




## Co-production 'thinking' and performance implications in the case of separate waste collection

Stefano Landi & Salvatore Russo


To cite this article: Stefano Landi & Salvatore Russo (2022) Co-production 'thinking' and performance implications in the case of separate waste collection, Public Management Review, 24:2, 301-325, DOI: [10.1080/14719037.2020.1823726](https://doi.org/10.1080/14719037.2020.1823726)


To link to this article: <https://doi.org/10.1080/14719037.2020.1823726>

 View supplementary material [↗](#)


 Published online: 01 Oct 2020.

 Submit your article to this journal [↗](#)

 Article views: 547


 View related articles [↗](#)

 View Crossmark data [↗](#)

 Citing articles: 3 View citing articles [↗](#)



# Co-production ‘thinking’ and performance implications in the case of separate waste collection

Stefano Landi  and Salvatore Russo

Department of Management, University “Ca’ Foscari” Venice, Venice, Italy

## ABSTRACT

The relevance of co-production paradigm in recent years suggests innovative observation methods in the context of public-service delivery while marking the advent of a new way of ‘thinking’ in public service logic. From this perspective, co-production processes within separate waste collection are investigated. An index, drawn on co-production literature, is built to measure the public officers’ co-production attitude. The association between the attitude in stimulating co-production and separate collection performance is tested controlling for ‘classic’ determinants already found in waste management literature. Results show that a higher attitude towards enhancing users’ co-production facilitates the best achievements in terms of separate collection results.


**KEYWORDS** Co-production; waste management; public-service logic; separate waste collection; public services; public-service organizations

## Introduction

Co-production is an important aspect of the current public-service reform agenda worldwide. It allows the identification of the important aspects of both effective public-service delivery and the role of public services in achieving wider societal purposes such as social inclusion and citizens’ engagement (Osborne, Radnor, and Nasi 2012). Several authors and institutions have argued that the co-production concept has the potential to improve the efficiency and effectiveness of public services, becoming a key response to the need for reform of the public sector (Bovaird and Loeffler 2017; Osborne, Radnor, and Strokosch 2016; Parliament of Australia 2011; Pestoff 2006; Scottish Government 2010; OECD Directorate for Public Governance and Territorial Development 2011).

Despite the growing body of literature, co-production concept is still a multi-faceted concept with some shortcomings. First, there is a wide variety in the terms that are linked to co-production in the literature (Verschuere, Brandsen, and Pestoff 2012). Second, there is a large amount of heterogeneity in the way co-production discloses itself in real practice, depending on the service typology and the co-productive relationship between the actors involved (Alford 2014; Cepiku 2014; Nabatchi, Sancino, and Sicilia 2017). Third, the outcomes of co-production are not systematically

**CONTACT** Stefano Landi  [stefano.land@unive.it](mailto:stefano.land@unive.it)

 Supplemental data for this article can be accessed at <https://doi.org/10.1080/14719037.2020.1823726>.

© 2020 Informa UK Limited, trading as Taylor & Francis Group

studied (Voorberg, Bekkers, and Tummers 2015). The majority of works analyse the determinants of co-production, but they do not deal with its influence on outcomes. This is an important gap as strong pressures arise on Public Service Organizations (PSOs) to enhance efficiency and effectiveness. There are some studies looking at outcomes of community engagement projects, but without a clear reference to co-production. Voorberg, Bekkers, and Tummers (2015) affirm that co-production may be perceived as a value in itself, which is supported by the observation that several authors have addressed the increase in citizens' involvement as an objective to be met. Moreover, Dudau, Glennon, and Verschuere (2019), in their editorial, called for constructive disenchantment and re-enchantment with the magic that surrounds co-production in public services. Treating co-production not as a normative good can help to increase the ability of this concept to improve public services (Dudau, Glennon, and Verschuere 2019). Therefore, as previous studies highlighted, one of the next challenges is to test and refine the concept through a set of testable propositions (Osborne and Stokosch 2013; Voorberg, Bekkers, and Tummers 2015). Thus, the aim of this article is to answer the following general research question: "Does a high intensity of co-production appreciably influence public service performance?". We argue that trying to answer this question contributes to the literature in understanding co-production concept and its implications. We focused on a specific service, the separate waste collection (SWC) in Italian municipalities, using data collected through a survey of public managers and official data on separate collection results. We statistically tested, controlling for confounding factors, the association between the percentage of separate collection results and the attitude of municipalities in eliciting citizens' co-production. A composite index has been developed to detect the level of attitude in eliciting co-production.

The analysis suggests that municipalities with a higher attitude towards enhancing users' co-production are more likely to achieve the best results in terms of separate collection. Nevertheless, the public managers' consciousness of the importance of eliciting co-production is quite low. These results underline the value of studies aiming at showing the influence of co-production on PSOs outcomes together with the role played by co-production to improve public services.

The article begins presenting the theoretical framework, previous research about co-production and its role in the separate collection service. Secondly, it describes the index with each sub-domains by which it is formed. Then, it introduces the methodology and the models used. Next, we present our statistical analysis and findings. The article concludes with interpretations, methodological limitations, and the implications of the study.

### **Definition of co-production in public service**

Owing to the importance of the co-production concept for public management, an extensive body of research has begun to mature (Fledderus, Brandsen, and Honingh 2014; Hardyman, Daunt, and Kitchener 2015; Isett and Miranda 2015; Radnor et al. 2014; Van Eijk and Steen 2014; Verschuere, Brandsen, and Pestoff 2012; Wiewiora, Keast, and Brown 2015). Co-production may influence several aspects of public services, for example, as a way to increase citizens' involvement (Voorberg, Bekkers, and Tummers 2015), as a valuable route to public-service reform (Nambisan and Nambisan 2013), or as an answer to the need to lower costs in the current era of

austerity that we are experiencing (Bracci et al. 2015). It can be also considered as an instrument to provide better targeted and more responsive public services (Duffy 2007), a response to the democratic deficit (Pestoff 2006, 2009), a way to increase the efficiency and effectiveness of service delivery and a chance of stimulating public sector innovation (Cepiku and Giordano 2014; Nabatchi et al. 2016; Osborne and Strokosch 2013).

Notwithstanding these important contributions, there is heterogeneity in the meaning linked to the term ‘co-production’. Therefore, it is necessary to make clear the framework within which our study was conducted. We refer to the definition developed by Osborne, Radnor, and Strokosch (2016), where *co-production is the voluntary or involuntary involvement of public-service users in any of the design, management, delivery, and/or evaluation of public services*. This approach is rooted in two areas of literature on co-production: public administration and management (PAM) theory (Alford 1998; Pestoff 2006; Pestoff, Osborne, and Brandsen 2006; Whitaker 1980) and service management theory (Johnston and Clark 2008; Normann 1991; Vargo, Maglio, and Archpru Akaka 2008; Venetis and Ghauri 2004).

Since 1972, literature has been concerned with ‘co-production’ in the implementation of public policy and the design and delivery of public services (Alford 2009; Ostrom 1972; Pestoff 2006). Public services should be delivered with ‘the maximum feasible participation of residents of the areas and members of the groups served’ (Judd 1979, 303). However, the idea that co-production is an optional element of the service delivery process endures throughout the PAM literature, arguing that ‘service users and their communities can – and often should – be part of service planning and delivery’ (Bovaird 2007). From a PAM perspective, co-production is seen as a normative voluntary good that should add value to the public-service production process, but it is not intrinsic to it because ‘public officials are exclusively charged with responsibility for designing and providing services to citizens, who in turn only demand, consume and evaluate them’ (Pestoff 2006, 506).

