Analysis of Information Governance Principal Implementation in the Management Information System of Indonesian Botanical Gardens' Plant Collections Data (Makoyana)

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Abstract

Information and data are the new gold in the last decade. The value of information and data has risen since the popularity of the internet. The Internet provides a possibility to exchange information and data without depending on place and time. However, it also opens the possibility of illegal access to the information and misused data and information practices. To solve the issue, the implementation of information governance is needed in the organization or the IT project. One of the essential aspects of information governance is an information security and privacy. It can prevent the leak of information for illegal purposes. Information governance provides a set of policies to control and manage information. The Management Information System of Indonesian Botanical Gardens' Plant Collection Data (Makoyana) contains valuable information about flora biodiversity in Indonesia. Information on flora biodiversity can be an asset for the Indonesian government that affect some sectors such as politics, economics, laws, and society. For instance, information about a specific flora can be used to develop a new product for cosmetics, medicines, or other purposes that have a positive impact on economics. The implementation of information governance is essential to managing the information and data in the Makoyana project. This research will analyze the implementation of information governance principles in the Makoyana project. Some information governance principles theories will be used to assess the project such as from ARMA international, Smallwood, and Sedona Conference.

Keywords: Information Governance, Makoyana, Indonesian Botanical Garden

I. INTRODUCTION

Information and data are valuable resources that are equal to gold in the last decade. In the internet era, information and data can be mined through social media, websites, journals, and any analytics data resources. The information and data can be used for legal or illegal activities involving individuals, groups, or government. Implementation of Information governance principles is essential in the organisation or IT project. It can prevent illegal access, minimise the risk, improve the quality of data, and enhance efficiency in the information and data management [1].

Indonesia is an archipelago country that consists of thousands of islands [2]. Every island in Indonesia has their characteristics and valuable biodiversity. According to Von Rintelen, et al. [3], Indonesia is the second-largest country with indigenous medicinal plants, Home to more than 15 per cent of reptiles in the world, and almost 20 per cent of birds living in Indonesia. Not only the valuable biodiversity but also information and data about Indonesian Biodiversity are

valuable sources that are needed almost in every sector. For instance, in the political sector, biodiversity data is needed to play an important role at the global level in solving global issues such as climate change and health issues. In the economic sector, the highest number of medicinal plants in Indonesia can be the new foundation for economic growth. The information and data can be the first step for the next research to access biodiversity.

The management information system of Indonesian botanical gardens' plant collection data (Makoyana) is an example information system that contains biodiversity data. There are more than 40 botanical gardens in Indonesia [4]. They maintain Indonesian flora biodiversity and record all information and data about the flora. This data will be useful to provide a policy at the national level regarding flora conservation, economic development, and global political movement. This data is also important for research activities at the national level or in the international communities. Many stakeholders are

interested to access the data about flora biodiversity from the Indonesian Botanical Gardens.

The implementation of information governance principles is essential for the Makoyana project. First, it can be used to protect data and information in the Makoyana project. Illegal access and misused information and data can be prevented with information governance implementation. Secondly, information governance also can improve the quality of information and data that are generated from the project [5]. An efficient and effective information and data management results in a good quality of information and data. In addition, information governance implementation can be a guide for the project team to maintain the policy, roles, process, and standards in the data management [6].

However, the lack of knowledge about information governance among Indonesian communities and the popular rate of information governance that is low in Indonesia, affect the success rate of the implementation. There is a possibility that the implementation of information governance in the Makoyana project is not appropriate to information governance principles. As the result, the efficiency and effectiveness of information governance implementation cannot be achieved.

In this research, the successful rate of implementation of information governance in the Makoyana project should be assessed to provide better future development in data and information management. The qualitative analysis method was used in this research. The analysis of the successful implementation rate of information governance in the Makoyana project was assessed with some information governance principles theories such as from the Association of Records Managers and Administrators (ARMA) International, Smallwood, and Sedona conference.

In the ARMA international theories, there are eight principles to improve recordkeeping practices [7]. These principles can be adopted to improve the quality of information governance in the recording process. These principles are:
1. Accountability
   All processes in the data management can be audited.
2. Transparency
   All activities and processes are documented and available for appropriate stakeholders.
3. Integrity
   The authenticity and reliability of data should be prioritised.
4. Protection
   The level of data protection should be implemented based on roles and responsibilities.
5. Compliance
   Data management should follow the law and policy in the organisation.
6. Availability
   The needed information should be available to be accessed.
7. Retention
   The data and information should be maintained and have a historical record.
8. Disposition

The data or information that is no longer needed should be organised securely.

