

Analysing the change management process for digital transformation involving citizens using textual analysis techniques

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ABSTRACT. The irreversible trend of digitalisation is reshaping our society, capturing citizens' attention by delivering high-quality, real-time digital services across various domains. Prior research has primarily concentrated on addressing concerns and challenges related to utilising digital platforms for citizen engagement. This research aims to improve understanding of change management process for digital transformation involving citizens for prioritising problem handling and devising appropriate solutions at different stages of the process. Firstly, content and thematic analysis techniques were employed to identify and analyse the characteristics of the change management process from 33 relevant studies in a systematic review. Subsequently, a change management process model was developed, including five stages: determining a change initiative, developing a change plan, communicating changes resulting from digital transformation, monitoring the progress of changes, and learning from past lessons. This model was then applied to analyse the change management process in a case study using text clustering technique based on online news released by the Shanghai government in 2023, allowing to gain insights into challenges/problems and strategies used to address them at each stage in the process. The findings show the utility of the model for analysing the change management processes. Implications for academia and practitioners are also discussed.

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Introduction

The integration of new digital technologies such as Internet of Things, cloud computing, and artificial intelligence has sparked organisational changes, leading to digital transformation (Sestino, et al., 2020). This transformation captures citizens' attention by offering high-quality, real-time digital services across various fields such as healthcare, education and urban governance (Sánchez-Corcuera, et al., 2019). Undoubtedly, the main audience for digitalisation is the general public. Digitalisation holds the potential to enhance citizens' experience and satisfaction, and decision-makers seek citizen engagement for better implementation and management of digital transformation (Chatterjee, et al., 2022). Researchers thus emphasise citizens' three essential roles in digital transformation: democratic decision-makers, co-creators of innovations, and users (Simonofski, et al., 2021), sparking extensive investigations by academia and practitioners into citizen engagement in this transformative phenomenon.

Prior research has addressed concerns and difficulties associated with utilising digital platforms for citizen engagement (Falco & Kleinhans, 2018) and has explored the conditions and factors influencing citizen involvement in digitisation (Purwanto, et al., 2020). However, there has been a lack of focus on the change management process specifically related to the digital transformation involving citizens. As noted in Rueckel, et al., (2020), digital transformation incurs possible changes in various areas in an organisation. Hence, digital transformation includes a management process to deal with the changes within the organisation. When citizens get involved in digital transformation, are there any characteristics of the change management process differed from a general change management process that remains unclear. These characteristics provide a theoretical lens to structure and organise the stages required in the change management process of digital transformation involving citizen. In light of this, we have a better chance to identify the challenges/problems and develop strategies for dealing with them at each stage in this process, in order to ensure the success of digital transformation. Thus, this study focuses on identifying and analysing the characteristics of change management process in digital transformation involving citizens.

For this to happen, we used multiple textual analysis techniques to explore the change management process associated with citizen engagement in digital transformation. Initially, we conducted a systematic review of relevant articles, utilising content analysis (Pohontsch, 2019) and thematic analysis (Braun & Clarke, 2022) techniques to identify the characteristics of the change management process. Subsequently, we proposed a model for the change management process based on these findings. Following this, we performed a case study using text clustering technique (Mehta, et al., 2024) to analyse the change management process of the digital transformation according to the model. This provided insights into the primary challenges/problems at each stage of the change management process, along with the strategies employed to address them, in the context of the case study. The findings of the present study will benefit for digital transformation developers and implementors to better prioritise problems handling and develop corresponding solutions at different stages of the change management process for digital transformation.

The rest of the paper is organised as follows: Material and methods section reviews related studies on digital transformation involving citizens and describes the research method used in this study. Results section presents the results from the data analysis using textual analysis techniques. Discussion section discusses research findings, possible future research directions, and both theoretical and practical implications and limitations from this study. Conclusion section summarises this paper.

Material and methods

In this section, we firstly present related studies on digital transformation involving citizens and then describe the research methods used to conduct this study.

