



Leveraging the Potential of Soft Systems Methodology to Trigger Data Governance Policy-Making in the Banking Industry

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ABSTRACT

A data governance policy is a foundational document providing instructions to manage data assets and organizational information effectively. Within the field of data governance, data access is one of the most important aspects of data management and includes considerations such as the extent of access, how to access data, access position, and data control and application. This research focuses on the banking industry, as its multiple stakeholders, diverse attitudes, and intangible aspects have created a problematic situation. To better understand and improve the current situation, soft systems methodology (SSM) provides a rich picture of the complex situation of data access in the bank, extracts key system definitions, and leads to a correct understanding of purposeful activities. After identifying these purposeful activities, a support policy for each set of activities is evaluated based on the literature in the field of data governance, specifically regarding data access. A mapping is established between activities and the fundamental principles of the data governance policy. One important innovation of this research is that, instead of directly utilizing SSM in the policy development process, it describes the situation and fundamental actions to provide the foundation for the policy. In conclusion, the data access problem has been identified as having various dimensions that can be grouped into six categories: data application, risk, processing, infrastructure, route, and access. These categories have been used to develop 13 support policy rules.

Keywords

Banking sector, Data access policy, Data governance, Data management, Soft systems methodology.

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1. Introduction

Over the last two decades, the word ‘governance’ has expanded and conquered new grounds and is now widely used (Micheli et al., 2020). In different realms of governance, data governance plays a prominent role in various organizations and is increasingly growing because the current trends keep up the pace. Data governance refers to the ownership of and controls over data management. Its objective is to increase the value of data assets in organizations and reduce relevant costs and risks (Abraham et al., 2019). Those data that are properly managed can be evolutionary and support sound decisions and measures (Reichental, 2023).

A proper governance program includes a governance committee or assembly that complies with a set of procedures and programs for implementing them, given that the cornerstone of organizational data governance is the policy of managing and governing data (Khairi, 2019). A data governance policy is a base document comprising instructions and compliance to ensure effective data asset and organisation information management (Eryurek et al., 2021). This policy has been deemed a reference source for regulatory expectations that provide guidelines on organizational measures in the data domain. In this respect, a comprehensive policy on data governance must support key aspects, including systems or procedures associated with raw data security and control, internal auditing by quality control staff, report and investigation of suspicious violation cases of data integration, discipline measures, staff training when outsourcing or interacting with outside corporations (Truong et al., 2017).

Data governance rules in policy documents comprised data access, usage, integration, integrity, provenance, retention, and archival policy (Eryurek et al., 2021; Reichental, 2023). Among these elements, *data access*, one of the most important aspects of data management, should be subject to governance rules. Data access, in brief, emphasizes who has access to what sort of data or what commitments must be provided to permit data access (Kerber, 2020). In other words, this aspect of governance incorporates the extent of access, how to access data, access position, and data control and application (Khatri and Brown, 2010).

In this respect, some mechanisms are required to ensure principled data sharing and provide the possibility for data sharing and blocking of data sharing if necessary (Janssen et al., 2020). To this end, specific frameworks for trustworthy data sharing should be established, and the corresponding rules in governance policy can be investigated. Successful solutions to the problem of data access require an inclusive set of complementary enablers. In this context, the capability to cooperate, standardization, and security are among the mentioned enablers, which

is the proper analysis and design of a comprehensive data governance system (Kerber, 2020). Regarding cooperability, data access is a subcategory of the mentioned system because governance is achieved by complying with a set of laws and rules and implementing them and developed through collaborations and cooperation among players and stakeholders. Moreover, through proper adherence to the security aspects of data access in the data governance system as well as efficient management of data, one can reduce possible dangers to a minimum and meet the requirements (Reichental, 2023).