Another theory about information governance principles was introduced by Smallwood. According to Smallwood [7], 11 principles in information governance should be implemented as guidelines in the organisation which are:
1. Stakeholder consultation
   The policy that is used to govern the information should be consulted with cross-functional stakeholders.
2. Value information as an asset
   The information should be treated like another physical asset in the organisation.
3. Information integrity
   The data and information should be accurate, authentic, and correct. A consistency procedure should be implemented.
4. Information organisation and classification
   Information should be properly organised based on a standard procedure.
5. Information security and privacy
   Security and privacy aspects should be concerned with implementing access control, auditing, and privacy awareness.
6. Information accessibility
   Information should be able to access and easy to locate. Security and accessibility should be balanced.
7. Information control
   Information including record and no record information should be controlled in the organisation.
8. Monitoring and auditing
   The activities related to information and data management should be able to be monitored and audited.
9. Executive sponsorship
   A senior member in the organisation should measure the accountable process in the management.
10. Change management
   All changes in the information and data should be recorded and communicated.
11. Continues improvement
   The policy and information governance strategy should be periodically improved to meet the changes.

The last theory that will be used to assess the Makoyana project is proposed at the Sedona Conference. At the conference, there are 11 principles generated for information governance programs [7]. The principles are:
1. Organisation decision
   Organisations should support the implementation of an information governance program.
2. Independence authority
   The independence of every role should be maintained.
3. Stakeholder participation
   All stakeholders should take part in the implementation of the information governance program.
4. Comprehensive assessment of strategy

The strategic objective should be based on the current situation.

5. Disposal management
Effective and consistent disposal management should be regulated to control unused data and information.

6. Review and update
Periodically review and update to ensure the program meets the requirements.

7. Considering new technologies
New technology considerations should be implemented for future improvement.

8. Integrity and availability
Integrity and availability of data and information should be considered.

9. Reasonable assurance
Structure, resources, and accountability should be set up to provide reasonable assurance.

10. Privacy and security
Privacy and security of information and data should be prioritised.

11. Compliance
All actions should consider laws and obligations.

II. THEORETICAL BASIS

A. Information

Information is valuable knowledge that is generated from a set of data. According to McFadden, information is data that has been processed into knowledge that is valuable for the person who uses the data [8]. Information can be categorised as useful information when the information can be understood by a person and can be used to make a decisions[9]. The level of useful information is determined by the level of information quality. Information quality becomes a new concern following the popularity of information in the internet era. Information quality refers to some aspects such as accuracy, update, accessible, well organised, and useful [10]. It means that the quality of information can be determined by more than one factor. The knowledge that is generated from the data also can be different following the data quality and the aspects that affect information quality.

B. Information System

An information system is a system that consists of connected subsystems that are developed together to manage and process data into a valuable information [11]. An information system is also developed to achieve the same objectives or the same activity [12]. According to Davis and Yen [13], the information system consists of a set of components such as humans, hardware, software, and data to provide information and data for the right user. The use of information systems in the organisation has rapidly increased since the popularity of the internet. However, developing a successful information system needs complicated efforts. Many aspects should be concerned and calculated. According to The DeLone and McLean Model, there are six criteria to assess a successful information system which are information quality, system quality, service quality, system usage, user satisfaction, and net benefits [14].
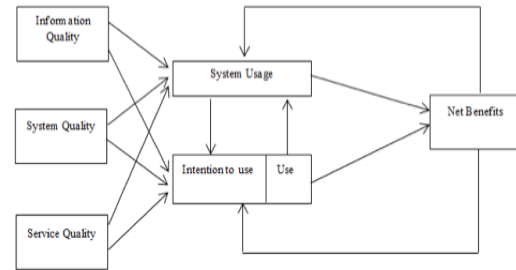

Fig. 1. The DeLone and McLean Model

From the model above, generating a successful information system needs to pay attention to more aspects to fulfil the criteria. For instance, handling time and average satisfaction for user satisfaction aspect, operational hours and availability for system quality, accuracy and relevant data for information quality, accessibility and reliability for service quality, frequency of use and technical support for system usage, and productivity for net benefits.

