



Leading Digital Technologies for Coproduction: the Case of “Visit Once” Administrative Service Reform in Zhejiang Province, China

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Abstract

Research on coproduction of public services has grown significantly within the politics and public administration field during the last decade. The existing literature mostly assumes that coproduction requires additional costs from the public. This article explores whether and how digital technologies, which arguably have the ability to reframe public participation, might influence coproduction between the government and the public. A revised theoretical framework for coproduction in the era of digital governance is illustrated through a case study of the “Visit Once” administrative service reform in Zhejiang Province, China. This study reveals a new possibility for coproduction through digital technologies, in which citizens are involved in service improvement when using public services without costing them extra time or effort. Thus, the assumption of the necessity of additional costs from the public could be relaxed in the digital governance era. These findings also suggest that the significance of facilitative leadership in leading to coproduction can be moderated by digital technologies.

Keywords Digital technologies · Coproduction · Public service · “Visit once” · Public participation

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Introduction

With the increasingly productive, complex, and fragmented state of public demand with which governments continue to wrestle, a coproduction approach has reemerged as a better alternative over the last decade [5, 7, 9, 25]. This approach advocates moving away from governments monopolizing public administration [59, 60, 74] and toward governments and the public working interdependently to create public values.¹ Current studies largely assume that the coproduction of public services is inevitably accompanied by extra costs for citizens (e.g. time and effort) [58]. In an atomized society, made up of a collection of self-interested and largely self-sufficient individuals [33], however, such activities without direct benefits are difficult to perform [30], even through compulsory means [72]. In this regard, digital technologies (DTs), which have been progressively recognized as having considerable power to restructure politics, public administration, and public participation in particular [26, 41, 85], could constitute crucial resources that need to be carefully considered and examined.

In recent years, e-government innovation and local governance reform in China has become an important agenda for local policymakers in response to the increasing demand of public service [6, 46, 69]. By unpacking the “Visit Once” administrative service reform in Zhejiang Province, China, which widely adopts DTs and commits to the idea that citizens should interact with the government once at most in order to obtain services, this paper explores how DTs might influence the coproduction of public services in China. The contributions of this study are threefold. First, the study introduces DTs into the study of coproduction, updating the general analytical framework of coproduction. Second, this study finds that DTs—especially big data analytics (BDA)—make it possible for the public to coproduce with the government without additional costs. Third, this study develops an understanding of leadership in coproduction. It will be argued that hierarchical leadership, without a strong capacity to work across boundaries and facilitate collaborations (the emphasis of leadership-related coproduction literature) could also lead to coproduction based on DTs.

This paper first addresses the terminology and identifies a general analytical framework from the coproduction literature. We then propose a revised framework for this research. Following an explanation of method and data, we report the main findings and then discuss overall conclusions and directions for further research.

Theoretical Background and Analytical Framework

In order to explore the relationship between coproduction and DTs within public services, in the current article we first clarify what is meant by the term “co-production,” given the wide variety of theoretical conceptualizations, and then present a general analytical framework for coproduction. Subsequently, we propose a revised analytical framework that integrates DTs and co-production.

¹ Public values mean the interests that the individual and the collective pursue, for example, well-being, the common good, and the just ([54]). They provide “normative consensus about (a) the rights, benefits, and prerogatives to which citizens should (and should not) be entitled; (b) the obligations of citizens to society, the state, and one another; and, (c) the principles on which governments and policies should be based.” ([11])

Coproduction

The concept of coproduction was initially highlighted by Ostrom and Ostrom in the late 1970s, who focused primarily on the efforts of service users to obtain better results [62]. The term then flourished in the 1980s, in the United States, since it provided an alternative for public service provision under severe fiscal pressure (e.g. [15–19, 29, 63, 71]). However, co-production research lagged during the next decade, mainly because managerialism and marketization, derived from neoliberalism, became dominant both in theory and in practice during that period.² Nevertheless, with the increasing complexity of public needs and the relations involved in public services production, the managerial viewpoint (also known as New Public Management) that regards the public as consumers became increasingly inappropriate. In the 2000s, a group of European and Australian scholars rebooted research into co-production, to move away from New Public Management discourse and investigate other possible approaches (e.g. [2, 8, 13, 64, 65]). As a theoretical lens, stressing the cooperation of the public with public service organizations (PSOs), coproduction reemerged and gained additional attention, not only in developed countries [9, 47, 65] but also in developing countries, such as China [37, 42], Brazil [23] and India [55].

The definition of coproduction has varied considerably over the past four decades [4, 14]. These variations exist mainly regarding the range (horizontal) and the extent to which (vertical) interactions between the public and PSOs are evident in coproduction [77].

Concerning the range of interactions, most of the early works on coproduction, intentionally or unintentionally, define coproduction as the co-delivery of public services. It is partly as a result of this that the typology of public service process remained underdeveloped at that time, and the delivery of public service was underscored both in research and in practice. For example, Kiser and Percy [35], Whitaker [78], and Sharp [71] all believed that coproduction is one form of citizen participation in service delivery. Levine et al. similarly understood coproduction as “the joint provision of public services by public agencies and service consumers.” [39] In recent studies, researchers prefer to accept that coproduction covers every possible process within public services.³ For instance, Nabachi et al. define coproduction as “an umbrella concept” that includes the co-commissioning, co-designing, co-delivery, and co-assessment of public services [56]. Bovaird asserts that “the concept of coproduction is not only relevant to the service delivery phase of services management (where it was first discovered in the 1970s) but also can extend across the full value chain of service planning, design, commissioning, managing, delivering, monitoring, and evaluation activities.” [9] In fact, in a seminal article on coproduction, in 1981, the first group of leading scholars on coproduction theory had left room for extending coproduction to other phases of public services. Their primary aim was to “add rigor to our understanding of the effects of coproduction in local service delivery and the processes by which coproductive activity occurs.” [63]

² Jeffrey L. Brudney, one of the leading scholars in the coproduction field, identifies four reasons for the lapse of coproduction research in the 1990s: “the introduction of New Public Management; emerging research on volunteer involvement in government service delivery; the rise of scholarship dedicated to interdisciplinary research on citizen involvement; and the growth of academic programs in nonprofit studies.” [20]

³ There are still exceptions, such as Verschuere et al., who define coproduction as “the involvement of individual citizens and groups in public service delivery.” [76]

The second dimension of coproduction looks at the degree of coordinating. Differing from the consensus above, understanding of coproduction in this respect has not reached agreement thus far. In the early stages, Whitaker proposed that coproduction refers to cooperative action between citizens and the government [78]. However, Sharp contended that coproduction should also involve activities that avoid counterproductive situations such as complaint actions [71]. Brudney and England systematically reviewed the early divergence and defined the coproduction model as “the degree of overlap between two sets of participants – regular producers (e.g. service agents, public administrators) and consumers (e.g. citizens, neighborhood associations), and the resultant overlap represents joint production of services by these two groups, or ‘coproduction’.” [15] Crucially, they set three conditions for activities to be considered coproduction efforts: positive (rather than negative), voluntary (rather than compliant), and active (rather than passive).

