Ceddi Journal of Information System and Technology (JST)
Vol. 4 No. 2 December (2025)
https://doi.org/10.56134/jst.v4i2.143

ISSN:2829-808X(print)
ISSN:2829-6575(online)

A Web-Based Information System for Targeted Social Assistance Distribution in Rural Communities: Evidence from Bontoa Village, Indonesia

Ummiati Rahmah[1*], Syahrul[2], Muh. Amir[3], Bobur Sobirov[4]

[1]*Electronics Engineering Education, Universitas Negeri Makassar, Makassar, Indonesia*
[2]*Educational Research and Evaluation, Universitas Negeri Makassar, Makassar, Indonesia*
[2]*Information System, STMIK AKBA, Makassar, Indonesia*
[3]*Economics, Samarkand branch of Tashkent State University of Economics, Samarkand, Uzbekistan*

Abstract

Social assistance distribution in Bontoa Village, Maros Regency, was previously handled through manual records, which reduced administrative efficiency, constrained transparency, and increased exposure to data manipulation. A web-based information system was designed and implemented to support targeted distribution for low-income households at the village level. System development followed the waterfall model, covering requirements analysis, system design, implementation, and testing. Empirical inputs were obtained from field observations, document analysis, and user involvement during evaluation. Functional validity was examined through black-box testing, while user acceptance was measured using a structured questionnaire administered to ten respondents representing village officials and community members. Descriptive quantitative analysis produced an average acceptance score of 87.2% (44/50), indicating strong perceived usability and relevance. The implemented system improved data accessibility, strengthened structured beneficiary management, and supported more efficient administrative workflows in distribution and reporting. These findings add empirical support for deploying web-based governance tools in rural social assistance settings where administrative capacity and information control remain limited.

Keywords: Web-Based Information System; Social Assistance Distribution; Rural Governance; Waterfall Model; Black-Box Testing.

Received: 7 July 2025 Revised: 15 August 2025 Accepted: 29 November 2025

Introduction

Poverty remains a persistent structural challenge in Indonesia, affecting millions of households and limiting their ability to meet basic needs. National statistics indicate that a significant proportion of the population continues to live below the poverty line, underscoring the urgency of adequate social protection policies. Poverty is commonly conceptualized as the inability to secure minimum food and non-food consumption, measured through household expenditure and access to essential services (Menyhert, 2024; Rosalina et al., 2007). In response, social assistance programs have been widely adopted as a primary policy instrument to alleviate economic vulnerability and promote social welfare (Abdu, 2025; Achmad, 2024).

Despite their strategic role, social assistance programs in Indonesia face persistent implementation challenges, particularly in the distribution phase. Prior studies have documented structural weaknesses in distribution mechanisms, including data inaccuracies, limited transparency, and governance risks that emerge as assistance flows through multi-layered administrative structures (Azisan et al., 2024; Gantini et al., 2023). Complex distribution networks have been shown to create opportunities for exclusion errors, discretionary practices, and unintended leakages, which may undermine program effectiveness and public trust (Azmi et al., 2022; Bell & Gill, 2018; Kazmi et al., 2017).

At the local level, regional governments are expected to play a central role in supervising and coordinating the distribution of social assistance to ensure accurate targeting and accountability. This supervisory function requires reliable data management and monitoring mechanisms that support evidence-based decision-making (Marska-Dzioba & Nawrolska, 2023; Pelealu et al., 2022). However, empirical evidence suggests that many local administrations,

*Corresponding author.
E-mail address: ummiatirahmah@gmail.com (Ummiati Rahmah)

particularly in rural areas, continue to rely on manual data management practices, such as paper-based registries and inventory books (Andersson et al., 2019; Ravallion & Wodon, 1999). Such practices constrain information accessibility, complicate data verification, and increase vulnerability to errors and misuse (Manasco & Bhatt, 2022; Manik et al., 2024).

The limitations of manual systems become more pronounced as the scale and diversity of social assistance programs expand. Managing multiple assistance schemes and beneficiary categories without digital support often leads to inconsistent records and delayed reporting, which can distort targeting accuracy and weaken policy evaluation (Easterly & Pfutze, 2008; Pannekoek et al., 2013). As a result, the adoption of information technology has increasingly been recognized as a critical enabler of transparency, efficiency, and accountability in public service delivery. Prior research has demonstrated that web-based information systems can enhance data integration, streamline monitoring processes, and support more transparent governance in public finance and social programs (Amannah, 2025; Devanand et al., 2019; Liu et al., 2020).

