Evaluation of Village Information System Maturity Using the KAMI Index: A Case Study of Indraloka Mukti Village and Its Significance in Information Security Readiness

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Abstract: Information systems are important in managing village data and information, including population data, correspondence administration, and other public services. One of the villages that implemented an information system is Indraloka Mukti village in the Way Kenanga sub-district, Tulang Bawang Barat district. With the implementation of information technology, various risks emerge that can threaten the security of information systems. Considering the importance of information systems in village operations, it is necessary to identify, evaluate, and manage risks to existing information systems. The measuring tool in this research is the KAMI Index (Information Security). The results of the assessment of information security readiness in Indraloka Mukti Village using the KAMI Index show that the electronic system received a score of 17 and is included in the "High" Category; Information security received a score of 90 out of 645, falling within the "Inadequate" Level of Readiness to meet ISO/IEC 270001 standards. All parts of the information security system must be updated, with the lowest maturity level at Level I and the highest at level I+.

Keyword: Evaluation, Village, Security System, ISO/IEC 27001, KAMI Index.

INTRODUCTION

The village of Indraloka Mukti, located in the Way Kenanga sub-district of Tulang Bawang Barat Regency, has implemented[1] a village information system[2][3] to enhance administration and public services[4]. This system is very important for managing village data, such as population data and mail administration, as well as other public information services [5]. Referring to Law No. 6 of 2014, the central and regional governments must build Village Information Systems and Rural Area Development [6]. As the use of information systems grows, various security risks emerge that can threaten the continuity and security of information systems. These threats include risks to data security[7], system availability, and software reliability[8][9]. The use of electronic systems is an important component in work operations, and tools are needed to measure[10] the security readiness of information systems, such as the KAMI Index [11][12][13]. Information Security Index (KAMI) is an application

used to assess and evaluate[14] the level of readiness (completeness and maturity) of information systems [15].

Previous studies show that awareness of the importance of managing information security is increasing [16]. The utilization of Information and Communication Technology (ICT) in Government operational activities must be balanced. This means that the greater an institution's dependence on ICT, the greater the risk and the greater the information security required [17]. The development of the Village Information System (VIS) provides benefits in the form of accurate data support and community services. Because accurate data helps village development planning, VIS development supports realizing smart villages [18]. This can also be proven from research results. The efficiency of the Dukuh Village SI web can shorten the time of Dukuh Village administration if it is managed well. [19]. There is other evidence that the use of open-source SIEM (OSSIM) technology can increase the KAMI index value of the UIN Sunan Kalijaga Yogyakarta Network in several aspects [20].

As a government institution, Indraloka Mukti Village is not immune to information security problems. It is crucial to conduct a comprehensive evaluation of the level of information security readiness in the village to ensure that existing systems and policies are up to the task of protecting the information they manage. The KAMI 4.2 index is used as an approach to assess the level of information security readiness in Indraloka Mukti village, highlighting the urgency of this research.

METHOD

The research stages for measuring the KAMI Index in the village of Indraloka Mukti, a crucial part of our methodology, can be seen in Figure 1 below.
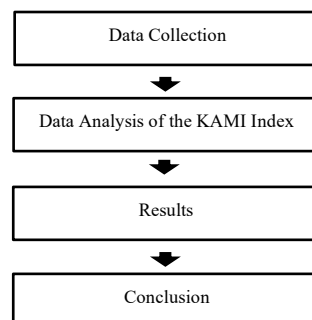
The research flow involves conducting a literature review to gather theories related to information security measurement implementation in Indraloka Mukti Village, Way Kenangan Subdistrict, West Tulang Bawang Regency. This is followed by preparing the research instruments, selecting officials as informants, and conducting a pilot test of the KAMI Index.

Describe the underlying key theories, models, and frameworks of information security, information system maturity, and The KAMI Index. You will learn to understand these concepts and that data security and the availability of systems are reliability issues contributing to the overall maturity of information systems.

