Received 23 October 2019
Revised 9 March 2020
27 June 2020
Accepted 23 October 2020

Exploring the mechanisms for records management's digital transformation: a case study from China

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Abstract

Purpose – The purpose of this study is to explore the mechanisms underlying the transformation of records management (RM) to digital processes in the context of electronic records management systems (ERMS). The aim is to facilitate the evaluation of the long-term performance of ERMS and the effectiveness of the current standards.

Design/methodology/approach – Qualitative methods, such as participant observation and the constructivist grounded theory, were applied on a case of ERMS implementation in the Chinese public sector.

Findings – The results revealed that the application of transition-oriented ERMS would stimulate restructuring in the RM pattern and expectation on the functions of ERMS, with information quality underlying as a key challenging factor. The above-stated factors together drive the digital transformation of RM. A model for this mechanism is provided in the present study.

Research limitations/implications – The selected case serves as an example for the cases that are not conditional on enforcing the electronic documents and RMS. As preliminary research, only one case has been studied here. However, it is possible to conduct other case studies to develop a further understanding of the transformation process.

Originality/value – The novelty of the present study is that it draws attention to the challenges encountered in moving RM towards digital transformation, by providing a theoretical foundation for developing sustainable evaluations of the ERMS and the associated current standards.

Keywords Case studies, Public administration, Records management, Information system, Information governance, Digital transformation

Paper type Case study

1. Introduction

To cope with the trend of digital transition, digital continuity has become a key orientation for achieving improvements in records management (RM). In the field of information management (IM), digital transition refers to the process of transition from paper-based to digital-based media, and ultimately into a paperless system (Orantes-Jiménez *et al.*, 2015; Reed, 2015). Policies pertaining to digital transition have been released by the respective governments in many developed countries (An, 2009; Fletcher, 2002; Özdemir, 2019; Reed, 2015). These policies represent a part of the holistic construction of the e-government, leading to a higher level of transparency, accountability, and public participation (Casadesús de Mingo and Cerrillo-i-Martínez, 2018). A few of these transition strategies were

Funding: This work was supported by the Natural Science Foundation of Guangdong Province, China [grant numbers 2018A03010261, 2018].

Records Management Journal
Vol. 31 No. 1, 2021
pp. 34-47

0956-5698
DOI 10.1108/RMJ-10-2019-0064

based on the implementation of the electronic documents and records management system (EDRMS) to maintain digital continuity, that is, to ensure the availability of digital information despite any changes occurring either in the time span of technology development or in the space span of system connection or migration (An *et al.*, 2016; Özdemir, 2017). The relevant theoretical foundation lies in continuum informatics (Upward, 2019; Upward *et al.*, 2013), which is to view records as dynamic and always in the process of forming continually across the institutional boundaries (Maroye *et al.*, 2017). This implies that the management of records should be established through a holistic integration of the information systems (IS). Although EDRMS offer continuity by converging the information management processes (Alshibly *et al.*, 2016; Siu, 2017; Yin, 2014), several obstacles are encountered in the implementation of EDRMS. Further, the widely observed issues of low adoption and intention to use digital technology have also been reported (Ab Aziz *et al.*, 2017; Olefhile *et al.*, 2018).

On the other hand, there exist cases, such as that of the Chinese public sector, wherein EDRMS could not be implemented due to the conditions, such as the administration structure and the business model. In such cases, the convergence model of EDRMS is split into electronic documents management system (EDMS) and electronic RMS (ERMS); both are weakly coupled to each other, and the issues related to digital continuity are largely ignored in academia.

As obstacles were found in implementing EDRMS and ERMS, the notion was put forward as the use of digital technologies is likely to push the transformation in value creation and bring improvements in the organizational and social spheres. While the core of digital transition focuses on sustaining digital continuity, the concept of digital transformation enters more into the area of structural changes in value creation. This is defined as "a process where digital technologies create disruptions, triggering strategic responses from organizations that seek to alter their value creation paths, while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process" (Vial, 2019).