After the resurgence of coproduction in the twenty-first century, the debate has continued. Some scholars advocate narrowing the scope of coproduction into an area that is more specific and limited [28, 43]. For instance, Brandsen and Honingh stress that coproduction requires a direct and active contribution from citizens [12]. Boyle and Harris define coproduction as delivering public services within an equal and reciprocal relationship among professionals, citizens using services, their communities, and others [10]. In contrast, another stream of researchers suggests a broader and more encompassing definition of coproduction. Ostrom notes that “coproduction is a process through which inputs from individuals who are not ‘in’ the same organization are transformed into goods and services.” [61] Similarly, Alford and Yates see coproduction as “including not only conjoint activity by both government personnel and citizens/service-users, but also any activity by one which adds value (‘produces’) and is at least partly prompted by some action or behavior of the other.” [4]

Regarding the definition of coproduction, we agree with Brudney and England’s idea that “the issue is not whether the interpretations of coproduction found in the literature are valid, but whether they are useful.” [15] Currently, scholars have not reached consensus on a definition of coproduction. However, two essential and overlapping elements of coproduction might be singled out which are useful for identifying coproduction activities. First, the PSOs and the public jointly contribute, which means coproduction groups the activity of one side and is at least partly prompted by the other side, such as the complaint action highlighted by Sharp [71]. Second, the efforts aim to improve services. Although coproduction efforts may not always generate positive outcomes, the original intention of the efforts should be to contribute to (rather than damage) the services. Nonetheless, some scholars appear to hold the view that the activity we present below is not sufficiently coproductive. We argue that the case maintains the basic elements of coproduction (we expand on this point in the discussion section), although these coproductive facets are largely government-managed. Given the global trend of adopting DTs within public governance, we believe that it is necessary for researchers to discuss how the theory and practice of coproduction might evolve when facing increasingly digitalized public services.

Voorberg et al. list the eight most discussed impact factors for coproduction, on both sides. The impact factors on the PSO side include the compatibility of PSOs with public participation, an open attitude toward engaging the public, a risk-averse organizational culture, and the presence of clear incentives. Those on the public side include citizen

characteristics (e.g. skills, marital status, and educational background), the feeling of ownership of a public service, the presence of social capital, and risk-averse thoughts [77]. Therefore, based on Voorberg and his co-authors' systematic review of coproduction, it is possible to outline a general analytical framework for coproduction (see Fig. 1). It becomes evident that these influential factors build upon the cognition and capacity domains, which are profoundly embedded in PSOs or the public.

Digital Technologies for Coproduction

Digital technology, in general, refers to all types of electronic equipment and applications that use information in the form of numeric code, including information and communication technology (ICT), the prevalent big data analytics (BDA), etc. The literature on using DTs in the public sector has grown exponentially over the last decade, in particular after Dunleavy and his co-authors' milestone work, which ambitiously predicts the death of New Public Management and the rise of Digital-Era Governance [26].

The idea that technology could benefit coproduction emerged in the 1980s. In one of the seminal works on coproduction, Kiser and Percy argued that technology is one of the three key factors (alongside economics and institutional constraints) that limit the degree of coproduction within public services, because it determines the feasibility of coproduction activity [35]. However, during that time, privatization and marketization were the dominant concepts in mainstream public administration research [1]. Therefore, neither coproduction itself nor the technology for coproduction attracted enough academic attention. During the last fifteen years, with coproduction as an idea revitalizing, as well as the growth of Internet usage, some researchers have begun to reassess the role of technology, especially DTs, in the coproduction of public services (e.g. [3]). A few scholars held the opinion that the widespread use of DTs in public governance recalls the coproduction mode [47]. For example, Clark et al. argue that "Innovations in how government services are delivered in the 2010s, especially the use of new

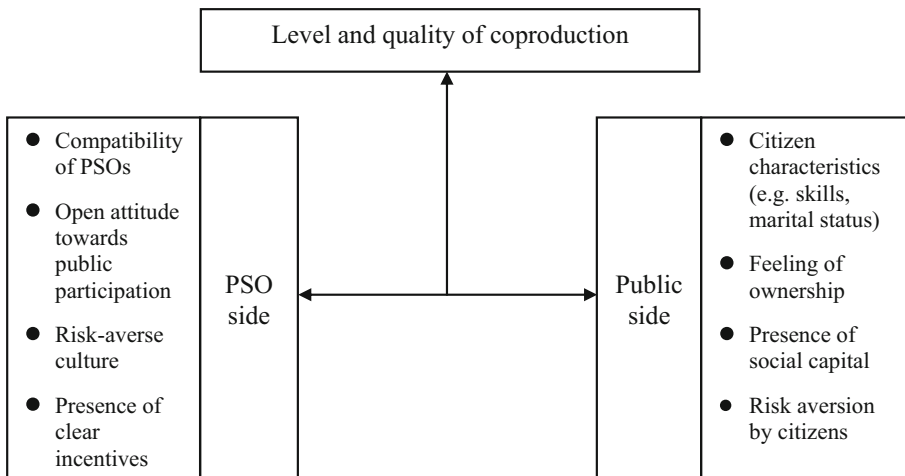


Fig. 1 General analytical framework for coproduction. Adapted from "A systematic review of co-creation and co-production: Embarking on the social innovation journey" [77]

electronic communications technology, have brought coproduction back to the fore, both as a service delivery option and as the subject of academic inquiry.” [25] In any case, by analyzing current studies that link DTs with coproduction, we find that most of the literature, in line with the traditional arguments in early works [63], assumes, or empirically supports, the positive effects of using DTs in coproduction. Three groups of advantages are highlighted.

First, DTs enrich the channels of coproduction. Based on evidence from the Netherlands, Meijer states that new media derived from DTs, such as networking and long-distance communication, can create virtual platforms for “networked coproduction of public services,” boosting the knowledge and information exchange between citizens and government [47–50]. Social media tools based on DTs are effective channels for integrating information and opinions and can facilitate collaboration between citizens and policymakers for public governance [51, 57]. In a recent study, Mergel demonstrates that OI platforms such as [Challenge.gov](#), run by the US federal government, where both government and citizens can present statements and exchange ideas, provide a new conduit for coproduction of public services [52]. Other digital technologies—like visualization tools in participatory planning and virtual learning platforms for land and water governance—are also understood to be additional means to help collate the opinions of various actors in their own professional areas (e.g. [45, 68]).

Second, DTs reduce the cost of citizen involvement in coproduction. Citizen participation is a primary component of coproduction [21]. However, it has associated costs for PSOs and the public. For PSOs, citizen participation requires high administrative costs, or what economists call transaction costs. Even acting as a facilitator, such as organizing meetings, could potentially be costly. To make their voice heard, citizens should devote time, effort, and attention. In this respect, DTs such as ICT are regarded as an alternative, to reduce the cost of coproduction, since they diminish the restrictions of time and space concerning citizen participation [26, 50]. Roberts explores the US Patent and Trademark Office’s Peer-to-Patent pilot program and the online relief effort in Haiti, discovering that Web 2.0 technology is an economical method to enable coordination across sectors [67]. In another study, Chatfield and Reddick show that by introducing digital and mobile systems, the operational fee for Houston 311 on-demand services (for non-emergency police and government services in the US) has saved \$500,000 per year [24].