The banking industry is one field that holds the issue of data access in high regard. Backed by the massive data centers of customers and the services they receive daily, the banking industry can produce big data. This issue has become more significant following the dominant spread of mobile phones in daily lives and other emerging technologies because most transactions and events in different cycles of banking services lead to big data (Bedeley, 2014). Even though the banking industry stands to benefit significantly from such a massive amount of data, it causes a series of challenges in the technology and governance layers since data access, especially banking data, is subject to the policy enforced, given that banks deal with vital data that require the highest level of privacy and security (Alhassan et al., 2019).

By considering the commercial banks and investigating the data access issue in such organizations, this paper points out a significant problematic situation regarding cooperability between players and stakeholders and data access security (Kerber, 2020). Upon studying the aspects and characteristics of the problem under scrutiny, it can be stated that the mentioned problematic situation is quite complex and unstructured in this research. Such issues are strategic and enjoy essential features. These features include multi-stakeholders, perspectives, multi-dimensions, conflict of or incomparable interests, and other intangible aspects, along with uncertainty (Mingers and Rosenhead, 2004; Mingers, 2011).

Table 1 shows that the current situation of common commercial banks is best characterized by complexity and non-structuring. In this table, among the set of problematic features, a description of data access problems in the banking industry is proportional to every feature in various situations. A profound understanding or analysis of the current situation has provided the insight given in the table, and it is required to analyse its various dimensions.

Table 1. Analysis of the problem in unstructured and ill-structured terms

The complexity of the structure of the problem	Description of the problem status in the case of the intended feature
Multi-stakeholders	The process of applying for data at the bank level requires the presence of players and stakeholders. Applicants generally constitute bank-led marketing units, bank holding companies, and partner companies in active ecosystems. Further to the above, servicing a wide spectrum of data applicants can be made possible by the unit management with the help of infrastructure provided by the IT management. This is while the acts enacted by the risk committee, along with their missions and instructions approved at the office of organizations & methods, lay the ground for such servicing.
Multi-perspectives	Data applicants often try to acquire the data and information they need while the owner or custodian of these data acts conservatively in presenting them. The problematic nature of the current situation is illustrated based on the convenience and extension aspects of data access about the risk of presenting data and in relation to the technical and operational aspects of data communication.
Intangible and uncertain aspects	Compatibility of a data application with current banking objectives and adaptability to the present rules and instructions are forms of uncertainty in the process of applying for data. Data governance must be flexible and viable enough to design various scenarios for every application to assess the rate, time, and approach required to respond to any data application. This perspective has not been considered in various data applications, so these applications would not enjoy data integration.

This study aims to provide the problem of data access with a structure based on the perceived situation given in Table 1. Since data access is part of governance and data governance requires a policy to determine key rules (Eryurek et al., 2021), this study focuses on giving weight or sense to the experiences gained from the data-access process based on a policy formation. Sense-making in human interaction with various systems presenting meaningful displays aims to ensure a deeper understanding or perception of complex matters (Pirolli and Russell, 2011). Therefore, the outcome of this research may portray a rich picture of the current situation and binding rules concerning policy formation relevant to data access in the data governance framework.

Given the significance of perception over complex situations, especially in the case of the problematic situation under study, this study has considered using a method for structuring the problem so that ‘discovery’, ‘learning’, and ‘obligation’ can be achieved. Governance data design requires distancing from conventional organisational data management (Khatri and Brown, 2010). This issue can make the current problem more complex and has motivated the authors of this study to turn to situation-improving methodologies to deal with this delicate problem rather than problem-solving methods. In other words, a shift from an optimization/normative paradigm to interpretive/learning paradigm occurs in this study.

2. Literature review

Governance is a broad field that has seen the use of several soft operational research methods. Scenario planning, soft system methodology, system dynamics, and strategic choice have

frequently been used in governance models ([Aliahmadi et al., 2022](#)). Specifically, SSM has been reported as useful in data governance, corporate governance, energy governance, and security governance. This research focuses on developing governance policy, and thus the use of SSM in this area is highlighted. Soft system methodology has emerged as a useful tool in policy-making in governance. SSM is a process-oriented approach used to understand and manage complex situations. The approach involves using qualitative data and systems thinking to identify the different perspectives of stakeholders and create a shared understanding of the problem at hand.