On the contrary, the service management literature is not concerned with how to ‘enable’ or ‘build’ co-production in the service delivery process (Sangiorgi 2012). Co-production is an essential and inalienable core component of service delivery according to which you cannot have (public) service delivery without co-production. It is an intrinsic process of the interaction between any service organization and its service users at the point of delivery of a service (Gronroos 2007). From a service-dominant approach, there is no way to avoid the co-production of public services (Osborne, Radnor, and Nasi 2012). The user’s contribution as a co-producer can be conscious, unconscious, or even coerced, but it is unavoidable. This can be crucial in determining the performance of a service. Indeed, the question is not how to ‘add’ co-production to public service, but how to manage and work with its implications. PSOs do not ‘add in’ but elicit co-production to enhance its effect on public service delivery.

### **Factors influencing citizens’ co-production**

Previous literature pointed out as multi-level factors may affect citizens’ co-production of public service outcomes (Alonso, Andrews, Clifton & Daniel Diaz-Fuentes 2019). In detail, there are individual and organizational/contextual factors.

On the citizen side, individual attitudes and motivations seem likely to explain co-production levels. Authors have distinguished between material incentives (money,

vouchers, etc.), solidarity incentives (belonging to a group) and intangible incentives, including intrinsic rewards or satisfaction with morally good action (Alford 2009; Van Eijk and Steen 2014). Personal values of citizens, such as loyalty, civic duty and the wish to improve public service management, influence the willingness of citizens to participate. Furthermore, the literature has identified a number of sociodemographic determinants, such as gender and age, likely to influence co-production behaviour. For example, empirical evidence suggests that women are more likely to co-produce than men and that elderly are more willing to engage in individual co-production (see, e.g. Bovaird et al. 2016; Parrado et al. 2013). Education is also an important predictor of citizens' participation with higher educated more willing to co-produce (Alonso et al. 2019; Egerton 2002). Moreover, the perceived ability of citizens to participate also affects citizens' co-production levels, they need to be aware of how and where they can influence public services, but they also need to feel it as their responsibility (Voorberg, Bekkers, and Tummers 2015).

On organizational factors, Voorberg, Bekkers, and Tummers's systematic review synthesized three areas that might influence co-production: (i) compatibility of public organizations with citizens' participation, (ii) administrative culture and (iii) attitude of public officials towards citizens' participation.

The first factor refers to the presence or the absence of infrastructure to communicate with citizens, such as not-for-profit and voluntary organizations, able to ease the development of shared values about public life and collaboration through interaction in horizontal networks (Andrews and Brewer 2010; Andrews and Brewer. 2013; Davidsen and Reventlow 2011).

Administrative culture refers to differences in governance traditions towards co-production behaviour. Some authors showed as the presence of an inclusive or risk-adverse administrative culture can ease or make difficult the co-production diffusion. Inclusive administrative cultures may cultivate collaborative structures favouring public service co-production while risk adverse administrative traditions could have a lack of collaborative structures able to encourage participation because they tend to consider citizens as mainly service recipients instead of partners (Voorberg, Bekkers, and Tummers 2015).

The third point refers to the propensity of politicians and public servants to collaborate with citizens. Public officials may be reluctant to lose control, they can consider co-production unreliable because the behaviour of citizens is unpredictable and not standardized (Osborne, Radnor, and Nasi 2012; Roberts et al. 2013). On the contrary, politicians or public officers willing to engage citizens would put more effort into 'actively and creatively' provide tools and incentives for citizens' participation (Coursey, Yang, and Pandey 2012; Handley and Howell-Moroney 2010). Several authors showed as this kind of attitudes may affect the extent co-production occurs in public services (e.g. Coursey, Yang, and Pandey 2012; Gebauer, Johnson, and Enquist 2010).

### ***Co-production and outcomes***

Few studies in co-production literature systematically investigate the influence of co-production on outcomes achieved. There is a predominance of studies dedicated to the identification of influential factors or the conceptualization of different co-production types, showing that most academics aimed their studies at the co-production process

rather than its outcomes. As documented by Voorberg, Bekkers, and Tummers (2015) in their systematic literature review, only 20% of 122 studies included evaluated specific goals to be met by the organizations. The few studies on co-production outcomes mostly refer to an increase (or a decrease) in effectiveness (59%). The second most-studied outcome is the increase (decrease) in citizen involvement (25%), while other dimensions such as obtaining more efficiency (4%), the gain of customer satisfaction (4%), and the strength of social cohesion (4%) are residual (see Voorberg et al., (2015).

Co-production concept has a positive aura around as if the outcome of (public) services co-produced by users and professionals ought to be 'better services' by definition (Dudau, Glennon, and Verschuere 2019). As a matter of fact, while there are many positives, empirical evidence is scarce and with mixed results. Studies showed that co-production is not a panacea and it does not always reach the results expected (Benari 1990; Bovaird et al. 2019; Kang and Van Ryzin 2019; Lindenmeier et al. 2019; Meijer 2012). Benari (1990) showed that co-production in Japanese garbage disposal did not generate positive outcomes. Meijer (2012) studied how new media help co-production between government and citizens or support the co-production of safety. He showed also that co-production is not to be considered as something that directly leads to a higher level of neighbourhood safety. Kang and Van Ryzin (2019), evaluating how co-production may influence trust in government, did not find statistically significant relationship and causal effect of co-production on trust. Lindenmeier et al. (2019) investigated the effects of co-production on satisfaction with public service organizations (PSOs) in a day-care setting. The study found a significant and positive indirect effect of social co-production on satisfaction showing, at the same time, that economic co-production had not the same impact on users.

Therefore, co-production cannot be considered a normative good as it can lead to the co-destruction of value as much as to its co-creation (Osborne, Radnor, and Strokosch 2016) or it can be likely to apply to some services better than to others (Dudau, Glennon, and Verschuere 2019). Dudau, Glennon, and Verschuere (2019), also for the reasons mentioned above, called for a constructive disenchantment and re-enchantment with the magic that surrounds co-production and, in particular, underlined that the current theoretical developments pose challenges for performance and evaluation studies. They stressed the need for more empirical evidence to show how and why co-production works.

### ***Measuring co-production***

Co-production is a multidimensional concept not directly measurable in real life. We need to make the concept of co-production operational, translating the theoretical co-production concept in indicators that are able to proxy its existence and intensity. Our goal is to measure the attitude or propensity of public officials towards co-production trying to detect how they provide tools or incentives for enhancing citizens' co-production. Based on previous literature this can be considered a proxy of the extent co-production occurs (e.g. Coursey, Yang, and Pande 2012; Gebauer, Johnson, and Enquist 2010; Osborne, Radnor, and Nasi 2012; Roberts et al. 2013).

Drawing on previous theoretical studies (Alford 2009; Osborne, Radnor, and Strokosch 2016), five domains were identified.

### **Five domains description**

Alford (2009) recognizes that citizens ‘*donate their valuable time and effort to the achievement of organizational or programmes purposes when they receive, or expect to receive, something at least as valuable in return*’. Separate waste operations cost the individual citizen time and effort. The key is making citizens the object of attention in the organizational process by understanding what induces clients to co-produce. Using the Alford approach, there are two factors affecting whether clients will contribute time and effort to co-production:

- (1) *Willingness to do (WTdo) co-production*, which is prompted by a complex mix of motivators, stackable in three groups: (1) sanctions, (2) material rewards, and (3) non-material motivators.
- (2) *Clients’ ability to co-produce*, which is a function both of the relative complexity of the task and their own capacities.

First, Alford described that WTdo can be elicited through ‘sanctions’. The use of sanctions against the non-compliant provides a guarantee to those more inclined to be cooperative that all citizens are required to contribute their fair share of time and effort (Alford 2009). Individuals with intrinsic motivation and strong pro-environmental attitudes will be likely to recycle, whereas others may be tempted to behave parasitically and let the first ones recycle. This problem may be partly solved by implementing controls and effective penalty systems.