Third, DTs extend the communities of coproducers. Clark et al. explore the Boston 311 on-demand services in the US and find that appropriate use of DTs can encourage additional groups into coproduction of public services. For instance, they demonstrate that by designing an application for smartphones, a growing number of students/youth contribute to coproducing public services, since smartphones have become so widely used among this group [25]. Margetts and Dunleavy mention another case, in Sweden, in which the online “social Web” advances the care of mentally disabled people from state professionals caring toward the use of combined care circles, containing both professionals and family/friends [44].

In contrast, some scholars question the benefits of integrating DTs into the coproduction of public services. One of the critical problems for DTs in coproducing is the “digital divide,” which refers to the gap between the “technology haves and have-nots” caused by the lack of computer access, Internet access, and technological expertise [34]. Several academic works have highlighted that the broad adoption of DTs would

isolate additional groups of people who have no access to the Internet and digital equipment, extending the inequality within political participation [32]. For example, Schradie observes a growing class-based gap in online coproduction in a survey of American adults, because poor and working-class citizens have less access to technological resources [70].

Other cautious arguments concerning the adoption of DTs in public governance may also be applicable for coproduction. By testing the promise of DTs in policymaking in the US, Rethemeyer finds that DTs such as electronic discussion networks reinforce the authority of the existing actors, rather than empowering new groups to reshape the existing structure. Moreover, he posits that deploying DTs may increase the financial burden on governments instead of achieving cost reduction, for instance investing digital infrastructure requires the use of public money [66]. The emerging application of DTs, particularly BDA, has shown its potential in eliciting information that is virtually undiscoverable [36]. Given that, the influence of DTs in coproduction may also need to be updated.

Our guiding research question then naturally arises: How might DTs, especially the newly-introduced BDA, enhance coproduction? Most significantly, in this article, we would like to examine whether coproduction happens under the influence of BDA, and in what ways BDA leads to coproduction of public services, apart from widening channels, decreasing costs and absorbing diverse coproducers.

Based on a review of the literature, we develop a revised analytical framework for coproduction by adding "technology" as an independent factor outside the PSOs and members of the public (Fig. 2). Second, we propose that, in the era of digital governance, technology, and DTs in particular, could serve as a potential intermediary between the government and the public, and might create a new form of public service coproduction. Therefore, we explore how the latest progress in technology, DTs, could be adapted into public governance and then contribute to coproducing a service.

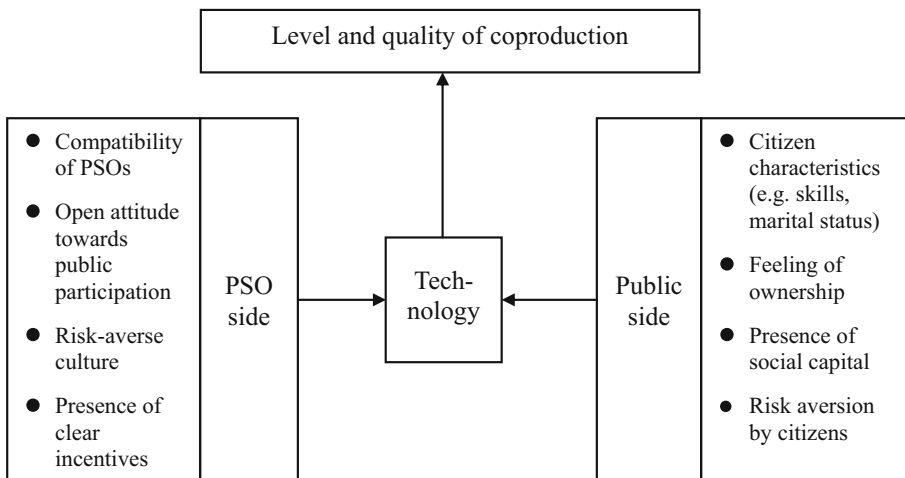


Fig. 2 Revised analytical framework for coproduction in the digital governance era. Adapted from "A systematic review of co-creation and co-production: Embarking on the social innovation journey" [77] and revised by the authors

Method and Data

Method

The present study adopts a single case design, which is a commonly-used approach to applying, testing, or building theories [83]. Specifically, the advantage of the single case study is that it can confirm, challenge, or extend existing theories by examining propositions or revealing other possible relationships between different elements. [31, 83]. The single case approach may generate more complex theories, because it applies concepts to more specific details of the case, while the multiple case study approach focuses on overlapping/common features among the cases. [27]. Therefore, a single case study could contribute to theory development when the case is seen to have the potential to adjust current theories [75].

There is, however, one inherent limitation of the single case method, i.e. that the findings of single case studies are difficult to extend to a large population of cases, namely, the lack of generalizability [83].

In order to explore the potential and the mechanisms of DTs contributing to coproduction, the single case approach is arguably suitable. The reasons are twofold. First, the initial goal of this study is to ascertain whether DTs, particularly the newly-adopted ones, facilitate coproduction as previous research has stated, and the single case study method is especially useful for testing extant theories. Second, this study primarily attempts to uncover probable new pathways for DTs to advance coproduction. The single case approach, as noted above, could serve as an appropriate way to extend existing understanding. Given the purposes of this study, the current research concentrates more on the theoretical value of “illuminating and extending relationships and logic among constructs” [27], rather than the value of representativeness.

Data

The empirical case in this research is the “Visit Once” (VO) administrative service reform in Zhejiang Province, China. Administrative service here refers to the services directly provided by administrative departments, such as registering real estate, social security, issuing business licenses, and personal identification. According to the official definition, VO means that citizens obtain one service by physically interacting with the government once, or even without physical interaction, when meeting requirements. This reform especially highlights “one service” from the citizens’ perspective. In practice, “one service” from the government’s perspective is commonly regarded as one service item of one department, such as the land registration service provided by the land resource department. However, “one service,” from the citizens’ perspective, sometimes includes several service items offered by different departments. For example, buying a house relates to at least three service items offered by three departments, i.e. land registration by the land resource department, property transaction permits by the housing department, and tax payment by the tax department, but citizens may understand these items as “one service” that should be provided by the government.

The case has been chosen because: (1) Coproduction of public services is necessary, since the government needs to involve citizens to redefine "one service." (2) DTs, including the popular BDA, are widely adopted in VO. (3) Several surveys conducted by the evaluation agency and third-party organizations show that VO is a good practice, as it brings considerable satisfaction gains and experience improvement for citizens.⁴ Through investigating this case, we are able to provide a cutting-edge answer to the research question.

This study incorporates three data sources. First, the documents analyzed encompass published official documents (such as operational plans and regulatory frameworks), unpublished official documents (such as intra-organizational procedures, meeting summaries, and internal references), third-party assessments, survey reports and research articles on VO. We used content analysis to gain preliminary knowledge about VO and the adoption of DTs in VO. Specifically, published official documents were studied to ascertain the definition of VO, the plan for VO reform, and the relationship between VO and DTs. Unpublished official documents were analyzed to identify the division of tasks within different departments and the operational mechanisms in practice, helping to locate the organizations and actors in charge of employing DTs in VO. Third-party assessments were consulted to learn the outcomes of VO reform and the impact of DTs. Survey reports were inspected to understand the current features of DTs in VO. Research articles were reviewed to redraw the map of VO reform, as well as the process for deploying DTs in particular (such as the starting point, the turning points, the drivers and the barriers, etc.).