Previous research has considered the use of soft system methodology in policy development. [Azar et al. \(2017\)](#) designed a model for policy-making based on SSM in the nanotechnology sector. Due to the complexity of nanotechnology commercialization policy-making and the role of human factors in it, SSM was used to create a rich picture of the policy-making problem and its CATWOE definitions. In the conceptual modeling of activities, some activities were directly allocated to policy-making, making it a conceptual model for policy-making for nanotechnology commercialization.

Similarly, [Monavarian et al. \(2020\)](#) used SSM as a tool to structure the issue of policy-making for electronic banking to overcome uncertainties and set a long-term plan to preserve the future position of this industry. The issue was modeled using a two-circle conceptual model, which included several steps for creating policy in the electronic banking sector. Therefore, the use of SSM in this research focuses on the activities involved in policy-making generation.

Furthermore, [Sujono et al. \(2023\)](#) proposed a soft-systems thinking approach based on social network analysis to map mineral and coal policies by analyzing the law and producing research novelty. SSM was used to reflect on the limitations in capturing the highly complex and problematic Mining Law research.

As evident in the reviewed articles, most of the efforts to use SSM in developing policy and policymaking are devoted to directly using definitions and conceptual models in the policy-making process. However, in this study, an attempt has been made to make the system's behaviour meaningful based on SSM, and then policies are extracted and developed based on the necessary actions.

On the other hand, few studies exist on using SSM in determining the governance policy. [Prasetyo and Surendro \(2015\)](#) utilized SSM to create a data governance model tailored to the organisation's specific requirements. SSM aims to find a suitable model for data governance by considering stakeholders' definitions and perspectives and considering models from DAMA,

IBM, and other sources. Ultimately, they created an Effective Data Governance Model using a cycle that involves Planning, Coordinating, Implementation, and Monitoring. The goal is to ensure data governance aligns with each organisation's unique needs.

Limited studies have focused on using SSM directly for creating data governance policies, and previous models that employed SSM for governance did not utilize the methodology suggested in this research.

3. Methodology

In order to create an interpretive perspective on improving the current situation under study, Soft Systems Methodology (SSM) was employed. SSM is widely associated with interpretive/learning paradigms and helps the current 'thinking' on a given problem be well structured (Azar et al., 2019). Well-structured thinking represents an organized and flexible process based on a systematic perspective to deal with problematic situations or circumstances for which proper measures must be taken to make them more acceptable, clearer, and calmer (Checkland and Poulter, 2007). To put it differently, SSM is a learning system that seeks to compromise with the situation constraints and takes targeted actions to achieve improvement (Mingers and Rosenhead, 2001).

SSM implementation takes place in 7 stages, some of which are real-world, while others are conceptual (Checkland and Poulter, 2020). In the first stage, a problem is discovered in the real world and its situation is considered. Here, the objective is not to define a problem but to determine what we seek. In the second stage, the individuals involved in this situation and the structure of this problem are depicted in a rich picture. The third stage is the point of departure from the real world to the conceptual and systemic one, where the problem's root definition is given. Root definition describes an ideal system, its objectives, and the individuals involved and introduces influenced and influencing individuals. To create a root definition based on rich pictures, a well-known method named CATWOE is used. Owners use CATWOE in forming and formulating a root definition of the problem and the following dimensions characterize it:

- **Customers (C):** Who are the customers, stakeholders, and individuals that gain or lose?
- **Actors (A):** Who are the players and participants in the system?
- **Transformation process (T):** What inputs can be transformed into what outputs in this process?
- **World View (W):** What is the world-view basis of the system?
- **Owner (O):** Who has the power or authority to stop the system?
- **Environment-related factor (E):** What environment constraints must be considered in this system?

