








QRIS in the Economic System of Food Distribution in Indonesia

Deden Kurniawan^{1*}, Muhammad Rakesh Mahendratama¹, Dwi Kristanto¹, Gita Eka Putri¹ and Mukhamad Lucky Satria Nugraha¹

¹ Universitas Budi Luhur, Jalan Ciledug Raya No.1 Petukangan Utara, Jakarta Selatan 12660, Indonesia

deden.kurniawan@budiluhur.ac.id

Abstract. This study develops an innovative digital approach to the food distribution system in Indonesia by utilizing QRIS as the core mechanism for transactions. The proposed system uses the Number of Family Registration Card (Kartu Keluarga) as the primary data key for distribution and integrates digital financial technology, logistics management by state-owned regional enterprises (Badan Usaha Milik Daerah - BUMD), village-owned enterprises (Badan Usaha Milik Desa - BUMDES), cooperation, or local grocery networks as the final distribution point. The objective of this approach is to improve the accuracy of food aid targeting, enhance the nutritional resilience of vulnerable households, and ensure transparency and accountability through an anti-fraud system based on the Fraud Triangle Theory. The research employs a qualitative descriptive method combined with the design of an integrated information system supported by risk mapping and digital control mechanisms. QRIS plays a crucial role as the main enabler of efficient and traceable cashless transactions. The findings reveal that this QRIS-based digital system can build an integrated, efficient, and adaptive food distribution ecosystem that is scalable for national implementation. These results contribute significantly to the development of inclusive, modern, and fraud-resistant food policy in Indonesia.

Keywords: Food distribution, QRIS, Anti-fraud.

1 Introduction

Food security remains a cornerstone of national development and stability for Indonesia, an archipelago with a vast and diverse population. However, ensuring equitable access to sufficient, safe, and nutritious food for all citizens presents a multidimensional challenge. Rapid urbanization, structural dependencies on complex supply chains, and vulnerability to price volatility create a precarious environment, particularly for low-income and vulnerable households (Sulaiman et al., 2017). These challenges are not merely logistical; they have profound implications for public health and human capital. Indonesia continues to grapple with the "double burden of malnutrition," where under-

© The Author(s) 2026

N. Alyani Ishak et al. (eds.), *Proceedings of the International Conference on Cross-Disciplinary Academic Research 2025 - Track 2 Advances in Business & Economics, Social Science, Communications & Media (ICAR-T2 2025)*, Advances in Economics, Business and Management Research 385,

https://doi.org/10.2991/978-94-6239-715-6_26

nutrition, manifested in high rates of stunting, coexists with a rising prevalence of over-nutrition and obesity (Ashari et al., 2022). This paradox underscores a critical failure in the food system: the issue is not just about the quantity of food available, but its quality, affordability, and accessibility.

The Indonesian government has long implemented social assistance programs, such as the Non-Cash Food Assistance (Bantuan Pangan Non-Tunai - BPNT), to address food insecurity. While these programs have been instrumental, evaluations have consistently highlighted persistent challenges. These include issues with targeting accuracy, where aid does not always reach the most deserving households; logistical bottlenecks leading to delays; and a lack of diversity in the food provided, often limited to non-perishable staples (Ariesta & Nugroho, 2023). Perhaps the most corrosive challenge is the system's vulnerability to fraud. Practices such as ghost beneficiaries, collusion between suppliers and distributors, and the diversion of aid not only result in financial losses but also erode public trust and systematically rob vulnerable families of their right to nutrition.

In response to these systemic weaknesses, this paper proposes a paradigm shift in food distribution, leveraging Indonesia's burgeoning digital financial infrastructure. The proposed model is an integrated ecosystem centered on the Quick Response Code Indonesian Standard (QRIS) as the primary transaction mechanism. This system moves away from individual-based targeting (using the National Identification Number - NIK) to a more holistic, household-based approach using the Family Card (Kartu Keluarga - KK) as the core data unit. This allows for a more nuanced understanding of a household's nutritional needs. The system integrates key local economic actors—including Regional-Owned Enterprises (BUMD), Village-Owned Enterprises (BUMDES), cooperatives, and a network of local grocery stores (*warung*)—as the backbone of logistics and last-mile distribution.

