.

The approach is qualitative-dominant, relying primarily on secondary data and document analysis rather than primary survey research. The evidence base draws from multiple source types: national legislation and regulatory instruments, statistical publications from Bappebti and the Central Statistics Agency (BPS), peer-reviewed and grey literature from Indonesian and international scholars, policy documents from the World Bank, IFC, FAO, and UNCTAD, and comparative case material from four reference countries—India, Brazil, Tanzania, and Ethiopia. The analysis was also informed by focused consultations with Bappebti technical staff and select external stakeholders, though these are treated as supplementary context rather than primary data.

Three analytical tools are central to the paper. The 5 Whys method is used to trace the causal chain behind low WRS utilization, moving iteratively from surface symptoms to structural root causes. Problem prioritization is validated through the USG matrix (Urgency, Seriousness, Growth), with scores assigned on a 1–5 scale. Policy alternatives are then evaluated against Bardach & Patashnik, (2019) four feasibility criteria—technical, economic-financial, political, and administrative—before cross-checking with Dunn, (2017) six normative criteria. All scoring was done by a panel of five mid-level experts drawn from distinct constituencies: one representative each from Bappebti, the academic community (agricultural economics), the warehouse operator sector, farmer cooperative organizations, and financial institutions. Individual scores were averaged to produce composite assessments.

Several limitations should be kept in mind when interpreting the findings. The paper does not draw on systematic primary field research, so the problem characterization reflects documentary and expert sources rather than ground-level observation at scale. The panel scoring exercise is indicative—a useful

structured judgment, but one that would benefit from iterative Delphi refinement with a larger respondent group. Projected outcomes are reasoned from comparative evidence and literature rather than econometric simulation, meaning the quantitative targets cited should be read as aspirational benchmarks, not model-derived forecasts.

RESULTS AND DISCUSSION

1. Conceptual and Regulatory Framework

At its core, the WRS embodies the warehouse receipt system concept that Coulter & Onumah, (2002) describe as a commercial mechanism through which commodity owners deposit goods in independent certified facilities and receive a receipt document that carries legal and financial weight—it can be sold, pledged as loan collateral, or simply held until the owner judges market conditions favorable. Three economic functions flow from this: deferred sale, financing collateral, and price discovery. What a World Bank, (2016) diagnostic makes clear, however, is that achieving these functions requires more than legal authorization. Four preconditions must be in place simultaneously: physical and logistical infrastructure of adequate quality, a predictable regulatory environment, a financing ecosystem willing to accept warehouse receipts as collateral, and commodity flows of sufficient volume and standardization to make the system worthwhile.

For the purposes of this analysis, WRS infrastructure is treated as a four-layer system in which each layer conditions the effectiveness of the others. The conceptualization draws on UNCTAD's (2017) (United Nations Conference on Trade and Development, 2018) framework for understanding financing access among commodity-dependent producers. The first layer is the physical warehouse itself—its structural integrity, storage conditions, and capacity. The second encompasses post-harvest support: drying equipment, sorters, graders, weighing systems, and quality-testing laboratories that determine whether

commodities entering storage meet the standards required for a bankable receipt. Third is logistics—the road access, proximity to production centers, and connectivity to export or processing points that determine whether it is economically rational for farmers to use the system at all. The fourth layer, often underappreciated, is digital: the ISWARE platform managed by PT KBI as PUSREG, and how well it connects to other government information systems such as INSW, Simluhtan, and Market Reference Prices.

