Co-production Through ICT in the Public Sector: When Citizens Reframe the Production of Public Services

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Abstract Co-production of public services is well known in the public management literature. Many studies show how co-production makes public services not only more efficient but also more effective. It the recent years, the development of several ICT applications and projects have shown that ICT has the potential to make co-production an easy and common practice for all citizens, changing completely how services are delivered on a large scale. The research, after having presented some existing cases of ICTs application that favorite co-production, shows that using ICT for co-production might help the state to deliver public services that generate Public Value. The paper follows with an in depth analysis according to the Actor Network Theory to understand if co-production through ICT might induce structural changes in the public administration allowing in future citizens to be actively involved in the production of public services. The research will conclude by providing a proposal to implement permanently co-production in the public sector.

Keywords Public administration · Co-production · Public value · Actor network theory · Internet of things

1 Introduction and Context

The term co-production was conceptualized to criticize the massive centralization of public management proposed by the dominant theories [1]. Elinor Ostrom, who originally coined the term co-production, won the Nobel Prize in Economy in 2009. She presents co-production as mix of activities that both public service agents and citizens contribute to the provision of public services [2]. However, only in the last

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decade, the interest about public sector co-production has found new attention since academics and practitioners have increasingly realised that many public services need the co-participation of citizens to be completely effective.

Although co-production has been largely discussed in the public administration literature, no references or contribution exists to account for the impact of ICTs on the co-production of public services. On the other hand, studies from other fields have seen in ICTs the capability to reshape existing models and frameworks, facilitating new connections within the community, establishing relationships that were not possible before, overcoming problems of geographical dispersion of users and facilitating enormously their participation [3, 4]. These characteristics show how ICTs are strategically important for the success of co-production in the public sector and in proposing new models of participation and of public administration.

However, co-production has to be distinguished from volunteering because citizens act not only to help their community but also to provide services they need for themselves that do not exist, or that are delivered ineffectively [5]. Co-production could be also interpreted as a will of citizens to pursue and propose public values bringing government to concentrate more efforts in collective needs (environment protection, social cohesion, more democratic processes, etc.) [6].

A successful example of co-production and public value is the childcare service in Sweden, where parents voluntarily have created cooperatives to integrate or to offer preschool services to their children, increasing incredibly the quality of the service and making the service available to people that cannot afford private services [7]. In the available researches nearly all the co-production cases show an increase of effectiveness and of cost reduction, proving in small scale experiments or projects the convenience of co-production [6–8]. On the other hand, co-production today is not so diffused or well exploited because there is not an organization or practical channels that make co-production easy and applicable on large scale. ICT has all the properties that can overcome co-production barriers making co-production a common practice for all citizens.

The paper aim to research how co-production is reshaping production of public services and proceeds as follows. First, it provides a wide range presentation of the existing applications developed by citizens that favourite and make easier co-production of public services through the internet of things. Secondly, the co-production through ICT is analysed according to the Public Value paradigm in order to show how the creation of Public Value is intrinsic in co-production practices. There follows an in depth analysis through the Actor Network Theory of how the ICT applications that favourite co-production are gradually changing the existing models of public service production. The final section provides a proposal of a platform to implement co-production in the public administration through the direct involvement of companies and citizens.

2 Co-production Through ICT

ICT is making co-production in the public sector an easier and widely spread practice. There are many apps for smartphones that help citizens to report problems or to be part of the public service. However, looking at Fig. 1 it is possible to see that currently there are three kinds of applications for co-production.

In the first category, we can find applications like Trashout (http://www.trashout.me/) that empowers citizens to report illegal dumps, taking pictures and sending localized information to local authorities. Crimepush (http://crimepush.com/) is another smartphone application that allows citizens to report crime anonymously becoming the eyes and the ears of authorities. The application Liberi di muoversi (http://www.liberidimuoversi.it/map/) allows people with handicaps to report places where there are architectural barriers and places that can be easily accessed through a wheelchair. Another interesting app is Evasori (http://evasori.info/) that allows citizens to report places such as shops or restaurants where they have found fiscal evasion, crowdsourcing all the information on a map and suggesting to the police places that should be controlled.