Several recent studies have explored the use of digital systems to manage village funds and distribute social assistance. For example, web-based monitoring platforms have been shown to improve oversight and reporting accuracy, while distributed social assistance systems have enhanced coordination across administrative units (Magdalena et al., 2020; Egeten et al., 2024). Nevertheless, existing research has largely focused on urban settings or higher-level government institutions, with limited empirical attention to village-level implementation in rural contexts. As a result, there remains a research gap concerning how web-based information systems can be designed and applied to support targeted social assistance distribution in rural communities characterized by constrained administrative capacity and reliance on manual processes.

This gap is evident in Bontoa Village, Maros Regency, where social assistance data management has continued to rely on manual procedures without an integrated information system. The absence of a digital platform has restricted transparency, increased susceptibility to data manipulation, and limited community access to information regarding beneficiary selection and assistance allocation. Addressing these challenges requires a context-sensitive technological solution that aligns with rural administrative practices while strengthening governance principles.

According to this study, a web-based information system was developed and implemented to support targeted social assistance distribution in Bontoa Village. The contribution of this research is twofold. First, it provides empirical evidence on the use of web-based information systems to improve transparency and data management in rural social assistance programs. Second, it extends the literature on information systems for public service delivery by demonstrating how digital solutions can be adapted to village-level governance contexts, thereby supporting more accurate targeting and accountable distribution of social assistance.

Method

This study employed a system development and evaluation design using the waterfall software development approach, consisting of requirements analysis, design, implementation, and testing (Ali & Yahaya, 2023; Hidayati & Sismadi, 2020; Saravanos & Curinga, 2023). The research was conducted in Bontoa Village, Maros Regency, Indonesia, focusing on village-level social assistance administration, including beneficiary records, prospective-beneficiary data, application processing, and reporting.

Data sources were obtained through (1) direct observation of ongoing administrative workflows, (2) semi-structured interviews with village personnel involved in registration and distribution to elicit functional needs and operational constraints, and (3) document analysis of relevant administrative forms and distribution recapitulations. System weaknesses and priority areas for improvement were identified using the PIECES framework (Performance, Information, Economic, Control, Efficiency, Service), which guided requirements specification (Mone et al., 2023; Ula et al., 2021). Design artifacts included process and interaction modeling (context, use case, and activity diagrams) and database design; implementation used a MySQL database aligned with the approved schema.

Evaluation was conducted at two levels. First, functional validation used black-box testing on core modules (authentication, navigation, beneficiary/prospective beneficiary/application management, and reporting) to confirm outputs match the specified specifications. Second, user acceptance was assessed using a structured questionnaire

administered to 10 respondents, including village officials and community members. The questionnaire contained seven items reflecting service-related dimensions aligned with PIECES and was analyzed descriptively by converting response scores into an acceptance percentage. The mean percentage was used as the feasibility indicator for system use within the village operational context.

Results and Discussion

Result

This study resulted in the development and evaluation of a web-based information system designed to support the management and distribution of social assistance at the village level. System evaluation focuses on two key aspects, namely functional performance and user acceptance, to assess the operational feasibility of the proposed system. Functional performance was assessed using black-box testing to verify that the core system modules met predefined requirements. Authentication testing confirmed that valid credentials enabled role-based access, while invalid inputs were consistently rejected. In addition, dashboard navigation and administrative data management functions allow users to access, manage, and report social assistance data without functional errors. The results of functional testing for the authentication, dashboard navigation, and administrative modules are summarized in Tables 1–3.

Table 1. Login test

Testing Criteria	Expected results	Results
Enter your username and password correctly	The system will navigate to the main page based on account access rights.	Succeed
Enter username and password with incorrect data	The system does not allow access to the main page.	Succeed
Click the button"Login"	The system checks the input data, performs the login process, and opens the main page if the data is correct.	Succeed

Table 2. Dashboard trial

Testing Criteria	Expected results	Results
Click the "List of Aid Recipients" menu	The system will display the Aid Recipient List page if it is correct.	Succeed
Click the "Register of Prospective Aid Recipients" menu	The system will display the List of Prospective Aid Recipients page if it is correct.	Succeed
Click the "Register for Assistance" menu	The system will display the Assistance Request page if it is correct.	Succeed
Click the “Reports and Assistance Types” menu	The system will display the Summary page for the entire list of candidates, recipients, and assistance applications, and display the Type of Assistance page if it is correct.	Succeed