Second, WTdo is elicited through ‘material rewards’. The idea is that if people are offered rewards proportionate to their performance, they will be motivated to perform better (Alford 2009). This dimension is not dealt with in this work. Material rewards have been used by some municipalities, but they are not relevant nowadays in the Italian separate collection sector. This is in line with the risk of material rewards, that is, a task is no longer performed when payment is withdrawn (see Iyer and Kashyap 2007).

The third WTdo driver is the ‘non-material rewards’. People’s propensity to co-produce is influenced by their internal norms and commitments about moral and social issues such as saving the environment or supporting the needy (Alford 2009). They receive intrinsic rewards with morally good actions increasing their will to co-produce (Van Eijk and Steen 2014, 2016). When recycling, individuals can feel a sense of intrinsic personal satisfaction in doing the right thing and getting the approval of the neighbourhood thanks to their virtuous behavioural conduct. Therefore, it is important to elicit people’s intrinsic motivation to improve separate collection by means of public information and awareness campaigns. Iyer and Kashyap (2007) found that information policies have less effect than monetary rewards, although their effect persists after they have been withdrawn. Knowledge can increase intrinsic motivation through enhancing individuals’ awareness of the benefits that separate collection confers upon society (Thørgersen 2003).

Another domain for eliciting co-production is the clients’ ability to co-produce which depends on: i) the relative complexity of the task for citizens and ii) the abilities of the citizen. The perceived ability of citizens to participate affects citizens’ co-production levels because they need to be aware of how and where they can influence public services and to know it is their responsibility (Voorberg, Bekkers, and Tummers 2015).

PSOs need to develop activities aimed to lower the complexity of the task.



Osborne, Radnor, and Strokosch (2016), connecting public management administration with the service management literature, observed that ‘co-production is an essential and inalienable core component of service delivery: you cannot have (public) service delivery without co-production’. For this reason, the fourth dimension we wanted to depict with the questionnaire was the municipality’s awareness of the importance of citizens’ contributions to the production of separate collection. Then following Osborne’s framework (2016) (see recycling service and co-production section), we added a fifth dimension, the propensity to engage citizens at a higher level, that Osborne calls co-design, where users collaborate in the design of service-evaluation programmes and take part in the decision process. These last two dimensions should reveal the consciousness of public managers towards the importance of co-production. Their understanding of the problem may reach the two opposite extremes: they can consider co-production unreliable or a game changer for their service (Coursey, Yang, and Pandey 2012; Handley and Howell Moroney 2010; Roberts et al. 2013).

### **Waste collection in the European Union and Italy**

In recent years, the concept of rubbish from waste (something not wanted or not useful; Latin *Vastus*: unoccupied, uncultivated) to a resource that, if properly exploited, can become a source of wealth has been re-evaluated. The first formal act was carried out by the European Commission with Directive 75/442/EEC on 15 July 1975. The directive introduced the ‘polluter pays’ principle, highlighting the extent of responsibility in the production of waste according to which anyone who produces trash automatically becomes responsible for its treatment and disposal. Following this directive, Italy issued a decree (D.P.R. 915/82) in 1982, where the municipality has been identified as the actor in charge of recycling. The law disposes the exclusive responsibility for the organization and management of waste to the municipalities in a direct and autonomous manner. Thereafter, starting with the ‘Ronchi Decree’ in Italy in 1997, minimum recycling targets have been set. Therefore, municipalities should achieve minimum levels of recycling collection of 15% by 1 March 1999, 25% by 2001, and 35% by 2003. These levels were updated in 2006 to at least 40%, 45%, 50%, 60%, and 65% by December 31st of 2007, 2008, 2009, 2011, and, 2012, respectively.

As summarized in Table 1, if a municipality does not comply with a minimum diversion rate of 65%, it suffers from sanctions at the national level. Regional

**Table 1.** Minimal compendium of the current national legislation on waste management evaluation.

Law	Effect
Law 549/1995	The ‘polluter pays’ principle introduced to the national legislation.
Legislative Decree 22/1997	Introduction of the Special Tax on Landfill Disposal and definition of the minimum rate.
Legislative Decree 152/2006 (and its modifications)	Definition of the minimum levels of the diversion rate to be attained to avoid sanctions.
Law 147/2013	Full cost coverage of the waste management service through the new waste tax ‘TARI’.
Law 221/2015	Sanctions for not reaching the minimum levels of the diversion rate; gradual reductions on the tax on landfill disposal if diversion targets are met.
Ministerial Decree 26 May 2016 (Ministry of Environment)	Guidelines for calculating the diversion rate of municipal solid waste.



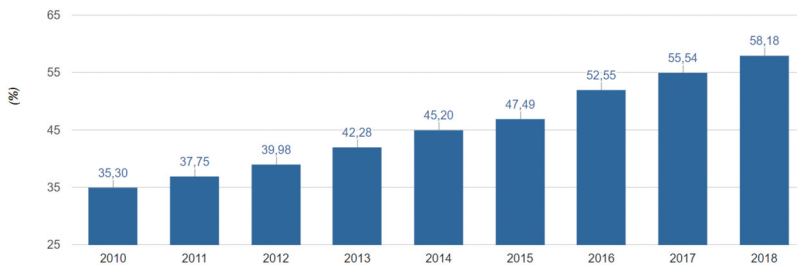
governments are also allowed to add further targets and sanctions, which are added to service provision costs. These rules, targets and sanctions, even with mixed concrete results on recycling activity (Cavalletti and Corsi 2019), are real actions that show the importance of separate collection for the society.

Extrapolating data from the Italian Institute of Environmental Research and Protection (ISPRA), in Italy 58% of waste belonged to separate collection in 2018 – below the 65% threshold of the objectives introduced by the Consolidated Environmental Law, but with a steady increase over the years (see Figure 1). There are large differences within the country: from 64.2% in North Italy to 37.6% in South Italy (Table 4). Globally the number of municipalities that achieved the threshold, in 2018, was 3,930 that is the 49% of them. A high variability exists, there are municipalities that have the 90% of separate collection and others that are under 40% of it (1,837 or the 24% of total municipalities).

### Recycling service and co-production

Recycling services produce public value for the community by protecting the environment, individual well-being and the economic sustainability of our society (Harder et al. 2008). In order to dispose and effectively run separate collection, the administration requires that citizens provide minimal effort and time to separate their refuse. Good performance is achieved when the waste management process is optimized with the joint action of citizens and local governments (Agovino et al. 2018).

Using the framework developed by Osborne, Radnor, and Strokosch (2016), a service can be classified with different typologies according to its operational and management level (Table 2). Actually, the categories are not a continuum. According to this classification, the SWC service can be represented by different typologies. First, it represents the purest form of co-production where the user co-produces the service



**Figure 1.** Percentage of separate collection by year (source: Italian institute of environmental research and protection ISPRA: <http://www.isprambiente.gov.it/it>).

**Table 2.** Conceptualization of co-production from Osborne, Radnor, and Strokosch (2016).

		Locus of co-production		Towards the co-creation (or co-destruction) of value
		Individual	Service	
Nature of co-production	<i>Involuntary</i>	I: Co-production	III: Co-construction	
	<i>Voluntary</i>	II: Co-design	IV: Co-innovation	

experience and outcomes (public value) with public-service staff (Etgar 2008). The process is not voluntary but intrinsic to the nature of a public service as a 'service' and may often be unconscious on the part of the service user. Osborne, Radnor, and Strokosch (2016) call it 'technical' co-production; it is impossible to deliver any form of public service without, at least, some elements of technical co-production. In fact, if the disposal of waste is not correctly performed, specifically the separation of paper, plastic, glass, wet, dry, and green waste, the correct realization of separate collection cannot occur.