In terms of the digital continuity addressed in digital transition, the resolution of EDRMS might be considered more effective than the model of "EDMS+ERMS", as the former provides a seamless procedure for the processing of digital information. However, in the cases where ERMS is adopted, it remains unclear, whether the requirements for digital continuity would act as a trigger for the RM to transform the model of ERMS into EDRMS. It is rational to perceive digital transformation as a consequence evolved from the digital transition, which implicates a transforming perspective to justify the sustainability of technology application. It is, therefore, crucial to discuss how digital transformation could be perceived as a measurement of the evolution of the RM system. Rather than considering the cases of EDRMS implementation that have been studied previously (Ab Aziz *et al.*, 2017; Olefhile *et al.*, 2018), the present paper focuses on the state of ERMS that is inappropriate for the further implementation of EDRMS, and attempts to answer the following questions:

Q1. At what level does the current development and optimization of ERMS respond to: digital transformation or merely digital transition?

Q2. How does ERMS respond to such requirements?

Q3. If ERMS is developing to respond to digital transition, what are the emerging demands that may drive this development toward digital transformation?

There are two main objectives of the present study. The first one is to evaluate the performance of ERMS, in the long term, through the preliminary cognition on the mechanisms of how the

digital transformation of RM might occur. The second is to establish the evaluation parameters for the current RM standards, as a baseline against which digital transformation would be considered. It is anticipated, while discussing the mode of ERMS, that the present paper will also provide relevant information on the acceptance of EDRMS utilization.

2. Theoretical foundation

2.1 Digital transition of records management

The digital transition of RM has been largely addressed, and various studies have highlighted the frameworks that structure the elements or the decisive factors for the successful transition of RM into a completely digital pattern. It was observed in these models that commitments from political, managerial, and technological resources are required, including the objective elements of strategic framework and planning, the technological elements of ICT and IS development, the business elements of the supportive regime, superior attitude and leader support and the responsibility elements led by the legitimacy of the digital records, regulations and standards (Feng *et al.*, 2017; Shen, 2018). The role of IS, including the ERMS, appeared as a part of the technological elements, interwoven with the other managerial and legal factors.

2.2 Digital transformation

Previous studies have extensively discussed the various ways in which the digital technologies would influence RM, which are not limited to the unit of archival aggregation from provenance-based fonds to the item-level ones for adapting to further diversified user requirements (Yeo, 2015). The various challenges encountered by the current RM frameworks include participatory recordkeeping (Evans *et al.*, 2019) and knowledge management (An *et al.*, 2016; Jones and Vines, 2016), among others. Even then, only a few studies have directed attention toward the digital transformation of RM or its relationship with the implementations of ERMS.

Meanwhile, the implications of digital transformation were explored in the broader terms of general business. Previous studies conducted on the relationship between digital transformation and the IS have emphasized that both the IS and the business leaders should participate in the strategic digital transformation with a shared mindset (Hansen *et al.*, 2011). Furthermore, a framework presenting the building blocks of the digital transformation process was developed, describing how the process occurs and what impacts does it exert (Vial, 2019). Nevertheless, the information available in the current literature on the transformational changes and values provided by digital technologies is inadequate (Morakanyane *et al.*, 2018).

2.3 Factors associated with the success of information system

The previous works concerning various case studies evaluated the efficiency of ERMS in terms of the support to RM and system adoption. Among these, a case study conducted in Iceland revealed that managerial support, cooperation between RM and ICT functions, user training in RM and system usage, and optimism toward change were the key factors resulting in higher productivity through the adoption of ERMS (Gunnlaugsdottir, 2008). Another case study conducted in Yemen tested the factors, namely, IT infrastructure, top management support, financial support, training and policy for the readiness of adoption and staff acceptance of ERMS (Mukred *et al.*, 2016). In another study, the dimensions of technological, organizational and system characteristics, which included a total of 11 factors, were observed to exert an impact on the adoption of ERMS in professional higher education (Mukred *et al.*, 2019).

It has been reported that, from the perspective of IS and technology acceptance, the theoretical models of IS success (DeLone and McLean, 1992, 2003), the Technology Acceptance Model (TAM) (Davis, 1989),the theory of planned behavior (TPB) (Ajzen, 1985), the model combined with TAM and TPB (C-TAM-TPB) (Taylor and Todd, 1995), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al.*, 2003), and other models (Standish Group, 1995; Poon and Wagner, 2001; Ab Aziz *et al.*, 2018; Hussin and Johare, 2014; Iivari, 2005; Lewellen, 2015; Smith, 2016) facilitate effectiveness in the human–technology interaction based on the IS. The aforementioned theories in the IS field were considered applicable to the field of RM (Pan, 2017).For instance, the unilization of UTAUT resulted in the identification of ten factors that exerted impacts on the adoption of EDRMS in the Malaysian public sector, among which, the factor, "level of management", was identified as significant for the adoption of EDRMS (Ab Aziz *et al.*, 2018). Only a limited number of studies have been conducted concerning the cases of ERMS, and none addressed the differences between the implementations of ERMS and EDRMS.