Table 3. Admin page test

Testing criteria	Expected results	Results
Click the "List of Aid Recipients" menu	The system will display the Aid Recipient List page if it is correct.	Succeed
Click the "Register of Prospective Aid Recipients" menu	The system will display the List of Prospective Aid Recipients page if it is correct.	Succeed
Click the "Register for Assistance" menu	The system will display the Assistance Request page if it is correct.	Succeed
Click the "Add Aid Recipient Data" menu	The system will display the Add Recipient Data Form if it is correct.	Succeed
Click the "Add Data for Prospective Aid Recipients" menu.	The system will display the Add Data Form for Prospective Aid Recipients if it is correct.	Succeed
Click the "Add Assistance Application Data" menu	The system will display the Add Data Form for the Assistance Application if it is correct.	Succeed
Click the “Reports and Assistance Types” menu	The system will display the Summary page for the entire list of candidates, recipients, and assistance applications, and display the Type of Assistance page if it is correct.	Succeed

User acceptance was measured using a structured questionnaire administered to 10 respondents, including village officials and community members. The instrument consisted of seven items covering service-related dimensions (performance, information quality, economic efficiency, control, and service aspects). The evaluation produced an average score of 44 out of 50, equivalent to an acceptance level of 87.2%, categorized as “strongly agree.” The highest

agreement (100%) was observed for the item related to operational efficiency (reducing time, effort, and administrative costs). A summary of the questionnaire results is reported in Table 4.

Table 4. Questionnaire results

Statement	Assessment Score (Qty)					Amount	%
	SS	S	CS	TS	STS		
	5	4	3	2	1		
1	7	3	0	0	0	47	94%
2	2	7	1	0	0	41	82%
3	6	3	1	0	0	45	85%
4	10	0	0	0	0	50	100%
5	2	7	1	0	0	41	82%
6	3	7	0	0	0	43	86%
7	2	7	1	0	0	41	82%
Average						44	87.2%

To provide contextual understanding of the implemented system, the main system interfaces are presented. The dashboard interface integrates key information related to social assistance programs, including beneficiary data, prospective beneficiaries, and assistance applications. Access to the system is controlled through a login interface, while administrative functions support structured data management and reporting activities. The main system interfaces are illustrated in Figures 1–3.

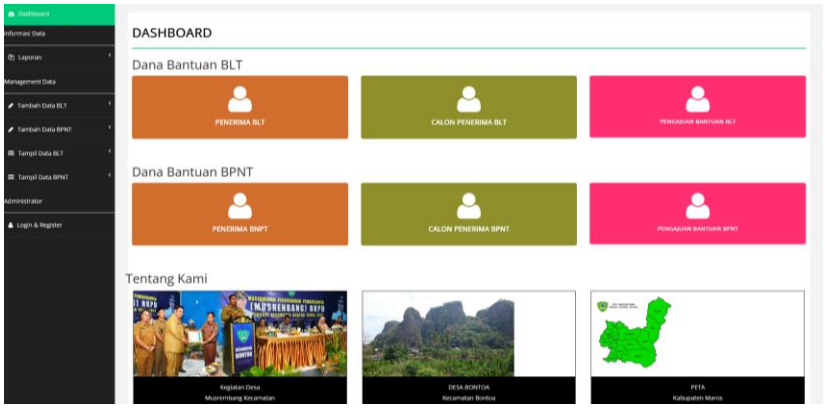

Figure 1. Dashboard page view

Figure 1 displays the dashboard interface for managing social assistance, specifically Direct Cash Assistance (BLT) and Non-Cash Food Assistance (BPNT). Several clear sections, including information on recipients, potential recipients, and applications, are organized in a structured and easily accessible manner. On the left, a navigation menu lets users easily switch between functions, such as information on villages and ministries.

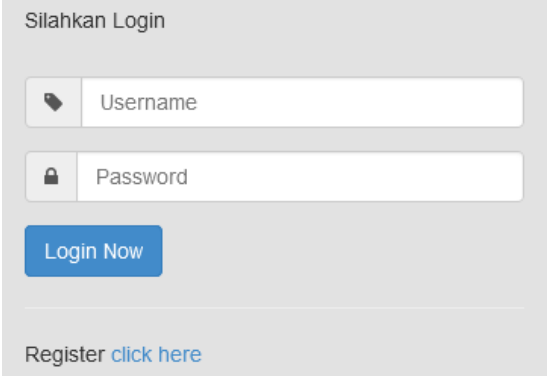

Figure 2. Login page view

Figure 2 shows a simple interface for a user login process in a system. There are two clear input boxes for username and password, accompanied by user-friendly instructions. The blue "Login Now" button stands out visually, drawing the user's attention to authentication. At the bottom, a "Register click here" option makes it easy for new users to register.