Related work

There are many studies concerning digital transformation involving citizens (Acco Tives Leão & Canedo, 2018; Becker, et al., 2023; Falco & Kleinhans, 2018; Hassan & Hamari, 2020; Purwanto, et al., 2020; Saxena, et al., 2022), yet limited attention has been given to investigating the characteristics of the change management process in this context. Digital transformation brings about potential changes in various areas within an organisation or region, necessitating a management process to address these changes. The characteristics of this change management process provide a theoretical lens (e.g., a model or framework developed) to understand the necessary stages in digital transformation involving citizens and to develop the corresponding strategies to address challenges/problems at each stage of this process, ensuring the success of digital transformation. While Liu and Zowghi (2023) conducted a systematic review focusing on digital transformation involving citizens, identifying the challenges/problems of digital transformation, the factors influencing the success of digital transformation, and the communication methods used to involve citizens, an investigation of the characteristics of the change management process was not included in their study. Accordingly, this study addresses a research gap that requires the development of a model/framework depicting the stages of the change management process for digital transformation involving citizens based on its characteristics, along with a case study to apply this model see (Table 1).

Table 1. Difference between Liu and Zowghi (2023) and this study.

Compared facets	The study (Liu & Zowghi, 2023)	This study
Study scopes	Three research questions in relation to the challenges/problems in digital transformation, the factors influencing the success of digital transformation, and the communication methods utilised to involve citizens, respectively	Characteristics of the change management process
Research methods	Systematic review	Systematic review (based on the articles included in Liu and Zowghi (2023)) and case study
Findings of the study	Findings addressing the proposed three research questions An integrated framework based on the research findings	Characteristics of the change management process A model developed based on the identified characteristics Insights of the change management process analysed using the model in the case study
Significances of the study	The fragmented findings related to the research questions that were synthesised The findings that help set up priorities for the problem areas based on actual situation of the	The characteristics of the change management process that were identified and integrated into a model to provide a theoretical lens for understanding this process

organisation/community and specific application scenarios	The model that was demonstrated to be used in a case study to assist in analysing the change management process and provide both academic and practical implications for change management and digital transformation implementation
The findings that benefit to select appropriate methods to involve citizens based on their benefits and limitations for purposes	

Research methods

Our study unfolded in two phases, each using a different research method: systematic review and case study, as described below.

Systematic review

In the first phase, we aimed to delineate the characteristics of the change management process, in order to construct a model for digital transformation that incorporates citizen engagement, drawing the insights from the exiting literature. Accordingly, we utilised the systematic review method that contributing to selecting, analysing and interpreting available literature related to a specific research topic, a research questions or a phenomenon of interest (Nicoletti, et al., 2023). During this phase, we meticulously examined and categorised sentences from the text of each selected article, specifically addressing the characteristics of the change management process in the context of digital transformation involving citizens, by using content analysis technique (Pohontsch, 2019). We then organised analogous content into groups, providing each group with a fitting designation through thematic analysis technique (Braun & Clarke, 2022). Through a thorough review of each included article with a specific focus on digital transformation involving citizens, we identified and formulated the characteristics of the change management process to pave the way for model development.

The data for analysis in this stage contained the selected 33 studies from Liu and Zowghi (2023). In this paper, we used the letter S followed by a number to label the articles included in the systematic review, to report our results and distinguish with those references which are not the study sample in the systematic review. The included articles in the systematic review are listed in (Appendix 1¹).

The change management process of digital transformation involving citizens comprises five main characteristics identified from the systematic review: determining a change initiative, developing a change plan, communicating changes resulting from digital transformation, monitoring the progress of changes, and learning from past lessons. These characteristics help us to develop a model of change management process for digital transformation involving citizens within the five stages see (Figure 1).



Figure 1. A change management process model for digital transformation involving citizens developed in this study.

Determining a change initiative. This characteristics/stage pertains to analysing the necessity of changes introduced by digital transformation and achieving desired outcomes. In study [S3], researchers emphasised the importance of evaluating the capabilities of partners in digital transformation services and the additional values created by digital transformation. This evaluation is crucial as the implementation of digital transformation brings about changes in practices that a large group of people must adapt to. If the initiative cannot convincingly demonstrate the benefits to the targeted audience, the digital transformation implementation may fail before it even begins. For instance, citizens are expected to handle tasks independently when they require services from providers during the initiation of digital transformation [S10, S19]. In contrast, studies [S14, S18] suggest that, to better address citizens’ needs and gain a competitive advantage in the market, organisations must transform into customer-centric operations through digital transformation amidst technological changes.

