

Article

M-Government Cooperation for Sustainable Development in China: A Transaction Cost and Resource-Based View

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Abstract: Mobile government (m-Government) is highly valued by many countries and governments worldwide for its important technical, economic, and political benefits. A development trend worthy of attention in China is that various public mobile services are provided through the cooperation between governments and Internet enterprises. The m-Government cooperation, as component of the public service system, has both a benefit safeguard function by mitigating transaction hazards and a value creation function by sharing advantageous resources. Previous studies have not explained both functions for m-Government cooperation. This study addresses this research gap. We establish a theoretical model by developing hypotheses from integrating model of Transaction Costs Theory (TCT) and Resource-based Theory (RBT). The OLS and Poisson regression method are used to test the proposed model by using cross-sectional data collected from 284 cities in China. Results show that strategy alliance, technology-specific knowhow, and financial security positively influence m-Government cooperation, asset specificity negatively influences the m-Government cooperation, and environmental certainty has no significant impact on m-Government cooperation. From the perspectives of technology, policy, and culture, the article puts forward suggestions on how to better promote m-Government cooperation in China, including promoting the government's digital capabilities, improving the citizen's privacy protection system and cultivating a public-private cooperative culture of mutual trust.

Keywords: mobile government; transaction costs theory; resource-based theory; cooperation; sustainable development

1. Introduction

In the continuous pursuit of sustainable development, i.e., “development that meets the needs of the present without compromising the ability of future generation to meet their own needs” [1]. The role of the government in achieving sustainable development goals (SDGs) is crucial [2]. There are many policy challenges that must be addressed to improve life quality. The public expect their administration to provide more and better services in an efficient and integrative manner [3]. In recent years, the rapid diffusion of mobile communication technologies (MCTs) such as laptops, mobile phones, and notepads have rapidly fueled the mobilization of information and data. Commerce, socializing, and Internet are becoming more mobile around the world [4]. All these clearly indicate the public's intense interest in mobility and sustainability related to “being mobile” [5]. Mobile government (m-Government), also labeled as mobile e-Government, emerges as alternative channel to the delivery of public services, makes a technology-driven burgeoning public service ecology even more mobile, interactive, accessible, and ubiquitous, and enhances citizen participation irrespective of their class [6]. The m-Government

has led to positive changes of government governance paradigm to deal with policy challenges embedded in the context of developing countries such as China [7]. The Chinese government has started to develop mobile applications that allow citizens to conduct government affairs at any time or any place. A development trend worthy of attention in China is that various public mobile services are provided through the cooperation with Internet enterprises, such as Alipay, not just through government portals and applications.

The cooperation between the government and enterprises in the mobile government is a new type of government service model in the era of big data, especially the cooperation between government departments and third-party platforms such as Internet companies. It is currently one of China's important ways of big data strategy and "Internet + government affairs" and is also the main feature of the government governance transformation [8]. Compared with the traditional government-led government service model, the current mobile government service model in China is mainly enterprise-led service model [9]. Since 2018, Alipay has become China's largest mobile government integration platform, providing m-Government services in more than 320 cities [10]. Previous literature in the era of m-Government frequently studied the function, challenges, and evaluation of m-Government development [11–14]. However, few studies focus on the m-Government cooperation between government and enterprises [15]. In addition, the application of mobile technologies has not narrowed the service capacity gap between Chinese cities surprisingly, which presents an extremely unbalanced situation. Therefore, it is meaningful to investigate the role of and factors influencing m-Government cooperation in Chinese cities.

In this paper, we have established a theoretical analysis framework by developing hypotheses from integrating model of Transaction Costs Theory (TCT) and Resource-based Theory (RBT). Transaction cost theory highlights the transaction cost saving function under the strategy alliance, environmental certainty, and asset specificity of cooperation. Resource-based theory highlights continuous value creation function of cooperation under heterogeneous organizational capacity and differentiated organizational resources. Specifically, the TCT view considers the m-Government cooperation as a value safeguard mechanism to reduce the operation cost of m-Government services by using the enterprise's sophisticated digital infrastructure. The RBT view highlights the m-Government cooperation as value creation mechanism to gain valuable resources and enhance organizational performance. It is argued that m-Government capability as intangible resources and asset specificity as tangible resources vary positively with the development level of m-Government cooperation, meanwhile, we also argue that strategic alliance and environmental certainty as appropriate governance arrangements vary positively with the development level of m-Government cooperation. These hypotheses are tested with data from 234 cities in China.

The main contribution of this study to m-Government literature is to prove the safeguard function and value creation function of m-Government cooperation. Applying RBT and TCT reasoning, we respond to a strong call to more research on investigate different national context and using integrated theoretical view to explain m-Government cooperation.

2. Theory and Hypotheses

2.1. Theoretical Framework

According to the TCT, the m-Government cooperation between government and enterprises as a safeguard mechanism depends on strategy alliance, asset specificity, and environmental certainty. Many previous studies have pointed out that transaction cost saving is a powerful factor for explaining the differences of cooperative performance among governments [16,17]. In addition to the transaction cost saving function, the RBT view highlights the joint value creation of government services cooperation by data sharing and resource integrating [18]. The RBT argues that deep-seated cooperation promotes the social development and knowledge transfer between governments and enterprises [19]. Therefore, local government will choose to cooperate with enterprises in the field

of government services as benefit safeguard function and value creation function. According to the TCT perspective, m-Government cooperation has a cost minimization function (see Figure 1-I). Under RBT reasoning, the heterogeneous resources positively influence the level of m-Government cooperation by promoting value creation due to organizational learning and technology diffusion. Hence, m-Government cooperation has a value creation function (see Figure 1-II).