2.4 Implications from the literature

In regard to the research questions listed in the present paper, the following aspects have been implicated in the literature:

- What lacks in the current studies is the demonstration of how the digital transition of RM would stimulate innovations at the transformational level, and what would be the role of ERMS in such process. It may be assumed from the literature that RM would further progress by transforming the value creation system where IS would serve as the fuel element triggering the digital transformation strategy (Vial, 2019). The manner in which such mechanisms would function in the actual scenarios associated with the cases of ERMS remains to be investigated.
- The models of IS success, together with the frameworks of the digital transition of RM, have provided the key factors and parameters for the evaluation of the quality of ERMS implementation projects in the context of digital transition.

To conduct further investigation in terms of digital transformation, it is required to establish cognition in the mechanisms through which the transformational process would occur, the judgment on which could be preliminarily developed in contrast to the frameworks associated with the digital transition.

3. Materials and methods

Since the conception of the digital transformation of RM is yet to be established, the present study was designed as an exploratory, explanative, and qualitative research aiming to identify the relationships among the factors facilitating the digital transformation of RM. While the mechanisms of the digital transformation of RM is objective in its evolutionary process, the perspective of ERMS implementation inevitably involves subjective human–machine interactions in which the perceptions of the participants are latent and entail constructive excavation rather than neutral observation. Therefore, the methodology of constructivist grounded theory (Charmaz, 2000; Mills *et al.*, 2006; Rodon and Pastor, 2007; Urquhart *et al.*, 2009) was adopted as the core methodology as it enables interactive data collection among the researchers and the participants.

3.1 Background of the case

The methodology of Grounded Theory was applied to the selected case of ERMS implementation in a provincial public agency in the Guangdong Province of China. According to the claim of the stakeholders, information that may lead to identification has been kept anonymous. The project was initially put into enforcement during the spring of 2019. The selected case was typical and representative of RM in the Chinese public sector for the following reasons:

- The RM department comprised less than five records managers dedicated to managing all the administrative records along with the other business records such as personnel, infrastructure, and audiovisual records.
- The project was based on the requirement to replace the uniprocessor systems with web-based ERMS to support the holistic construction of e-government.
- The selection of the ERMS developer was conducted through regular procurement and competitive bidding procedures.

3.2 Data collection

The data were collected mainly through the process of participant observation (Kawulich, 2005; Nandhakumar and Jones, 2002; Spradley, 1980), focusing on the negative issues that appeared in the project. A group of seven researchers specialized in RM participated in the operation of the ERMS for a duration of three months at a frequency of 2–3 times a week. The researchers were required to maintain communication with all the stakeholders regarding their perceptions and the problems they have encountered during the implementation and operation of the ERMS. The issues raised by the stakeholders as well as those noticed by the researchers were recorded in a semi-structured sheet which comprised the items of "issue description" and "reason analysis and resolution plan". The scope of the issues observed covered, in general, although not strictly limited to, the following aspects: contracts fulfillment, standards fulfillment, managerial connectivity, subjective perceptions of usage, and sustainability. Finally, a total of 21 logs were recorded, containing 48 issues in total. Moreover, the original objectives of the project were also collected from the project documentation provided by the stakeholders to verify the reliability of the recorded issues.

3.3 Data processing

The 48 issues were processed using the methodology of constructive Grounded Theory, by another researcher who is an expert in RM. The procedure is presented in Table 1. Initially, the procedures were not limited to four steps and were proceeded according to the extent of concept extraction until it was independent and incompatible with each other.

Table 1. Encoding procedure by applying the grounded theory

Step	Data processing	No. of items generated
1	Based on careful analysis of the content of the texts, and discussions with the stakeholders, literature, and experience; give free tags on the 48 issues from such aspects as its category, cause, and implication	110 (reduplicative included)
2	Merge similar tags by its content and subject to generate independent descriptions of the issues (eliminate duplications and similarities)	27
3	Extract concepts from the descriptions according to the field to which they are subject	8
4	Further generalize relevant concepts into independent factors	5

4. Results and discussion

The results of the present study implied a bottom-up system of concepts underlying the issues perceived by the stakeholders and the researchers in the selected case (Table 2).