The fundamental innovation of this model lies in its three-pillared design:

- **Precision Targeting:** Using the KK to allocate aid based on the collective nutritional needs of the household.
- **Integrated Digital Ecosystem:** Employing QRIS to create a seamless, cashless, and traceable transaction flow from the government to the beneficiary's plate.
- **Proactive Anti-Fraud Framework:** Embedding principles from the Fraud Triangle Theory directly into the system's architecture to minimize opportunities for malfeasance.

This paper aims to provide a comprehensive blueprint for this QRIS-based food distribution system. It will outline the operational model, the roles of each stakeholder, the technological architecture, and a robust anti-fraud strategy. By doing so, it contributes a scalable, efficient, and accountable solution poised to transform Indonesia's food policy into one that is truly inclusive, modern, and resilient against fraud.

1.1 Theoretical Framework and Literature Review

This study is built upon an interdisciplinary foundation that integrates food security studies, digital finance, public administration, and criminology.

1.2 Food Security and Social Assistance in Indonesia

Literature on food security in Indonesia consistently points to access and affordability as primary barriers for low-income households, who spend a disproportionate amount of their income on food of often low nutritional quality (Machfud & Martianto, 2023). Government programs like BPNT were designed to address this by providing electronic vouchers. However, studies reveal significant implementation gaps. Ariesta & Nugroho (2023) identified issues such as invalid beneficiary data, delays in fund disbursement, and inadequate availability of diverse food items at designated e-warungs. This highlights a need for a system that not only provides financial assistance but also ensures access to a balanced and nutritious food basket.

1.3 The Shift from Individual to Household Targeting (NIK vs. KK)

Most social assistance programs in Indonesia have traditionally used the NIK as the primary identifier for beneficiaries. While simple, this individualistic approach fails to capture the reality of a household as a collective nutritional unit. The needs of a toddler, a pregnant mother, and an elderly person within the same household are distinct yet interconnected. A system that provides a uniform benefit per individual cannot effectively address household-level malnutrition. The Family Card (KK) offers a more powerful data key, providing information on household size, composition, and demography. Designing interventions around the KK allows for the customization of aid packages to meet the specific nutritional requirements of the entire family unit, a critical gap in existing literature and practice.

1.4 Digitalization, FinTech, and QRIS

The rapid adoption of financial technology (FinTech) in Indonesia presents a transformative opportunity for social assistance programs. Digital payment systems enhance transparency, reduce administrative costs, and improve financial inclusion (Jange et al., 2024). QRIS, as a national standard for QR code payments, is a particularly potent tool. Its interoperability allows beneficiaries to transact with any participating bank or e-wallet provider, while its digital nature creates an immutable record of every transaction. This traceability is crucial for monitoring and accountability, directly addressing the opaqueness of traditional cash or voucher systems.

1.5 The Role of Local Economic Institutions (BUMD/BUMDES)

BUMD and BUMDES are mandated to drive local economic development. Their potential role in the food supply chain, however, remains under-optimized. These institutions are uniquely positioned to act as local logistics hubs or "food stations," aggregating produce from local farmers, ensuring quality control, and managing inventory (Djuardi & Aprilia, 2020). Integrating them into the food distribution system not only enhances logistical efficiency but also strengthens the local economy by creating a stable market for local producers. This study proposes a hybrid model that combines the

centralized efficiency of BUMD/BUMDES-run food stations with the last-mile accessibility of a distributed network of local warung.

1.6 The Fraud Triangle Theory

To build a system that is resilient against corruption, a reactive, audit-based approach is insufficient. A proactive, preventative framework is needed. This study adopts the Fraud Triangle Theory, a cornerstone of criminology and forensic accounting. The theory posits that fraud occurs when three elements are present:

1. Pressure (or Motivation): A financial or non-financial need that pushes an individual to commit fraud (e.g., personal debt, performance targets).
2. Opportunity: A weakness in the system's internal controls that allows fraud to be committed and concealed.
3. Rationalization: An ethical justification the perpetrator uses to make the fraudulent act seem acceptable to themselves (e.g., "everyone does it," "I'm just borrowing the money").