C. Information Governance

According to Gartner, information governance is a framework to manage information in the appropriate behaviour [15]. Information governance is not only about technical aspects but also social aspects [16]. There are three foundations to serve good information governance: data quality and reliability support, enable integration, validation, verification, and the context for analysis and decision-making. In the social media era, information governance plays an important role to encourage people in the organisation to be more aware of information and data management. According to Lomas, et al. [17], information governance is defined as a holistic ethical framework that enables the process of information sharing, management, co-creation, ownership and rights. It is aligned with Webers' statement that information government covers structural practices, procedural practices, personal responsibilities and relational practices [18].

According to Smallwood [19], implementation of information governance can be a legal practice for organisations to discard unused information, confidential security, sensitive information protection, and secret information management. Other advantages of information governance are providing a consistent base, reliable management method, securing, optimising, and controlling information. There are 10 reasons to implement information governance in the organisation:

1. Enabling organisations to dispose of unnecessary information

2. Providing a framework to decide what information should be kept

3. Simplifying finding and producing responsive information

4. Focusing on valuable information, improving information delivery, and improving productivity

5. Providing a way to respond to the regulation and. technology changes

6. Identifying and managing risk

7. Helping to control email

8. Privacy compliance

9. Treating information as an asset

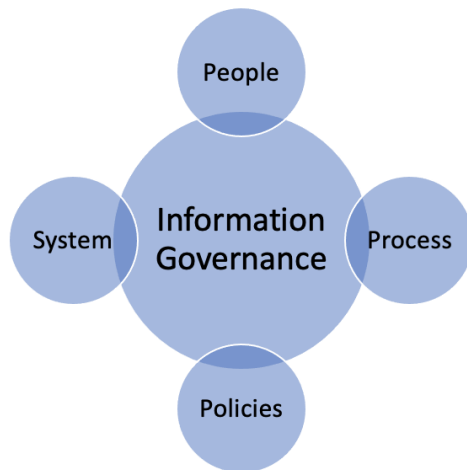10. Helping in auditing or examining process.

Fig. 2. Information governance coverage

III. RESEARCH METHODS

This research implements a qualitative analysis method to assess the implementation of information governance principles in the Makoyana project. The qualitative analysis method is commonly used to research an object based on a quality approach. In the qualitative method, the constructive assumption is generated from collected data [20]. According to Creswell and Creswell [21], there are 5 kinds of qualitative analysis:

1. Phenomenological research

The constructions of phenomenological research are observation and data collection on a phenomenon object.

2. Grounded theory

In this research, the conclusion of the research is generated from an inductive observation abstract theory, and interview.

3. Ethnography

This research focuses on anthropology, culture, and social communication.

4. Case study

This research focuses on a case that is happening in the community. Observation, interview, and literature review are conducted to construct the conclusion.

5. Narrative research

This research is based on a certain narration. It is commonly conducted to research individuals or groups for getting history or a narrative report.

Of the 5 kinds of qualitative analysis above, grounded theory is an appropriate theory for this research. Grounded theory generates a new theory or conclusion based on the observation fact and collected data. The analysis of information governance in the Makoyana project will be based on the collected data that is compared with some information governance principles theory from some experts or professional groups.

According to Miles and Huberman, there are 4 stages in qualitative analysis which are data-collecting which focuses on gathering data from many methods such as observation or interview, data condensation which processes data with classification or comparison, data display which provides the processed data, and conclusion where the processed data is interpreted [22].
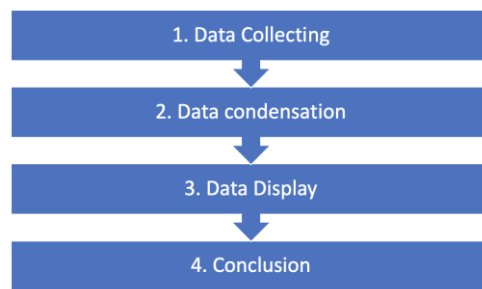

Fig. 3. Qualitative analysis stages

In this research, the stages from the Miles and Huberman concept are appropriate to be adopted to manage the process. The analysis process will be divided into 4 stages which are:

A. Data Collecting

Data collection is the first stage of this research. In this stage, the data is collected using three methods:

1. Observation

In the observation process, the information from the system, documentation, development plan and official report is collected. This activity also monitors the stakeholders' activity in the system and regular management of the Makoyana project.

