

The analysis of information technology' effects on public service productivity

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Abstract. Given the increasing important of IT in the public services delivery and the massive amount of spending in IT in governments, it is imperative to understand how to evaluate the contributions of IT in governments for better delivery of services and enhanced interactions with citizens and business. From the perspective of Business Process Management and public value management, this paper takes a process level approach to productivity and IT effects of public service. This paper argues that IT, does not directly lead to greater service productivity, but they do so through intermediate organizational and interorganizational capabilities. The case study of home service illustrates IT's effects on the four key of organizational and interorganizational capabilities that are paramount to public service productivity, which includes operational capability, communication capability, partnering capability and innovative capability. IT resources in public organizations enable public managers to pursue greater service productivity by cultivating these four capabilities.

Introduction

Public service as one of the core content of public administration, improving the productivity of public service is the constant goal of governments at all levels. Even in the developed countries, public sector productivity is still significantly lower than the private sector, and the productivity has a tremendous room for growth [1]. Thus, seeking effective theory and methods for public service productivity is of great significance.

At the same time, modern information technology has become an indispensable tool for public service production and delivery. With the advancement of e-government, as well as the rapid development of kinds of new information technology, the public services are clustered by information technology as an integration system. Explore the mechanism of IT for public service productivity, will be one of the basic research to achieve public service productivity gains and effective application of information technology. It has been one of the primary research focuses on information systems literature for the last couple of decades to find whether information technology investments can lead an organization to generate greater productivity and achieve sustainable competitive advantages [2]. A large number of empirical evidences have shown that information technology is positively associated with organizational productivity, profitability, and market value [3, 4, 5]. A subsequent question raised is how investments in IT lead to greater organizational productivity in public service. This question leads researchers to shift their attention from the direct impact of IT on organizational productivity to under which mechanism IT contributes to public sector productivity [6].

A broad range of literature search in the areas of IS, public administration, public economics, and political sciences shows that there have been a limited number of empirical studies on the productivity impact of IT in public organizations [7]. This paper presents three parts examining the effects mechanism of IT on the public service productivity. The first part is literature reviews on the public service productivity and the contribution of IT to productivity. The second part of the analytical framework of this paper, from the perspective of Business Process Management (BPM) and public value management, it is mainly taken a process level approach to productivity and IT effects of public service. The third part is the case study on the IT's application practice at Hangzhou, China. This case illustrates that, IT's effects on the four key of organizational capabilities that are paramount to public

service productivity, which includes operational capability, communication capability, partnering capability, and innovative capability. IT resources in public organizations enable public managers to pursue greater service productivity by cultivating these four organizational capabilities.

Literature Reviews

The measurement challenges for public service productivity. There is increasing pressure for public sector organizations to improve their productivity and demonstrate progress with effective productivity measures. The task of the public sector is to produce a selected set of services within the limits of budget constraints. Thus, it is important to be able to turn those financial inputs into high-quality service outputs and outcomes using effective and efficient processes. “Productivity” is traditionally defined as the ratio between output (e.g. the quantity of products or services produced) and input (e.g. the time needed for production) [8]. Productivity measurement can potentially be a useful tool for monitoring productivity development and for guiding improvement efforts. However, finding useful productivity measures in the public sector has proved problematic.

Measurement of public service productivity is a challenging task due to several reasons. A public service system usually consists of a large variety of services and a number of different organizations producing them, not to mention the diversity of customers and their needs. Even if individual organizations operate productively, there is a risk of suboptimal performance at system-level. In practice, it is difficult to say whether a certain service is productive or not, and the same methods may not be applicable in all service delivery processes [9]. Furthermore, there are different information needs at various organizational levels [10]. Most public organizations provide services—a traditionally challenging context for productivity measurement [11]. Min-Seok Pang aggregated measurement information from component measures used at the operative level (e.g. units providing single services) [7]. With this kind of method it is possible to take better account of the specific characteristics of different services.