By systematically designing controls to mitigate each of these three elements, it is possible to create an environment where fraud is inherently difficult to commit, easy to detect, and hard to justify (Ratmono & Pradopowati, 2016).

2 Methodology

This research employs a qualitative descriptive approach with a strong orientation toward system design, akin to the initial phases of a Research and Development (R&D) methodology. The primary objective is to move beyond describing existing problems to constructing a detailed, implementable solution. The research process is structured in two main phases:

1. Problem Mapping and Contextual Analysis: This phase involves a comprehensive review of secondary data to map the existing food distribution landscape in Indonesia. Sources include government reports from agencies like the Ministry of Social Affairs and the National Statistics Bureau (BPS), official policy documents, standard operating procedures for programs like BPNT, academic publications, and white papers on FinTech and food security. The goal is to build a rich, detailed description of the current system's workflows, stakeholders, challenges, and critical failure points.
2. Synthetic Model Design and Anti-Fraud Integration: In this phase, the findings from the contextual analysis are synthesized to design the conceptual and operational model of the new QRIS-based system. This involves defining the roles of all stakeholders, outlining the technological architecture, and mapping the end-to-end workflow. The designed model is then conceptually stress-tested using the Fraud Triangle Theory to identify potential vulnerabilities and embed specific, multi-layered control mechanisms to ensure integrity and accountability.

The analysis of qualitative data follows the interactive model proposed by Miles, Huberman, and Saldaña (2014), involving continuous cycles of data reduction, data

display (e.g., through flowcharts and tables), and conclusion drawing/verification to refine the proposed system design.

Table 1. Type of fraud in social aid by group.

Partner store	Regional food BUMD	Beneficiary
Fake transactions or <i>ghost transactions</i> (swiping card without giving goods).	Inventory data manipulation (recording high-quality goods as damaged/missing, then selling them externally).	Registering one family under several different family registration card (KK) numbers.
Reducing quantity or swapping premium quality goods with lower-quality ones.	Collusion with suppliers during procurement process (receiving goods below specifications).	Reselling received aid packages.
Collusion with beneficiaries to convert aid into cash (cash-out) with a deduction.	Creating fake purchase orders.	

3 Result and Discussion

The findings of this research culminate in a comprehensive blueprint for a modern, QRIS-enabled food distribution ecosystem. The system is designed to be efficient, transparent, and fundamentally fair.

3.1 The Role of Local Economic Institutions (BUMD/BUMDES)

The proposed system orchestrates a synergistic collaboration between government, financial institutions, local enterprises, and communities.

1. The Government (Central and Local): Acts as the primary funder and regulator. The central government allocates funds via the national budget (APBN), while local governments can supplement this with their budgets (APBD). The Ministry of Home Affairs, through its Directorate General of Population and Civil Registration (Dukcapil), provides the secure, validated household data (KK) that forms the basis of the beneficiary database.
2. Bank Indonesia & Partner Banks: Bank Indonesia provides the QRIS infrastructure, ensuring security and interoperability. Partner commercial banks are responsible for creating and managing closed-loop digital accounts or "food wallets" for each beneficiary household, linked to their KK number. They process all QRIS transactions, manage settlement with merchants, and provide real-time transaction data for monitoring.
3. BUMD/BUMDES/Cooperatives (as Food Stations): These local enterprises form the logistical core of the system. They are responsible for procuring food (prioritizing local farmers), performing quality control, and assembling nutritionally balanced food packages tailored to different household profiles (e.g., packages with extra protein for families with children). They manage centralized warehouses or

- "food stations" with real-time inventory systems.
4. Local Grocery Network (*Warung Mitra*): Thousands of existing neighborhood *warung* are onboarded as certified partners. They act as the final, "last-mile" distribution points, eliminating the need for beneficiaries to travel long distances. This empowers micro-entrepreneurs and injects economic vitality directly into local communities.
 5. Beneficiaries: Vulnerable households, identified and verified using KK data, are the focus. They receive a monthly digital credit in their food wallet, which they can use to redeem their entitled food package at any *Warung Mitra* simply by scanning a QR code.