Interviews are a data collection procedure involving direct conversations between the interviewer and respondent to learn more about a subject. When assessing the maturity of village information systems using the KAMI Index, interviews should be one of the most important data collection methods to acquire a qualitative perspective on the existing information security practices and difficulties experienced by the surveyed village information systems. The Security Category Matrix , a vital tool in our data analysis, is used to categorize and evaluate various aspects of information security in an organization or system

Table 1: Security Category Grouping Matrix

Implementation Status	Security Category		
	Category 1	Category 2	Category 3
Not Implemented	0	0	0
In Planning	1	2	3
Partially Implemented	2	4	6
Fully Implemented	3	6	9

Final Score Matrix and Readiness Level Status

The Final Score Matrix and Readiness Level Status table are useful tools for summarizing the overall maturity and readiness of information security measures in an organization or system. This matrix helps translate individual scores into an overall level of readiness, which can guide further actions to improve security in Table 2.

Table 2: Final Score Matrix and Readiness Level Status

Electronic Systems Category		Information Security Category		Readiness Status
Low Category		Final Score Range		
10	15	0	174	Not Adequate
		175	312	Basic Framework Compliance
		313	535	Moderately Adequate
		536	645	Good
Low Category		Final Score Range		Readiness Status
16	34	0	272	Not Adequate
		273	455	Basic Framework Compliance
		456	583	Moderately Adequate
		584	645	Good
Low Category		Final Score Range		Readiness Status
35	50	0	333	Not Adequate
		334	535	Basic Framework Compliance
		536	609	Moderately Adequate
		610	645	Good

Maturity Level Level Matrix

Information security maturity in the KAMI Index Version 4.2 consists of 5 levels, each of which represents the following maturity stages:

    a.   Level I - Initial State
    b.   Level II - Basic Framework Implementation
    c.   Level III - Defined and Consistent
    d.   Level IV - Managed and Measured
    e.   Level V – Optimal

Four additional levels were added for subsequent assessments: I+, II+, III+, and IV+. According to the ISO/IEC 27001 standard[25], information security must be at least level III+. The level of information security can be seen in Figure 2.
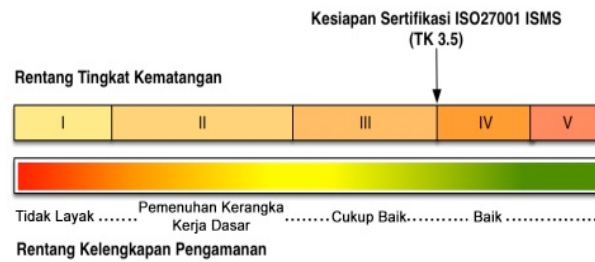
Figure 2: ISO 27001 Maturity Levels

RESULTS AND DISCUSSION

Research Result

Figure 3 presents the results of the information security maturity assessment of the Indraloka Mukti Village information system in 7 categories in the KAMI Index Version 4.2.