In contrast, the separate collection service has the potential to be in the second quadrant of the Osborne conceptualization of co-production, i.e. co-design. At this level, co-production becomes a conscious and voluntary act with the goals of creating capacity within public-service delivery systems and, concomitantly, improving the performance of public services by actively involving the service user in their design, evaluation, and improvement (Osborne, Radnor, and Strokosch 2016).

## Research method

### *Data*

In this study, two main typologies of data sources are employed: survey and Italian official data on separate collection. Survey data were collected in the last three months of 2018, through the administration of a web-based questionnaire (Google Surveys) with closed questions sent to a sample of municipalities. Questions were organized according to funnel succession: first proposing general questions and then moving to more specific questions to allow a respondent to focus his/her attention on the proposed topic and to formulate opinions that were not meditated. A total of 18 questions were formulated (see Supplementary Material).

The sample was randomly selected using a non-proportional quota-sampling scheme aimed at selecting a percentage of respondents shared equally in consideration of two stratification variables considered significant in influencing the performance of a municipality: the size of the municipality and the geographical area. This method is a non-probabilistic equivalent of stratified random sampling. A sample of 180 municipalities was extracted. The questionnaire was sent to a specific employee, the head manager of the environmental office, who, as a representative of the public body, was expected to provide the requested data with greater accuracy and objectivity. Further, because the questionnaire was administered by email, it was considered that addressing a specific person would increase engagement and therefore facilitate data collection. The sample response rate was 56.6%.

Data from the cadastre of urban waste of the Italian Institute of Environmental Research and Protection (Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA))<sup>1</sup> were used. ISPRA is an administrative database with a large and accurate amount of data regarding garbage collection. It can be considered as a census of urban waste because it contains the data of every Italian municipality.

### *Outcomes measure*

It is important to choose a measure of outcomes influenced by co-production processes. The type of outcome studied depends on the perspective. In this work, we

adopted the perspective of the Public service organizations in charge of the service (municipalities). Using PSOs perspective, we could choose indicators measuring: i) improved efficiency, ii) improved effectiveness, iii) reduced cost, or iv) higher citizen engagement or increasing internal legitimacy. In the case study, we selected the effectiveness dimension and the measure chosen was the ability of the municipality to recycle. The indicator used to measure the effectiveness is the ‘percentage of recycling on the total amount of waste’ achieved by each municipality. This is our dependent variable.

### **Co-production index**

Co-production is a complex concept constituted by several dimensions. As shown in the theoretical section ‘measuring co-production’, to measure its presence we need to operationalize the concept using proxy indicators. According to previous literature, the attitude of public officials towards co-production and providing incentives to elicit it can be considered a proxy of the extent co-production occurs (e.g. Coursey, Yang, and Pandey 2012; Gebauer, Johnson, and Enquist 2010; Osborne, Radnor, and Nasi 2012; Roberts et al. 2013). The five domains identified were operationalized through questions (see Table 3):

- i) Willingness to do: Sanctions;
- ii) Willingness to do: Non-material rewards;
- iii) Ability to co-produce;
- iv) Co-production propensity;
- v) Co-design propensity.

We measure *Willingness to do: sanctions* using a survey question assessing municipality statement on the frequency of monitoring compliance with the rules and of imposing administrative sanctions. Informants were invited to indicate on a 5-point Likert scale from 1 (never) to 5 (very often).

*Willingness to do: non-material rewards* were depicted through the presence (or not) of municipality awareness initiatives to engage citizens in waste problems, e.g. environmental communication campaigns or awareness projects in schools. More specifically, our non-material reward indicator is a count of the number of initiatives promoted.

*Ability to co-produce* was evaluated as the effort to enhance users’ capacities/skill and to lower the complexity of the task. The first indicator is a count of the number of initiatives implemented to provide information on ‘where’ and ‘how’ make separate collection. The second is a question asking if municipalities use the results of surveys on citizen satisfaction for developing changes to the service.

Then, we assess *co-production propensity* as public officials’ perception of the importance of citizens’ contributions on a 5-point Likert scale from 1 (no way) to 5 (citizen’s contribution is essential). Lastly, *co-design propensity* was measured here as the presence/absence of evaluation programs (0–1) and public managers’ opinion on the involvement of citizens in the service design phase (1 – not in favour, 2 – in favour of citizens’ engagement, but not in the design of the service, 3 – completely in favour).

The five domain scores were aggregated to compose an index using the Mazziotta–Pareto (MP) aggregative method. In the last years, the MP index (MPI) has been

**Table 3.** Domains composing public officials attitude towards co-production.

Factors affecting contribution	Goal of the questions	Questions	Score
Willingness to do: Sanctions	- Monitoring compliance with the rules - Frequency of administrative sanctions	1) How often do checks on compliance with the rules for separate collection take place?	1-5
Willingness to do: Non-material rewards	- Awareness campaigns	2) How often are fines imposed for non-compliance with separate waste collection? Following the introduction of separate waste collection, have information campaigns and/or public awareness campaigns been implemented regarding this topic? If you choose Yes, with which methods?	1-5 0-4
Willingness to do: Material rewards	Not present		
Ability to co-produce	Activity - To enhance users capacities/skill	1) What methods do you implement to provide information on 'where' and 'how' waste differentiate on citizens?	0-4
Co-production propensity	- To lower the complexity of a task - public officials opinion or awareness of a citizen's contribution to the production of the service - Evaluation of the programmes	2) If you make surveys on citizen satisfaction, have any changes been made to the service? According to you, to what extent does the citizen contribute to the co-production of the service?	1-3 1-5
Co-design propensity	- Public officials opinion on the involvement of a citizen in the service design phase	1) Has the municipality made an inquiry into citizens' satisfaction about the separate collection service? 2) According to you, would the service improve if the citizen was involved in the design phase of the service?	0-1 1-5

**Table 4.** Summary statistics and associations with separate collections.

	Mean (SD)/ Number of cases	Min-max	% of separate collection (SD) [F-test]	Correlation coefficient
Municipality	102			
<i>Regions</i>				
Northwest	31		52.5% (12.8)	
Northeast	27		65.4% (10.7)	
Centre	24		49.6% (19.2)	
South	20		33.2% (22.0)	
			[9.968]***	
<i>Municipality Pop. Size</i>				
Small	36		55.5% (21.8)	
Medium	35		57.9% (18.8)	
Large	31		51.7% (16.9)	
			[1.744]	
<i>Method of collection</i>				
Curb-side	78		59.5% (18.5)	
Street bins	24		45.3% (17.1)	
			[4.785]**	
<i>Co-production dimensions</i>				
WTdo: Sanctions	4.6 (2.7)	1–9		0.475**
WTdo: Awareness	2.88 (0.8)	0–4		0.384**
Ability to co-produce	1.9 (1.1)	0–4		0.459**
Co-production propensity	4.1 (1.5)	1–5		0.244*
Co-design propensity	2.5 (1.6)	1–5		0.123
Co-production index	3.7 (1.4)	0–5		0.676**

\* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

adopted to discuss the Millennium Development Goals (MDG) (De Muro, Mazziotta, and Pareto 2007), assess the quality of life in provinces (Mazziotta and Pareto 2013), and verify the socioeconomic inequalities in health status (Bruzzi, Ivaldi, and Landi 2020). The MP approach is a non-compensatory aggregation method. The choice of this method was determined by its properties. In detail, the score of each domain is normalized by ‘standardization’; in this way, the different metrics of a unit do not affect the results, and each domain has the same weight in determining the aggregate score.