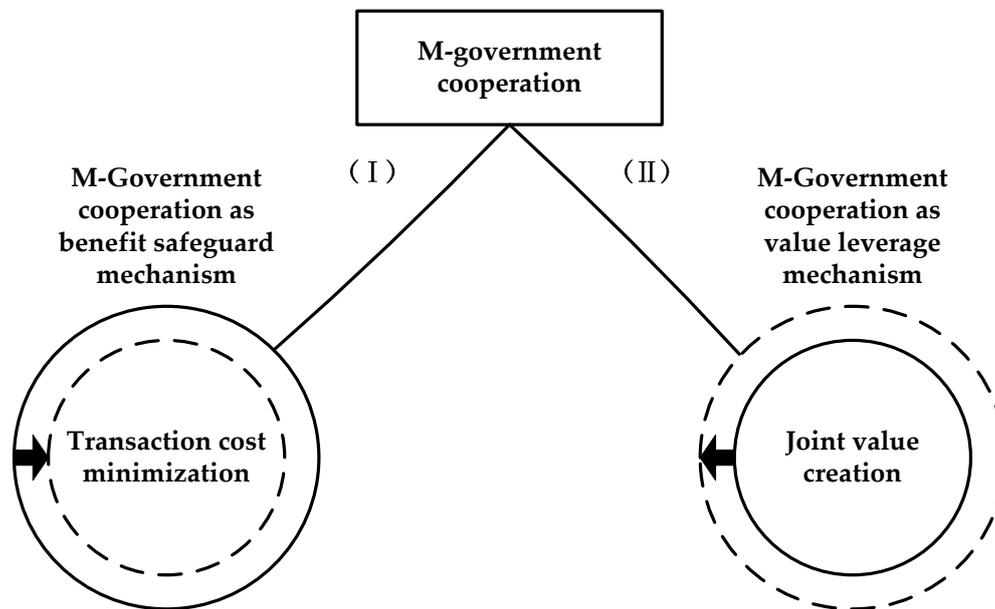


Figure 1. Theoretical framework.

Finally, it needs to be emphasized that our empirical framework focuses on the impact of variables of TCT and RBT on m-Government cooperation without considering possible interaction effect between TCT variables and RBT variables.

2.2. Hypotheses

2.2.1. Transaction Cost Hypotheses

Asset Specificity

Asset specificity is the degree to which durable, specific investments are required to maximize the transaction value, includes investments in buildings, equipment, learning, and/or brand name capital that are specific to a particular relationship [20]. Assets are specific when they have value within the context of a transaction but relatively little value outside the transaction [21]. Thus, asset specificity gives rise to interdependence between contracting parties and creates bilateral monopoly and the consequent issue of quasi-rent expropriation—that is, the party having made the specific investments can be exploited by the other party [22]. Thus, asset specificity increases the relationship-specific quasi-rents and reduces the willingness to have deep-seated cooperation with enterprises [23]. In the beginning of m-Government cooperation, the local governments need to invest funds to build digital infrastructure compatible with mobile government technologies and make new institutional arrangement for reshaping business processes. If local government establishes a cooperative relationship with only one enterprise, it means that this enterprise has specific assets, which can easily lead to opportunism. Therefore, local governments need to use the same assets as an adjustable substitute and establish a cooperative relationship with sub-optimal enterprises to prevent possible negative behaviors. Wang has found that that the asset specificity refers to the cost of website optimization, equipment renewal, and technician training—exposing them to uncertain risks, which can be mitigated by diversified cooperation [24]. Additional studies in m-Government

investigated similar hypotheses and found a negative relationship between asset specificity and the level of Government cooperation [25,26]. Hence, we can formulate:

H1. *Asset specificity is negatively related to m-Government cooperation.*

Strategy Alliance

Transaction Cost theory emphasizes the desirability of integration, and such perspective recognizes that in public services, governments engage in collaborative governance [27]. That is, strategy alliance (relational governance) may be a viable governance arrangement for government-enterprise cooperation. Strategy alliance incorporates a large formal and informal component and trends to establish a sustainable cooperation mechanism such as major strategic initiative, trust relation, shared values, and mutual benefit, which sustain both parties to achieve a win-win situation [28]. In China, many cities have signed strategic cooperation agreements with Alibaba Group. The agreement mainly covers tourism, e-commerce, credit investigation, logistics, investment, and rural development. Governments hope to promote regional development through cooperation with Alibaba Group in technology, investment, and e-commerce. Alliance is usually open-ended relationships, with no compulsory or temporary termination points. Researchers have found that uninterrupted exchanges provide new knowledge and complementary resources about the alliance behavior between the government and enterprises [29]. In addition, some studies have found that alliance self-safeguard and the value of cooperation are attractive enough and that either party wishes to deepen the cooperation [30,31]. Hence, we can formulate:

H2. *Strategy alliance is positively related to m-Government cooperation.*

Environmental Certainty

Environmental certainty arises when relevant contingencies surrounding a contact are simple and can be easily predicted through market governance [32]. Both parties have no need to adjust agreements to reduce transaction costs [33]. According to the TCT, environmental certainty reduces the transaction cost in exchange relationships. Researchers have found the positive influence of environmental certainty on development and the stability of inter-organizational cooperation. When the environmental certainty is high, cooperation behaviors and resource circulation are at low-cost [34]. The effect of certainty on decision and policy implementation depends on the decision environment. Enterprises tend to invest in areas with stable policies and economic environment. The higher environmental certainty, the more willing both parties are to carry out inter-organizational cooperation. Therefore, environmental certainty increases the willingness of both the government and enterprises to have cooperation in government affairs and encourages them to adopt diversified cooperation modes. Previous empirical researches have confirmed the positive influence of environmental certainty on the cooperation between the government and enterprises [35,36]. Hence, we can formulate:

H3. *Environmental certainty is positively related to m-Government cooperation.*

2.2.2. Resource-Based Hypotheses

Technology-Specific Knowhow

Grounded on the theories developed within the RBT, it is suggested that technology-specific knowhow presents the ability to mobilize and deploy IT-based resources in support of and for the enhancement of governments' business strategies and work processes [37]. Technology-specific knowhow is an organizational capability that is heterogeneous and knowledge-based and can lead to sustainable competitive advantage [38]. Established as a critical organizational capability, technology-specific knowhow is defined as a firm's IT-enabled dynamic capabilities to leverage its IT resources and IT competencies, in combination with other organizational resources and capabilities,

in order to address rapidly changing business environments [39]. Research now recognizes that it is only by embedding m-Government technology in organizational capabilities that governments can realize significant and sustained competitive returns [40]. Technology-specific knowhow, such as m-Government technology capacity referring to technical infrastructure and the diversity of mobile services, plays a key role in the development of m-Government cooperation. The more important the technology-specific knowhow of local government for continuous value creation, the more cooperative effort of m-Government. During the cooperation, organizational learning is required for governments to learn sophisticated knowhow from enterprises [41]. In addition, business process docking and data sharing play important roles in encouraging government-enterprise cooperation, and enterprises benefit from government services cooperation by institutional support and user monopoly. Therefore, governmental technology-specific knowhow is positively associated with the cooperative effort of m-Government in order to acquire sustainable competitive advantage. Hence, we can formulate:

H4. *Technology-specific knowhow is positively related to m-Government cooperation.*

Financial Security

With RBT reasoning applicable, financial resources are the special tangible resources which promote the diversity of resource allocation [42]. The diversity of resource allocation enhances the flexibility of organizational decision-making and forms a competitive advantage that can be hardly imitated by other organizations [43]. In China, government's fiscal capacity varies widely. In some underdeveloped areas, governments need loans to implement policies and update information systems. Hence, financial security is a very important indicator for government-enterprise cooperation. If the financial security index is low, then enterprises will hold the view that m-Government cooperation is subject to many uncertainties and they will tend to evade participation. Strong financial security leads to economic rent for the government which may positively seek infrastructure development and technological innovation [44]. The government also undertakes the responsibility to improve the quality of corporate service and promote the cooperation level [45]. The government's effort to support the development of financial security involves more in-depth m-Government cooperation. It is necessary to have in-depth m-Government cooperation with strong financial and a high level of financial investment for sustainable government development. Therefore, financial security is positively associated with m-Government cooperation. Hence, we can formulate:

H5. *Financial security is positively related to m-Government cooperation.*

3. Empirical Analysis

3.1. Institutional Context of Chinese National M-Government Policy

Due to the limited level of m-Government technology, compared with that in developed countries, China is an attractive context for us to raise the issue, where the m-Government policy is a subsystem of the "Internet plus services" policy system, and the national m-Government policy is mainly promulgated by the State Council of China. With the implementation of the global e-government initiative, since 2011, the State Council of China has formulated rolling the national m-Government strategy which clarifies the purposes of the organizational reform, cultural change, and information plan, as well as refining the policy instruments of m-Government strategy [46]. Chinese m-Government has experienced two key periods; the first is from 2008 to 2011, when the State Council of China established the e-government office to comprehensively coordinate the e-government practices of local governments. Local governments began to design and implement government applications on a large scale but no corresponding operation mechanism was established as a guarantee. As a result, the expected goals of the m-government strategy have not been achieved. The second is from 2012 to 2018, when mobile Internet technology gradually replaced the PC Internet technology, and mainstream social platforms dominated by WeChat, micro-blog, and Alipay led the development

of mobile government in China. In this case, the State Council of China has issued the “Internet + services” and “big data” strategies, hoping to achieve sustainable development of m-Government through cooperation with third-party platforms. As for government services, it has not only retained original service channels of government departments, but also added new business services channels, so that the government service presents the characteristic—“dual track system” parallel operation. In addition, at the data level, the new model of government-enterprise cooperation is based on the real-time sharing of bilateral data and puts forward an open data policy on big data initiative. This institutional background pushes China’s m-Government policy onto a different path from that of developed countries.