Figure 3: KAMI Index Assessment Results

The results of the KAMI Index assessment of the Indraloka Mukti Village information system show that daily village operations are very dependent on information technology, with an Electronic Category score of 17, so it is in the "High" category. In addition, the completeness of implementing ISO 27001 received a score of 90 out of a possible 645 points, which is in the red zone, indicating significant deficiencies. Therefore, the information security level of Indraloka Mukti Village is classified as "Not Appropriate", with the lowest maturity level being Level I and the highest being Level I+. The evaluation results for the completeness and security of each assessed area are illustrated in Figure 4.
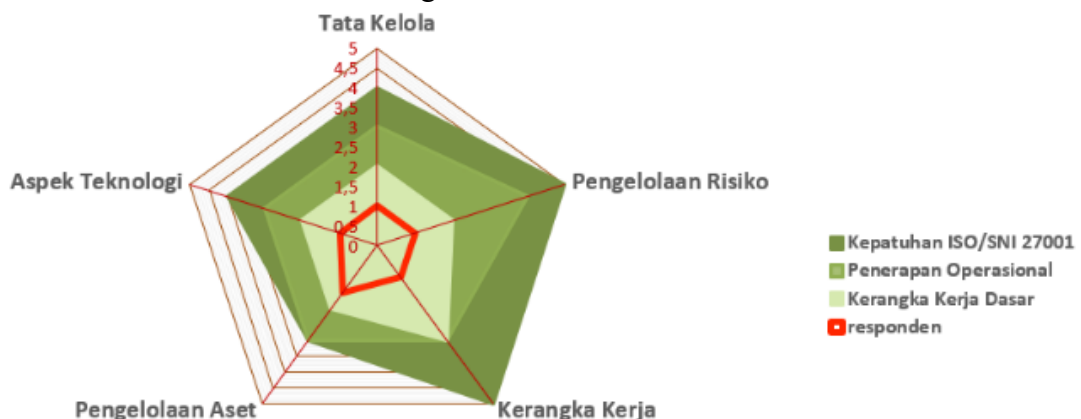

Figure 4: Radar Chart of Completeness Levels

The radar graph above shows that Indraloka Mukti Village still needs to meet ISO 27001 compliance standards. Asset management received the highest rating in this assessment because asset management practices in Indraloka Mukti Village are slightly better but still require improvement to meet ISO 27001 standards. Other aspects, such as management risk, framework, governance, and technology, ranked lowest. Therefore, significant improvements are needed to achieve ISO 27001 compliance. The scores and percentage of maturity level for each area are detailed in Table 3 below.

Table 3: Percentage of Maturity Levels for Each Measurement Area

Area	Maximum Score	Evaluation Score	Percentage
Governance	126	9	7%
Risk Management	72	7	10%
Framework	159	18	11%
Asset Management	168	37	22%
Technology and Security	120	19	16%
Supplement	645	90	14%

Based on the table above, you can see the maturity level percentage in each assessment area; the Governance sector has a maturity percentage of 7% with an evaluation score of 9, which corresponds to Maturity Level I. The Risk Management sector has a maturity percentage of 10% with an evaluation score of 7. placing it at Maturity Level I. The Framework area has a maturity percentage of 11% with an evaluation score of 18, indicating it is at Maturity Level I. The Asset Management area has a maturity percentage of 22% with an evaluation score of 37, including in the Maturity Level I+ category. For The technology and Information Security sector has a maturity percentage of 16% with an evaluation score of 19, including Maturity Level I.

CONCLUSION

An assessment of information security readiness in Indraloka Mukti Village using the KAMI Index shows that the electronic system received a score of 17 and is in the "High" category. However, information security scored 90 out of a possible 645 points, which is included in the "Inadequate" readiness level to meet ISO/IEC 27001 standards. To meet security standards in Indraloka Mukti Village, all components of the information security system need to be improved. Current maturity levels range from the lowest at Level I to the highest at Level I+.

Research using the KAMI index has yet to capture all measurement areas in our index. Future research could evaluate information security using other methods appropriate to village conditions.

REFERENCES

Badan Siber dan Sandi Negara, "Peraturan Badan Siber dan Sandi Negara Nomor 8 Tahun 2020 Tentang Sistem Pengamanan Dalam Penyelenggaraan Sistem Elektronik," p. 20, 2020.

D. Dwi Prasetyowati, I. Gamayanto, and S. wibowo, "Evaluasi Manajemen Keamanan Informasi Menggunakan Indeks KAMI Berdasarkan ISO/IEC 27001:2013 pada Politeknik Ilmu Pelayaran Semarang Evaluation of Information Security Management Using KAMI Based on ISO / IEC 27001: 2013: The case of Politeknik Ilmu Pelay," ■ 65 Journal of Information System, vol. 4, no. 1, pp. 65–75, 2019.