In the second category, we can find applications to help citizens to crowd source information collected through sensors. An example is AirCasting (http://aircasting.org/) a smartphone application available for Android that empowers users through a portable sensor to analyse the air quality. There is also another sensor Mobosens (http://nanobionics.mntl.illinois.edu/mobosens/) that works according to the same model, analysing the quality of the water through an external device that once connected to the smartphone, processed the data and then send the data on a shared map where everybody can see the quality of the water or polluted areas. Both applications as many other projects, prove that is possible, especially in the future through the internet of things, creating public networks and infrastructures utilizing sensors and devices owned by citizens.

In the third category, it is possible to find applications like Firedepartement (http://firedepartment.mobi/) and PulsePoint (http://www.pulsepoint.org/) two apps for smartphone that empowers individuals to be part of the rescue operations cooperating actively with paramedics. After registered users have indicated their level of training in cardiopulmonary resuscitation (CPR), they are alerted if someone nearby is affected by hearth attack or needs medical assistance. When the 911 operator receives the call, he is able to see the closest users to the accident. The operator invites trained citizens to reach the area of the accident and to provide CPR to the victim in order to not interrupt the chain of survival until the arrival of the ambulance.

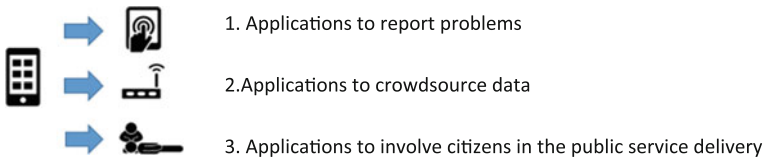

Fig. 1 Type of mobile applications for co-production

These applications able to connect people, sensors and share data with the rest of the community can be also described through the concept of the 'internet of things'. The common definition and vision is that the internet of things links objects such as sensors, tags, smartphones, machine, buildings to the virtual world generating a network of multiple human and non-human agents [9]. Many authors [10] see the internet of things as the enabler for the smart city concept as well as a new way to manage communities based on sharing information and collaboration. In fact, the data collected can improve the ability to forecast problems developing a collective intelligence.

Without ICTs, it would be hardly possible reproducing the connections and the organization that these applications created. Therefore, all these applications, as well as many others, are a clear example of how ICTs could empower citizens to co-produce public services without too many efforts or resources, utilizing common and already available technologies and revolutionizing the existing model of public administration.

3 Co-production Through ICT According to the Public Value Perspective

The existing applications that favourite co-production of public services show that citizens through ICT can also reinvent how public services are delivered according to their own perspective and needs. ICT has empowered citizens to deliver services according to new models. The creation of an application that allows citizens to participate in first aid is not just a new way to deliver a public service together with citizens but it is also a new framework of how public services are delivered. This will to change, the current production of public services can be explained through the paradigm of the Public Value [6] that is intrinsic in the co-production concept. The Public Value paradigm is not the value produced by collective organizations that represent the individual preferences or that pursue the good of the community such as Parliaments, NGOs, government organizations but rather the value that citizens perceived about a specific public good, public service or public policy [11]. Citizens are not just customers of the State and their perception is not only based on the direct benefit they can get from how public services are delivered. Citizens have socio-political values such as aspirations, goals and visions that share with the rest of the community, that make them thinking not as individuals but as part of a community [6, 12].

Therefore citizens evaluate a policy or a public good also according to collective values such as equality, justice, protection of the environment that cannot be evaluated in economic terms and that are more related to the Public Value [11]. This Public Value perspective goes directly against to the New Public Management perspective that thinks that citizens behave just as clients that only want better and more efficient services at a lower price [13]. To understand better the difference between client and citizen perspective we can use an example of a State that decides

to not offer anymore the ambulance service to people that do not pay taxes regularly. The ambulance service is a public service and is mainly for emergencies and for people that risk their lives. According to the New Public Management perspective, a citizen behaving just as a customer would be happy of this new law because it would benefit who pays regularly the service making the service more efficient. On the other hand, this new law is not respecting collective values such as equality, justice or the common vision that the emergency service should be free for everyone. This example shows that citizens do no only asses public sector organizations for their ability to deliver efficient services but also for their ability to meet collective expectations [12]. However, Public Value differs according to the culture and is not static because citizens change their collective vision or expectations overtime, making sometimes public services inadequate to meet their perspective [11, 12].