Therefore, we aggregated the indicators of each dimension and summed the partial composite indices as per the MPI method:

$$z_{i,j} = 50 + \frac{(x_{i,j} - \mu_j)}{\sigma_j} 5$$

where  $z_{i,j}$  is the standardized value of variable  $j$  of municipality  $i$ ,  $x_{i,j}$  is the original value of variable  $j$  of municipality  $i$ , and  $\mu_j$  and  $\sigma_j$  are the mean and standard deviation of municipality  $j$ , respectively. We calculated the  $z$  scores and partial composite index for each dimension  $k$ , given by

$$z'_{i,k} = \frac{\sum_{j=1}^n z_{i,j,k}}{n}, k = 1, \dots, 5$$

where  $z'_{i,k}$  is the partial composite index for dimension  $k$  of municipality  $i$  and  $z'_{i,j,k}$  is the standardized value of variable  $j$  of municipality  $i$  for dimension  $k$ . Then, the single standardized indicators were aggregated using an arithmetic algorithm with a penalty

function based on the ‘horizontal variability’, i.e. the variability in standardized values for each unit:

$$MPI_i = \mu'_{z_i} - \sigma'_{z_i} cv'_{z_i}$$

where  $MPI_i$  is the value of the MPI for municipality  $i$  and

$$\mu'_{z_i} = \frac{\sum_{k=1}^{11} z'_{i,k}}{115}$$

$$\sigma'_{z_i} = \sqrt{\frac{\sum_{k=1}^{11} (z'_{i,k} - \mu'_{z_i})^2}{5}}$$

$$cv'_{z_i} = \frac{\sigma'_{z_i}}{\mu'_{z_i}}$$

This approach is characterized by the use of the function  $(\sigma'_{z_i}, cv'_{z_i})$  to penalize units with ‘unbalanced’ values for the partial composite indices. The penalty is based on the coefficient of variation and is zero if all values are equal. The objective is to favour organizations whose means are equal, and that demonstrate greater balance among different domains (Mazziota and Pareto 2013). In practical terms, municipalities stating a very high level in one dimension and low in the other five domains will be penalized giving more importance to balanced organizations. The final score is a ‘continuum’ bounded between 0 and 5. Municipality with score zero has no positive attitude towards co-production while five points represents the relative max positive attitude.

### Control variables

The different results achieved by the PSOs can be attributable to the co-production process and the ‘classic’ factors of production. Hard factors such as the technology used, the skill of the professionals, and the methods of production have to be considered along with soft factors, e.g. implying better management and governance or socio-economic level such as the level of per capita income, socio-demographic conditions, and the culture where the organization works. The identification of inputs or a combination of them allows us to evaluate co-production *ceteris paribus* with other factors influencing the outcome. Failing to control for these variables could lead to a positive (or negative) relationship between the co-production intensity (or quality) and the outcomes, but the results are actually due to the ‘standard’ factor of production.

The percentage of separate collection of a municipality can be affected by many factors outside co-production. The main factors highlighted by the literature as drivers of efficiency and effectiveness in waste management are presented below. (A specific literature review is beyond of the scope of this paper. However, for waste management, see Simões and Marques (2012) and Guerrini et al. (2017)).

The first factor is the ownership of waste utilities. The literature on waste management offers evidence of the advantages and disadvantages of privatized waste utilities;

however, as for other public sectors, the findings are not unanimous (Simões and Marques 2012). The ownership of waste utilities is addressed in this study through a specific question allowing the model to control for the type of utility: privately or publicly owned. Another factor is the dimensions of the town or catchment area. There is a debate about the best dimensions. It seems that cities and highly populated municipalities have the best places for organizing SWC because of the higher population density (Guerrini et al. 2017). In contrast, a higher efficiency and better results are 'easier' to achieve in medium/small towns (Agovino et al. 2018; Passarini et al. 2011). It seems that extremely large and populated cities together with rural and low-density areas have more difficulties obtaining great results (Agovino et al. 2018; Guerrini et al. 2017; Simões and Marques 2012). Italy has around 7,000 municipalities. To account for the dimensions of a town, the municipalities were divided by populations' size. Three groups of demographic classes were identified in accordance with the official classifications provided by Istat (Italian National Statistical Institute):

- (1) Small municipalities with a resident population less than or equal to 15,000 inhabitants;
- (2) Medium-sized municipalities with a population between 15,001 and 70,000;
- (3) Large municipalities with a population greater than or equal to 70,001 inhabitants.

Beyond these sizes, the macro-area or region where the town is located matters. Municipalities can be located in a macro-area with a higher level of effectiveness because they have better socioeconomic contexts, can use more resources, or possibly have a tradition of better management and governance. Moreover, there are areas where the attitude of citizens towards recycling is more favourable because there is a higher social capital. (Putnam 1993). People may be motivated to recycle by pressure from the surrounding environment, family, and friends (Bilz and Nadler 2014). Previous studies on Italian municipalities showed that there are areas with good results, while others are far from achieving minimum goals (Agovino et al. 2018). The results of former studies suggested two clusters (Northeast Italy) performing well in the differentiated collection process and a cluster with poor performance (the provinces of South-central Italy). Responsibility for this gap can be attributed to local governments and the attitude/motivation of the population towards pro-environmental behaviour (Boldero 1995; D'Amato, Mazzanti, and Nicolli 2015). Another important factor affecting performance is the collection method (curbside or street bins) because the different ways that municipalities choose to deliver separate collection can affect performance. From the literature, curbside collection is more costly, but has a higher waste-separation percentage (Guerrini et al. 2017). It is not within the scope of this work to determine the best method for separate collection, but it is important to account for it in our model. The factors exposed are inserted into the model presented in Section 4.

### ***Regression model***

To evaluate the association between the co-production index and the percentage of separate collection, the following model was built:



$$\text{PercentageSC}_i = \beta_0 + \vec{\beta}_1 \text{Region}_i + \vec{\beta}_2 \text{PopSize}_i + \beta_3 \text{Curbside} + \beta_4 \text{Public} \\ + \delta \text{CoProductionIndex}_i + \varepsilon_i$$

where  $\text{PercentageSC}_i$  is the percentage of separate collection achieved by municipality  $i$ ,  $\text{Region}$  is a vector of dummy variables for each area (Northwest, Northeast, Centre, and South Italy), and  $\text{PopSize}$  is a vector of dummy variables indicating the dimension of the municipality population.  $\text{Curbside}_i$  indicates the method of collection applied by municipality  $i$ : It assumes a value of 1 if the municipality uses the curbside method and 0 if it uses street bins.  $\text{Public}$  indicates the owner of the organization in charge of collecting waste assuming a value of 1 if a municipality collects waste directly or through an owned firm and 0 if it is a private firm. Finally,  $\varepsilon$  is an error term.

All reported models were estimated using ordinary least-squares (OLS) regression. Diagnostic tests were performed to address the common concerns regarding violations of key classical linear regression assumptions. The tests show homoscedastic, no multicollinearity, and no autocorrelation among residuals.

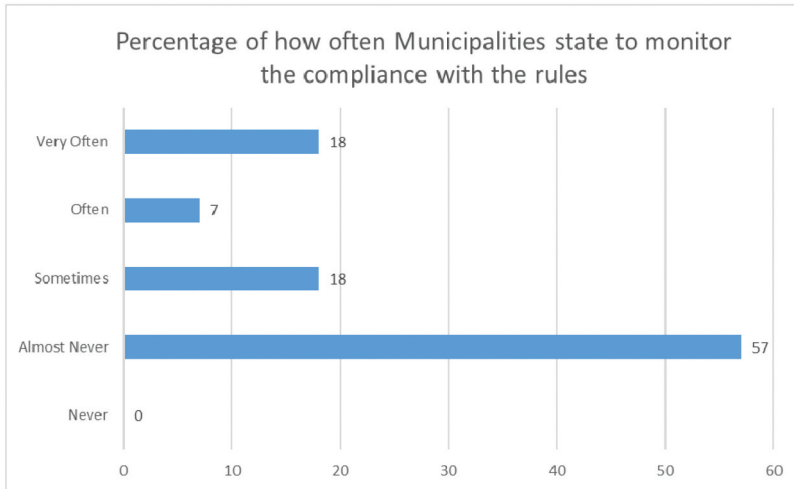
## Findings

The descriptive statistics are presented in [Table 4](#), which shows the variables and their association with the percentage of separate collection.