D. I. Khamil, "Evaluasi Tingkat Kesiapan Keamanan Informasi Menggunakan Indeks Kami 4.2 dan ISO/IEC 27001:2013 (Studi Kasus : Diskominfo Kabupaten Gianyar)," JATISI (Jurnal Teknik Informatika dan Sistem Informasi), vol. 9, no. 3, pp. 1948–1960, 2022, doi: 10.35957/jatisi.v9i3.2310.

D. Rusdianto and F. Firmansyah, "Analisis Pemanfaatan Web Sistem Informasi Desa Di Desa Dukuh Kecamatan Ibun Kab Bandung," Jurnal Sistem Informasi, J-SIKA, vol. 4, no. 1, 2022.

F. Sulistyowati, H. S. Tyas, M. C. C. R. Dibyorini, and C. Puspitosari, "Pemanfaatan Sistem Informasi Desa (SID) untuk Mewujudkan Smart Village di Kalurahan Panggungharjo DIY (Utilization of Sistem Informasi Desa (SID) to Realize Smart Village in Kalurahan Panggungharjo, Sewon, Bantul, DI Yogyakarta)," JURNAL IPTEKKOM Jurnal Ilmu Pengetahuan & Teknologi Informasi, vol. 23, no. 2, pp. 213–226, 2021, doi: 10.17933/iptekkom.23.2.2021.213-226.

Febrianto, "Panduan Fasilitasi Replikasi dan Pelembagaan Pengembangan Sistem Informasi Desa (SID)," pp. 1–34, 2021.

H. Taherdoost, "How to Conduct an Effective Interview; A Guide to Interview Design in Research Study," 2022. [Online]. Available: www.elvedit.com

I. Shammugam, G. N. Samy, P. Magalingam, N. Maarop, S. Perumal, and B. Shanmugam, "Information security threats encountered by Malaysian public sector data centers," Indonesian Journal of Electrical Engineering and Computer Science, vol. 21, no. 3, pp. 1820–1829, 2021, doi: 10.11591/ijeecs.v21.i3.pp1820-1829.

J. L. Sandoval, L. Andrade-Arenas, D. Hernandez Celis, and M. Cabanillas-Carbonell, "Enterprise information security risks: a systematic review of the literature," Indonesian Journal of Electrical Engineering and Computer Science, vol. 31, no. 3, pp. 1589–1604, 2023, doi: 10.11591/ijeecs.v31.i3.pp1589-1604.

L. D. A. Jelita, M. N. Al Azam, and A. Nugroho, "Evaluasi Keamanan Teknologi Informasi Menggunakan Indeks Keamanan Informasi 5.0 dan ISO/EIC 27001:2022," Jurnal SAINTEKOM, vol. 14, no. 1, pp. 84–94, Mar. 2024, doi: 10.33020/saintekom.v14i1.623.

L. N. Amali, M. R. Katili, S. Suhada, L. Hadjaratie, and H. Mardlatillah, "Technology Acceptance Model in Government Context: A Systematic Review on the Implementation of IT Governance in a Government Institution," Jurnal Online Informatika, vol. 7, no. 1, p. 80, Jun. 2022, doi: 10.15575/join.v7i1.853.

M. A. Adinata, R. E. Putera, and K. Kusdarini, "PENYELENGGARAAN SISTEM PEMERINTAHAN BERBASIS ELEKTRONIK DI LINGKUNGAN PEMERINTAH KOTA BATAM," Dialogue: Jurnal Ilmu Administrasi Publik, vol. 6, no. 1, pp. 2685–3582, 2024, doi: 10.14710/dialogue.v6i1.22071.

M. B. R. Burhan and A. Syazili, "Perancangan Sistem Informasi Indeks KAMI," Journal of Computer and Information Systems Ampera, vol. 2, no. 3, pp. 208–227, 2021, doi: 10.51519/journalcisa.v2i3.119.