Is the case of how the nuclear disaster of Fukushima leaded to a radical change in the opinion of Italians and Germans about nuclear energy. In fact, Italians renounced through a referendum to the reintroduction of nuclear power and the Germans accelerated their plans to close their nuclear power reactors [14]. This rapid change of vision among Germans and Italians made inadequate policies and the strategies taken by regularly elected parliaments few years before. However, the mobile applications previously presented, indicate how ICT is enabling today citizens to organize public service delivery according to their current perspective without waiting the political decision of their governments. Therefore, co-production practices naturally generate public value. For example, the application PulsePoints, shows that American citizens, have collectively developed the vision that citizens should be involved in the co-production of first aid services in order to save more people. Consequently they have decided to directly redesign the emergency service through a smartphone application proposing a new model of first aid service that satisfy their current vision of fist aid without passing through policymakers. Other applications such as Trashout or CrimePush and many others similar applications show that citizens are starting perceiving themselves as active actors in the public service production. On the other hand, the current public administration and especially e-government services still perceive citizens as clients and not as active actors [12]. This common will to co-produce public services and the development of these applications show that citizens want to redesign public service delivery to affirm their Public Value perspective. Therefore, ICT is allowing these citizens to change how the public administration delivers services according to their current perspective and ideas forcing public administration to be more flexible and adaptable.

4 ICT for Co-production Is Changing the Public Administration

Extending the co-production of ICT applications for public services to citizens would increase the innovation and the responsiveness of the services [15]. This change of the role of citizens from passive to active actors through ICT is also

changing the structure of the public administration. Bovens and Zouridis [16], have already shown how ICT has the power to change the public administration structure and how public services are delivered. However, the difference with the past cases is that this change today is not top-down as in the past but bottom-up and comes from citizens. This means that legislators and public managers are not anymore the only ones that decide how to organize public services. The cases previously shown prove that ICT helps to make political decisions that can change how public sector is shaped and services are produced. According to the Hodgson and Cicmil [17], when standards, infrastructures and categories are implemented in an organization they change how the organization works. In fact, the organization has to adapt to the introduction of a new knowledge, to assimilate the new procedures and to reshape its structure. Behind the introduction of new standards or artefacts there is also a political and ethical meaning [17]. Therefore the assimilation of these ICT applications, has also a political connotation that conflicts with the current structure of the public administration. In fact, these applications show not only that citizens can actively co-produce public services but that they can also create new models of organization to deliver public services. This has clearly a political impact that threats the idea of a public administration just managed by public officers and where there is not space for citizens.

This change in the public administration might find several obstacles. In fact, every time an organization acquires a new technology, infrastructure or standard its actors live a period of stress and alienation [17] that as underlined by Markus [18] can generate resistance. In this case, these applications strongly affect the current organization of the public administration and threat the decisional and political power of many public officers. In addition, co-production increases transparency and then the accountability of public institutions. Furthermore, the Public Sector is usually reluctant to open experiments, to take risks or to implement projects that have been developed by non-public servants [19]. The Actor Network Theory can help to better understand the problems and the process of implementation of co-production to the public sector and how the different actors interact.

Looking at the stage of development of these applications and considering the Actor Network Theory [20] these applications are today in the ‘translation phase’, trying to modify the structure of the public administration that should be perceived as a network of human and non-human actors. In fact, there are several ICT applications, created by single users and NGOs that are currently involved in changing the existing public administration framework to propose new networks where citizens can start covering an active role. The intermediaries used in this translation process are the smartphone applications previously presented, where are inscribed behaviours and visions that naturally bring citizens to participate and to be involved in the co-production of public services. The translation process that creates or changes a new network has a political nature that in this case consists in making citizens more involved in the production of public services. The first step of the translation process is the “problematization” when actors identifies and explore a problem trying to persuade other actors to accept their favourite solutions and scenarios about how the new network should look like. In this case the problem

identified by all the citizens, is the inability of the current public administration model to produce effectively public services and the solution promoted is to use ICT to involve citizens in co-producing public services. In many parts of the world, the translation process is ongoing. In fact, these applications are gradually aligning all the actors to a new network that involves citizens in the co-production and where citizens are not just clients.