3.2 The Operational Workflow and Technical Architecture

The system operates through a clear, digitally-enabled workflow:

1. Registration and Verification: The government identifies eligible households based on social welfare data and validates their status against the national Dukcapil database using the KK number.
2. Fund Disbursement and Credit Allocation: The government transfers the total aid budget to the partner banks. The banks then distribute these funds as digital credits into the dedicated, closed-loop food wallets of each registered household. This credit is non-transferable and cannot be cashed out.
3. Logistics and Inventory Management: BUMD/BUMDES procures food supplies and manages them in their food stations. Using a centralized inventory system, they track stock levels and distribute pre-packaged, nutritionally balanced parcels to the network of *Warung Mitra*.
4. The QRIS Transaction: A beneficiary visits a local *Warung Mitra*. The *warung* owner uses a simple merchant app to select the package the beneficiary is entitled to, generating a dynamic QRIS code for the transaction. The beneficiary scans this code using a basic smartphone app (or is assisted by the owner), authorizing the payment from their food wallet.
5. Settlement and Real-Time Monitoring: The transaction is instantly processed by the bank. The beneficiary's wallet is debited, the *Warung Mitra*'s account is credited, and the inventory system is updated. All transaction data (time, location, items, amount) is recorded and fed into a central dashboard accessible to government authorities for real-time monitoring and auditing.

This system is designed not just to be efficient, but to be inherently resistant to fraud by systematically addressing all three sides of the Fraud Triangle. The registration process starts when the beneficiary registers by providing their Family Card Number (No KK). After the registration, the bank verifies the QRIS code linked to the beneficiary and checks the current balance associated with their account. Once the QRIS validation and balance check are completed successfully, the bank automatically creates a new account for the beneficiary. After the account has been set up, the process moves to the final step where the account is automatically credited with the appropriate balance. This

ensures that the beneficiary can access the funds linked to their registration without any manual intervention.

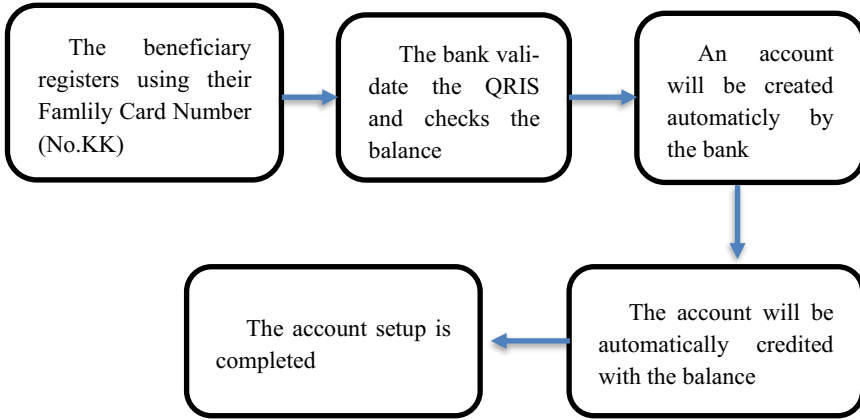
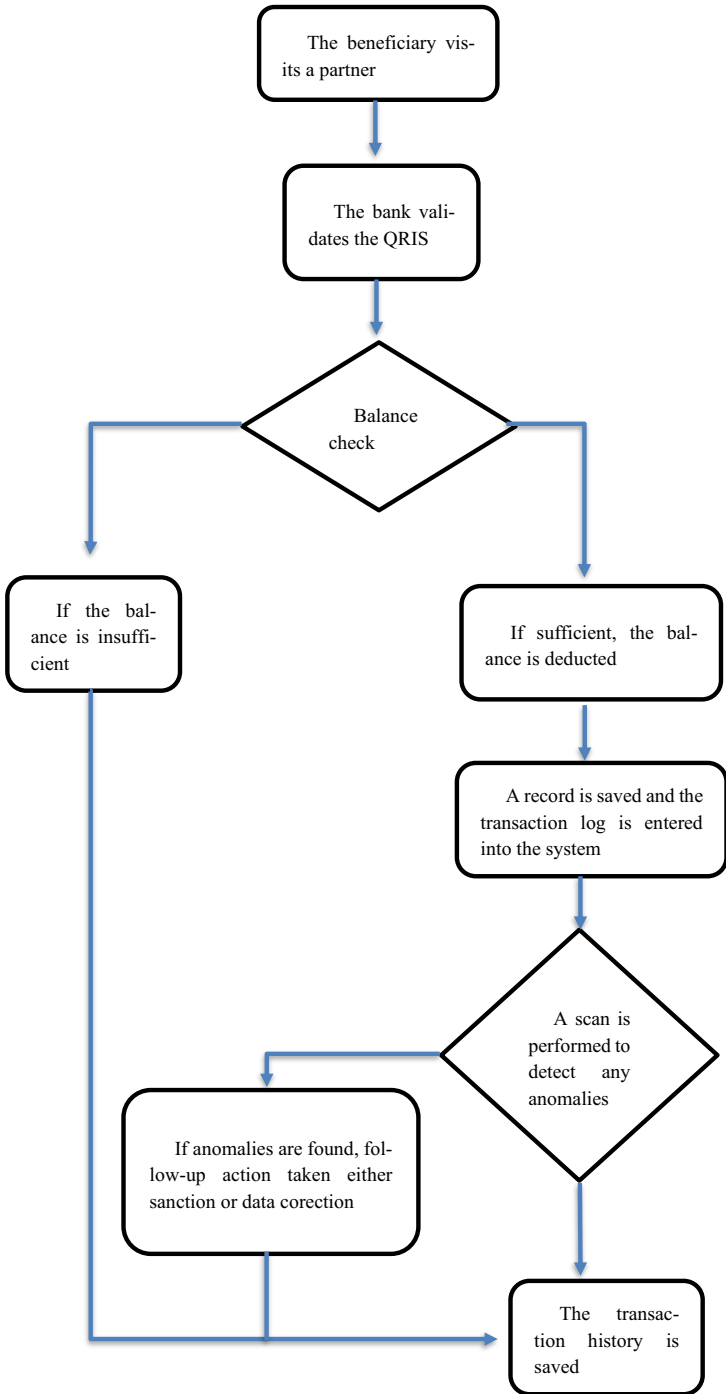