Indonesia's WRS regulatory architecture is, on paper, reasonably well-developed. The layered framework—from the parent law down through government regulations and ministerial orders—covers most of the necessary legal ground. Yet two structural gaps stand out. There is no requirement for a strategic masterplan that spatially integrates WRS infrastructure with commodity cluster maps and value chain geography. And the framework offers no meaningful pathway for financing beyond the annual national budget cycle, leaving the system vulnerable to investment fluctuations and politically driven allocation decisions. One potential opening for change lies in Coordinating Ministry Regulation No. 16 of 2025 (Peraturan Menteri Koordinator Bidang Perekonomian Nomor 16 Tahun 2025 Tentang Perubahan Kedelapan Atas Peraturan Menteri Koordinator Bidang Perekonomian Nomor 7 Tahun 2021 Tentang Perubahan Daftar Proyek Strategis Nasional, 2025), which includes food security and commodity downstreaming among its National Strategic Projects (PSN). Formal designation of WRS infrastructure within the PSN framework would unlock cross-agency coordination mechanisms and longer-horizon financing that the current setup cannot access.

2. International Experience

International experience offers instructive reference points, though the lessons are not uniformly optimistic. India's trajectory under the Warehousing Development and

Regulatory Authority (WDRA) is perhaps the most ambitious: the country has registered more than 100 million tons of warehouse capacity and, since 2017, has integrated an electronic Negotiable Warehouse Receipt (e-NWR) system with major commodity exchanges, including NCDEX and MCX. Brazil's approach centered on a different instrument—the *Cédula de Produto Rural* (CPR)—which proved highly effective at mobilizing agribusiness financing running into tens of billions of reais annually (Höllinger et al., 2009). The African cases, examined in Table 1, are more cautionary: Tanzania's early progress eroded when donor support subsided, and Ethiopia's centralized exchange model achieved standardization gains but at the cost of market flexibility.

Table 1. Comparative Overview of Warehouse Receipt Systems in Four Countries

Country	Primary Model	Key Lessons for Indonesia	Main Sources
India	WDRA + e-NWR integrated with commodity exchanges (NCDEX, MCX); >100 million tons of registered warehouse capacity	Strong regulatory authority, large-scale infrastructure, full integration with capital markets	World Bank, (2016); (Höllinger et al., 2009)
Brazil	<i>Cédula de Produto Rural</i> (CPR) + securitization via CRA in the capital market	Development of capital-market instruments based on Warehouse Receipts increases liquidity and financing	Höllinger et al., (2009)
Tanzania	Warehouse Receipt System Act 2005, donor-supported approach	Short-term success does not guarantee sustainability without domestic institutional capacity	Onumah, (2010); (World Bank, 2016)
Ethiopia	Ethiopian Commodity Exchange (ECX), centralized and mandatory approach	Standardization can boost export value; however, market freedom must be balanced	Onumah, (2010); (World Bank, 2016)

Source: compiled from (World Bank, 2016), Höllinger et al., (2009), Onumah, (2010), and national publications of each country.

3. WRS Implementation Profile in Indonesia

A clearer picture of the current WRS situation in Indonesia emerges from looking at several interlocking indicators: the number and status of warehouses, conformity assessment bodies (LPK), commodity coverage, geographic reach, utilization rates, and financing flows. Table 2 draws together the available data from Bappebti, (2026) and Kliring Berjangka Indonesia, (2025) into a national implementation snapshot.

Table 2. WRS Implementation Profile in Indonesia (Data 2025–2026)

Indicator	Achievement	Notes
Number of WRS warehouses constructed via APBN (of 302 total including private and regional government)	123 units	Some built since 2009 fiscal stimulus; 147 of 302 total units (incl. private & regional) actively operating
Geographic distribution	105 districts/cities in 25 provinces	Concentrated in Java, Sumatra, Sulawesi
Commodities eligible for storage	30 types	Per Ministerial Regulation No. 14 of 2026
Cumulative WRS value	IDR 8.57 trillion	Cumulative data as of August 2026 (Bappebti, 2026)
WRS-based financing value	IDR 5.32 trillion	Predominantly via WRS Subsidy and People's Business Credit (KUR)
Registered Warehouse Receipts (PUSREG)	497 WRs; volume 89,000 tons	Data from PT KBI (2025)
Dominant stored commodities	10 commodities	Shallots, rice, paddy, sugar, fish, soybeans, coffee, seaweed, tobacco, tapioca
Information system	ISWARE Next Gen	Blockchain-based; managed by PT KBI as PUSREG

Source: Bappebti, (2026); PT Kliring Berjangka Indonesia, (2025).