However, are still few the cases where the process of translation has been successfully validated through conventions and regulations which have stabilized the network. One of these rare cases, is the IRIS application of Venice Municipality that allows citizens to report damaged streets, illegal dumps and other problems directly to the responsible bureau without calling or writing mails and with the certainty to reach the public officer that might solve their problem [21]. Since the launch of IRIS in Venice in 2008, no other applications for reporting problems in Venice has been created, showing that the network in Venice has been stabilized and the actors have never felt the need to propose new applications to challenge the existing solution. On the other hand, in other parts of Italy many applications such as Decoro Urbano (http://www.decorourbano.org/) or Aid your city (http://www.aidyourcity.com/) have been created and used to report problems but without being fully integrated through conventions with Municipalities. Pisa another Italian city, has its own app to report problems (https://www.androidpit.it) however as it happens in many other cities, the network is still not stabilized because not all the actors are fully aligned and then they continue proposing applications to persuade other actors to choose the application they prefer. Therefore, the Venice case show that when co-production is institutionalized through conventions and norms the rest of the network is temporarily stabilized and the other actors do not try to develop other applications with the same or similar goal. However, beyond the successful IRIS case, there is still not a permanent institutional process of co-production in the public administration that allows citizens to propose new kind of organizations and approaches of public service delivery.

5 Implementing Co-production in the Public Administration

Considering the Actor Network Theory it is therefore necessary to find a way to stabilize the "network" [20] allowing citizens to produce new models of public service that satisfy their changing needs and values. In this new network, the State would become the coordinator and the facilitator of the production in order to generate more Public Value through public services. To reach this goal the final users, in this case the citizens, will be directly involved in the production of ICT applications for the production of public services. This would create an agile, bottom-up and citizen-responsive development process that would improve the innovation reducing costs with the certainty to satisfy citizens' needs [22]. The

current proposal is based on the previous research of Fishenden and Thompson [22] where is suggested the importance to build an e-government platform based on open source standards to create an ecosystem of companies in order to reduce the existing oligopoly of few IT companies [23]. However, before creating a platform the government needs to enhance its in-house ICT expertise and skills to successfully adopt and manage an Open Architecture platform [22]. As Google shows, once the platform is created, is necessary to create an ecosystem where the creation of services is completely outsourced to companies, users and other providers [24]. This platform structure is characterized by a centralized power that coordinates and create norms and decentralized structures that develop and deliver services and applications. As already presented in the Digital Era of Governance [25] the creation of a platform would allow new forms of co-creation and co-production not only between government and companies but also between government and citizens.

Social networks, cloud computing, internet of things and emergent digital technologies are opening a new channel of interaction and collaboration between citizens and government [25]. Therefore, the ecosystem of the e-government platform should be opened not only to companies as mentioned by Fishenden and Thompson [22] but also to normal citizens as it happens with Google and Apple. Outsourcing the production to the community would not be something of new. Wikipedia is a successful example of how users can co-produce public goods. However, the structure of Wikipedia allows users to enrich the contents according to predefined rules and frameworks [26]. Considering the experience of Wikipedia [27] and also how Apple manages its market of applications [28, 29], the State should create a platform to collaborate with citizens in order to develop ICT applications for the creation of new services.

Once the trend has been individuated looking at the emergent application features (Fig. 2), the state would open the development of a new module/application on its platform that would work on a national and local scale according to a standardized interface.

The modules could be created by the community and companies. Each module is a project with a specific goal. As the Fig. 3 shows, the module can be used both by local and central government according to their needs and competencies. Once the state has established the rules and a general framework to allow and monitor collaboration, the community (and not the state) starts creating the module according to the "bazar method" [30]. The community would discuss the "to do