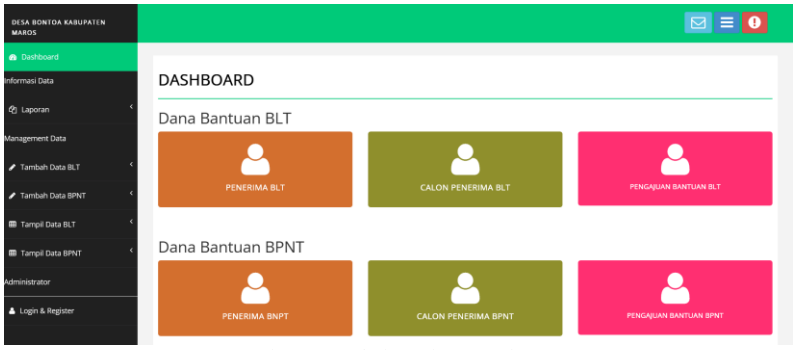

Figure 3. Admin main page view

Figure 3 displays a dashboard interface for managing social assistance programs, organized systematically. There are two main categories: Direct Cash Assistance (BLT) and Non-Cash Food Assistance (BPNT), each with subcategories such as recipients, potential recipients, and assistance applications. Each section is marked with a different background color, making it easier for users to distinguish information and access data. On the left side of the screen, a navigation menu allows users to explore reports and manage data.

Discussion

The results demonstrate that the developed system was functionally reliable and suitable for operational use within a village administration context. The successful execution of black-box testing across authentication, navigation, and administrative modules indicates that the system implementation aligns with established practices in web-based information system development, where functional correctness and stability are considered fundamental quality attributes (Hidayati & Sismadi, 2020; Saravanos & Curinga, 2023).

From an information systems governance perspective, the findings indicate that the system addressed several weaknesses commonly associated with manual data management in public service delivery. The use of centralized digital records and dashboard-based monitoring improved data organization and control, which are frequently identified as critical factors for enhancing transparency and accountability in public administration systems (Magdalena et al., 2020; Manik et al., 2024). These improvements are particularly relevant in village-level governance, where administrative capacity and monitoring mechanisms are often limited.

The user acceptance level of 87.2% suggests that the system was perceived as usable and beneficial by its intended users. This result is consistent with previous studies reporting that perceived usefulness and efficiency gains play a decisive role in the acceptance of information systems in public-sector environments (Devanand et al., 2019; Liu et al., 2020). The strong agreement on efficiency-related items further supports earlier observations that digital systems can substantially reduce the administrative burden associated with manual, paper-based data processing, which has been shown to constrain service quality and decision-making accuracy (Pannekoek et al., 2013).

Compared with previous studies on social assistance information systems, this research provides empirical evidence from a rural village context, complementing earlier work that focused on system design and monitoring at higher administrative levels (Egeten et al., 2024; Magdalena et al., 2020). The findings indicate that web-based systems can be effectively implemented and accepted at the village level, provided that system design aligns with local administrative practices and user needs. Overall, the discussion supports the argument that web-based information systems can enhance transparency, efficiency, and accountability in social assistance management. By linking functional validation and user acceptance results with existing literature, this study strengthens the empirical foundation for adopting digital governance solutions in rural public service delivery.

Conclusions and Suggestions

Conclusions

This study confirms that a web-based information system can be effectively implemented to support targeted social assistance distribution at the village level when it is designed in accordance with local administrative workflows and operational constraints. Empirical validation demonstrates that the system reliably supported key processes, including beneficiary data management, assistance application handling, and reporting, thus addressing structural limitations associated with manual record-keeping in rural administrations. Beyond technical feasibility, the findings indicate that the system contributed to measurable improvements in operational efficiency and information management. The high level of user acceptance reflects the system's capacity to align functional reliability with practical usability, suggesting that digital solutions can be successfully integrated into administrative routine practices even in resource-constrained village contexts.