In this fourth stage (conceptual model formation), a conceptual model is designed through root definitions involving a diagram model of activities with related connections. In this model, targeted actions are defined by imperative verbs and are arranged based on their interdependence (Mingers and Rosenhead, 2001; Azar et al., 2019).

SSM performance measures investigated for system evaluation are summarized by three main criteria: efficacy, efficiency, and effectiveness. Efficacy emphasizes proper transformation and output creation as a result of a process. Efficiency refers to the minimum and best use of sources, and effectiveness represents the capacity to reach goals on higher levels in the long term (Checkland and Poulter, 2007).

The fifth, sixth and seventh stages involve comparing real-world and conceptual models, defining required variations for improvement and development, and programming for applying those variations. Given that the objective of creating these purposeful activities is the corresponding mapping of data governance policy, this study does not attempt to model via SSM; instead, the focus is to form a data-access policy from the set of data governance programs via SSM-based purposeful measures.

To develop a comprehensive data governance policy using SSM, it is essential to map each area of the policy to each activity in the SSM action plan. This approach ensures that all aspects of data governance are addressed in the policy and there is a clear understanding of how each area of the policy relates to the SSM process. The SSM action plan comprises several activities, including problem definition, analysis, feasibility, implementation, and monitoring. Each of these activities can be used to develop specific aspects of the data governance policy. For example, in the problem definition activity, it is essential to identify the data-related issues that must be addressed in the policy. This could include data quality, security, privacy, and compliance with relevant regulations.

According to the above, the policy can be formed based on the conceptual model of SSM. In other words, the base of every activity and its contextualizer constitute parts of the rules that support the literature-approved policy.

The current study has utilized the expertise of professionals and specialists in commercial banking to develop a rich picture and conceptual model. The methodology used in the research involves a qualitative approach that relies on collecting and analysing data from in-depth interviews with experts in the field. The experts were selected based on their experience and knowledge of commercial banking and were asked to provide insights and perspectives on the various components and dynamics of the industry in order to data access in the data governance

area. Through this process, a rich picture and conceptual model were developed that provide a comprehensive understanding of the data access of commercial banks and their various components. The rich picture provides a visual representation of the various components and their interrelationships, while the conceptual model offers a more abstract representation of the industry that highlights key concepts and relationships between them.

4. Findings in the data governance area

4.1. SSM components in the redefinition of data access problem

4.1.1. A rich picture of the problem

Creating a rich picture of the problem is an indirect attempt to access the leading establishments or institutions, structures, and perspectives in the current situation and ongoing processes that help better recognize the problem (Checkland and Poulter, 2007). The rich picture of the problem under study includes its engaged and effective roles and the association between them based on communication type (interactions, opinions, or data & information transfer) is depicted in Figure 1.