3.2. Data Collection

This paper focuses on China, a vast country with 23 provinces, 5 autonomous regions, and 2 special administrative regions, which can also be subdivided into 333 prefecture-level cities and 4 administrative districts. This paper has studied 337 local governments and established a cross-sectional model with the data from 284 Chinese cities to test the hypotheses. The reasons for choosing 284 cities are as follows: first, with limited levels of collaboration, China is a more attractive sample compared with other developing countries, and the cooperation scope of mobile government is much larger than that of other countries. The research on mobile government cooperation has great potential and provides sufficient representative sample material of China. Through the 2016 Internet plus Government Report, we can find that in Figure 2 that the government-Alipay service cooperation program has covered 337 cities in China, including 96 cities in the northeast coastal region, 83 cities in the central, 132 cities in the western, and 36 cities in the eastern. As can be seen from Figure 2, mobile government cooperation has been promoted nationwide in both developed and underdeveloped regions, making our research with broad prospects. Second, the high degree of autonomy in Chinese local governments leads to huge differences in government behaviors. To test the implementation of the mobile government strategy in various regions, we selected some cities from 23 provinces and tried to cover all regions to ensure its applicability in China. Therefore, sampling selection bias can be avoided in our data collection method. In addition, it should be noted that these 284 cities were identified, including prefecture-level cities and sub-provincial cities, but no municipalities, autonomous regions, and counties. Third, as Chinese mobile government cooperation is still at an early stage, government cooperation has rapidly expanded nationwide since 2017. Hence, there was no relevant database to match before 2017, directly leading to the use of cross-sectional data in our study.

For the empirical part of this paper, data are collected from three main sources. First, primary data from *China Statistical Yearbook (CSY) 2018* are used. CSY is an annual statistics program compiled by the National Statistical Bureau of China, comprehensively reflecting the economic and social development of Chinese cities. Therefore, administrative activities of 284 cities in China can be investigated and compared. Second, the data of m-Government cooperation are gathered by means of online collection, which can be considered a suitable method to gather the number of government services applied to different cities on Alipay app. With 700 million users in China, Alibaba Group’s Alipay is China’s largest electronic payment application in a bid to establish a secure payment ecosystem for online transactions. Mobile government project is a subsystem of Alipay’s payment ecosystem, which greatly enhances Alipay’s ability to utilize and aggregate social data. Therefore, the number of government services provided by Alipay app can fully reflect China’s m-Government cooperation at the current stage. Third, the data from *the 2018 Development Report on Internet Service Capabilities of China’s Local Governments (DRISCCLG)* are used. The DRISCCLG is a comprehensive research project to evaluate the online service capabilities of local governments in 334 Chinese cities. According to the report, local governments’ online service capability refers to their performance in using mobile technologies, big data, cloud computing, and other technologies to improve government services. The value of the DRISCCLG is that it involves the attitude and behavior of local governments towards mobile

government and matches the organizational characteristics of the Chinese government. This report is publicly available in Reference [47].

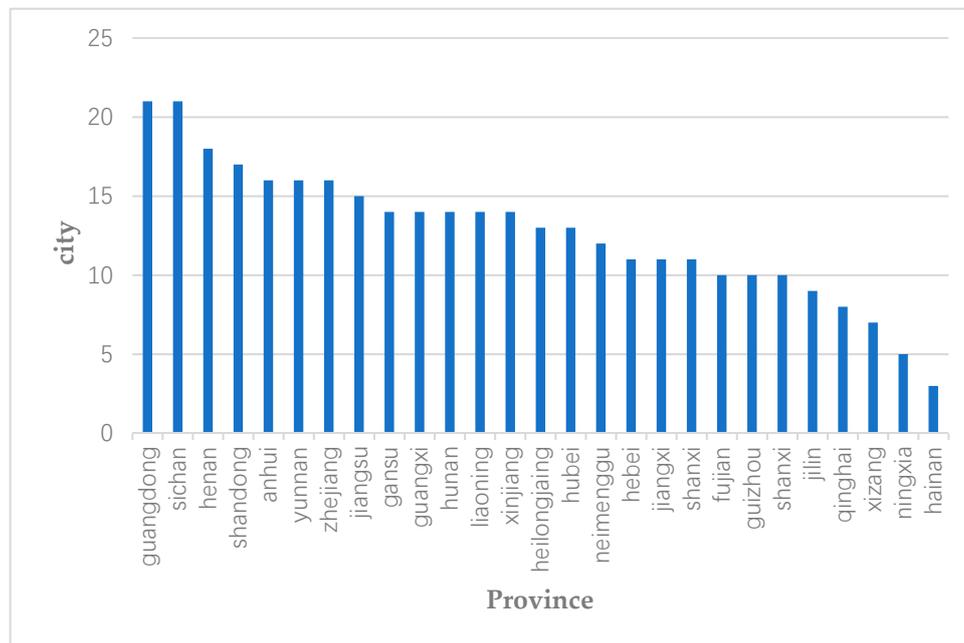


Figure 2. The number of Chinese cities covered by the mobile government cooperation project in each province.

3.3. Measurement

3.3.1. M-Government Cooperation (COOPERATION)

It is measured as the amount of government services applied by Alipay app at different cities. The deadline for data collection was December 31, 2018. Data were collected from the real-time information of Alipay app. The same measurement was used in previous studies [48,49].

3.3.2. Asset Specificit (AS)

Higher AS may indicate that governments lack alternative arrangements that can lead to higher transaction costs and more fragile governance structures [50]. In China, many local governments establish cooperative relations with Alipay and WeChat simultaneously. WeChat is considered an alternative arrangement. Alternative arrangements are an indicator for governments' AS and are frequently used in empirical researches [51]. Data were collected from the real-time information of WeChat app. The same measurement was used in previous studies [52,53].