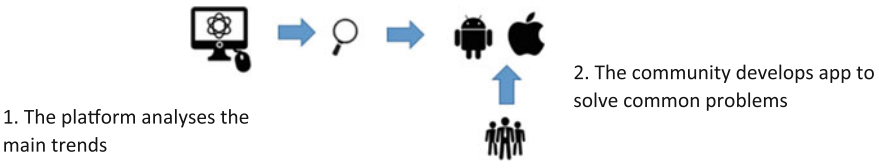

Fig. 2 The functioning of the platform

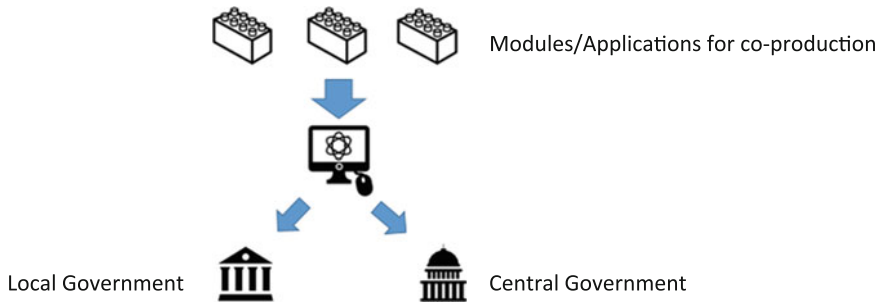

Fig. 3 The modular architecture of the platform

list" as well as the general direction that the development should follow [31]. All members of the community can review and modify the modules. All the users are registered to the platform and their contribution is tracked and awarded by the platform. Considering Fig. 4, once the module is created, a public mix commission composed by public officers and citizens would certify the quality and make the module available on the platform following a similar process already utilized by Apple [28]. The competent authorities responsible in delivering the new public services would be individuated by law in order to avoid misunderstandings or overlapping of duties. Once the application is published, the community could still work on the development of a further and more updated version [24, 27, 31].

The main goal of this platform would be in creating a unique ecosystem of citizens and companies that can freely compete to co-produce the creation of new public services. Basing on the researches about Wikipedia [26, 27, 32] and about Public Value [6, 12] citizens would cooperate because they want to solve common problems (air pollution, criminality, first aid etc.) that the State alone is not able to solve. In addition, they would contribute to the good of the community for a matter of reputation [32] and to affirm their collective aspirations. Shame and honour are probably the most important drivers when all the users registered to the platform could see who is giving more and who is giving less. Utilizing gamification and a dedicated system of incentives would make able citizens to see who contributes to the good of the community. The pressure of the community would incentivize

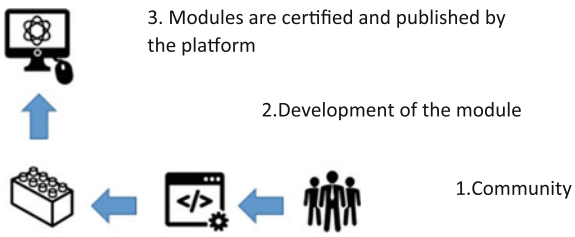

Fig. 4 Process of certification of a module

Fig. 5 Awarding system for users and developers

citizens to behave better and help the co-production of public service [32]. As it possible to see in Fig. 5, co-production can consist both in the development of the applications and in the active participation in co-production of public services (reporting problems, collecting data etc.). In both cases, the platform would award users that contribute more.

6 Conclusions

This research has concentrated on how co-production practices through ICT are changing how public services are delivered and then how the public administration structure is shaped. Although there are many successful cases of co-production of public services through the involvement of citizens, the current public administration model still perceives citizens as costumers. On the other hand, the development of many ICT applications have made co-production an easy practice involving many citizens in collecting data and information about pollution or criminality or in the direct co-production of vital public services such as first aid. According to the Public Value perspective, behind the co-production of public services there is the will of many citizens to create new models of public service production that match their current collective aspirations and ideas and that the current model of public administration is unable to satisfy.

However, these applications are proposing also alternative models of public service delivery that risk to modify the existing public administration structure. Just few cities have started implementing co-production through ICT in their public administration but there is still not a permanent process that can guarantee flexibility and adaptability to the co-production practices. This research tries also to propose an e-government platform that outsources the creation of new modules of public services production to an ecosystem of citizens and companies, nevertheless being a preliminary proposal more research is needed. It would be also interesting to use the framework of Boundary Resources about platforms to understand how to successfully organize the citizen co-production in an ICT context [33]. More research is also needed to better understand the correct implementation of co-production practices through ICT and the possible structural changes that can be generated in the public administration.

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