4.1 Information quality

Stakeholders provided a negative feedback on the accuracy and the integrity of the metadata, and specifically indicated the difficulties associated with migrating the historical data concretely into the ERMS. The fundamental reason for this could be the incompatibility of the RM policies and standards; this was supported by the suggestions received from the ERMS developer that certain requirements in the current standards of the RM metadata appeared "inefficient and unrealistic to be filled in either manually or automatically", and it was also "difficult for the document-processing systems (EDMS) to comply with the RM standards". In regard to the managerial system of the concerned case, the ERMS was designed as a platform for specialized semi-active RM functions which would be segregated

Fourth-level concepts (Factors)	Third-level concepts (Subjects)	Second-level concepts (Issues and Problems)
Information quality	Data quality (Stock and Incremental)	Problems with importing stock data
		Data quality issues caused by manual entry
		Data quality issues caused by the resource of creation
		Issues about metadata description
Policies and standards	Policy and standard compliance	Failed to conform with or respond to the current and changing regulations and standards
		Lack of referable policy and standard
RM Business	Business flow	Issues in the integration of ERMS and EDMS
		Ambiguous functional positioning and orientation
		Issues about the overall design of the functional modules
	Emerging practical requirements	Failed to provide multiple schemes for records arrangement
		Failed to meet industrial requirements in access control
		Failed to meet the requirements in discovering records interrelation
		Failed to meet the requirements in displaying records status
		Searching algorithm failedto meet searching requirements
		Not conforming with records managers' general user habits
		Direct response to user requirements and insufficient discussion about expected scenario
		Insufficient requirement investigation by ERMS developers
		Insufficient communication between the stakeholders
	Professional knowledge	Records classification incompatibility
		Ambiguous terms and definitions used in the user interface
		Insufficient understanding of professional recordkeeping/archival concepts and knowledge
Technological-managerial collaboration	Issues in system replacement	Migration and transformation of function between the old system and the new one
		Difficulty in transferring user habits in the new system
Sustainable development of RM	Potential requirements	Lack of multiple access terminals
		Weak in supporting data mining and analysis
	Research agenda	Issues about retention schedule
		Issues about metadata setting

Table 2.
Encoding results by applying the grounded theory

from the whole process of document and RM flow, with a developer different from that of the EDMS, which lead to challenges in cooperation between the developers to establish digital continuity. In this case, improvements in the information quality should rely on the shared standards, through the placement of the series of standards into the context of records continuum and metadata governance on the foundation of the information quality assessment models (Gorla *et al.*, 2010; Lee *et al.*, 2002; Zavalina *et al.*, 2016).

4.2 Policies and standards

Challenges have also been identified in policies and standards. Despite being closely associated with information quality, these challenges reveal the structural incompatibility to a deeper extent. The challenges are:

- Difficulties in coping with the changing policies and standards in the digital transition process. To respond to the tendency of digital transition, National Archives and Administration of China has continued to release regulations and standards for managing the born-digital and digitized records since 2002, and has already covered the digitization of the paper records as well as the organization, arrangement, and encapsulation of the digital records. A few of these regulations and standards have regularly been revised after 2015, such as DA/T 22-2000 (revised from DA/T22-2015), DA/T 31-2005 (revised from DA/T 31-2017), and GB/T 18894-2002 (revised from GB/T 18894-2016). Although these policies and standards have been proven to be more compatible with the requirements for maintaining trustable records, it was revealed from the case in the present study that it nevertheless inevitably caused increasing complexity in the ERMS that manages both incremental records and the records accumulated under the control of the previous versions of standards.
- Lack of top-level policies or records governance standards across the boundaries of IS. Regarding the cases where ERMS was implemented independently from the other IS such as EDMS, the governance of digital information encountered restrictions and obstacles throughout its lifecycle. The experiences associated with the cases of EDRMS, where RM was integrated into the holistic framework of digital information management, have demonstrated that leader support or CIO/CDO leadership (Haffke and Benlian, 2016; Horlacher *et al.*, 2016) plays an important role in this regard. Further, such systems should receive the support of top-level policies adopting information governance (Upward, 2019) and standards integrating archiving requirements at the general information and data level.

4.3 Records management business requirements

In the context of RM business, the business flow, practical requirements, and professional knowledge were reported as the challenges underlying the ERMS implementation, implicating that although the ERMS was designed to meet the challenges of digital transition, challenges at the structural level of digital transformation are emerging.