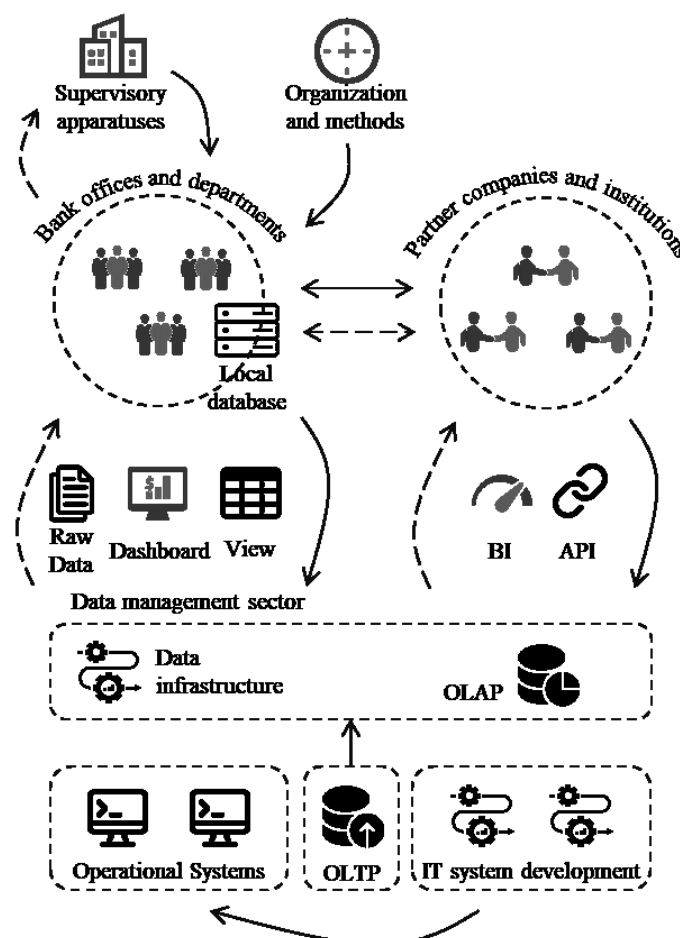


Figure 1. The rich picture of the data access and flow described in this section

4.1.2. CATWOE definitions

CATWOE includes effective elements in transfer activities and system objectives ([Checkland and Poulter, 2020](#)). These elements are separately expressed in the following to shed light on the components of the problem under study. Table 2 presents the CATWOE definitions.

Table 2. Definition of CATWOE components for the studied problem

Item	Definition
C (Customers)	<ol style="list-style-type: none"> 1. Bank divisions 2. Subsidiaries 3. Partner companies 4. Dominant or supervisory institutions 5. Bank customers
A (Actors)	<ol style="list-style-type: none"> 1. Data management department 2. IT Office 3. Risk office 4. Organizations & methods Office
T (Transformation process)	The input “data requirement” under the transformation process is transformed into the output “satisfied requirement through data access”.
W (World view)	<ol style="list-style-type: none"> 1. Data access brings about valuation. 2. Data access control reduces the security risk and reporting burden. 3. Obviating the need for data is directly linked to the context of data and the way to access them.
O (Owner)	<ol style="list-style-type: none"> 1. CEO 2. Data management committee
E (Environment Constraints)	<ol style="list-style-type: none"> 1. Dominant laws and reports resulting from state and supervisory apparatuses. 2. Constraints result from collaboration with extra-banking companies through platforms and other interactive contexts

4.1.3. Root definition

According to [Checkland and Poulter \(2007\)](#), the enhancement formula for root definition is called PQR, which involves “applying P through Q to achieve R as a goal”. Accordingly and based on the definitions of CATWOE components, one can express the root definition of this research as follows: “Data governance system provides data access for all divisions and stakeholders through safe, efficient, application-friendly methods so that valuation concerning job tasks throughout the bank will increase, leading to the development of banking services and products.”

4.1.4. Conceptual model of activities

The intended conceptual model comprises purposeful activities of the system that must form in the framework of fundamental definitions and based on logical dependencies. Based on the earned recognition and CATWOE definitions, this problem achieves a set of activities compliant with the root definition, as shown in Figure 2.