What Table 2 makes plain is a mismatch that goes beyond raw numbers. Even setting aside the utilization rate problem—roughly half the completed warehouses are inactive—the geographic distribution is poorly aligned with the commodity geography it is supposed to serve. The majority of facilities cluster in Java,

which is primarily a consumption and rice-producing region. Meanwhile, Indonesia's most export-competitive non-staple commodities—coffee, cocoa, pepper, rubber, seaweed, nutmeg, cinnamon—are grown in Sumatra, Sulawesi, and the eastern islands, where WRS coverage remains thin. This spatial mismatch is not incidental; it reflects the planning logic that built warehouses wherever budget and political will happened to align, rather than where the actually underlying commodity economy is.

4. Infrastructure Problem Identification

Examining each infrastructure layer in turn surfaces a distinct set of problems, summarized in Table 3.

Table 3. WRS Infrastructure Problem Identification

Layer	Problem	Implication
Physical warehouse infrastructure	Many warehouses built in the 2009 period are aging; generic specifications inadequately adapted for coffee, cocoa, pepper, horticulture; small unit capacity (1,500–2,000 tons).	Storage quality deteriorating; non-staple commodities poorly served; economies of scale unattainable.
Post-harvest support infrastructure	No dryers, cleaners, sorters, or grading equipment; quality testing laboratories unavailable; cold storage absent for perishable commodities.	Commodities enter the WRS with non-uniform quality; in-situ testing difficult; perishable commodities unserved.
Logistics infrastructure	Warehouse locations disconnected from production centers and markets; access roads frequently inadequate; no integration with national logistics nodes.	High logistics costs; farmers discouraged from using warehouses; poor connectivity to export markets.
Digital infrastructure	ISWARE not fully integrated with INSW, Simluhtan, or Market Reference Prices; quality, stock, and price information not real-time; no unified multi-stakeholder platform.	WR issuance bureaucracy is lengthy; financing institutions' trust is limited due to information asymmetry between warehouse operators and creditors (Akerlof, 1970); system efficiency is low.

Source: analysis based on literature review and policy documents.

Working backwards from the symptom of low warehouse utilization, the 5 Whys

analysis surfaces a cascade of causes that leads somewhere unexpected. Warehouses are underused because they are mismatched to local commodity characteristics. That mismatch exists because construction decisions were driven by budget availability rather than commodity-cluster analysis. And that planning failure persists because no integrated national WRS infrastructure masterplan has ever been developed. Why not? Because no cross-agency policy framework exists to mandate one. At the deepest level, the analysis points to a conceptual failure: WRS has been treated, implicitly, as a sectoral trade program under Bappebti's narrow purview—not as strategic economic infrastructure that warrants cross-sector planning, multi-ministry ownership, and multi-year financing commitments.

Identified root cause: *"The absence of an integrated WRS infrastructure policy framework and national masterplan based on commodity clusters and value chains, as part of the national strategic economic infrastructure."*

To validate the prioritization of infrastructure above the other four WRS problem dimensions, the USG method was applied. Five panelists—covering expert planning, policy analysis, warehouse operations, and financial sector perspectives—scored each dimension on urgency, seriousness, and growth potential, using a 1–5 scale. The composite results are in Table 4.

Table 4. Problem Priority Scoring Using the USG Method

Problem Dimension	U	S	G	Total	Rank
WRS Infrastructure (physical, post-harvest, logistics, digital)	5	5	5	15	1
WRS Institutional Capacity	4	4	4	12	2
Financing	4	4	3	11	3
Human Resources	3	3	3	9	4
Farmer Behaviour	3	3	2	8	5

Source: panel scoring by five mid-level expert planners, policy analysts, WRS warehouse

operators, and financial institution representatives. Scale: 1 (low) – 5 (high).