Sector: "0" refers to use Alipay platform to provide services only, and "1" to use Alipay platform, WeChat platform and other platforms to provide services simultaneously.

3.3.3. Strategy Alliance (SA)

Based on RBT, SA refers to relational governance modes characterized by the parties to a transaction jointly developing policies directed toward the achievement of expectations of future exchanges. Based on the network theory, SA is a social networking system with structure and behavior enacted through a series of government-enterprise relationships [54]. For example, a path of cooperative relationships could be traced from government's decision to the accomplishment of policy goal (disclose), through citizens and partners monitoring the process of this disclosures (monitor), to citizens and partners influencing the government administrative behaviors (participate) [55]. SA between local governments and Alibaba Group incorporates a large formal and informal

component and trends to establish a win–win mechanism such as strategic initiative, trust relation, shared values, and mutual benefit sustain them in economics and technology. In addition, SA is an organizational culture that affects the spread of m-Government and influences the adoption of m-Government among different governments [56]. When the government and enterprises establish an alliance, it proves that the government has an open and learning organizational culture. Thus, coalition-building governments have a higher will to co-operate [57]. Based on measures used by Liang [48], this construct was measured by dummy variable. Data were collected from public information on the government’s official website.

Sector: “0” refers to establish strategic alliance between local governments and Alibaba Group and “1” not to establish strategic alliance.

3.3.4. Environmental Certainty (ENV)

Consistent with the measures used in previous studies [58,59], it is measured as the gross domestic product per capita (GDPPC) of local governments. We use GDPPC to measure the predictability of local business markets and volatility of local economic situation. The variables are lagged by 1 year. Data were collected from *China statistical yearbook (CSY) 2018*.

3.3.5. Technology-Specific Knowhow (KNOWHOW)

Adopted from Welch [60], we use internet service capability of local government as a proxy for technology-specific knowhow. The higher the intangible internet service capacity, the more willing it is to implement m-Government cooperation. The variables are lagged by 1 year. Data were collected from *the 2018 Development Report on Internet Service Capabilities of China’s Local Governments*.

3.3.6. Financial Security (SECURITY)

It is measured as the amount of public expenditure in each local government [61]. In local government with higher fiscal capacity, the local government has higher m-Government capabilities, and this may positively influence the breadth and length of cooperation contracts. The variables are lagged by 1 year. The same measurement was used in previous studies [62,63]. Data were collected from *China statistical yearbook (CSY) 2018*.

3.3.7. Control Variables

Population size (PS) is measured by the population size of prefecture-level cities and is a proxy for market demand and scale economy [64]. Cities with large populations have stronger economies of scale to reduce service costs [65]. The larger the population size, the higher the level of mobile government cooperation at the local market. The control variables are lagged by 1 year. The same measurement was used in previous studies [66,67]. Data were collected from *China statistical yearbook (CSY) 2018*.

Mobile user scale (MUS) is measured by the number of the mobile phone users of prefecture-level cities. MUS refers to the target group of m-Government cooperation, which involves the basic user scale and knowledge acceptance level of mobile government. The number of mobile users positively influences the level of m-Government cooperation. The control variables are lagged by 1 year. The same measurement was used in previous studies [68,69]. Data were collected from *China statistical yearbook (CSY) 2018*.

Descriptive statistics are reported in Table 1.

Table 1. Descriptive statistics of the variables.

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
COOPERATION	284	58.40	13.49	39	126
Asset Specificit (AS)	284	0.73	0.45	0	1
Strategy alliance (SA)	284	0.51	0.50	0	1
Environmental certainty (ENV)	284	52,625.26	30,215.80	11,892	21,5488
KNOWHOW	284	56.14	9.75	34.88	81.09
SECURITY	284	90,804.81	276,716.30	753	4,035,240
Population size (PS)	284	429.17	254.30	24	1314
Mobile user scale (MUS)	284	429.37	383.70	44	2828

3.4. Regression Analysis

This study uses Ordinary Least Square (OLS) and Poisson regressions analysis to test the hypotheses. The dependent variable represents the m-Government cooperation (COOPERATION). Asset specificity (AS), strategy alliance (SA) and environmental certainty (ENV) are the transaction costs variables, technology-specific knowhow (KNOWHOW) and financial security (SECURITY) are the recourse-based variables. Additionally, we include the following control variables: population size (PS) and mobile user scale (MUS).

To test the hypotheses, we estimated the following regression equations:

$$COOPERATION = \alpha_0 + \alpha_1 AS + \alpha_2 SA + \alpha_3 ENV + \alpha_4 PS + \alpha_5 MUS + \varepsilon_1 \quad (1)$$

$$COOPERATION = \alpha_0 + \alpha_1 KNOWHOW + \alpha_2 \ln SECURITY + \alpha_3 PS + \alpha_4 MUS + \varepsilon_2 \quad (2)$$

$$COOPERATION = \alpha_0 + \alpha_1 AS + \alpha_2 SA + \alpha_3 ENV + \alpha_4 KNOWHOW + \alpha_5 \ln SECURITY + \alpha_6 PS + \alpha_7 MUS + \varepsilon_3 \quad (3)$$

Equation (1) includes transaction costs and control variables. Based on the TCT view, we hypothesize a positive effect of strategy alliance and environmental certainty and a negative effect of asset specificity on m-Government cooperation. Equation (2) includes the resource-based variables and control variables. Based on the RBT view, we hypothesize a positive impact of technology-specific knowhow and financial security on m-Government cooperation. Equation (3) includes the TCT, RBT and control variables. We expect that the impact of TCT and RBT variables will enhance the level of m-Government cooperation.