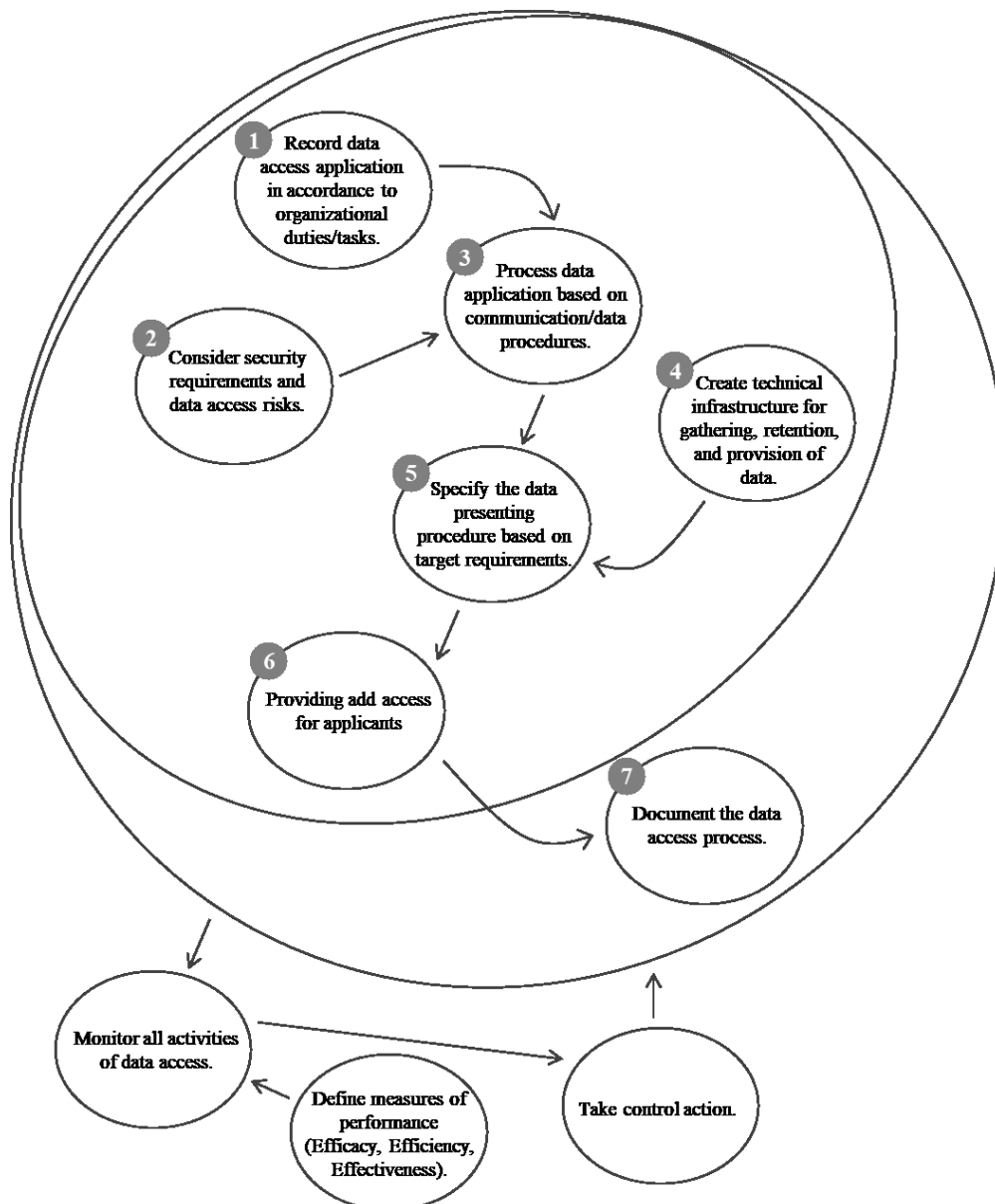


Figure 2. The purposeful activity model for the data access process

Figure 2 presents 7 purposeful activities hinged on the earned knowledge of the problematic situation panned out in two layers. The first layer, incorporating activity numbers 1 to 6, presents issues ranging from data access procedure and application to access permit. The second layer includes the retention procedure and documentation of events. Preconceived activities like monitoring, control, and measuring based on all purposeful system measures are included in this layer.

4.2. Key fields of data governance policy in the data-access domain

Given the earned knowledge of the data access problem via SSM and the resulting conceptual model facilitating the redefinition of the problem and its purposeful activities, the critical fields

of data governance policy among the group of data governance programs gain significance.

In this section, by the adopted methodology, the key fields of data governance policy are elaborated, through which key concepts related to data governance correspond to every measure in the conceptual model of SSM. This definition considers performance measures, including the three criteria of efficacy, efficiency, and effectiveness and accordingly, the policy rules set based on the improved performance of data access procedure are given.