Infrastructure's top score of 15 across all three USG dimensions is, on reflection, not surprising. Its urgency is high because the other WRS dimensions—however well-reformed—cannot generate the intended outcomes without functioning warehouses and digital systems to anchor them. Its seriousness score reflects the scale of stranded public investment already in the system. And growth is rated high because, absent a coordinated intervention, the gap between WRS infrastructure capacity and the commodity-sector demand it should serve is likely to widen rather than narrow, particularly as export-oriented agricultural commodities gain policy priority under RPJMN 2025–2029.

POLICY ALTERNATIVE DEVELOPMENT AND EVALUATION

With the root cause established, the alternative-generation stage focuses on how a more coherent infrastructure planning and investment framework might be constructed. The four alternatives below are not mutually exclusive in theory, but they represent genuinely different strategic emphases—and the trade-offs between them matter for how resources, risks, and timelines are distributed. Table 5 sets out each alternative in descriptive terms before the evaluation.

Table 5. WRS Infrastructure Policy Alternatives

Alternative	Description
Alternative 1 — Revitalization of Existing Warehouses	Focuses on rehabilitating and improving the quality of existing WRS warehouses. Key components: warehouse condition audits; revitalization of structures, roofs, ventilation, and electrical systems; provision of minimal post-harvest facilities (dryers, sorters, scales); and re-certification to national standards (SNI). Nature: incremental, low-risk, relatively low cost per unit.
Alternative 2 — Commodity Cluster-Based Infrastructure Development	Focuses on constructing new warehouses and their support ecosystems in a consolidated manner within high-priority commodity cluster areas, following the value chain from farmers to markets. Key components: cluster masterplan (paddy/rice in Java, coffee in Sumatra–Sulawesi, cocoa in Sulawesi, pepper in Bangka Belitung–Lampung, sago/maize in South Papua, seaweed

	in Southeast Sulawesi–NTT); warehouses of 5,000–10,000-ton capacity with integrated post-harvest facilities; spatial integration with access roads, logistics terminals, and export ports. Nature: transformative and high impact.
Alternative 3 — Government–Private Partnership (KPBu)	Focuses on utilizing the KPBu scheme (Presidential Regulation 38/2015) for financing, constructing, and operating modern WRS warehouses at strategic nodes. Key components: WRS KPBu project pipeline, private sector operator selection, viability gap fund/availability payment scheme; long-term operation under Bappebti oversight. Nature: leveraged financing, high-quality infrastructure, high complexity.
Alternative 4 — Physical and Digital Infrastructure Integration	Focuses on comprehensive modernization through digital technology. Key components: ISWARE architecture redesign, IoT-based stock monitoring sensors, data integration with relevant ministries/agencies, electronic trading platform linked with commodity exchanges. Nature: enabling, relatively low cost, but limited impact without adequate physical infrastructure.

Source: authors' alternative development.

The same expert panel applied Bardach & Patashnik, (2019)'s four-criteria framework to score each alternative. Technical feasibility asks whether the intervention can actually be implemented with available technologies and capacities. Economic-financial feasibility considers cost-effectiveness and financing realism. Political feasibility reflects the likelihood of securing and sustaining the political coalition needed for implementation. Administrative feasibility addresses institutional capacity and coordination demands. Composite panel scores are reported in Table 6.

Table 6. Alternative Evaluation Using Bardach Criteria

Alternative	Technical	Economic-Financial	Political	Administrative	Total
Alternative 1 — Revitalization	5	4	4	4	17
Alternative 2 — Commodity Cluster ✓	4	5	5	4	18
Alternative 3 — KPBu	3	5	3	2	13
Alternative 4 — Digital Integration	4	4	4	3	15

Source: panel scoring by five mid-level expert planners, policy analysts, WRS warehouse operators, and financial institution representatives. Scale: 1 (low) – 5 (high). ✓ = selected as primary approach.