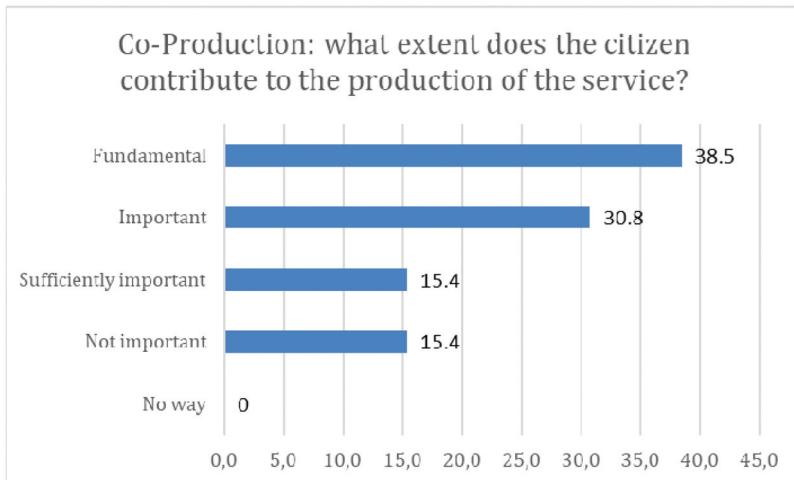
The share of respondent municipalities are balanced between the two stratification levels. The answers obtained were 23.08% from the regions of central Italy, 26.92% from the Northeast, 30.77% from the Northwest, 19.23% from the South, 34.6% from municipalities with a small size, 34.6% from municipalities with a medium size, and 30.77% from municipalities with a large size ([Table 4](#)). Analyses of the questionnaire showed that Italian municipalities have a good grade for the awareness of separate collection evidenced by the fact that 48% of municipalities had already implemented some sort of separate collection before the legal obligation became stricter in 2006. Moreover, 84% of the municipalities declared that they were persuaded to implement separate collection taking into account the growing sensitivity for environmental protection (the data were up to 99% for those who implemented the service before 2006). Other reasons included cost savings and the opportunity of reducing waste tax (both 15%). However, there is still room for improvement. It seems that there is a lack of control and monitoring of rules compliance by citizens: 57% of municipalities affirm they do not monitor the compliance of the rules ([Figure 2](#)). There are also low levels of administrative sanctions: 67% of municipalities never or almost never impose sanctions. Only 42% of municipalities surveyed citizens' satisfaction with the separate collection service.

As shown in [Figure 3](#), the majority of local governments have awareness of the role of citizens in service delivery (68%), and 38% consider it fundamental. Still, in 30% of cases, the contribution is considered very small or not important. Sorting the data by geographical area, 50%, 42%, 20%, and 33% of municipalities in the Northwest, Northeast, South, and Centre, respectively, consider the citizens' contribution to be essential.

Regarding municipalities engaging citizens in the design of a service, only 27% declared that they believe that the co-design of the service would allow greater efficiency and effectiveness for service delivery, while 42% agreed to the involvement of citizens but they did not like them to participate in the design phase. In contrast, a very large share of municipalities stated they doubt the involvement of citizens allows



**Figure 2.** Percentage of how often municipalities state to monitor compliance with the rules.

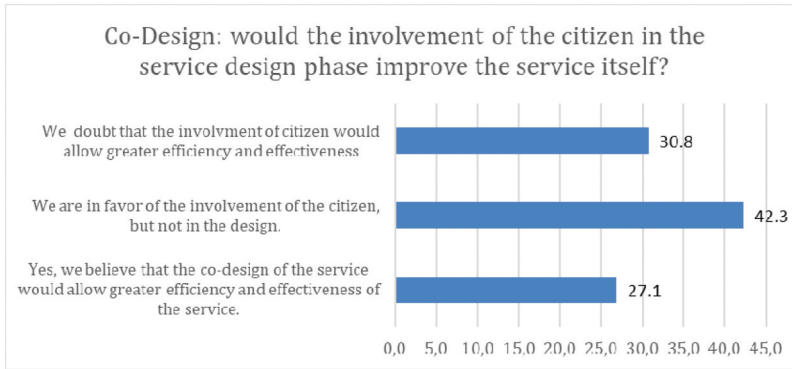


**Figure 3.** Co-production: what extent does the citizen contribute to the production of the service? (percentage of municipalities).

greater efficiency and effectiveness (31%) (Figure 4). Sorting the data by geographical area, there are no statistically significant differences, except for the south area, where 60% of municipalities affirmed that they do not believe that the involvement of citizens in co-design could lead to better results.

### **Regression analysis**

Table 5 summarizes our results from a series of regressions on SWC by municipalities. Model 1 incorporates our aggregate index of co-production and all control variables that can influence effectiveness. From the results in Table 5, a greater co-production tendency



**Figure 4.** Co-design: would the involvement of the citizen in the service design phase improve the service itself? (percentage of municipalities).

**Table 5.** OLS regressions on the % of separate collection.

	Model 1	Model 2	Model 3
Constant	28.759 (3.740)**	13.955 (1.465)	29.835 (3.282)**
Region			
North-Est	Base case		Base case–11.858
North-West	-11.17 (-3.258)**		(-2,150) -18,456
Centre	-13.95 (-2.735)**		(-3,745)*** -22,628
South	-19.748 (-4.520)***		(-4.456)***
Municipality Pop. Size			
Small	Base case		Base case
Medium	-1.604 (0.481)		.129 (.033)
Large	-19.414 (-4.716)**		-20.004 (-4.244)***
Curb-side method	6.485 (1.785)		10.444 (1.634)
Publicly owned firm	-11.789 (-2.316)*		-4.885 (-1.868)
Co-production index	8.878 (4.664)***	11.781 (4.895)***	
WTdo: Sanctions			2.856 (2.647)*
WTdo: Awareness			12.658 (3.462)**
Ability to co-produce			0.645 (0.381)
Co-production propensity			0.395 (0.180)
Co-design propensity			-0.295 (-0.296)
Adj R <sup>2</sup>	0.756	0.352	0.722
F	17.488***	28.01***	12.415***

*t* statistics in parentheses based on robust standard errors.

\**p* < 0.10; \*\**p* < 0.05; \*\*\**p* < 0.01

is associated with higher levels of separate collection, in fact an increase of one point in the bounded 0–5 index leads to an increase of 9% of separate collection. We note that the control variables still play key roles. The results confirm that there are different levels of performance across areas of the country, as shown in previous studies on Italian municipalities (Agovino et al. 2018). The Northeast has the highest level of separate collection, and the South the lowest. The dimension of the town is also statistically significant; in particular, there are no differences between small- and medium-sized towns, while large cities seem to face more difficulties. In contrast, the method of collection is not statistically significant, while the ownership structure of waste utilities presents advantages for privatized ones. These results are interesting, but they are not the focus of the study as stated earlier. In Model 2, the context variables were removed to compare the results with and without them. The magnitude of co-production increases, but the coefficient of determination ( $R^2$ ) decreases from 0.713 to 0.343. Controlling for the variables, that according to the literature affect waste management, is crucial to avoid overestimation of the effect of co-production. By generalizing, when we want to evaluate the impact of co-production or the attitude of co-production with a measure of performance, it is necessary to account for the normal factors of production; otherwise, the results are biased.