Moreover, we conducted five face-to-face interviews with government officials during November 2017 and June 2018. The elite interviews were in-depth and ranged between 90 min to 150 min in length. The interviewees comprised the key actors that introduced DTs and utilized DTs in VO. Table 1 reports the position of respondents, their roles in VO, and the content of each interview. The contextual nature of the interview data allows us to reconstruct more detailed and comprehensive images of this reform, especially the adoption and application of DTs in VO. After data cleaning, we held discussions with six researchers and government officials with in-depth knowledge of VO, between August 25, 2018, and August 28, 2018, to double-check our understanding. Two of them acted as policy entrepreneurs⁵ in this reform.

Third, we used participant observation. We visited two of the administrative service centers in Zhejiang Province on October 12, 2017, and December 13, 2017, respectively and observed how DTs were used to involve people in improving service quality. The participant observations allowed us to develop a more intuitive understanding of the application of DTs in VO.

It might be asked how we managed to maintain the unbiasedness of the data obtained. Biasedness is also one of the disadvantages of the single case approach [38, 83]. In order to safeguard the credibility of the data collected, the data gathered from documents, the interviews, and the participant observations were triangulated.

⁴ From June 2017 (three months after VO formally launched) to December 2017, the satisfaction rate of citizens with the administrative service in Zhejiang Province increased by 7.8% (based on [80, 86, 87]).

⁵ "Policy entrepreneurs" refers to the advocates of policy changes [53].

Table 1 List of Interviews

Interviewee(s)	Role in VO	Content (Focus)
The Party Secretary of Zhejiang Province	Initiator, Promoter	The background of proposing VO, the reasons for introducing DTs into VO
The director of Zhejiang Commission Office of Public Sector Reform (ZCOPSR)	Principal Implementer, Coordinator	The process of carrying out VO, the expected roles of DTs in VO
The chief of Division of Administrative Reform in ZCOPSR	Key Implementer, Coordinator	The process of introducing DTs into VO from the perspective of the institution and policy, the use of DTs in VO
The director of Data Management Center of Zhejiang Province (DMCZP hereafter)	Manager of DTs	The process of introducing DTs into VO from the technical perspective, the use of DTs in VO
The group of Zhejiang Comprehensively Deepening Reform Commission Office (Zhejiang VO Reform Office)	Research and Consultation Organization	The influence of DTs in VO

Digital Technologies and Coproduction in VO

Introducing DTs into VO

On December 27, 2016, VO was officially proposed at the economic work conference of Zhejiang Provincial Party Committee, known as one of the most critical annual activities for strategic planning in decentralized China [82]. During this meeting, the Zhejiang Provincial Party Committee and Zhejiang Provincial Government proposed the VO reform and chose DTs to be the primary tools for achieving VO. DTs were introduced because the reformers strongly believed that reforming the public sector through adopting DTs was the most painless and effective means with the fewest barriers, and when compared with other places, Zhejiang had stronger external DT support, of which the reformers aimed to take full advantage.

As a crucial decision made by Zhejiang Province, the idea of VO was substantially unfolded in the follow-up work under the upward accountability system [40, 81, 84]. At the end of February, 2017, the Zhejiang Provincial Government published the *Operational Plan for VO Reform in Zhejiang Province*, pointing out that “‘Visit Once’ as the principle and object...making the best use of ‘Internet Plus Administrative Service’ and BDA...let the data transmission take the place of people physically interacting with administrative departments.”

Three key projects that related to leading DTs for coproduction were conducted. First, the intra-governmental data-sharing mechanism was built. One of the basic requirements of data transmission replacing physical interaction was that data would be able to travel freely among different agencies. Therefore, the Zhejiang Provincial Government established the *Regulation on Public Data and E-Government Management*, which states that governments and departments at all levels have an obligation to share data with each other, and that this digital information shares the same legal status

as the hard copy. This data-sharing mechanism directly led to the second scheme: developing the Zhejiang Province VO reform data-sharing platform.

For the purpose of bridging the information across different departments and across all levels of governments, it was necessary to have a platform with unified protocols and ports for public data exchange. Thus, the DMCZP set up the provincial data-sharing platform by seeking support from third parties such as AliCloud, the computing support group of Alibaba.

The third critical project was to improve the non-contact service platforms. Before VO reform, the administrative service centers were the most frequently-visited places for the public to obtain services. Citizens seldom used the non-contact service platforms, although the local government had devised an online service platform called Zhejiang Administrative Service Network and the 12,345 administrative service hotlines. For VO, the ZCOPSR and DMCZP invited several technological groups, including Alipay and Ant Financial, to update these existing platforms to be more service user-oriented and to combine administrative services with other frequently-used mobile applications such as Alipay and WeChat.

Digitalizing Administrative Service Behaviors in VO

When deploying the digital governance infrastructure, Zhejiang Government carried out an essential job: digitalizing administrative service behaviors. This task was led by DMCZP, covering most of the behaviors within the provision of administrative services. In relation to the public, the information included the service used, the time when citizens requested the service, the duration of time from request to receiving a response, the platform they choose, the waiting time from arriving to interacting with the frontline workers (applicable to contact-based service platforms), the search history (applicable to non-contact service platforms), the access pathway, and the satisfaction rating. Concerning the government, the steps through which services moved, the type of work, the time taken to respond, the corresponding officials involved at each step, and how the service was delivered (such as by email or by express) were coded.

However, when put into practice, DMCZP encountered some difficulties. One aspect of the problems was the standard of data. Governments and departments at all levels in Zhejiang Province mostly had their own systems. The frameworks, the data structures, the data units, and the protocols, varied significantly from one to another. The other part of the problem came from opposition by some governments and departments, since once digitalized, most of their powers would be limited in a rigorous and logical system that narrowed their autonomy considerably. Meanwhile, their movements would be supervised by an outside organization, thereby constraining the shirking of duties and engagement in corruption.

In order to advance this work, the directors of DMCZP and ZCOPSR jointly reported this issue to the governor of Zhejiang Province. The governor ordered every government and department in Zhejiang Province to participate in the digitalization work positively. The governor then organized several meetings to discuss a unified standard of digitalization, and in the meantime, he also supervised the work of digitalizing service behaviors in practice.

It is worth mentioning that the digitalization task deals with both contact-based service platforms and non-contact service platforms. This is possible because the

behaviors that happen on contact-based service platforms, even though they are physical actions, are recorded as digital information once the citizens interact with the government which has been equipped with computers.

Coproducing through DTs in VO

In VO, coproduction elements emerge in multiple DT-based activities. These activities can be divided into two types, based on whether additional costs arise for the public or not. Additional costs here refer to the costs that citizens pay to coproduce public services along with the government, aside from the costs for using the services. For example, to co-design a public policy, citizens may need to spend time participating in discussion with policymakers. They may also make an effort to do research about the policy in advance. For citizens as service users, time and effort are the additional costs. Coproducing without additional costs means that the citizens coproduce with the government simply by using public services. Coproduction is the positive externality of service using.