Developing a change plan. This characteristics/stage emphasises engaging citizens in the preliminary phases of planning for the implementation of digital transformation and shaping alternative ways to achieve the goals. As each citizen has equal power to present opinions, citizen engagement in crafting an implementation

¹ Appendix 1 is available at the following link: <https://www.dropbox.com/scl/fi/xpvi8e2s8zuu04jm0b5hb/Appendix-1.docx?rlkey=v2xo1ldzk2vb4mh6levnk4j5b&dl=0>

plan for digital transformation contributes to strengthening a sense of collectivity to address a common issue, enhancing their trust in the goal [S4, S9, S10, S27]. Capturing voices from citizens helps better shape and reshape the implementation plans for digital transformation that fulfill various needs, making citizens more likely to adapt to changes during the implementation of digital transformation [S6, S8, S14, S21, S22, S26]. Furthermore, clearly defining the results of change and aligning the change with organisational vision and strategy contribute to determining whether or not the implementation of digital transformation achieves the expected outcomes [S13, S14].

Communicating changes resulting from digital transformation. This characteristics/stage involves engaging in communication with citizens and/or stakeholders from the inception of the change. Some studies have reported that citizens were organised in workshops annually to provide new insights and feedback for improvements when new services with changes derived from digital transformation were released [S10]. Similarly, researchers consistently examined citizens' attitudes toward technology to address human factors and resistance to change [S13]. As noted in [S17], communication occurred with both top management and end-users at different stages of digital transformation implementation for change management, contributing to the facilitation of digital transformation projects.

Monitoring the progress of changes. This characteristics/stage concerns assessing the progress of digital transformation implementation and evaluating its success or failure. Researchers have demonstrated that citizens and/or stakeholders (e.g., governments) can easily access services derived from digital transformation [S1, S2, S6, S31] and evaluate whether or not the implementation of digital transformation achieves the expected effects. These effects may include improved participation and collaboration from citizens in civic activities [S2, S24, S27, S28, S30] or the attainment of expected training objectives [S12], facilitated through digital technologies. Some studies have also employed usability evaluations to measure the effects of the digital transformation implementation [S10, S13, S15]. In light of this, partners and/or providers of digital transformation products and services have a better chance to detect deviations and control risks at an early stage [S1]. Meanwhile, citizen engagement in the digital transformation implementation also gives rise to new service paradigms, such as innovations in devices or connectivity for improvements, providing an opportunity to propose new changes [S5, S14].

Learning from past lessons. This characteristics/stage describes how implementers of digital transformation reevaluate and learn from their experiences during the change management process to enhance the execution of subsequent steps. Researchers observed that, in the digital transformation process, implementers tended to focus excessively on technical changes within organisations, with limited attention given to understanding the motivation and capability of citizens in adapting to these changes through the use of digital artifacts [S9]. The ways in which citizens use these artifacts determine the extent to which the expected values of digital transformation can be achieved, emphasising the need to consider these managerial aspects in future digital transformation projects. Moreover, implementers should innovate around new technologies, reconsider their operations, and modify approaches to engaging citizens in digital transformation implementation [S11, S14, S32]. Implementers also derive benefits from prior experiences, enabling them to revise procedures that hinder work process efficiency [S14] and propose improvements to instigate changes at the optimal speed, such as offering incentives to stimulate new digital transformation initiatives [S20].

Case study

The second phase aims to demonstrate the practicability of the developed model used for analysing the change management process of digital transformation involving citizens, providing guidance and reference for digital transformation developer and implementors to better manage changes and implement digital transformation projects. We selected a case study that is well-suited for the scope of this research, as this research method allows for a thorough investigation to comprehend more about an unknown or poorly understood situation, or to generate new insights about a phenomenon (Yildirim, et al., 2022). In the case study, we employed text clustering technique (Mehta, et al., 2024) to analyse the change management process of digital transformation involving citizens based on the developed model, drawing on the data from online open government news related to the case. In light of this, we have a better chance of recognising the main challenges/problems encountered in digital transformation and the strategies used to overcome them. This also provides us with insights and details into how changes were managed in the context of digital transformation involving citizens within the case study. We selected Shanghai as the research site in the case study because this research is supported and funded to investigate digital transformation in the Chinese

context and Shanghai has taken the lead in urban digital transformation in China. This will help in learning the experiences of change management for digital transformation involving citizens from the case study.