The effects of information technology on public service productivity. It is difficult to understand the managerial implications and impacts of IT investments on productivity of service organizations [12]. Measuring and understanding the productivity impact of information technology is a significant and difficult problem facing researchers. Mukhopadhyay et al [13] proposed that the effect of IT applications could be best understood through the analysis of the information process levels. Business Process Management (BPM) has already been successfully applied to improve productivity of service processes [14]. The results showed that IT has a substantial impact on the efficiency of processing complex transactions but no impact on simple transactions. Stiroh [15] also showed that IT investments contribute to the productivity. Osei-Bryson and Ko [16] reviewed some studies investigating the effect of IT investments on productivity. Although there are a lot of studies done on the impact of IT on productivity and efficiency, there are few studies about IT influence on the efficiency of non-commercial sectors such as public institutions. Also, research on IT in public sectors has mainly focused on why IT is introduced and how e-government is implemented [17].

Brynjolfsson [18] points out that between 1970 and 1990 delivered computing power in the U.S. economy increased by more than two orders of magnitude, yet productivity, especially in the service sector, seems to have stagnated. Brynjolfsson goes on, however, to make some suggestions: first, poor returns on IT investments may be the result of faults in the way we measure productivity; and second, poor returns are the result of unresolved organizational issues, such as mismanagement. According to Uchitelle [19], those who look to computers for economic miracles and insist on measuring their contributions only in dollars miss the less tangible improvement in quality that computers have made possible. Corcoran [20] notes that innovations often come at considerable expense. These innovations do, however, allow for new opportunities that would otherwise be impossible. Thus, he concludes, the truth is that government productivity statistics don’t reflect the contributions that computers make. The numbers don’t measure improvements in quality, innovation, flexibility or timeliness.

As shown on the above literatures, the measurement of public service productivity is full of challenges, and with the massive amount of application of information technology in governments at all levels, it is imperative to understand how IT contributes to the public service productivity and the value creation to the public. The researches on the business process management and public value management provide us with an organizational capability angle of study for the mechanism of IT's contribution for public service productivity from a process-oriented perspective.

The analytical framework of IT's effects on public service productivity

Based on the perspective of business process management and public value management literature, we proposed that, information technology does not directly lead to greater public service productivity, but they do so through intermediate organizational processes. The relationship between IT and public service productivity in governments is mediated by organizational capabilities, which include operational capability, communication capability, partnering capability, and innovative capability. Public service productivity is enhanced when a government improves its operational capability by increasing the quality or quantity of public services with fewer inputs. The impact of IT resources on operational capability can be explained mainly by the strategic roles that IT resources play in business organizations-the standardization [21] and automation. The most essential and significant role of IT is to automate business processes that traditionally have been driven mostly by paper handling and therefore tended to be laborious and error-prone [5]. Hence, given the large number of transactions a government agency usually handles, the value impact of automating business processes can be enormous. Automating processes can take place in two fronts-internal administrative processes and external service delivery to citizens [22].

For the communication capability, the involvement of a large number of stakeholder groups in policy decision and service delivery is crucial. As Stoker[23] elaborately puts it, Politicians and officials have a particular legitimacy given the government is elected, but there are other valid claims to legitimacy from among others, including business partners, neighborhood leaders, those with knowledge about services as professionals or users, and those in a position of oversight or regulators. The fundamental idea is that for a decision to be legitimate or for a judgment to be made, it is necessary to have all the stakeholders involved. Stoker continues to argue that "new information and communication technologies offer a range of further opportunities to get people's participation in ways that are flexible, attractive to them, and not too time-consuming". Benington [24] argue that decisions on policies and public services are increasingly being made not by governments alone, but via deliberation and negotiations involving governments, non-governmental organizations, and individual citizens, given the increasing size and complexity of public administration. It is also stressed that in order to ensure broad participations in deliberation processes and to increase the acceptance of public services, public officials should be active in public information campaigns. They "can enrich the possibilities for democratic participation. Better-informed citizens may participate more knowledgeably and effectively in all democratic processes" [25].

For the partnering capability, Stoker stresses that effective provision of public services requires an open-minded approach to identify the best supplier, be it in the public, private, or voluntary sector. IT resources play a crucial role in enabling such cooperation transcending traditional organizational boundaries [26]. IT resources such as tightly integrated inter-organizational systems (IOS), seamless information sharing, and advance communication technologies facilitate collaboration and cooperation between government agencies [27]. Like for-profit firms, public organizations are increasingly needed to develop the ability to cooperate and collaborate with peer agencies and outside private-sector organizations. Anecdotal evidence and academic studies consistently point out that to develop such an ability, governments need to make a smart use of IT resources for more seamless information sharing and process integration.