Fig.1. Registration process

Table 2. Type of fraud in social aid by group.

Fraud Triangle Element	Potential Risks & Actors	Mitigation Strategies & Control Mechanisms
Opportunity (Systemic Loopholes)	<p>Warung Mitra: Fictitious/ghost transactions, reducing quantity/quality of goods, and colluding with beneficiaries to illegally cash out aid.</p> <p>BUMD/BUMDES: Inventory manipulation; collusion with suppliers; creating fictitious orders.</p> <p>Beneficiaries: Registering under multiple KKs, selling aid packages.</p>	<p>Technology-Based Controls:</p> <p>Unique Digital Identity: One KK equals one secure, encrypted digital account, preventing duplicate registrations.</p> <p>Real-Time Inventory Tracking: Digital audit trail from BUMD warehouse to <i>warung</i> to beneficiary.</p> <p>Closed-Loop QRIS Transactions: System is hard-coded to prevent cash withdrawals.</p> <p>Anomaly Detection: AI-powered algorithms in the banking system flag suspicious patterns (e.g., too many transactions in a short time at one <i>warung</i>).</p> <p>Procedural Controls: Segregation of Duties: Separating procurement, receiving, and payment functions within BUMD/BUMDES.</p> <p>Surprise Audits: Random physical stock-taking at <i>Warung Mitra</i> locations to match physical inventory with digital records.</p>