The data for the analysis in the case study came from online open government news by visiting Shanghai government's website (<https://www.shanghai.gov.cn/>). We selected the news released in 2023 as a practical example to demonstrate the developed model that can be utilised to analyse the change management process of digital transformation involving citizens from the collected data. By using the keywords "digital transformation" and "citizen engagement" in the search engine of the website, we identified 82 pieces of news. After reviewing their full text, we removed 49 pieces that mentioned only the keyword "digital transformation" or only the keyword "citizen engagement". Finally, only 33 pieces of news (above eighty-eight thousand words in total) remained for text clustering analysis. The title of the news remained for further data analysis is listed in (Appendix 2²).

In summary, the change management process for digital transformation involving citizens was analysed in this study using multiple textual analysis techniques (i.e., content analysis, thematic analysis and text clustering analysis).

Results

This section presents the results of the case study using the model developed in the systematic review for analysing the change management process of digital transformation involving citizens. Here, we focus specifically on the case of the city's digital transformation in Shanghai, to understand the challenges/problems in this process and the strategies to address them.

As mentioned in the Research Method section, the data analysis is drawn on online open government news related to the Shanghai' case study by using text clustering technique (Braun & Clarke, 2022). In this study, we use the tool Weiciyun (www.weiciyun.com) to conduct text clustering analysis, since this tool is convenient, available for its members to use online, and widely applied to analyse Chinese texts. Firstly, we took advantages of the function of the Latent Dirichlet Allocation (LDA) topic model (Jelodar, et al., 2019) in its interface to upload the texts. The LDA approach was used in the present study for two reasons: (1) generally, the words with the highest probabilities within each topic offer a clear indication of the content associated with that particular topic, as inferred from the word probabilities generated by LDA (Jelodar, et al., 2019). This helps us to better identify the most frequently used words related to the five stages of the change management process in the texts to analyse challenges/problems and relevant strategies addressing them. (2) The LDA approach that adds semantic associations to traditional textual analysis (e.g., thematic analysis) enables the automatic identification of latent thematic information within large-scale collected texts without relying on external dictionary-based similarity calculation methods. This approach addresses the challenges related to polysemy and synonymy, enhancing the professionalism of textual analysis in the context of this study. Secondly, we adopted the semi-automatic classification to label the relevant words (namely, the most frequently mentioned five nouns in the texts in relation to each stage of the change management process model for digital transformation involving citizens identified in the systematic review to concentrate the topic of interest and develop insights) identified from the texts for the five stages in the model. In light of this, we identified the most concerned subject contents for each stage of the change management process to better understand the phenomena.

By conducting the text clustering analysis based on the LDA topic model, we thus obtained the relevant words (that were most frequently mentioned in the texts) and TF-IDF scores³ of the subject content for each stage of the process see (Table 2).

Determining a change initiative. Under this subject, "city" was most frequently mentioned in the texts. Digitalisation is changing our society in an irreversible trend, and Shanghai is advancing city digital transformation with the aim of creating an internationally influential digital city. This initiative seeks to explore a new path for the governance of super-sized cities with Chinese stages, and to catalyse and promote digital transformation in other cities. Digital transformation brings the new challenges in areas such as the rule of law and regulations. To address these challenges, Shanghai government continuously strengthens institutional improvement and legal safeguards, contributing to the reconstruction of social management rules in the digital era.

² Appendix 2 is available at the following link: <https://www.dropbox.com/scl/ff/vgzxwfa4ewwzmg3ghgt1/Appendix-2.docx?rlkey=7cwmvfkq4u9tm3yrnoeh5js0z&dl=0>

³ TF-IDF represents the word importance of texts in a corpus, facilitating the identification of texts most relevant to the topic of interests (Kaiser & Ali, 2018).