Alternative 2 emerges as the top-ranked option with a composite score of 18. Its strong economic-financial score reflects a straightforward argument: concentrating warehouse investment in nodes where commodity volumes are highest and value chains most developed generates far better returns on public expenditure than spreading facilities thinly across the country. The political feasibility score is equally strong—not by accident, but because this approach maps directly onto the commodity downstreaming, food security, and MSME empowerment priorities that already command political attention under RPJMN 2025–2029.

The scoring exercise also makes clear, however, that a single-alternative strategy would sacrifice genuine value. Alternative 1 (revitalization) addresses the existing asset base that cannot simply be abandoned; Alternative 4 (digital integration) is a relatively low-cost enabling layer that the cluster approach cannot function without; and Alternative 3 (KPBu) remains the most credible route to large-scale infrastructure at nodes where commercial viability can be demonstrated. The recommended combination therefore places Alternative 2 at the center, with Alternatives 1 and 4 running in parallel, and Alternative 3 deployed selectively where the financial case is strongest. To assess whether this combination holds up against normative criteria beyond feasibility, Dunn, (2017)'s six-criteria framework was applied as a cross-check. Results appear in Table 7.

Table 7. Cross-Validation Using Dunn's Criteria

Dunn's Criterion	Assessment	Justification
Effectiveness	High	The cluster approach directly addresses the root cause; target storage capacity utilization from

		<40% to >70% (distinct from the 48% warehouse activation rate across 302 total units).
Efficiency	Medium–High	Concentrating investment in priority clusters generates economies of scale; combination with revitalization maximizes return on existing assets.
Adequacy	Medium–High	Coverage of 6–10 clusters in 2026–2030 allows phased expansion; KPBU extends capacity.
Equity	Medium (requires mitigation)	Risk of bias toward Java. Mitigation: cluster representation in Sumatra, Sulawesi, Kalimantan, Papua; affirmative schemes for underserved (3T) regions.
Responsiveness	High	The cluster approach responds to the needs of farmers and MSMEs; farmer association involvement strengthens responsiveness.
Appropriateness	High	Aligned with RPJMN 2025–2029 agenda, the WRS regulatory framework, Bappebti's institutional mandate, and international best practices (India, Brazil).

Source: cross-validation results.

The Dunn validation broadly confirms the Bardach findings: on five of the six criteria—effectiveness, efficiency, adequacy, responsiveness, and appropriateness—the combination scores at adequate to high levels. The exception is equity, which is rated medium-with-mitigation required. This is an honest result, not a failure of the framework. Commodity cluster logic, if applied without geographic affirmative action, will naturally concentrate resources in higher-productivity regions—which means Java. Avoiding that outcome requires deliberate design: explicit cluster targets for Sumatra, Sulawesi, Kalimantan, and Papua; commodity quotas for non-Java export crops; and access provisions for underserved (3T) regions that cannot yet demonstrate commercial viability on their own terms.

Policy Recommendation

The analysis leads to a specific policy recommendation addressed to the Minister of Trade and the Head of Bappebti:

"Formulate and establish a Policy for Strengthening the Warehouse Receipt System Infrastructure Based on Commodity Clusters and Value Chains, implemented through a combination of new cluster infrastructure development (Alternative 2 as the primary approach), revitalization of existing warehouses (Alternative 1), integration of physical infrastructure with the Electronic Warehouse Receipt digital platform (Alternative 4), and utilization of the KPBU scheme (Alternative 3) at strategic nodes meeting financial feasibility criteria."