4. Results

4.1. Results of the Models Estimated

The results of OLS regression analysis are presented in the Table 2 (Model 1–3). First, we test the TCT hypotheses. Asset specificity varies negatively with m-Government cooperation. The results show that m-Government cooperation of a government is negatively affected by asset specificity. Asset specificity increases the relationship-specific quasi-rents and reduces the willingness to have deep-seated cooperation with enterprises. In reality, almost all government agencies constructed unique mobile apps and had partners to deliver services together in China. Although much of the services do not comply with the relevant requirements of citizens, the amount of m-Government services have much to do with the asset specificity. Therefore, H1 is verified. The higher the level of government's asset specificity, the fewer the amount of m-Government services. In addition, strategy alliance and environment certainty vary positively with m-Government cooperation. Strategy alliance trends to establish a sustainable cooperation mechanism such as major strategic initiative, trust relation, shared values, and mutual benefit, which sustain both parties to achieve a win-win situation. A sound

bilateral relationship in the context of strategic alliance is crucial for m-Government cooperation. The coefficient of strategy alliance is significant providing strong support for the TCT hypotheses (Hypothesis 2). Therefore, H2 is verified. The coefficient of environmental certainty is positive but not statistically significant, providing insufficient support to Hypothesis 3. The results suggest that governments may choose to build their own applications rather than rely on m-Government cooperation in the developed economies. In summary, the more important asset specificity and strategy alliance for transaction cost minimization in this relationship, the larger should be benefit safeguard capacity of cooperative process, the more efficient will be the risk aversion.

Table 2. Ordinary Least Square and Poisson regressions.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
DV: Cooperation	OLS	OLS	OLS	Poisson	Poisson	Poisson
Constant	52.197 *** (2.186)	5.785 (5.433)	25.836 *** (6.135)	3.949 *** (0.034)	3.114 *** (0.079)	3.471 *** (0.102)
Asset Specificit (AS)	−4.614 *** (1.453)		−2.918 ** (1.455)	−0.081 *** (0.022)		−0.051 ** (0.023)
Strategy Alliance (SA)	11.118 *** (1.171)		9.753 *** (1.226)	0.200 *** (0.019)		0.177 *** (0.020)
Environmental certainty (ENV)	3.10×10^{-6} (2.22×10^{-5})		-4.44×10^{-5} * (2.41×10^{-5})	1.64×10^{-7} (3.44×10^{-7})		-0.750×10^{-7} * (3.99×10^{-7})
KNOWHOW		0.319 *** (0.065)	0.0856 (0.063)		0.005 *** (0.001)	0.001 (0.001)
LnSECURITY		3.145 *** (0.607)	2.525 *** (0.631)		0.060 *** (0.009)	0.048 *** (0.011)
Population size (PS)	−0.009 *** (0.003)	−0.012 *** (0.003)	−0.013 *** (0.003)	−0.0002 *** (4.38×10^{-5})	−0.0001 *** (3.78×10^{-5})	−00001 *** (4.66×10^{-5})
Mobile user scale (MUS)	0.018 *** (0.002)	0.016 *** (0.002)	0.016 *** (0.002)	0.0002 *** (3.01×10^{-5})	0.0002 *** (2.77×10^{-5})	0.0002 *** (4.66×10^{-5})
N	284	284	284	284	284	284
F value	93.71	86.06	74.54	Chi ² test: 509.46 ***	Chi ² test: 446.53 ***	Chi ² test: 509.46 ***
R ²	0.628	0.552	0.654	DF: 5	DF: 4	DF: 7
Adjusted R ²	0.621	0.546	0.645	PseudoR ² : 0.209	PseudoR ² : 0.179	PseudoR ² : 0.219

Values in parentheses represent standard errors. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Second, we test the RBT hypotheses in Model 2. The technology-specific knowhow and financial security vary positively with m-Government cooperation. The coefficient of RBT variables is positive and statistically significant. The results show that technology-specific knowhow, such as m-Government technology capacity referring to technical infrastructure and the diversity of mobile services, plays a key role in the development of m-Government cooperation, which is consistent with our conclusion. Therefore, a high-level technical staff and technical training of staff are vital to improve m-Government cooperation. Meanwhile, the data provide strong support for the positive impact of financial security on m-Government cooperation. A strong financial security leads to economic rent for the government which may positively seek infrastructure development and technological innovation. The government also undertakes the responsibility to improve the quality of corporate service and promote the cooperation level. Therefore, H4 and H5 are verified. Consequently, the more important technology-specific knowhow and financial security for joint value creation in this relationship, the larger should be the resource sharing capacity of cooperative process, and the broader the cooperation scope will be.

In addition, we add the TCT variables in model 3. We can conclude that a combined application of TCT and RBT view to explain the influence factors in m-Government cooperation increases the explanatory power of theoretical model from R-square 0.55 to 0.654. In addition, the results show

that the significance level of the impact of the TCT variables on m-Government cooperation decreases when adding the RBT variables (see Model 1 and 3).