In Model 3, we replicate the above analyses (Model 1), replacing the total co-production index with our five disaggregated measures of WTdo: sanctions, WTdo awareness, ability to co-produce, co-production and citizens' involvement in designing the service. We find that, when total co-production index is disaggregated into its various components, the most important dimension seems to be the sanctions and WTdo awareness, while the other dimensions are not statistically significant.

## Discussion

Many authors have pointed out the key role that co-production can play in current challenges of public service reforms (Bovaird and Loeffler 2017; Osborne, Radnor, and Nasi 2012; Pestoff 2006). The co-production concept may have the potential to improve effectiveness, efficiency, and citizens' participation. There are few studies reporting the outcomes of co-production and the results are mixed (Benari 1990; Bovaird et al. 2019; Kang and Van Ryzin 2019; Lindenmeier et al. 2019; Meijer 2012). The aim of this study is to contribute to co-production debate by empirically testing the association between co-production and PSOs performance in a specific type of service (separate collection service).

The results have shown that PSOs with a positive attitude towards co-production have, on average, the best level of performance. Empirical evidence supports the idea that municipalities more willing to elicit co-production obtain better results in terms of a higher percentage of recycling collection.

The analysis also has shown that co-production has a statistical significant impact along with standard factors of production. In detail, the results show different levels of separate collection performance across areas of the country with the Northeast having the highest level of separate collection and the South the lowest. This is probably due to different effectiveness of local governments, of social capital, and the attitude/motivation of the population towards pro-environmental behaviour (Boldero 1995; D'Amato, Mazzanti, and Nicolli 2015). Further, larger and more populated cities have greater difficulty in obtaining good results. This evidence is consistent with previous studies on

Italian municipalities and separate collection (Agovino et al. 2018; Guerrini et al. 2017).

Results from the questionnaire showed that Italian municipalities made a good effort to stimulate the willingness to participate through non-material motivators. However, there is still room for improvement in the elicitation of the ability to co-produce and in the use of compliance monitoring and sanctions. In particular, sanctions domain should be improved to avoid a situation where individuals who are co-producing more than others feel as they are 'suckers', leading a part of the population to behave parasitically and let others recycle (Alford 2009).

Another interesting insight is that, in Italian waste management sector, public managers are conscious of the importance of citizens' collaboration, but they do not intend to involve them in the design of the service. The questionnaire results show a good level of co-production awareness (68% of municipalities believe citizen's co-production is important or fundamental), while the majority of municipalities state a low degree of willingness to engage citizens in the design of the service (only 27% of the total). This is in line with prior works that showed as public officials can be reluctant to encourage co-production because they may fear to lose control and they do not trust the behaviour of citizens (Osborne, Radnor, and Nasi 2012; Roberts et al. 2013). In short, public officials seem favourable to citizens' co-production, but not beyond a certain extent.

## Conclusions

The empirical evidence obtained by investigating the case of Italian municipalities in the separate waste collection service highlights the importance for PSOs to make efforts in eliciting co-production from citizens. The present findings are important for the contribution they provide to the response to the general research question whether a great level of intensity of co-production positively influences public service performance. Although literature emphasizes the important role of co-production in effective delivery of public services, few studies showed evidence of its direct influence on outcomes and the results are not always in favour of a positive association (Kang and Van Ryzin 2019; Bovaird et al. 2019; Lindenmeier et al. 2019). Our results indicate that municipalities, more willing to activate and facilitate modalities of co-production, *ceteribus paribus*, obtain the best achievements in terms of percentage of separate collection. Therefore, our analysis has shown that high level of co-production positively influences PSOs outcomes. Using Dudau, Glennon, and Verschuere (2019) words, our findings call for re-enchantment with the concept of co-production.

Our research contributes to the co-production literature in several ways. Co-production is a complex concept not directly measurable in real life so we need to account for several dimensions. Building on previous literature, we proposed a multi-dimensional indexable to detect five factors with the goal to proxy the co-production level.

Moreover, we learned that not every lever can have the same effect towards eliciting co-production. In the case of SWC in Italy, the results showed that awareness campaigns and sanctions are the most associated with effectiveness so municipalities with higher scores in these areas have better results. The findings can outline practical implications too. For example, around 60% of Italian municipalities have low scores in *WTdo sanctions* dimension and, clearly, if they can improve this factor also the

percentage of their separate collection should increase. Using a multidimensional index, we can be given information also on the relative importance of each factors.

In addition, results confirm that, when studying the impact of citizens' co-production, it is fundamental to control for production factors that the literature of the specific service has already found as determinants of the performance. Co-production can have a substantial role along with these factors. From our analysis, we also have seen several factors affecting the percentage of separate collection as the geographic area (probably detecting a different administrative culture and level of efficiency), the size of the city and the ownership structure.

Our study echoes the necessity for increasing the research evaluating the outcomes of co-production. If other studies show a relationship among enhancing users' co-production and the resulting performance, we will be able to reason in term of co-production thinking. Co-production, before being an essential component of public service, is a thought that inspires the design and creation of the service itself. 'Thinking' in terms of co-production means designing a service and establishing the range where the participation of the citizen/user can be considered acceptable in order to achieve a good performance of the service itself. We use the term thinking because co-production, in order to realize its potential benefits, needs to be thought before the service takes place. As when we apply the concept of lean thinking, co-production thinking should become a way to determine how to organize public services, starting from the planning, to facilitate citizens' co-production as a value creation process. Citing the editorial from Osborne (2018), 'it is the citizen and/or service user who creates the performance and value of a public service, with the PSO acting as a facilitator of this process'. As showed by our survey, public managers act as if co-production were a voluntary good that should add value to the public-service production process, but it is not intrinsic to it. They see themselves as exclusively charged with responsibility for designing and providing services to citizens, who, in turn, only demand, consume and evaluate them (Pestoff 2006). Co-production, in the best scenario, is introduced in the last stages of the operational process. Co-production thinking means that, for achieving the best results, we need citizens to be included in the planning of the service from its beginning so that they can be enabled to co-produce and create the performance.

Nevertheless, some limitations of the present study should be taken into account. First, our research concerns a specific type of PSOs in one country. Further research has to evaluate the influence of co-production on outcomes in different contexts, different countries and type of services to refine our understanding. A longitudinal design may also reveal how the relationship evolves in time. Furthermore, more specific control variables may be used. For example, in addition to the two methods of collection examined, street bins and curbside, there can be many under-typologies, either a mixture of the two methods or the use of different technologies aiming at lowering the burden on citizens. Lastly, the sample is quite small (180 municipalities over the entire population of around 7,000 municipalities), even if a rigorous sampling method was followed. Given that, we know from waste management literature that geographical location and municipality population size influence results in separate collection, so we used a non-proportional quota sampling scheme aimed at having a quota of municipalities for these two stratification variables.

Future research should refine the index we built in this paper with the goal to proxy more and more accurately the co-production level. Our results are promising and call for more research on the evaluation of co-production outcomes to understand more

deeply how and for what type of service co-production can directly influence outcomes. Precisely, the intrinsic characteristics of each type of services may play a role in the level of influence that co-production can produce on outcomes. Potentially, we have a sort of *continuum* starting from services where eliciting a high intensity of co-production can directly cause positive relapse and other services where the outcomes are not directly affected by the level of co-production. Therefore, refining, through more studies, the understanding of the service characteristics leading to the two extreme results will help public managers to provide more effective and efficient services.

Notwithstanding the above limitations, the results seem comforting about that the opportunities that greater involvement of citizens/users as co-producers in public service management should be explored.