The first type is the activities that the citizens participate in with extra costs. VO stresses “one service” from the citizens’ perspective. Hence, at the beginning of VO, citizens were invited to help redefine “one service.” In this phase, the public co-designed along with the government through multiple methods, e.g. the hotline, the online message board, the administrative service application on mobile devices, the WeChat official account, and questionnaire surveys. When VO was put into practice, the government set up multiple channels to attract the public to advise on service delivery. Except for the suggestion window for VO in the administrative service centers, other channels were all DT-based, such as the “I make a suggestion for VO” section on the homepage of the government official website, Weibo (Chinese twitter)/ WeChat account of governments in Zhejiang Province and the welcome page of the mobile administrative service application. The citizens who had used administrative services were also asked to evaluate their experience via DTs. In the administrative service centers, users were invited to rate their satisfaction with the electronic equipment connected to the data-sharing platform. On the non-contact service platforms, similar evaluation questions were presented when the service procedures concluded.

The second type of DT-based activities that incorporates coproduction elements involves the public in service improvement without extra costs. In VO reform, all citizens’ behaviors during service use were, to the largest extent, coded or re-edited (applicable to historical information) as standard data. The data on citizens’ behaviors was not just numbers, but also carried much information. For instance, the access time, the selected platform, the search history online, etc. all conveyed the preference and priority of the public. As another example, the waiting time and the duration from applying to receiving a response could reflect the efficiency of a service center and the effectiveness of the service if other related data were controlled, such as the number of officials working on that day and how many steps the service required.

Zhejiang Provincial Government introduced BDA and built appropriate mathematical models by seeking support from specialists and technological teams. By doing so, the data on citizens’ behavior was applied to improve the quality of public services. In the phase of redefining “one service” from the users’ perspective, previous data were analyzed by BDA to indicate which service items were strongly correlated in time or space, since those items

were very likely to be "one service" in the citizens' view, and could then contribute to identifying public opinion. Additionally, the data also showed which services were provided more frequently than others, contributing to prioritizing public need.

Once VO reform was put into operation, additional data concerning service use were collected. The government utilized the fresh data to examine the list of "one service" and to check the "lagged points" in each service, and then redesigned the unsuitable procedures. More specifically, by comparing the correlation matrix of different service items with previous ones, the government updated the list of "one service" instantaneously. Through checking the waiting time and response durations for each item, the government explicitly uncovered problematic service items and revised the service flows. In addition, the data on service use were employed to improve the delivery of administrative services. To explicitly match citizens' preferences, the government analyzed the data of service frequency, the time when citizens sought services, the channels they used, the places they chose (if accessing via contact-based platforms), and then rearranged the public resources according to the results. This process included relocating the workforce onto different channels, revising the service time, and reorganizing the configurations of the centers and the online pages.

The government also created an intelligent management system based on BDA and machine learning to monitor the real-time data about service use in administrative service centers and on non-contact service platforms. Once a specific data point exceeded the preset value (mostly according to unsupervised machine learning), the decision support subsystem would be activated automatically. Then, the government officials who were in charge of the center or platform would be informed, with multiple proposed schemes, thereby contributing to the fine adjustment of public resources. Additionally, the government also imported the data and the BDA into assessment work. The evaluation department analyzed the duration for citizens from applying for the service to receiving a response, combining this with the complexity level and the corresponding department for each item within this service. Then, the evaluation department scored and rated the performance of each government department in VO. In this sense, the behavior of using administrative services, which used to be a one-way exchange (producer to client), once digitalized, became a reciprocal process. With the help of DTs, citizens contributed to the improvement of service quality merely by utilizing public services, without incurring additional costs.

Discussion

This case highlights that DTs may lead to coproduction of public services in two ways. First, DTs open up new channels for coordination between the government and its citizens and make public involvement easier and broader. Current studies have, to some extent, noted these ideas, since non-contact interaction is one of the most crucial characteristics of DTs, particularly ICT, for extending the limits of time and space.

Second, we argue that through this case one might be able to identify a new possibility for coproduction through DTs, i.e. that DTs could extract the latent information on service using, which would help the government to understand public opinion and preference better, and might then contribute to the improvement of service quality. Within this process, citizens express their ideas and coproduce with the government without additional costs, merely by

using public services, as with the “vote with their feet” model in public choice theory.⁶ These activities could be regarded as coproduction efforts, because they maintain two fundamental elements of coproduction: behavior outside the government is conjoint with agency production, and these activities attempt to improve service quality. As for the former element, citizens’ behaviors regarding service use impact service production through DT support, together with the endeavors of the government. As for the latter element, in the VO case, the efforts that the government makes to utilize DTs to bring the public back do seek to ameliorate service quality.

However, some studies suggest that the active involvement of the public is also a necessary feature of coproduction. For example, Brudney sees coproduction as active participation by either individuals or groups in the delivery of services [15]. Similarly, Bovaird understands coproduction as providing public services through the active involvement of professionals, service users, and other members of the community [8]. Researchers have been concerned with the attitudes of the participants, because this may make a difference to the outcome. Whether the participants engage knowingly and voluntarily in coproduction is a central issue. Why would individuals be reluctant to engage in service improvement, which is normatively good? The answer rests with the cost. Once people are asked to contribute to the public good substantially, additional costs such as time, effort, or even money, are usually needed. When considering the cost-benefit, some people would choose to be free riders rather than to devote themselves to advancing public services. In this sense, we agree with Brudney and others’ consideration that activities with passive public participation should not be incorporated into coproduction, since passive participation sometimes contradicts the second element of coproduction which is “aiming at service improvement.” However, in this case, the new possibility for coproduction through DTs does not require additional costs from citizens, so the question of participants’ active or passive participation does not arise.

Based on this evidence, the spectrum of coproduction is expected to be broadened when introducing DTs as a new impact factor. The existing literature has revealed that for coproduction the public invests additional time and effort in service improvement because extra costs used to be a prerequisite for the citizens to make a contribution. In the era of digital governance, employing DTs—particularly BDA—revises this precondition for public participation and makes coproduction without additional costs for citizens possible. As for the government, to neutralize citizens’ costs, it needs to invest more resources in deploying DTs and conducting digital governance reform. Indeed, the costs for the government increase. In the VO case, they mainly result from the digital infrastructure (the data storage and sharing platform, for example), the development of the smart system (the mobile application and BDA models, for example), and the workforce for cleaning the historical data and maintaining the system. In the short term, introducing DTs does increase the government burden. However, from the long-term perspective, utilizing DTs in public services is of importance for coproduction, not just due to the growing cost of mobilizing and organizing people, but because of the difficulties in leading people with diverse, fragmented, and even conflicting perspectives toward reaching common ground.⁷ Although

⁶ “Vote with their feet” is also known as “foot voting.” It refers to expressing preferences through actions, by voluntarily participating in or withdrawing from an activity, group, or process (see [73]).

⁷ Here, we are not arguing that coproduction without additional costs for citizens would or should replace the traditional approaches of coproduction. We suggest that technology-driven coproduction could be an effective supplement.

DTs cannot directly develop a comprehensive understanding of collective preferences, they may provide a supplementary approach for coproducing public services via uncovering some underlying dimensions of public needs in an increasingly complex world.