From a theoretical perspective, this study contributes to the information systems and digital governance literature by extending empirical evidence on public-sector system adoption to the village level. This area remains underrepresented in prior research. The results reinforce the argument that system effectiveness in public service delivery is not solely determined by technological capability, but also by contextual fit with governance structures and user needs. From a practical perspective, the study demonstrates that web-based information systems can serve as an enabling mechanism for enhancing transparency, accountability, and oversight in social assistance management. By providing structured data, centralized monitoring, and improved accessibility, such systems support more informed decision-making and reduce administrative vulnerabilities associated with manual processes.

Overall, the findings highlight the strategic role of web-based information systems in advancing digital governance initiatives in rural communities and provide a foundation for future research and policy efforts to strengthen public service delivery through context-sensitive technological innovation.

Suggestions

Although the proposed system has been successfully developed and evaluated, several opportunities remain to improve it. Future research and development efforts may consider the following directions. First, further enhancement of the user interface design is recommended to improve visual clarity and user engagement. Incorporating more interactive elements and responsive design principles may increase usability and support more intuitive system interaction, particularly for users with varying levels of digital literacy.

Second, integrating automatic data synchronization into social assistance applications is suggested to strengthen accountability and data consistency. Automated synchronization across administrative records can reduce manual intervention, minimize data discrepancies, and support more transparent monitoring of village fund utilization. These improvements are expected to extend the system's functionality and contribute to more robust digital governance practices in rural social assistance management.

Acknowledgments: The author gratefully acknowledges all individuals and institutions whose contributions supported the completion of this research. Appreciation is extended to academic mentors, reviewers, and colleagues for their valuable insights and constructive feedback throughout the research process.

References

Abdul, A. (2025). Analysis of the effectiveness of social assistance grants to improve community welfare in West Sulawesi Province. International Conference on Accounting, Management, and Economics 2024 (ICAME 2024), 2596–2602. https://doi.org/10.2991/978-94-6463-758-8_209

Achmad, RW (2024). Politics and social welfare: Dynamics of social assistance programs on electability in Indonesia. Jurnal Wacana Politik, 9(2). https://doi.org/10.24198/jwp.v9i2.53634

Ali, WNAW, & Yahaya, WAJW (2023). Waterfall-ADDIE model: An integration of software development model and instructional systems design in developing a digital video learning application. ASEAN Journal of Teaching and Learning in Higher Education, 15(1), 1–28. https://doi.org/10.17576/ajtlhe.1501.2023.01

Amannah, CI (2025). Development of an online power distribution information management system. Journal of Science Innovation and Technology Research, 7(9). https://doi.org/10.70382/ajsitr.v7i9.026

Andersson, M., Hall, O., & Archila Bustos, M. F. (2019). How data-poor countries remain data poor: Underestimation of human settlements in Burkina Faso as observed from nighttime light data. ISPRS International Journal of Geo-Information, 8(11), 498. https://doi.org/10.3390/ijgi8110498

Azisan, A., Tamma, S., & Yunus, A. (2024). Challenges in the implementation of cash social assistance (BST) programs in Indonesia. Proceedings of the World Conference on Governance and Social Sciences (WCGSS 2023), 843, Article 4. https://doi.org/10.2991/978-2-38476-236-1_2

Azmi, KHM, Radzi, NAM, Azhar, NA, Samidi, FS, Zulkifli, IT, & Zainal, AM (2022). Active electric distribution network: Applications, challenges, and opportunities. IEEE Access, 10, 134655–134689. https://doi.org/10.1109/ACCESS.2022.3229328

Bell, K., & Gill, S. (2018). Delivering a highly distributed electricity system: Technical, regulatory and policy challenges. Energy Policy, 113, 765–777. https://doi.org/10.1016/j.enpol.2017.11.039

Devanand, P., Rastogi, R., Ahmad, M.S., Batra, T., Ohja, A., Kumar, V., Das, G.G., & Ansari, M. (2019). Advanced distribution management system: Improving distribution efficiency through an integrated approach. IEEE Power and Energy Magazine, 18(1), 55–62. https://doi.org/10.1109/MPE.2019.2945345

Easterly, W., & Pfutze, T. (2008). Where does the money go? Best and worst practices in foreign aid. Journal of Economic Perspectives, 22(2), 29–52. https://doi.org/10.1257/jep.22.2.29