2. Interview

Information and data in this research were also gathered from the direct or indirect interview process. communication with users and developer generates valuable information for this research.

3. Literature review

The literature review was also conducted by reviewing the current research about information governance, management information system, and Indonesian botanical garden in some journals as references. The outcome of this research activity can be additional material to support the analysis.

B. Data Condensation

The focus of this research is to analyse the implementation of information governance principles in the Makoyana project. The collected data and information are selected and sorted based on the focus of the research. In this stage, the data and information are prepared for analysing process.

C. Data Display

In this stage, collected data and information are arranged in visual data. In this stage, data and information are organised and sorted to support the analysis process. In this research, the principles of information governance will be used to assess the Makoyana project. The rate of implementation of information governance will be generated from this process.

D. Conclusion

The last stage in this research is to generate a conclusion from the analysis process. this stage plays an important role in the research activity. interpretation based on pattern data and literature review is elaborated in this stage. According to Sinkovics [23], understanding the pattern-matching logic is an essential point in qualitative research. It means that the conclusion stage is a key to the research.

IV. RESULTS AND DISCUSSION

A. Results

This research analyses the implementation of information governance based on three information governance principles. The first principle was introduced by ARMA international. This focuses on data recording and data protection. Other principles were proposed by Smallwood and Sedona conference. These principles govern information in general terms in the organisation. In the analysis process, the value parameter is used to assess the implementation and to determine the rate of implementation in the Makoyana project.

Table 1. value parameter for implementation assessment

Categories	Value	Percentage value	Interpretation
Strongly agree	5	100%	Fully implemented
Agree	4	75%	Almost Fully implemented
Neutral	3	50%	Half implemented
Disagree	2	25%	A little implemented
Strongly disagree	1	0%	Not implemented

The categories above represent the implementation rate information governance principle in the Makoyana project. When the principle is already implemented in the Makoyana, it can be valued at 5 for fully implemented with 100% value or 4 for almost fully implemented.

Based on ARMA International, the information governance that was implemented in the Makoyana project will be assessed by 8 principles. The principles will be valued according to the implementation rate of the information governance principle in the Makoyana project.

Table 2. Assessment of implementation of information governance principles in the Makoyana project according to ARMA international principle.

Implemented principle in Makoyana	Value	Percentage value	Justification
Accountability	4	75%	The data in the Makoyana can be audited but there is no mechanism to audit the data
Transparency	5	100%	All data can be accessed by all stakeholders
Integrity	5	100%	Integrated single sign-on BRIN and level of access based on roles have been already implemented
Protection	5	100%	Integrated single sign-on BRIN and level of access based on roles have been already implemented
Compliance	4	75%	Law and regulation from BRIN have been followed. Law and regulation from local government hard to be measured
Availability	5	100%	Makoyana can be Accessed 24 hours on Makoyana.brin.go.id
Retention	5	100%	All transactions can be traced in the activities lists module
Disposition	4	75%	Disposal management for data already implemented but for restoring the data is not facilitated.
Average	4,63	90,63%	

From the table above, the implementation of the information governance principle in the Makoyana project according to ARMA international is at a sophisticated level. Almost all principles have a 100 per cent value and the average value is almost in the maximal value (4,67).

According to the Smallwood principle, Makoyana will be assessed by 11 information governance principles to understand the level of implementation information governance principle in this project.

Table 3. Assessment of implementation of information governance principles in the Makoyana project according to the Smallwood principle

Implemented principle in Makoyana	Value	Percentage value	Justification
Stakeholders' consultation	5	100%	Stakeholders' requirements and aspiration are considered with some communicational media such as social media group and regular meeting.
Value information as an asset	5	100%	Information and data are maintained and regularly update.
Integrity	5	100%	All data and information that is visualised is already filtered and monitored by administrators