For the innovate capability, Moore [28] emphasizes the innovative capability of public organizations in changing environments. He states that it is not enough that managers simply maintain the continuity

of their organizations, or even that organizations become efficient in current tasks. It is also important that the enterprise be adaptable to new purposes and that it be innovative and experimental. IT resources can develop the innovative capability by enabling public managers to drastically redefine existing public services or to create a whole new sort of public services[29] that would not have been impossible to offer without IT.

Empirical study for IT's application on home service at Hangzhou

Paper of this part illustrates home service innovation in Hangzhou Shangcheng district and examines information technology's application for the home services' productivity. Home service as an important part of the public service, its design and practices with flexibility and inclusiveness meet the needs of the masses of different levels of the public. Via the Internet cloud computing technology and the support to the integration of information systems, the local government of Hangzhou Shangcheng district, has built an online "home service platform" system, which integrate variety public services including civil affairs, labor, education, health, family planning, culture and other multi-sectoral public services as well as multi-sectoral resources. Residents face an integrated government instead of the single departments. Investment and application of information technology play a significant role in enhancing public service capability and improving the productivity of public services [30].

Firstly, in the operation of public services, home services online platform to automate and standardize the process of a large number of services. Service platform leverages workflow engine technology, the information transfer calls automatically, without the aid of artificial service. Inventory service demands can be automatically distributed to the appropriate public sectors. This platform also introduces service evaluation feedback system and the entire process real-time monitoring technology, which not only do a quick response to the demand for services, but also facilitate service performance evaluation, and protect the service efficiency and service quality.

Secondly, in terms of communication aspect, application of information technology significantly promoted the participation of the public. Based on the online platform, the local government of different sectors employs it to create an enabling environment for individuals and groups to be empowered to participate meaningfully and effectively in service development and delivery processes. The public can use the kinds of tools including the phone, a key pager, Internet, mail, micro-letters, etc., to consult and complain, and government through diverse channels give timely feedback.

Again, online services platform also plays a significant role in improving partnership relations of all the stakeholders involved. Through the integration of service provision, the local government put eight government departments, including civil affairs, social security, health, education, family planning Committee, the Broadcasting, the CDPF, the administrative service center together, and access to the online services platform according to uniform technical standards to improve the ability of integrate resources. In addition to the internal integration of government's departments, the platform further integrates social resources by way of social participation. By way of government procurement of services, local government effectively promotes the running of online home services project, forming a good cooperation mechanism between governments and social organizations.

Finally, without the support of information technology, home service innovation is difficult to achieve. The convergence in supply and demand of the public service needs comprehensive public service and interactivity of the platform. The government can achieve the transition from public service content, organization and evaluation to promote the standardization of home service, optimize various functional departments connotation, promote the construction of home service of the modernization, informatization and establish performance appraisal and supervision of the home service system. As the development of economics and society in China, it is clear that the social demand transform from subsistence to development, and the traditional public service model is increasingly unable to adapt to the personalized and diversified needs of the residents. The home service of Hangzhou provide some conference for other cities to adapt to the social requirement, they launched a home service innovative practice, covering eight aspects such as pension, health care and education. Home service is based on a

worry-free online platform and secured by the system of social services management grid, which is aimed to meet the diverse service requirements of residents and improve the public service productivity continuously.

Conclusion

Taking the process-level approach from the literature on information technology and its effects on public service productivity, this study develops a theoretical framework that explains how information technology in governments contribute to public service productivity as measured by the intermediate variable of organizational capacities. Information technology help public organizations nurture the four crucial organizational capabilities, which includes the operation, communication, partnering, and innovative capabilities. In turn, an improvement in these organizational capabilities contributes to greater public service productivity.

The case study of home service in the paper illustrates IT's effects on the four key of organizational capabilities that are paramount to public service productivity, which includes operational capability, communication capability, partnering capability, and innovative capability. IT resources in public organizations enable public managers to pursue greater service productivity by cultivating these four organizational capabilities.

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