Table 3 shows the policy fields for the primary layer in the SSM conceptual model.

Table 3. The fields of data governance policy on data access

Conceptual model activities		Policy fields
1	Recording data access applications by organizational duties/tasks	<ol style="list-style-type: none"> 1. Redefining the extent of requirement for data based on organizational mission (Dawes, 2010; Janssen et al., 2020; Reichental, 2023) 2. Integrating organizational literature based on marketing nomenclature (Cheng et al., 2017; Shin et al., 2020) 3. Informing and training staff concerning data-oriented interactions (Janssen et al., 2020)
2	Considering security requirements and data access risks	<ol style="list-style-type: none"> 1. Classifying data in terms of confidentiality and sensitivity (Hripcsak et al., 2014; Kim et al., 2014; Reichental, 2023) 2. Determining confidentiality level for extra-organizational and ecosystem-related interactions (Dasgupta et al., 2019)
3	Processing data application based on communication/data procedures.	<ol style="list-style-type: none"> 1. Defining metadata to describe data (Khatri and Brown, 2010; Brous et al., 2016; Abraham et al., 2019) 2. Translating data application in terms of intermediary roles in data governance (Gou, 2022; Reichental, 2023)
4	Creating technical infrastructure for gathering, retention, and provision of data.	<ol style="list-style-type: none"> 1. Preventing access to the online transaction processing system (OLTP) (Mahanti, 2021; Nadal et al., 2022) 2. Focusing on access based on data archive and analytical data centers (OLAP) (Mahanti, 2021; Nadal et al., 2022)
5	Specifying the data presenting procedure based on target requirements.	<ol style="list-style-type: none"> 1. Identifying a safe and efficient channel in terms of data-sharing tasks (Borgman et al., 2016; Janssen et al., 2020) 2. Identifying a safe and efficient format in terms of data-sharing tasks (Eryurek et al., 2021)
6	Providing additional access for applicants	<ol style="list-style-type: none"> 1. Focusing on approved data management environments (Jia and You, 2021) 2. Assigning access to the applicant (Janssen et al., 2020)

As mentioned in the methodology section, the system's performance measures based on the above definitions include the three criteria of efficacy, efficiency, and effectiveness, each of which can contribute to the fabrication of logical procedures based on the policy. In other words, the procedures that determine the details of activities should be investigated in terms of activity-measuring criteria.

5. Conclusion

Having investigated various data access applications in Iran's banking industry and scrutinised volumes of documents on such applications, this study shed light on the current problematic trend through stakeholder interaction. To illustrate the trend and perceive its complex and sensitive situation, SSM was employed so that a transparent and proper image of the problem as well as its root definition and essential components, could be presented. To this end, various trends and procedures were investigated in technical and marketing terms by considering the operational steps of SSM in creating a rich picture of the problematic situation in data access in the data governance domain. In consequence, the SSM model managed to obtain a list of purposeful activities. Upon identifying these activities, the supporting policy corresponding to every set of activities based on the data governance literature, specifically in the data access field, was studied and mapping between activities and basic principles of governance policy was created.

As shown in the Finding section in Table 3, various policy dimensions were divided into 6 classes: data application, risk, processing, infrastructure, route, and access, each of which is entitled to its own literature. This procedure significantly helps achieve an initial document of the data governance policy regarding data access because active fields can be readily segregated in terms of roles, communication and data flow, stakeholders, technical developments, and organizational tasks. This distinction led to classification and helped structure the complex problem of this research and properly identify key fields of data governance policy, hence greater convenience in forming the details of this policy and the corresponding procedures.

This research study achieved an improved situation in the conceptual model out of a problematic situation whose dimensions included multi-stakeholders, multi-perspectives, and complex aspects. With the help of this new, improved situation in the model, we can decide on the data governance policy. Decision-making elements, in this case, were the very key policy fields that had already been separately presented for each activity.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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