Five operational elements give this recommendation its practical shape. The first, and arguably most foundational, is the preparation of a National WRS Infrastructure Masterplan covering 2026–2030—a document that spatially links commodity cluster priorities to warehouse locations and investment plans. Second, priority clusters should be formally designated as National Strategic Projects, which would unlock multi-ministry coordination and longer-horizon financing commitments. Third, infrastructure financing needs to move beyond annual APBN dependency toward a blended model that combines national and regional budgets, food security funds, concessional international financing, and KPBU instruments. Fourth, the current ministerial technical guidance on warehouse construction specifications is too generic; it needs revision to reflect the storage, processing, and access requirements of specific commodity types. Fifth, the ISWARE platform requires architectural modernization and genuine integration with INSW, Simluhtan, Market Reference Prices, and commodity exchange platforms—not the partial links that currently exist.

Implementation should be anchored in a monitoring and evaluation framework with clear, time-bound outcome targets. Four headline indicators are proposed: warehouse utilization rate (target above 70 percent by 2030, compared to the current sub-40 percent

capacity utilization), commodity volume entering the WRS (five-fold increase over baseline), WRS-based financing value (also five-fold), and the number of farmers and MSMEs accessing system benefits (ten-fold). These are ambitious, but they are calibrated to the scale of unmet potential that the diagnostic reveals—setting modest targets would not match the level of investment the recommendation requires.

Risk management, organized around ISO 31000:2018, identifies two categories of concern as most critical. The first is institutional: cross-agency coordination failure carries a high probability and high impact profile, since the masterplan approach requires sustained cooperation across ministries and levels of government that have historically operated in silos. The proposed mitigation is a Ministerial-level Cross-Agency Steering Committee, chaired at Coordinating Minister or Bappenas Head level, with Bappebti providing the single institutional secretariat. The second risk is adoption—even well-located, well-equipped warehouses will underperform if farmers and MSMEs do not find them financially accessible or operationally trustworthy. This risk is rated medium-probability but high-impact, and should be managed through early and intensive stakeholder socialization, strong integration with WRS Subsidy and People's Business Credit (KUR) channels, and the deployment of trained field facilitators in key commodity-cluster areas.

CONCLUSION

Indonesia's WRS underperformance is, at its core, an infrastructure problem. Two decades of legal and regulatory effort have produced a framework that is normatively sound but physically and digitally under-resourced, spatially misaligned, and institutionally fragmented in its planning. The 2009 fiscal stimulus produced the first wave of warehouse construction, but without a guiding

masterplan, that investment was dispersed—and much of it now sits idle.

The 5 Whys analysis tracks this to a root cause that is institutional rather than technical: WRS development has never been governed by an integrated national masterplan that links infrastructure investment to commodity cluster geography and value chain logic. A panel of five domain experts evaluated four policy alternatives against Bardach & Patashnik, (2019)'s feasibility criteria, with the results cross-checked against Dunn, (2017)'s normative framework. The commodity cluster-based infrastructure approach scored highest (18 out of 20), distinguishing itself on economic-financial and political feasibility in ways the other alternatives could not match.

The recommended policy instrument—a Commodity Cluster-Based WRS Infrastructure Strengthening Policy—packages five operational elements into a phased implementation timeline: three primary budget years of cluster-focused investment, followed by two consolidation years, with monitoring and evaluation checkpoints built in. The recommendation is addressed directly to the Minister of Trade and the Head of Bappebti, who hold the institutional authority to commission the masterplan, propose PSN designation, and initiate the regulatory revisions needed.

One qualification deserves emphasis. Prioritizing infrastructure does not mean treating the other WRS problem dimensions—institutional capacity, financing access, human resources, and farmer behavioral patterns—as secondary concerns that can wait. The argument is sequencing, not substitution. Infrastructure that is physically and digitally functional creates the conditions under which institutional reforms, financing schemes, and capacity-building efforts can actually take hold. Without that foundation, improvements in the other dimensions will continue to generate disappointing results. At its broadest, what is at stake here is not just warehouse coverage or

utilization statistics. The WRS, if developed well, can shift the structural terms on which millions of Indonesian farmers and MSMEs engage with commodity markets—offering them price leverage, financing access, and market transparency that the current system denies them. That is the ambition this paper hopes to support.

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HALAMAN INI SENGAJA DIKOSONGKAN