This case also shows that DTs do not always result in a digital divide, which is a potential catalyst for inequality. As for those technologies which call for knowledge, skills, and access—such as the Internet and smart mobile devices—these may produce group bias. In relation to the use of BDA in this case, it does not block any individuals or communities outside the service circle, since it transfers the behaviors of all service users into a group of numbers, no matter what knowledge and skills they have and regardless of whether or not they gain access to services via the Internet or technological devices. To some extent, this indistinctive digitalization of the behaviors of service users may minimize selection bias, which most other means of public opinion-gathering cannot achieve.

Besides, the process of adopting DTs for public participation without additional costs illustrates that hierarchical leadership based on authority and mandates might also promote the coproduction of public services, which challenges the argument that cross-sector leadership such as facilitative leadership is pivotal in supporting collaboration in the absence of a neutral shared space for coproduction. For instance, Bussu and Galanti found that facilitative leadership is the most appropriate leadership style for the coproduction process [22].

Nonetheless, DTs, similarly to other policy instruments, are a double-edged sword. Several other parameters should be maintained to introduce DTs for coproduction of public services. Based on this case, three key factors could be extracted: leaders' support within government, technological support from outside, and an effective implementation system. Otherwise, DTs may fail to facilitate coproduction, and even harm public interest. Of particular concern is the "tyranny of the data," such as the neglect of the rights and interests of special groups (e.g. disabled people), because the small amount of data would be, without specific settings, treated as random errors within BDA. Even worse, if there is a lack of specific constraints on the government's power to use DTs, the state authority could employ these as weapons to control society, e.g. by developing a universal surveillance system. Furthermore, even if DTs are well adopted, there are still inherent limitations of using DTs for public governance, including coproduction, because public values arguably cannot be read off through the formulation of algorithms. A recent report released by the Nuffield Foundation identifies four fundamental tensions between the service provided by DTs and the shared societal and individual values of all members of society: accuracy versus fair and equal treatment, personalization versus solidarity and citizenship, quality and efficiency of services versus privacy, and convenience versus self-actualization and dignity [79].

Conclusion

There are few studies addressing the use of digital technologies (DTs), especially the latest big data analytics (BDA), in coproduction. This study aimed to reveal how fast-developing DTs link to and influence the coproduction of public services in the era of digital governance.

The article proposed a revised analytical framework, by adding in technology as an impact factor between public service organizations (PSOs) and the public within

coproduction. The results of the case analysis suggest that the role of DTs in coproduction is not only to carry information that helps to make additional voices heard by PSOs, or to ensure that political signals are better received by the public; rather, it shows that DTs can potentially act as an intermediary that reshapes the interaction between the two sides in coproduction. Hence, the revised framework for coproduction in the digital governance era is appropriate.

This article also illuminated an underdeveloped aspect of coproduction—the public becomes involved in coproduction without extra costs. Through adopting DTs in public services, particularly BDA, the public can contribute to the improvement of public services when using these services, and PSOs could coproduce with the public by analyzing the data on service use, instead of creating mechanisms and platforms to nudge or mobilize the public. Therefore, the theory of coproduction of public services in the era of digital governance requires modification in the following two ways: (1) the assumption that public participation needs additional costs could be relaxed and (2) the necessity for facilitative leadership can be neutralized.

While this work contributes to a greater understanding of coproduction in the digital age, there are still several avenues for further study. First, from a macroscopic point of view, researchers should pay closer attention to those developing countries which are embracing DTs to reform public governance and have “the late-development advantage” in digital governance initiatives, such as China, India, and Ghana. Their experience may shed new light on the question of how coproduction of public services is achieved via DTs, outside the Anglo-Saxon context. Second, at the micro level, further research could focus on revealing the conditions and circumstances in which DTs are effectively employed and reinforce the coproduction of public services between the government and the public (e.g. to identify appropriate environmental settings, institutional arrangements and specific scenarios for coproducing through DTs). In order to achieve these objectives, comparative case studies and quantitative studies are needed. Third, further research could also microscopically examine the detailed performance of different DTs in coproduction of public services, instead of generally arguing that DTs promote or hinder coproduction, since neither performance nor DTs is homogeneous. Last but not least, future studies should carefully consider public values and the accountability of employing DTs in moving coproduction to new forms of expression in a digital age. Does using DTs in coproduction of public services always create public value? If not, how might the tension between utilizing DTs and creating public value in coproduction be relieved? Where is the boundary of DT-driven coproduction? What accountability system is needed to regulate the use of DTs in coproductive activity? Although this research views DTs as stimulators of coproduction, the negative externalities of DTs and the possibility of the misuse of DTs should be systematically studied.

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References

1. Alford, John. 1998. A public management road less travelled: Clients as co-producers of public services. *Australian Journal of Public Administration* 57 (4): 128–137.

2. Alford, John. 2002. Defining the client in the public sector: A social-exchange perspective. *Public Administration Review* 62 (3): 337–346.
3. Alford, John. 2002. Why do public-sector clients coproduce? Toward a contingency theory. *Administration & Society* 34 (1): 32–56.
4. Alford, John, and Sophie Yates. 2016. Co-production of public services in Australia: The roles of government organisations and co-producers. *Australian Journal of Public Administration* 75 (2): 159–175.
5. Aligica, Paul Dragos, and Vlad Tarko. 2013. Co-production, polycentricity, and value heterogeneity: The Ostroms' public choice institutionalism revisited. *American Political Science Review* 107 (4): 726–741.
6. Balla, Steven J. 2017. Is consultation the "new Normal?": Online policymaking and governance reform in China. *Journal of Chinese Political Science* 22 (3): 375–392.
7. Bifulco, Robert, and Helen F. Ladd. 2006. Institutional change and coproduction of public services: The effect of charter schools on parental involvement. *Journal of Public Administration Research and Theory* 16 (4): 553–576.
8. Bovaird, Tony. 2005. Public governance: Balancing stakeholder power in a network society. *International Review of Administrative Sciences* 71 (2): 217–228.
9. Bovaird, Tony. 2007. Beyond engagement and participation: User and community coproduction of public services. *Public Administration Review* 67 (5): 846–860.
10. Boyle, David, and Michael Harris. 2009. *The challenge of co-production: How equal partnerships between professionals and the public are crucial to improving public services*. London: NESTA. Access http://assetbasedconsulting.co.uk/uploads/publications/The_Challenge_of_Co-production.pdf. Accessed 18 Nov 2018
11. Bozeman, Barry. 2007. *Public values and public interest: Counterbalancing economic individualism*. Washington, D.C.: Georgetown University Press.
12. Brandsen, Taco, and Marlies Honingh. 2016. Distinguishing different types of coproduction: A conceptual analysis based on the classical definitions. *Public Administration Review* 76 (3): 427–435.
13. Brandsen, Taco, and Victor Pestoff. 2006. Co-production, the third sector and the delivery of public services. *Public Management Review* 8 (4): 493–501.
14. Brandsen, Taco, Victor Pestoff, and Bram Verschuere. 2012. Co-production as a maturing concept. In *New public governance, the third sector, and co-production*, ed. Victor Pestoff, Taco Brandsen and Bram Verschuere. New York: Routledge, 1–10.
15. Brudney, Jeffrey L., and Robert E. England. 1983. Toward a definition of the coproduction concept. *Public Administration Review* 43 (1): 59–65.
16. Brudney, Jeffrey L. 1984. Local coproduction of services and the analysis of municipal productivity. *Urban Affairs Quarterly* 19 (4): 465–484.
17. Brudney, Jeffrey L. 1985. Coproduction: Issues in implementation. *Administration & Society* 17 (3): 243–256.
18. Brudney, Jeffrey L. 1986. The SBA and SCORE: Coproducing management assistance services. *Public Productivity Review* 10 (2): 57–67.
19. Brudney, Jeffrey L. 1987. Coproduction and privatization: Exploring the relationship and its implications. *Journal of Voluntary Action Research* 16 (3): 11–21.
20. Brudney, Jeffrey L. 2018. *Consumption is not the same as production: Amplifying involvement and effectiveness in coproduction. Presentation on the international workshop on co-production of public services under the comparative at Zhejiang University, December, 21–22. China: Hangzhou.*
21. Bryson, John M., Kathryn S. Quick, Carissa Schively Slotterback, and Barbara C. Crosby. 2013. Designing public participation processes. *Public Administration Review* 73 (1): 23–34.
22. Bussu, Sonia, and Maria Tullia Galanti. 2018. Facilitating coproduction: The role of leadership in coproduction initiatives in the UK. *Policy and Society* 37 (3): 347–367.
23. Chaebo, Gemaël, and Janann Joslin Medeiros. 2017. Conditions for policy implementation via coproduction: The control of dengue fever in Brazil. *Public Management Review* 19 (10): 1381–1398.
24. Chatfield, Akemi Takeoka, and Christopher G. Reddick. 2018. Customer agility and responsiveness through big data analytics for public value creation: A case study of Houston 311 on-demand services. *Government Information Quarterly* 35 (2): 336–347.
25. Clark, Benjamin Y., Jeffrey L. Brudney, and Sung-Gheel Jang. 2013. Coproduction of government services and the new information technology: Investigating the distributional biases. *Public Administration Review* 73 (5): 687–701.
26. Dunleavy, Patrick, Helen Margetts, Simon Bastow, and Jane Tinkler. 2006. New public management is dead—Long live digital-era governance. *Journal of Public Administration Research and Theory* 16 (3): 467–494.