Table 2. Words and TF-IDF scores of the subject content for each stage of change management process of digital transformation involving citizens

Determining a change initiative			Developing a change plan		
Words	Frequency	TF-IDF	Words	Frequency	TF-IDF
City	168	0.005	Centre	99	0.004
Citizen	127	0.004	internationality	70	0.003
Enterprise	124	0.004	Platform	65	0.003
Community	72	0.003	Domain	60	0.003
Technology	59	0.003	Function	56	0.003
Communicating changes resulting from digital transformation					
Words	Frequency		TF-IDF		
Citizen	137		0.004		
Crowd	77		0.003		
System	67		0.003		
City management	65		0.003		
Idea	53		0.002		
Monitoring the progress of changes			Learning from past lessons		
Words	Frequency	TF-IDF	Words	Frequency	TF-IDF
Community-level	94	0.004	Comprehensiveness	85	0.003
Aspect	42	0.002	Theme	49	0.002
Data	39	0.002	Situation	32	0.002
Representative	37	0.002	System	32	0.002
Intensity	22	0.001	Transformation	29	0.002

Developing a change plan. “Centre” was most frequently mentioned in this subject. In the background of digital transformation, Shanghai adheres to the development ideology centered around the people and integrates the important concept of “People’s City” throughout the entire process of planning, construction, and management. To overcome the challenges from shaping the activities for digital transformation implementation, the government has developed a series of digital transformation plans and policies, guiding enterprises in constructing digital workshops and smart factories, and enhancing the community information infrastructure and intelligent terminal development. Citizens are also invited to participate in the activities related to digital transformation and digital city governance.

Communicating changes resulting from digital transformation. In terms of this subject, “citizen” was also most frequently mentioned in the texts. When achieving certain phased outcomes and progress in digital transformation, stakeholders invite citizens to participate in open days for digital products and educational outreach events. This aims to enhance citizens’ digital literacy and gather their feedback and experiences, thereby further improving digital products and services. Additionally, representatives of the people are organised in the meetings to provide their suggestions and insights for digital transformation. These communication activities help better address the issue of the “digital divide”, advocating for various public services to be digitally accessible for all.

Monitoring the progress of changes. For this subject, “community-level” was most frequently mentioned in the texts. The government persists in conducting satisfaction assessments from community-level and consider citizen satisfaction as the fundamental criterion for handling complaints on digital city governance. With biannual satisfaction evaluations as a key focus, the government prioritises the rectification of issues identified through complaint assessments. It also conducts investigations on social norms such as ethics and morality, and intervenes risks in data governance and privacy by enhancing the construction of standards systems for data, systems, networks, products, and security. Based on these strategies, the government enhances the momentum in advancing various civic digital service initiatives and monitoring in order to improve the satisfaction of community-level.

Learning from past lessons. “Comprehensiveness” was most frequently mentioned in this subject. Through a comprehensive review of the achievements and progress in the city’s digital transformation, insights from the Shanghai’s experience in city’s digital transformation are derived. First, the full implementation of the important concept of “People’s City” is emphasised, integrating people’s democracy into the entire process of city digital transformation. This involves establishing a digital city governance model where everyone participates, takes responsibility, contributes, and shares. Second, leveraging the comprehensive advancement of digital transformation, resources are coordinated to support urban infrastructure construction, community public services, and the development of key industries. This drives comprehensive process redesign, rule reconstruction, and function shaping across various sectors of the city.

Discussion

The present study identified the characteristics of the change management process for digital transformation involving citizens and integrated them into a model that contributes to a better understanding of this process. This model was then further employed in a case study to demonstrate its practicability in analysing the change management process in digital transformation. In this section, we firstly discuss the findings on the change management process identified in this study (from both systematic review and case study). Secondly, we provide implications for both academia and practitioners. Lastly, we outline the limitations of this study that will guide future work.

Extending the understanding on the change management process for digital transformation involving citizens

This study reveals a set of characteristics/stages in the change management process of digital transformation involving citizens: (1) determining a change initiative, (2) developing a change plan, (3) communicating changes resulting from digital transformation, (4) monitoring the progress of changes, and (5) learning from past lessons. Essentially, researchers have developed frameworks for the change management process in their study contexts (Hwang & Low, 2012; Mento, et al., 2002; Sujova & Rajnoha, 2012), assisting us in recognising the commonalities and differences from related studies, as illustrated in (Figure 2). To create (Figure 2), we initially referred to the stages included in related studies on the change management process (Hwang & Low, 2012; Mento, et al., 2002; Sujova & Rajnoha, 2012) and then grouped these stages based on their similarity according to their definitions and descriptions in the text. Subsequently, we utilised the terms explicitly mentioned in the articles to present the stages in the figure. See (Appendix 3⁴).