Egeten, AEJ, Choriyanto, AKF, & Anggrainy, DP (2024). An information system analysis and design of cash social assistance distribution in North Jakarta. In 2024 International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE) (pp. 290–295). IEEE. https://doi.org/10.1109/ICITACEE62763.2024.10761954

Gantini, L., Listiani, T., Rahman, A., Gedeona, HT, & Afandi, MN (2023). Distribution model of social assistance. In Fourth International Conference on Administrative Science (ICAS 2022) (pp. 129–136). https://doi.org/10.2991/978-2-38476-104-3_14

Hidayati, N., & Sismadi, S. (2020). Application of the waterfall model in the development of a work training acceptance system. INTENSIF: Scientific Journal of Research and Application of Information Systems Technology, 4(1), 75–89. https://doi.org/10.29407/intensif.v4i1.13575

Kazmi, S.A.A., Shahzad, M.K., Khan, A.Z., & Shin, D.R. (2017). Smart distribution networks: A review of modern distribution concepts from a planning perspective. Energies, 10(4), 501. https://doi.org/10.3390/en10040501

Liu, J., Zhao, Z., Ji, J., & Hu, M. (2020). Research and application of wireless sensor network technology in power transmission and distribution systems. Intelligent and Converged Networks, 1(2), 199–220. https://doi.org/10.23919/ICN.2020.0016

Magdalena, H., Santoso, H., & Septryanti, A. (2020). Web-based village fund management monitoring system. In 2020 International Conference on Cyber and IT Service Management (CITSM) (pp. 1–6). IEEE. https://doi.org/10.1109/CITSM50537.2020.9268923

Manasco, P., & Bhatt, D. L. (2022). Evaluating the evaluators—Developing evidence of quality oversight effectiveness for clinical trial monitoring. Contemporary Clinical Trials, 117, 106764. https://doi.org/10.1016/j.cct.2022.106764

Manik, F., Rengifurwarin, R., & Madubun, M. (2024). The role of technology in internal oversight of public administration: Improving efficiency and transparency. MSJ: Majority Science Journal, 2(4), 58–63. https://doi.org/10.61942/msj.v2i4.248

Marska-Dzioba, N., & Nawrolska, I. (2023). Social services and sustainable regional development. In Financing regions toward sustainability in the midst of climate change risks and uncertainty (pp. 162–177). IGI Global. https://doi.org/10.4018/978-1-6684-7620-8.ch008

Menyhert, B. (2024). Absolute poverty measurement with minimum food needs: A new inverse method for advanced economies. Social Indicators Research, 174(1), 313–351. https://doi.org/10.1007/s11205-024-03368-x

Mone, KPI, Ekasari, K., & Kusmintarti, A. (2023). Integrated hospital payment information system modeling analysis using the PIECES method. Indonesian Journal of Business Analytics, 3(4), 1171–1182. https://doi.org/10.55927/ijba.v3i4.5120

Pannekoek, J., Scholtus, S., & der Loo, M. (2013). Automated and manual data editing: A view on process design and methodology. Journal of Official Statistics, 29(4), 511–537. https://doi.org/10.2478/jos-2013-0038

Pelealu, ESR, Simangunsong, F., & Maryani, D. (2022). Implementation of the policy on functional positions for supervision of the implementation of regional government affairs. Journal of Research in Social Science and Humanities, 2(1), 21–28. https://doi.org/10.47679/jrssh.v2i1.22

Pradana, M., Rubiyanti, N., Hasbi, I., & Utami, DG (2020). Indonesia's fight against COVID-19: The roles of local government units and community organizations. Local Environment, 25(9), 741–743. https://doi.org/10.1080/13549839.2020.1811960

Ravallion, M., & Wodon, Q. (1999). Poor areas, or only poor people? Journal of Regional Science, 39(4), 689–711. https://doi.org/10.1111/0022-4146.00156

Rosalina, T., Wibowo, L., Kielmann, AA, & Usfar, AA (2007). Food-poverty status and food insecurity in rural West Lombok. Food and Nutrition Bulletin, 28(2), 135–148. https://doi.org/10.1177/156482650702800202

Saravanos, A., & Curinga, M. X. (2023). Simulating the software development lifecycle: The waterfall model. Applied Systems Innovation, 6(6), 108. https://doi.org/10.3390/asi6060108

Ula, M., Adek, RT, & Bustami, B. (2021). Emarketplace performance analysis using PIECES method. International Journal of Engineering Science and Information Technology, 1(4), 1–6. https://doi.org/10.52088/ijesty.v1i4.138