27. Eisenhardt, Kathleen M., and Melissa E. Graebner. 2007. Theory building from cases: Opportunities and challenges. *Academy of Management Journal* 50 (1): 25–32.
28. Ewert, Benjamin, and Adalbert Evers. 2012. Co-production: Contested meanings and challenges for user organizations. In *New public governance, the third sector, and co-production*, ed. Victor Pestoff, Taco Brandsen, and Bram Verschuere, 61–78. New York: Routledge.
29. Ferris, James M. 1984. Coprovision: Citizen time and money donations in public service provision. *Public Administration Review* 44 (4): 324–333.
30. Fu, Diana. 2016. Disguised collective action in China. *Comparative Political Studies* 50 (4): 499–527.
31. Hartley, Jean. 2004. Case study research. In *Essential guide to qualitative methods in organizational research*, ed. Catherine Cassell and Gillian Symon, 323–333. London: SAGE Publications Ltd.
32. Helbig, Natalie, J. Ramón Gil-García, and Enrico Ferro. 2009. Understanding the complexity of electronic government: Implications from the digital divide literature. *Government Information Quarterly* 26 (1): 89–97.
33. Heywood, Andrew. 2013. *Politics*. Fourth ed. London: Palgrave Macmillan.
34. Horton, Jacqueline. 2004. Is the serpent eating its tail? The digital divide and African Americans. *Journal of Technology Studies* 30 (4): 17–25.
35. Kiser, Larry L., and Stephen L. Percy. 1980. *The concept of coproduction and its implications for public service delivery*. 1980 Annual Meetings of the American Society for Public Administration. Access <http://hdl.handle.net/10535/1466>. Accessed 5 Dec 2018
36. Klievink, Bram, Bart-Jan Romijn, Scott Cunningham, and Hans de Bruijn. 2017. Big data in the public sector: Uncertainties and readiness. *Information Systems Frontiers* 19 (2): 267–283.
37. Lam, Wai Fung, and Xiaoqi Wang. 2014. The cognitive foundation of a co-production approach to performance measurement: How do officials and citizens understand government performance in China? *Public Administration and Development* 34 (1): 32–47.
38. Lee, Allen S. 1989. A scientific methodology for MIS case studies. *MIS Quarterly* 13 (1): 33–50.
39. Levine, Charles H., and Glenn Fisher. 1984. Citizenship and service delivery: The promise of coproduction. *Public Administration Review* 44: 178–189.
40. Li, Hui, and Lance L.P. Gore. 2018. Merit-based patronage: Career incentives of local leading cadres in China. *Journal of Contemporary China* 27 (109): 85–102.
41. Liou, Kuotsai Tom. 2017. Government reform, public governance, and Chinese economic development. *Journal of Chinese Governance* 2 (3): 255–270.
42. Liu, Tao, and Tobias Ten Brink. 2018. Introduction: International comparative perspectives on Chinese social policy. *Journal of Chinese Governance* 3 (4): 371–375.
43. Löffler, Elke. 2009. *Improving the quality of public services: Putting the citizens at the centre of administrative action*. Budva: OECD. Access <http://www.sigmaxweb.org/publicationsdocuments/42750708.pdf>. Accessed 10 Nov 2018
44. Margetts, Helen, and Patrick Dunleavy. 2013. The second wave of digital-era governance: A quasi-paradigm for government on the web. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 371 (1987): 1–17.
45. Medema, Wietske, Arjen Wals, and Jan Adamowski. 2014. Multi-loop social learning for sustainable land and water governance: Towards a research agenda on the potential of virtual learning platforms. *NJAS - Wageningen Journal of Life Sciences* 69: 23–38.
46. Mei, Ciqi, and Xiaonan Wang. 2017. Political incentives and local policy innovations in China. *Journal of Chinese Political Science* 22 (4): 519–547.
47. Meijer, Albert J. 2011. Networked coproduction of public services in virtual communities: From a government-centric to a community approach to public service support. *Public Administration Review* 71 (4): 598–607.
48. Meijer, Albert J. 2012. Co-production in an information age: Individual and community engagement supported by new media. *Voluntas: International Journal of Voluntary and Nonprofit Organizations* 23 (4): 1156–1172.
49. Meijer, Albert J. 2014. New media and the coproduction of safety: An empirical analysis of Dutch practices. *The American Review of Public Administration* 44 (1): 17–34.
50. Meijer, Albert J. 2016. Coproduction as a structural transformation of the public sector. *International Journal of Public Sector Management* 29 (6): 596–611.
51. Mergel, Ines. 2013. Social media adoption and resulting tactics in the U.S. federal government. *Government Information Quarterly* 30 (2): 123–130.
52. Mergel, Ines. 2018. Open innovation in the public sector: Drivers and barriers for the adoption of Challenge.gov. *Public Management Review* 20 (5): 726–745.