M. H. Koniyo, I. A. D. Giriantari, M. Sudarma, and N. M. A. E. D. Wirastuti, "Electronic Government system measurement model: a systematic testing of e-government implementation," Indonesian Journal of Electrical Engineering and Computer Science, vol. 32, no. 2, pp. 845–856, Nov. 2023, doi: 10.11591/ijeecs.v32.i2.pp845-856.

M. Matitah, S. Arifin, S. Sumarto, and W. Widiyanto, "Confronting E-Government Adoption in Indonesian Local Government," Journal of Indonesian Legal Studies, vol. 6, no. 2, pp. 279–306, 2021, doi: 10.15294/jils.v6i2.47795.

N. Zainuddin, W. W. Winarno, N. Ningsi, Y. P. Pasrun, and M. Muliyadi, "It governance evaluation at the population and civil registry office in Kolaka district using COBIT

5 framework," Register: Jurnal Ilmiah Teknologi Sistem Informasi, vol. 6, no. 2, pp. 86–95, 2020, doi: 10.26594/register.v6i2.1728.

P. Sundari and W. Wella, "SNI ISO/IEC 27001 dan Indeks KAMI: Manajemen Risiko PUSDATIN (PUPR)," Ultima InfoSys : Jurnal Ilmu Sistem Informasi, vol. 12, no. 1, pp. 35–42, 2021, doi: 10.31937/si.v12i1.1701.

R. Dewantara and B. Sugiantoro, "Evaluasi Manajemen Keamanan Informasi Menggunakan Indeks Keamanan Informasi (KAMI) pada Jaringan (Studi Kasus: UIN Sunan Kalijaga Yogyakarta)," Jurnal Teknologi Informasi dan Ilmu Komputer, vol. 8, no. 6, p. 1137, 2021, doi: 10.25126/jtiik.2021863123.

R. Fiati, Widowati, and D. M. K. Nugraheni, "Service quality model analysis on the acceptance of information system users' behavior," Indonesian Journal of Electrical Engineering and Computer Science, vol. 30, no. 1, pp. 444–450, Apr. 2023, doi: 10.11591/ijeecs.v30.i1.pp444-450.

R. W. Anwar, A. Zainal, and S. Iqbal, "Systematic literature review on designing trust-based security for WSNs," Indonesian Journal of Electrical Engineering and Computer Science, vol. 14, no. 3, pp. 1395–1404, 2019, doi: 10.11591/ijeecs.v14.i3.pp1395-1404.

R. Y. Rahman and M. S. Hasibuan, "Evaluasi Keamanan Informasi Pada Sman 1 Tanggamus Menggunakan Indeks Kami Versi 4.2," Jurnal Fasilkom, vol. 13, no. 2, pp. 181–187, 2023.

S. Yuliani, N. T. Ramadhini, A. I. Gustisyaf, and A. Wahyudin, "Asesmen Keamanan Informasi Menggunakan Indeks Kami," Naratif : Jurnal Nasional Riset, Aplikasi dan Teknik Informatika, vol. 2, no. 1, pp. 1–5, 2020, doi: 10.53580/naratif.v2i1.76.

T. Ariyadi, I. Irham, and E. F. Cahyadi, "An Evaluation of Wireless Network Security with Penetration Testing Method at PT PLN UP2D S2JB," Jurnal Infotel, vol. 16, no. 1, pp. 120–135, 2024, doi: 10.20895/infotel.v16i1.1057.

Y. A. Singgalen, "Strategic Planning of Morotai Tourism Village Information System (SIDEWITA) Using Ward and Peppard Method," Journal of Information Systems and Informatics, vol. 5, no. 1, pp. 134–149, 2023, doi: 10.51519/journalisi.v5i1.442.

Y. A. Singgalen, H. D. Purnomo, and I. Sembiring, "Exploring MSMEs Cybersecurity Awareness and Risk Management : Information Security Awareness," IJCCS (Indonesian Journal of Computing and Cybernetics Systems), vol. 15, no. 3, p. 233, Jul. 2021, doi: 10.22146/ijccs.67010.