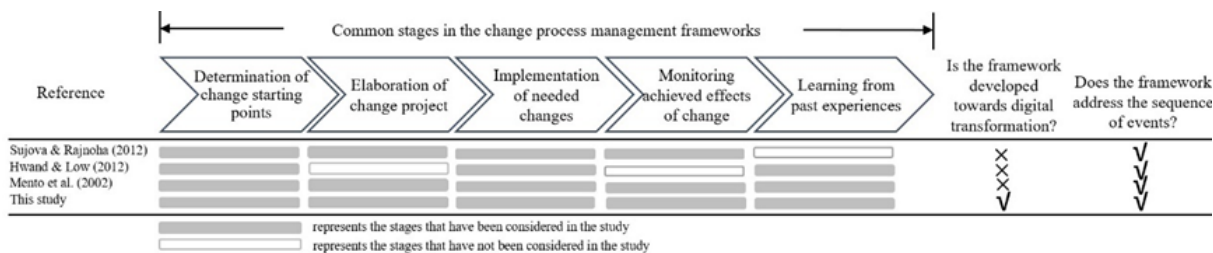


Figure 2. Communalities and differences in the stages of change process management between prior studies and this work.

Several studies have proposed a general framework for change management process, considering the sequence of events in this process as the defining stages of their frameworks (Hwang & Low, 2012; Mento, et al., 2002; Sujova & Rajnoha, 2012). They all viewed change management as a dynamic and interrelated process, where an issue related to the change could trigger or affect other interconnected events. Accordingly, establishing links between these events is a significant enabler to guarantee a successful change management process. Our study thus contextualised the stages of the change management process for digital transformation, supported by citizen engagement, and considered the most common stages in this process. We note that the identified stages of the change management process in this study did not use the same term to describe the stage of “implementation of needed changes” in prior studies (Hwang & Low, 2012; Sujova & Rajnoha, 2012). This is because our study focused on digital transformation involving citizens, and during the implementation of a digital transformation project, change management was addressed through a constant communication with participants to apply the changes. This constant communication can be viewed as an essential element in digital transformation implementation to support change initiation and management, aligning with the results from Mento et al. (2002), in the context of digital transformation.

By using the developed model, we further analysed the change management process in the case study and discussed relevant challenges/problems in each stage of the change management process and strategies used to overcome the challenges/problems. These findings are summarised in (Table 3) that will benefit for developers and implementors of digital transformation to implement and manage changes in order to achieve their expected goals in the digital transformation projects.

⁴ Appendix 3 is available at the following link: <https://www.dropbox.com/scl/fi/ju4ej1biftl3r9fp1x6b/Appendix-3.docx?rlkey=mq6801mtdq1wkimzx6s8nhlpp&dl=0>
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Table 3. A summary of challenges/problems in the change management process of digital transformation involving citizens and strategies used to address them in the case study

Stage of change management process in digital transformation involving citizens	Challenges/problems	Strategies used to address the challenges/problems
Determining a change initiative	Incomplete legal and regulatory framework that aligns with digital transformation	Continuously strengthen institutional improvement and legal safeguards
Developing a change plan	Shaping the activities for digital transformation implementation	Develop a series of digital transformation plans and policies and invite citizens to play their parts in relevant activities
Communicating changes resulting from digital transformation	“Digital divide” that creates the gap between those who have access to online information and digital technologies and those who do not	Invite citizens to participate in open days for digital products and educational outreach events and collect their feedback and suggestions
Monitoring the progress of changes	Issues identified through complaint assessments such as data governance and privacy	Prioritise the rectification of issues based on citizen satisfaction assessments and intervene in risk prevention
Learning from past lessons	Comprehensively practicing the important concept of “People’s City” and promoting digital transformation	Integrate people’s democracy into the entire process of city digital transformation and coordinate resources across various sectors of the city to support relevant activities

Implications of this study

Implications from the theoretical perspective. Theoretical contributions of this study include a systematic review of identifying the characteristics of the change management process and developing a model for the process. This is achieved by considering the commonalities generated from stages included in the change management process from related studies (Hwang & Low, 2012; Mento, et al., 2002; Sujova & Rajnoha, 2012) and contextualising these stages in the specific context of digital transformation involving citizens, which is lacking in the existing literature.