53. Mintrom, Michael, and Phillipa Norman. 2009. Policy entrepreneurship and policy change. *Policy Studies Journal* 37 (4): 649–667.
54. Moore, Mark H. 2013. *Recognizing public value*. Cambridge, Massachusetts and London, England: Harvard University Press.
55. Mukherjee, Ishani, and Nilanjana Mukherjee. 2018. Designing for sustainable outcomes: Espousing behavioural change into co-production programmes. *Policy and Society* 37 (3): 326–346.
56. Nabatchi, Tina, Alessandro Sancino, and Mariafrancesca Sicilia. 2017. Varieties of participation in public services: The who, when, and what of coproduction. *Public Administration Review* 77 (5): 766–776.
57. Nograšek, Janja, and Mirko Vintar. 2014. E-government and organisational transformation of government: Black box revisited? *Government Information Quarterly* 31 (1): 108–118.
58. O'Flynn, Janine. 2007. From new public management to public value: Paradigmatic change and managerial implications. *Australian Journal of Public Administration* 66 (3): 353–366.
59. Osborne, Stephen P., Zoe Radnor, and Greta Nasi. 2012. A new theory for public service management? Toward a (public) service-dominant approach. *The American Review of Public Administration* 43 (2): 135–158.
60. Osborne, Stephen P., Zoe Radnor, and Kirsty Strokosch. 2016. Co-production and the co-creation of value in public services: A suitable case for treatment? *Public Management Review* 18 (5): 639–653.
61. Ostrom, Elinor. 1996. Crossing the great divide: Coproduction, synergy, and development. *World Development* 24 (6): 1073–1087.
62. Ostrom, Vincent, and Elinor Ostrom. 1977. Public goods and public choices. In *Alternatives for delivering public services: Toward improved performance*, ed. Emanuel S. Savas, 7–49. Boulder, Colo: Westview Press.
63. Parks, Roger B., Paula C. Baker, Larry Kiser, Ronald Oakerson, Elinor Ostrom, Vincent Ostrom, Stephen L. Percy, Martha B. Vandivort, Gordon P. Whitaker, and Rick Wilson. 1981. Consumers as coproducers of public services: Some economic and institutional considerations. *Policy Studies Journal* 9 (7): 1001–1011.
64. Pestoff, Victor. 2006. Citizens and co-production of welfare services. *Public Management Review* 8 (4): 503–519.
65. Pestoff, Victor, Stephen P. Osborne, and Taco Brandsen. 2006. Patterns of co-production in public services. *Public Management Review* 8 (4): 591–595.
66. Rethemeyer, R. Karl. 2007. Policymaking in the age of internet: Is the internet tending to make policy networks more or less inclusive. *Journal of Public Administration Research and Theory* 17 (2): 259–284.
67. Roberts, Nancy C. 2011. Beyond smokestacks and silos: Open-source, web-enabled coordination in organizations and networks. *Public Administration Review* 71 (5): 677–693.
68. Salter, Jonathan D., Cam Campbell, Murray Journeay, and Stephen R.J. Sheppard. 2009. The digital workshop: Exploring the use of interactive and immersive visualisation tools in participatory planning. *Journal of Environmental Management* 90 (6): 2090–2101.
69. Schläger, Jesper, and Matthias Stepan. 2017. Exploring the sustainability of e-government innovation in China: A comparative case study on 22 prefectural-level cities' websites. *Journal of Chinese Political Science* 22 (4): 625–649.
70. Schradie, Jen. 2011. The digital production gap: The digital divide and web 2.0 collide. *Poetics* 39 (2): 145–168.
71. Sharp, Elaine B. 1980. Toward a new understanding of urban services and citizen participation: The coproduction concept. *Midwest Review of Public Administration* 14 (2): 105–118.
72. Thomas, John Clayton. 2012. *Citizen, customer, partner: Engaging the public in public management*. New York: Routledge.
73. Tiebout, Charles M. 1956. A pure theory of local expenditures. *Journal of Political Economy* 64 (5): 416–424.
74. Torfing, Jacob, and Peter Triantafyllou. 2013. What's in a name? Grasping new public governance as a political-administrative system. *International Review of Public Administration* 18 (2): 9–25.
75. Tsoukas, Haridimos. 2009. Craving for generality and small-N studies: A wittgensteinian approach towards the epistemology of the particular in organization and management studies. In *The sage handbook of organizational research methods*, ed. David Buchanan and Alan Bryman, 285–301. London: Sage Publications Ltd.
76. Verschuere, Bram, Taco Brandsen, and Victor Pestoff. 2012. Co-production: The state of the art in research and the future agenda. *Voluntas: International Journal of Voluntary and Nonprofit Organizations* 23 (4): 1083–1101.
77. Voorberg, William, Victor Bekkers, and Lars Tummers. 2015. A systematic review of co-creation and co-production: Embarking on the social innovation journey. *Public Management Review* 17 (9): 1333–1357.

78. Whitaker, Gordon P. 1980. Coproduction: Citizen participation in service delivery. *Public Administration Review* 40 (3): 240–246.
79. Whittlestone, Jess, Rune Nyrupe, Anna Alexandrova, Kanta Dihal, and Stephen Cave. 2019. *Ethical and societal implications of algorithms, data, and artificial intelligence: A roadmap for research*. London: Nuffield Foundation.
80. Xinhua Net. 2018. Zhejiang: Zongshen tuijin “zuiduo paoyici” Qidong zhengfu shuzihua zhuanxing (Zhejiang: Deeply promoting “visit once”, initiating the transition of government digitalization). Access http://www.xinhuanet.com/mrdx/2018-07/25/c_137346686.htm. Accessed 30 July 2018
81. Wu, Alfred M. 2012. Economic miracle and upward accountability: A preliminary evaluation of the Chinese style of fiscal decentralization. *Asian Review of Public Administration* 23 (1–2): 104–120.
82. Wu, Alfred M., Lin Ye, and Hui Li. 2019. The impact of fiscal decentralization on urban agglomeration: Evidence from China. *Journal of Urban Affairs* 41 (2): 170–188.
83. Yin, Robert K. 2015. *Case study research: Design and methods*. London: SAGE Publications Ltd.
84. Yu, Jianxing, and Biao Huang. 2019. *Mapping the progress of local government innovation in contemporary China in The palgrave handbook of local governance in contemporary China*, ed. Jianxing Yu and Sujian Guo, 119–138. Singapore: Springer Singapore.
85. Yu, Wenxuan, and Chengwei Xu. 2018. Developing smart cities in China: An empirical analysis. *International Journal of Public Administration in the Digital Age* 5 (3): 76–91.
86. Zhejiang Administrative Service Network. 2018. Quanwei diaocha xianshi: Wosheng “zuiduo paoyici” shixianlv da 87.9% (an authoritative survey shows: The coverage rate of “visit once” in Zhejiang Province reaches 87.9%). Access http://www.zjzfwf.gov.cn/art/2018/1/4/art_1299557_14799312.html. Accessed 30 July 2018
87. Zhejiang Administrative Service Network. 2017. Tujie | Zuiduo paoyici gaige shixianlv he manyidu junyong mingxian tisheng (figure showing | the coverage rate and satisfaction of “visit once” reform both increasing significantly). Access http://www.zjzfwf.gov.cn/art/2017/10/17/art_1299557_11942559.html. Accessed 30 July 2018

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