Principle	Value	Percentage	Justification
Organisation and classification	5	100%	Roles and level of access have been generated based on organisation structures and business process
Security and privacy	5	100%	All access is monitored under Single sign-on BRIN
Accessibility	5	100%	Makoyana can be Accessed 24 hours on Makoyana.brin.go.id
Information control	5	100%	There three level administrators that monitor the updated information in the Makoyana
Monitoring and auditing	4	75%	Monitoring and auditing are done without there is no specific policy or mechanism that regulates the process
Executive Sponsorship	5	100%	All decision that is made in the project are already discussed with senior member in the organisation
Change Management	4	75%	There is no specific regulation about change management
Continuous improvement	5	100%	The project is designed to be improved tailoring the new technology.
Average	4.81	95,5%	

The results of the analysis above show that the implementation of the information governance principle in the Makoyana project according to Smallwood is not fully implemented. There are some principles such as change management and monitoring and auditing that needs to be improved. However, it can be claimed that the implementation of the information governance principle in this project is a success. The value of implementation is more than 95%.

The last information governance principle that is used to assess the Makoyana project is from the Sedona Conference. The principles are almost like Smallwood principles. However, some points are different from Smallwood. There are 11 principles in the Sedona Conference.

Table 4. Assessment of implementation of information governance principles in the Makoyana project according to the Sedona conference principle

The implemented principle in Makoyana	Value	Percentage value	Justification
Organisations decision	5	100%	Every decision in the project is decided by organisation (BRIN)
Independence authority	5	100%	Every role has their responsibilities and territory to maintain information and data.
Stakeholder participation	5	100%	Stakeholders' requirements and aspiration are considered with some communicational media such as social media group and regular meeting.
Comprehensive assessment of strategy	5	100%	The strategy for improvement and maintenance purposes is regularly communicated with

Principle	Value	Percentage	Justification
			administrator and executive.
Disposal management	4	75%	Disposal management for data already implemented but for restoring the data is not facilitated.
Review and update	5	100%	The system is regularly monitored by national administrator group.
Considering new technology	5	100%	The project is designed to be improved tailoring the new technology.
Integrity and availability	5	100%	Makoyana can be Accessed 24 hours on Makoyana.brin.go.id. Also, Integrated single sign-on BRIN and level of access based on roles have been already implemented
Reasonable assurance	4	75%	The data in the Makoyana can be audited but there is no mechanism to audit the data
Privacy and security	5	100%	All access is monitored under Single sign-on BRIN
Compliance	4	75%	Law and regulation from BRIN have been followed. Law and regulation from local government hard to be measured
Average	4.72	93,2%	

Based on the table above, the outcome of the analysis shows that there are some points in the Sedona conference principle that are not fully implemented in the makoyana project such as compliance, reasonable assurance, and disposal management. However, the average percentage of the assessment is about 93%. It can be claimed that the makoyana project has already successfully implemented the principles of the project.

B. Discussion

Implementation of information governance principles in the Makoyana project still has minor issues after analysing the outcome of the assessments process above. There are some principles that are not fully implemented in the project. For instance, in the first assessment (ARMA International principle), accountability, compliance and disposition points need to be concerned. Three of them need the policy to regulate the issues. In the Smallwood principles, the mechanism or policy to regulate the monitoring and auditing process is still not adopted in the system. In addition, change management policy also needs to be developed to cover and trace changes in the system. In the last assessment, similar issues are detected such as disposal management, reasonable assurance, and compliance. From the three assessments, the policy is the main aspect that causes the problems.

Table 5. Final assessment value

Principles	Value	Percentage value
ARMA International	4,63	90,63%
Smallwood	4.81	95,5%
Sedona Conference	4.72	93,2%
Average	4.72	93,11%

However, according to the final assessment value, the final average shows that the implementation value

of the information governance principle in the makoyana project is relatively high. Hence, although the implementation status of the project is not fully implemented, it can be claimed that the implementation process is successful in this project. In the future, some improvements such as generating policy can. Increase the implementation rate of information governance policy in the Makoyana project.

V. CONCLUSION

To conclude, the implementation of information governance in the Makoyana project is not fully implemented. There are some aspects of the information governance principles that are not perfectly implemented in the project. However, the results of the analysis show that the Makoyana project has implemented almost all information governance principles. It can be claimed that the implementation of information governance principles in the makoyana project can be considered a success. In the future, improvements such as the development of a policy to regulate the information management in makoyana can increase the implementation rate in this project.

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