Our findings elucidated the stages of the change management process in a model, revealing it to be a dynamic and interconnected process, which are consistent with prior studies (Hwang & Low, 2012; Mento, et al., 2002; Sujova & Rajnoha, 2012), in the context of digital transformation involving citizens. Challenges emerge in this process, necessitating collaborative efforts for resolution.

The study shows that maintaining constant communication with participants helps land digital transformation in the change management process. This stage, thus, serves as the essence of implementing digital transformation, which is in an agreement with the results reported by Mento et al. (2002).

By using text clustering technique, the present study demonstrated the developed model can be applied to analyse the change management process of digital transformation involving citizens in a case study and gain an insight into challenges/problems in the process and relevant strategies to address them, as presented in the section of Results.

Implications from the practical perspective. Our findings on the characteristics of the changes management process in the context of the study allow digital transformation developers and implementors to realise the role of citizen engagement at different stages of this process. For instance, opinions and feedback from citizens will help (1) determine whether or not it requires changes initiated by digital transformation to achieve citizens’ demands based on the current development situation and investment capability of an organisation, (2) formulate a change plan and revise the change process, (3) improve methods of constant communications to facilitate the implementation of digital transformation, (4) monitor and evaluate the change progress in order to ensure the digital transformation projects that achieve the expected goals, and (5) gain insights into the digital transformation success or failure for improvements. From both systematic review and case study of city’s digital transformation in Shanghai, several implications related to the characteristics of the change management process in future practices are outlined below:

Firstly, the majority of current digital transformation initiatives follow a top-down approach. Introducing gamification in citizen involvement can enhance the potential to facilitate bottom-up digital transformation initiatives. This approach aims to meet citizens’ requirements and enhance the acceptance of digital transformation products and services.

Secondly, when developing a change plan, organisations/communities open up channels for expression and actively listen to public suggestions since citizens are the target audience for digital transformation products

and services. Contingency plans should be established to remedy issues that may arise during the transformation process, utilising intelligent technology to predict risks and intervene early. Meanwhile, thorough investigations need to be conducted to validate the feasibility of digital transformation plans, minimising potential losses in the event of transformation failures.

Thirdly, while the voices from citizens are captured in routine communications during the change management process, it is important to determine whether the problems raised by participants have been addressed. This step is crucial for successfully implementing the changes, such as the updated digital transformation products and services, and enhancing citizens' satisfaction.

Fourthly, organisations/communities should rely on a guideline/checklist to carry out relevant activities for change management and evaluate the change process with predefined targets. Otherwise, it is difficult for organizations/communities to implement the changes and determine their current position and future direction.

Lastly, the lessons learned from prior experiences regarding the root causes of success or failure in digital transformation, supported by citizen engagement, will assist in strategising the change process and developing solutions to address the problems encountered at different stages of the change management process. This helps better achieve digital transformation goals.

Limitations of this study

This study still has a few limitations. Firstly, while we searched for and selected the research publications to ensure the inclusion of relevant studies as much as possible, there may still be some articles not included in the study sample and we might have underestimated the characteristics of the change management process in the context of digital transformation involving citizens. However, the primary sources of this field have been applied to address an exhaustive scope on the topic of interest, covering the potential largest set of peer-reviewed, relevant literature from English language sources identified in our review. Secondly, in the case study we only utilised limited online open documents to conduct text clustering analysis to ascertain the main challenges/problems and relevant strategies used to address them at each stage of the change management process. Further investigations are encouraged to compare the results with our findings in this study through collecting and analysing other relevant documents and transcription texts derived from interviews/surveys focusing on specific questions of the change management process of Shanghai's city digital transformation.

Conclusion

The present study employed multiple textual analysis techniques to examine the change management process of digital transformation involving citizens. Firstly, content analysis and thematic analysis techniques were utilised to identify the characteristics of the change management process from the reviewed papers, resulting in a developed change management process model. A case study on Shanghai's digital transformation involving citizens was then analysed based on this model and text clustering technique to gain insight into the main challenges/problems at each stage of the process and the strategies used to address them. Both theoretical and practical implications of this study are discussed.

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