Pressure (Motivation to Cheat)	<p>Warung Mitra: Need for working capital, high operational costs.</p> <p>BUMD/BUMDES Staff: Low salaries, unrealistic performance targets.</p> <p>Beneficiaries: Urgent need for cash for non-food emergencies (health, education).</p>	<p>Positive Incentives & Economic Support:</p> <p>Fair Compensation: Providing <i>Warung Mitra</i> with a fair and promptly paid transaction fee.</p> <p>Performance Bonuses: "Best Partner" awards for <i>warung</i> with perfect compliance records.</p> <p>Access to Formal Credit: Partner banks offer accessible micro-loans (like KUR) to <i>Warung Mitra</i> to help them grow their business.</p> <p>Financial Literacy: Programs for both <i>warung</i> owners and beneficiaries to improve financial management.</p>
Rationalization (Justifying the Act)	<p>All Actors: "It's a small amount, it won't hurt anyone.", "Everyone else is doing it.", and "The system is unfair, so I'm just taking what I deserve."</p>	<p>Strengthening Ethics and Transparency:</p> <p>Integrity Pacts: All partners must sign a contract with clear, strict sanctions for any violation.</p> <p>Ethics and Awareness Campaigns: Continuous communication about the program's goals and the negative impact of fraud on the community.</p> <p>Public Transparency Dashboard: A public-facing website showing aggregated, anonymized data on distribution to build trust.</p> <p>Secure Whistleblowing System: An anonymous and secure channel (e.g., a dedicated hotline or online portal) for anyone to report suspected fraud.</p> <p>Visible Enforcement: Ensuring that every credible report is investigated and that sanctions are applied and communicated, creating a powerful deterrent effect.</p>



4 Conclusion

This study presents a blueprint for a QRIS-based food distribution system aimed at addressing long-standing issues of inefficiency, inaccurate targeting, and fraud within Indonesia's social assistance programs. By focusing on the household (KK) as the main unit of nutritional support and creating an integrated digital ecosystem around QRIS, this model offers a fairer and more accountable system. It also empowers local economic institutions such as BUMD, BUMDES, and neighborhood warungs, fostering community-based economic growth. The system incorporates an anti-fraud framework based on the Fraud Triangle Theory, shifting from reactive to proactive measures to ensure integrity.

The policy implications for Indonesia are substantial, providing a scalable model that can be piloted regionally and expanded nationally after evaluation. Key recommendations include fostering multi-stakeholder collaboration among government ministries, Bank Indonesia, banks, and local enterprises; investing in digital literacy campaigns for beneficiaries and Warung Mitra to ensure broad adoption; establishing strong data governance with clear privacy and security protocols; and committing to a phased implementation with continuous evaluation and adaptation. Ultimately, this QRIS-based system represents not just a technological upgrade but a strategic reimagining of social welfare, aimed at improving nutritional resilience, transparency, and fraud resistance while advancing Indonesia's goal of inclusive and sustainable development.

REFERENCES

- Ariesta, H., & Nugroho, F. (2023). Implementasi Kebijakan Bantuan Pangan Non-Tunai dalam Rangka Pengentasan Kemiskinan di Era Covid-19. *Jurnal Ilmu Kesejahteraan Sosial*, 24(1), 1-15.
- Ashari, C. R., Linda, O., & Muslimah. (2022). Pembentukan Kader Muda Kesehatan Masyarakat dan Gizi di Panti Asuhan Muhammadiyah Tanah Abang I. *PengabdianMu: Jurnal Ilmiah Pengabdian kepada Masyarakat*, 7(5), 664-671.
- Djuardi, D. K., & Aprilia, H. D. (2020). Optimalisasi Strategi Rantai Pasok UMKM. *Jurnal Kompetitif Bisnis*, 1(3), 145-153.
- Jange, B., Pendi, I., & Susilowati, E. M. (2024). Peran Teknologi Finansial (Fintech) dalam Transformasi Layanan Keuangan di Indonesia. *Indonesian Research Journal on Education*, 4(3), 1199-1205.
- Machfud, E. F. K., & Martianto, D. (2023). Optimalisasi Konsumsi Pangan pada Rumah Tangga Berpendapatan Rendah di DKI Jakarta. *Jurnal Ilmu Gizi dan Dietetik*, 2(1), 37-44.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. SAGE Publications.
- Ratmono, D., & Pradopowati, A. (2016). Determinan Fraud Belanja Bantuan Sosial. *Jurnal Akuntansi Multiparadigma (JAMAL)*, 7(3), 328-340.
- Sulaiman, A. A., et al. (2017). *Menyangga Pangan Jakarta: Sebuah Konsep Keterkaitan Pangan Kota Besar dan Wilayah Penyangga*. IAARD Press.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