4.3.1 The business flow of records management. Although the standards of ERMS such as GB/T 29194–2012 (derived from ISO 15489–1: 2001) were referred to, the division of the procedural and functional modules and the records organization system in the afore-stated ERMS were conceptualized, to a large extent, from the pattern of manual RM. Consequently, issues such as overlaps and repetitions in the functions emerged, and disobedient classification schemes were observed between the ERMS and the EDMS. Such issues align with the notion that disruption is caused by the use of digital technologies that drive the digital transformation (Vial, 2019).

4.3.2 Emerging practical requirements. With the use of ERMS, practical requirements that were not considered previously also emerged, implicating stimulation of alteration in the user behavior and expectations. The users of ERMS comprise the customers served by the records managers and the records managers themselves. While several previous studies have focused on the user habits and requirements of the former group (Singh *et al.*, 2007), hardly any study has been conducted on the latter. In the present study, the records managers expressed their expectations regarding several aspects such as multiple schemes for records arrangement, intelligent access control, discovery of records interrelations, display of records status, and intelligent searching services, etc.

4.3.3 Professional knowledge. The results also revealed that there existed different understandings regarding the RM knowledge between the owner and the ERMS developer. The terminologies or definitions used commonly by the developers or the records managers sometimes failed to communicate with each other, particularly in the classification of records. The unit of archival aggregation and description remained fixed and unilateral according to the principle of provenance (Millar, 2002), which was regarded as highly rigid for the digital environment by the ERMS developer. The characteristics of the records are crossing boundaries (Niu, 2013) to become more dynamic and flexible (Mokhtar and Yusof, 2015, 2016; Mokhtar *et al.*, 2016; Mokhtar and Zawiyah, 2015), and should, therefore, be organized and described using multiple features. In the concerned case of the present study, it was required that the stakeholders collaborated to reach a consensus in the cognition of records organization with common knowledge.

4.4 Technological–managerial collaboration

A managerial perspective is the other aspect that requires consideration in organizational innovation (Damanpour and Aravind, 2012). Despite the fact that the application of ERMS has served as a technological foundation for innovative RM, it has been reported that the overall managerial style of RM remains under-established in terms of efficient human-machine collaborations. Regarding the application of ERMS, the conventional RM patterns have been confronting the requirement for restructuring, which was driven by the factors such as the use of metadata, novel types of records, multiple organizations of records, and hybrid forms of records. Nonetheless, a few records managers in the concerned case were inclined to follow a conservative RM pattern until certain novel managerial patterns were established. This appeared to have moved beyond the current theories of technology acceptance (Davis, 1989; Venkatesh *et al.*, 2003) and should be attributed to the necessity in managerial innovation. Ultimately, a collaboration between the application of ERMS and the accommodation of managerial style would represent a critical factor for the digital transformation of RM.

4.5 Sustainable development of records management

Since potential requirements and research agenda were put forward in the present case study, it indicated the necessity to clarify the path of value creation through the application of ERMS. Further expectations that the ERMS could be able to support multiple access terminals, data mining and data analysis along with the accumulation of records were also expressed by the owner. It was demonstrated that the records managers as well as the leader of the organization were inspired by the cloud services on the internet, expecting a more intelligent, humanized, and dynamic ERMS. It implicated a positive attitude on the ERMS for its potential to lead to an innovative path of value creation in RM. Moreover, research agendas associated with records classification, retention scheduling and others were identified by the researchers for academia.

5. Findings

The pattern based on the implementation of EDRMS, which integrates RM with document processing, has suggested a framework of information governance for the present case study of ERMS application. Nonetheless, the issues confronted by the ERMS implementation did not fall in the realm of technology acceptance as suggested by the theories provided in the studies involving the successful application of IS in EDRMS implementation, and rather revealed more regarding its ongoing mechanisms moving to digital transformation at the structural level, both practically and cognitively. The findings of the present study may be summarized as follows:

- Complying with the current policies and standards of RM, the ERMS in the presented case was implemented to cope with digital transition rather than with digital transformation. This was evidenced by the fact that the ERMS met critical challenges in information quality with current policies and standards, especially the challenge of integrating the stock and incremental records, which was a key factor for maintaining digital continuity as emphasized in the framework for digital transition (Feng *et al.*, 2017). Specifically, the key challenges arose from two aspects: the first one was the vertical requirement for coping with the digitization of the stock paper records as well as its management information, such as its descriptions and catalogs for retrieval, which were aimed to be integrated into the ERMS. The other one was the horizontal requirement for being capable of managing incremental born-digital or digitized records generated from the other IS.
- Even though the current policies and standards of RM were followed, the functional modules adopted by the ERMS were based mostly on the conventional RM system for the best utilization of digital technologies to support the RM procedures. It was observed that in the presented case, such RM flow was inefficient in the context of digital RM, which gave rise to the following questions: whether the current policies and standards were efficient in rendering effective resolutions for digital RM practices in the context of ERMS; if not, what kind of management pattern should be established for such cases?
- Emerging demands for digital transformation of RM were identified in the presented case, which were observed to be stimulated by the strategies contextualized in the digital transition. Such demands comprised both technological and managerial aspects, and warranted deeper collaborations between these two aspects.
- The model extracted in the presented case (Figure 1), revealed a relationship between the digital transition and the digital transformation of RM through the integration of the technological and managerial factors and the associated challenging factors.

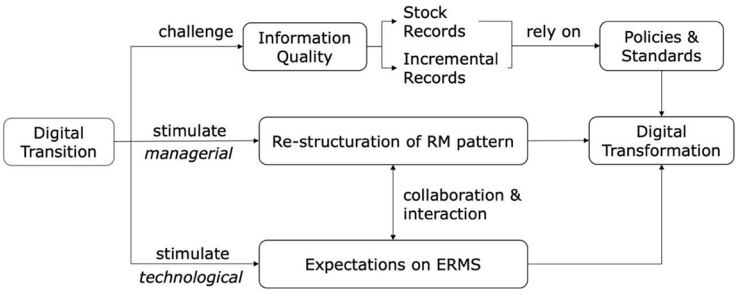

Figure 1.
Process of moving from the digital transition to the digital transformation of RM (extracted from a case study from China)

As illustrated in Figure 1, on the one hand, the digital transition of RM has raised prominent challenges to information quality, arising from the requirements for integrating stock paper records with various multi-structured incremental digital records into a shared scheme. To achieve this goal, reliance on governance-oriented (Shepherd *et al.*, 2010; Upward, 2019) policies and standards is required to pursue continuity, from business to recordkeeping and records access, based on common, shared, and continuous regulations. On the other hand, the digital transition also stimulated restructuring in the RM pattern as well as higher expectations on the ERMS to improve the RM performances. It should be emphasized that technologies such as ERMS must collaborate and interact with the managerial requirements, by discovering inefficient management flow and restructuring of the path of value creation in RM for the stakeholders. Ultimately, it may be assumed that the digital transformation of RM occurs under the synergized function of optimized policies and standards corresponding to the restructured RM system and the improved ERMS capable of accommodating the user expectations for higher efficiency.

6. Conclusions

Most of the previous studies conducted in the concerned field have focused on the pattern of EDRMS and its resolution for the challenges raised by the digital transition. Whereas, the present study is a pioneer in preliminarily illustrating the path to move from the digital transition to the structural transformation of RM in the context of ERMS implementation, through a qualitative case study of ERMS application in the Chinese public sector. It was implied that the pattern of ERMS could confront issues regarding the maintenance of digital continuity owing to the disruption between the document processing and RM, which could be resolved in a better manner with the pattern of EDRMS, user acceptance has to be facilitated nonetheless. In contrast to the pattern of EDRMS, the presented case exhibited certain flaws in the current policies and standards of RM when it is applied in ERMS where top-level governance of RM should be established, and this could be the breakpoint for the digital transformation of RM. It is believed that the model described in Figure 1 would provide an insight for understanding the process of digital transition to digital transformation of RM through the identification of the associated challenges and the stimulation mechanisms, which would implicate, from both technological and managerial perspectives, how the digital transformation of RM would occur and how to further evaluate the effectiveness of the ERMS on the basis of transformation-oriented insights.

Nonetheless, the findings of the present study require further investigation regarding several aspects. For instance, it remains unclear whether the establishment of an information governance system would be able to resolve the challenges of records information quality. Therefore, the actual manifestations of the digital transformation of RM should be observed and studied further. Further discussions are required to be conducted on the integration of RM and information governance at the level of IS. Other perspectives such as impact factors of regime, culture, technology, subjective perceptions, etc., require greater attention.

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