4.2. Robustness of the Models Estimated

In the following we discuss the robustness of our results. First, we tested the hypotheses using Poisson regression. The Poisson regression is used when the dependent variable takes only non-integer values [70]. Due to the number of m-Government services that are non-integer values, it is appropriate that we use Poisson regression to analyze the influencing factors of m-Government cooperation for proving robustness of the model. A pre-test showed that there was no over dispersion in the data, so Poisson regression was chosen over Negative Binomial regression. The results of Poisson regression are showed in Table 2 (Models 4–6). They are compatible with the OLS regression results providing some support of both TCT and RBT hypotheses.

Second, we excluded the data from Sub-provincial city because they may cause a serious upward bias in m-Government capability and user scale, although we try to mitigate the problem by increasing the number of prefecture-level cities. This procedure reduces the sample size from 284 to 269, the estimation results are shown in Table 3 (Model 7). The results show the same effect as the original analysis.

Table 3. Main coefficients of robustness test regressions.

Variables	Model 7	Model 8
DV: COOPERATION	OLS	Negative Binomial Regression
Constant	11.94 ** (3.46)	3.87 *** (0.07)
Asset Specificit (AS)	−2.09 * (1.12)	−0.08 *** (0.02)
Strategy Alliance (SA)	4.84 *** (1.00)	0.19 *** (0.02)
Environmental Certainty (ENV)	-7.35×10^{-6} (0.0001)	-1.11×10^{-8} (3.18×10^{-7})
KNOWHOW	0.73 *** (0.05)	0.002 (0.001)
SECURITY	7.62×10^{-6} *** (1.92×10^{-6})	8.56×10^{-6} ** (4.03×10^{-8})
Population size (PS)	−0.004 * (0.002)	−0.00005 (0.00005)
Mobile user scale (MUS)	0.001 *** (0.002)	0.0002 ** (0.00005)
N	269	301
F value	148.79	Wald $\chi^2(7) = 422.49$
R ²	0.79	Pseudo R ² = 0.1277
Adjusted R ²	0.78	

Values in parentheses represent standard errors. *** p < 0.01; ** p < 0.05; * p < 0.1.

Third, our key result—that TCT and RBT variables positively influence m-Government cooperation—remains stable across region boundary. To investigate whether governments with no mobile services cooperation may bias our results, we expend size from 284 to 301 and run a Negative Binomial regression in Table 3 (Model 8). The results remain very similar to original analysis, indicating that m-Government service model is not masking the true effect. Therefore, our estimation results are quite robust.

5. Discussion

5.1. Finding

The purpose of this paper is to identify the factors that determine the sustainability of m-Government cooperation. The previous studies have mainly explained m-Government cooperation among local governments [71,72]. To the best of our knowledge, this study is the first that examines the m-Government cooperation for sustainable development between the government and enterprises. Specifically, our theoretical framework could be as a model to help deconstruct motivation of m-Government cooperation for sustainable development. Based on this framework, new variables of m-Government cooperation are developed with the use of Transaction Cost and Resource-based perspective. It is important to emphasize that the influence of the benefit safeguarding and the joint value creation function of government-enterprise's choice on m-Government cooperation is analyzed for sustainable development. Using data from local governments and Alipay application in China, we present evidence on the transaction cost and resource-based determinants of m-Government cooperation for sustainable development. First, according to the TCT, local government's asset specificity negatively influences the m-Government cooperation, while strategy alliance positively influences m-Government cooperation. The results of our research confirm these hypotheses. On the other hand, the results of our research do not confirm the positive impact of environmental certainty on m-Government cooperation, and the reason may be that environmental certainty creates entry barriers that limit the market expansion of the third-party service platform when cooperation relationship lacks policy support. Overall, our study extends the results of previous transaction cost by including the joint effect of strategy alliance and the government's asset specificity as determinants of m-Government cooperation.

Second, based on the RBT, it is argued that m-Government cooperation facilitates value creation through resource sharing in continuous exchanges. The empirical results show the importance of intangible technology-specific knowhow as determinants of government's choice of m-Government cooperation. Intangible technology-specific knowhow and financial security positively impact m-Government cooperation. Due to the in-depth government-enterprise cooperation to develop the technology-specific knowhow, it is transferred and replicated in the local context. Hence, the resource-based perspective emphasizes the importance of m-Government cooperation for the creation and transfer of strategy resources by focusing on the value creation function of m-Government cooperation.

Third, when the TCT and RBT results in Models 3 and 6 are compared, the results indicate that, by adding RBT variables to the regression equation, the significance level of the impact of government's asset specificity and strategy alliance on m-Government cooperation strongly decreases. This result highlights that the RBT variables (i.e., technology-specific knowhow and financial security) are more important for the government's choice of m-Government cooperation than the TCT variables "asset specificity" and "strategy alliance".

5.2. Implications

This paper has important implications for both researchers and policymakers. First, it extends the impact of government and other non-public organizational network literature on m-Government cooperation by arguing that the sustainability of incorporation of mobile services has—in addition to the benefit safeguard function—a joint value creation function. Since the imitation and transfer of technical and managerial knowhow are necessary for improving competitive position of mobile service market, the functions of m-Government cooperation consist of both transaction cost minimization and technology-based resource value creation. Specifically, in m-Government systems, the capability of developing specific resources (such as technology-specific knowhow and financial security) is critical for the sustainability of m-Government cooperation. Second, the study adds to sustainable perspective of m-Government cooperation by including the combined effect between TCT and RBT as determinants

of m-Government cooperation. Third, most of the existing studies on m-Government cooperation use the case or archival data, and our study is based on survey data which offers an opportunity to test new hypotheses from the perspectives of TCT and RBT that may not be provided by using case or archival data. Finally, the RBT proposes that the resources and capabilities are important drivers of overall performance, and understanding the relationship between resources and capabilities and performance helps governments identify their strengths and weaknesses. RBT provides the theoretical understanding on how capabilities can be employed for enhanced performances. In this study, we propose that technical know-how is a sustained competitive advantage, which is a dynamic ability driven by information technology. Meanwhile, our study considers the importance of building digital capabilities that can be applied to cope with changing environments. The challenges of MCT and regional competition have encouraged governments to build digital capabilities. Therefore, embedding MCT in government's information resources will not only result in cost reduction and increased speed of external exchanges but will also enable governments to capitalize on development opportunities before competition.

Our study has important managerial implications: policymakers should emphasize both benefits safeguarding and value creation function of m-Government cooperation when determining the opportunity choice of mobile service aggregation. Based on our results, it can be concluded that government authorities should establish an in-depth strategic cooperative partnership with a wider range of m-service contents under the following conditions: low asset specificity, highly technology-specific knowhow, and sturdy alliances.

6. Conclusions

M-Government cooperation has become an irreversible trend worldwide. Large amounts of resources have been invested into m-Government to deliver public services with utmost extent by cooperation with Internet enterprises. This study attempts to explore the factors that influence the m-Government cooperation based on the RBT and TCT. The government's choice of m-Government cooperation for sustainable development is influenced by its benefit safeguard and value creation mechanism. While TCT reasoning highlights the cost minimization function of m-Government cooperation, the RBT view highlights the value leverage function of m-Government cooperation. Our results show that technology-specific knowhow, financial security, asset specificity, and strategy alliance are important factors influencing the government's choice of m-Government cooperation. Thus, we have verified the applicability of RBT and TCT theories in the field of mobile government. Compared to previous empirical studies, this study has some special conclusions. First, m-Government cooperation is a relatively new activity of government agencies and is mainly implemented in municipal governments. The central government has no clear regulations on m-Government cooperation in China. Meanwhile, some uncertainties on m-Government cooperation remain unsolved, which will affect the reaction of the government agency to m-Government cooperation. We proposed that SA is an open, win-win organizational culture and is a scarce resource in China's political system. Chinese government agencies are highly conservative and closed, but SA is a positive factor that affects the spread of m-Government cooperation and influences knowledge diffusion between different regions. The impact of SA should be noticed. Second, KNOWHOW describes the ability to effectively manage MCT for efficient and sustained dissemination of high quality and useful government services. The way technology is used, accepted, and transformed by an agency has a crucial effect on m-Government cooperation of local governments. We propose that technical knowhow is a sustained competitive advantage, which is a dynamic ability driven by information technology. Meanwhile, our study considers the importance of building digital capabilities that can be applied to cope with changing environments. The challenges of MCT and regional competition have encouraged governments to build digital capabilities. Therefore, embedding MCT in government's information resources will not only result in cost reduction and increased speed of external exchanges, but will also enable governments to capitalize on development opportunities before competition.

Combined with the conclusion of this paper, the following suggestions on the development of m-Government cooperation can be adopted by China. First, the demand of citizens, the fragmented governance model, and the market monopoly of Internet enterprises promote m-Government cooperation in China. Our research shows that there are many factors that influence m-Government cooperation, and none of them has an absolute influence. The results suggest that government departments need to take all factors into consideration, especially encouraging government departments to build digital capabilities. Second, China's local governments are implementing the transformation of government functions, hoping to achieve limited government. In this context, it is necessary to cultivate a public-private cooperative culture of mutual trust for stimulating various parties' potential roles. Third, government services are a special commodity, which is both commonwealth and commercial in the digital age. The model of China's multi-participatory government cooperation can release the potential of mobile government services. However, this model tends to confuse the essential characteristics of public goods of government services. Therefore, in the process of delivering government services, the attributes, sources, and functions of the services should be identified to ensure the balance between commonwealth and commercial nature of government services. In addition, the supply mode of China's mobile government, which is based on the third-party platform, makes it easy to cause the incompatibility of the government-enterprise system and the risk of user privacy disclosure. Hence, the governments and third-party platforms should standardize the services delivery process and pay attention to the improvement of users' privacy systems.

It is hoped that our contribution will inspire further research into m-Government cooperation, such as cooperative network, cooperative contract design, joint ventures, and technology utilization. For example, one important unexplored issue of m-Government cooperation is the suitability of cooperative framework to various local contexts. In addition, investigating the relationship between organizational cooperation performance and technology utilization to cope with the changing environment is interesting. Such studies would provide more useful and profound results and suggestions for theoretical research and practical activities.

The study also has its limitations. First, it is important to note that our theoretical model is based on hypotheses derived from TCT and RBT without addressing possible interaction between the transaction cost variable and resource-based variable. The further research should focus on possible interaction between TCT variables and RBT variables. Second, the dataset in this paper is cross-sectional data, and future studies may use panel data to measure the time effect of factors.

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