## Note

1. <http://www.catasto-rifiuti.isprambiente.it/index.php?pg=findComune>

## Acknowledgments

We would like to thank the municipalities involved in this survey.

We would like to thank also Editage ([www.editage.com](http://www.editage.com)) for English language editing.

## Disclosure statement

The authors declare no conflicts of interest.

## Notes on contributors

*Salvatore Russo* is an associate professor in the Department of Management at Ca' Foscari University Venice, Italy. He has received his Ph.D. in "Business Administration" in 2001 at Ca' Foscari University Venice and has several years work experience in the areas of teaching and research. His interests include public sector accounting and management, performance management in public sector organisations and in other specific areas such as healthcare, welfare and cultural institutions. He has several research publications in well-known international Journals and conferences.

*Stefano Landi* is a research fellow in the department of Management at Ca' Foscari University, Venice, Italy. He has received his Ph.D. in "Healthcare management" in 2017 at University of Genoa. His main research interests are on public sector, in particular management accounting, public engagement, social and technological innovation in health and waste collection sectors.

## ORCID

*Stefano Landi*  <http://orcid.org/0000-0001-9835-1877>

## References

- Agovino, M., M. D'Uvab, A. Garofalo, and K. Marchesano. 2018. "Waste Management Performance in Italian Provinces: Efficiency and Spatial Effects of Local Governments and Citizen Action." *Ecological Indicators* 89: 680–695. doi:10.1016/j.ecolind.2018.02.045.



- Alford, J. 1998. "A Public Management Road Less Travelled: Clients as Co-producers of Public Services." *Australian Journal of Public Administration* 57 (4): 128–137. doi:10.1111/j.1467-8500.1998.tb01568.x.
- Alford, J. 2009. *Engaging Public Sector Clients: From Service-Delivery to Co-Production*. Basingstoke: Palgrave Macmillan.
- Alford, J. 2014. "The Multiple Facets of Co-Production: Building on the Work of Elinor Ostrom." *Public Management Review* 16 (3): 299–316. doi:10.1080/14719037.2013.806578.
- Alonso, J. M., R. Andrews, J. Clifton, and D. Diaz-Fuentes. 2019. "Factors Influencing Citizens' Coproduction of Environmental Outcomes: A Multi-level Analysis." *Public Management Review* 21 (11): 1620–1645. doi:10.1080/14719037.2019.1619806.
- Andrews, R., and G. Brewer. 2013. "Social Capital, Management Capacity and Public Service Performance: Evidence from the US States." *Public Management Review* 15 (1): 19–42. doi:10.1080/14719037.2012.662445.
- Andrews, R., and G. A. Brewer. 2010. "Social Capital and Fire Service Performance: Evidence from the U.S. States." *Social Science Quarterly* 91: 576–591. doi:10.1111/j.1540-6237.2010.00708.x.
- Benari, E. 1990. "A Bureaucrat in Every Japanese Kitchen? on Cultural Assumptions and Coproduction." *Administration & Society* 21 (4): 472–492. doi:10.1177/009539979002100405.
- Bilz, K., and J. Nadler. 2014. "Law, Moral Attitudes and Behavioural Change." In *The Oxford Handbook of Behavioral Economics*, edited by E. Zamir and D. Teichman, 241–267. Oxford: Oxford University Press.
- Boldero, J. 1995. "The Prediction of Household Recycling of Newspapers: The Role of Attitudes, Intentions and Situational Factors." *Journal of Applied Social Psychology* 25 (5): 440–462. doi:10.1111/j.1559-1816.1995.tb01598.x.
- Bovaird, T. 2007. "Beyond Engagement and Participation: User and Community Coproduction of Public Services." *Public Administration Review* 67 (5): 846–860. doi:10.1111/puar.2007.67.issue-5.
- Bovaird, T., and E. Loeffler. 2017. "From Participation to Co-production." In *The Palgrave Handbook of Public Administration and Management in Europe*, edited by E. Ongaro and S. Van Thiel, 403–423. Houndmills.
- Bovaird, T., G. Stoker, T. Jone, E. Loeffler, and M. P. Roncancio. 2016. "Activating Collective Coproduction of Public Services: Influencing Citizens to Participate in Complex Governance Mechanisms in the UK." *International Review of Administrative Sciences* 82 (1): 47–68. doi:10.1177/0020852314566009.
- Bovaird, T., S. Flemig, E. Loeffler, and S. P. Osborne. 2019. "How Far Have We Come with Coproduction—and What's Next?" *Public Money & Management* 394: 229–232. doi:10.1080/09540962.2019.1592903.
- Bracci, E., C. Humphrey, J. Moll, and I. Steccolini. 2015. "Public Sector Accounting, Accountability and Austerity: More than Balancing the Books?" *Accounting, Auditing and Accountability Journal* 28 (6): 878–908. doi:10.1108/AAAJ-06-2015-2090.
- Bruzzi, C., E. Ivaldi, and S. Landi. 2020. "Non-compensatory Aggregation Method to Measure Social and Material Deprivation in an Urban Area: Relationship with Premature Mortality." *The European Journal of Health Economics* 21 (3): 381–396. doi:10.1007/s10198-019-01139-x.
- Cavalletti, B., and M. Corsi. 2019. "By Diversion Rate Alone: The Inconsistency and Inequity of Waste Management Evaluation in a Single-indicator System." *Papers in Regional Sciences* 98: 307–329. doi:10.1111/pirs.12356.
- Cepiku, D., and F. Giordano. 2014. "Co-Production in Developing Countries: Insights from the Community Health Workers Experience." *Public Management Review* 16 (3): 317–340. doi:10.1080/14719037.2013.822535.
- Coursey, D., K. Yang, and S. K. Pandey. 2012. "Public Service Motivation (PSM) and Support for Citizen Participation: A Test of Perry and Vandenabeele's Reformulation of PSM Theory." *Public Administration Review* 72 (4): 572–582. doi:10.1111/puar.2012.72.issue-4.
- D'Amato, A., M. Mazzanti, and F. Nicolli. 2015. "Waste and Organized Crime in Regional Environments. How Waste Tariffs and the Mafia Affect Waste Management and Disposal." *Resource and Energy Economics* 41: 185–201. doi:10.1016/j.reseneeco.2015.04.003.
- Davidson, A., and S. Reventlow. 2011. "Narratives about Patients with Psychological Problems Illustrate Different Professional Roles among General Practitioners." *Journal of Health Psychology* 16 (6): 959–968. doi:10.1177/1359105310397219.

- De Muro, P., M. Mazziotta, and A. Pareto. 2007. "Composite Indices for Multidimensional Development and Poverty: An Application to MDG Indicators." *Wye City Group Meeting*, Rome, Italy. [http://www.fao.org/es/ess/rural/wye\\_city\\_group](http://www.fao.org/es/ess/rural/wye_city_group)
- Dudau, A., R. Glennon, and B. Verschuere. 2019. "Following the Yellow Brick Road? (Dis) Enchantment with Co-design, Co-production and Value Co-creation in Public Services." *Public Management Review* 21 (11): 1577–1594. doi:10.1080/14719037.2019.1653604.
- Duffy, S. 2007. "Care Management and Self-Directed Support." *Journal of Integrated Care* 15 (5): 3–14. doi:<https://doi.org/10.1108/14769018200700033>.
- Egerton, M. 2002. "Higher Education and Civic Engagement." *The British Journal of Sociology* 53 (4): 603–620. doi:10.1080/0007131022000021506.
- Etgar, M. 2008. "A Descriptive Model of the Consumer Co-Production Process." *Journal of the Academy of Marketing Science* 36 (1): 97–108. doi:10.1007/s11747-007-0061-1.
- Fledderus, J., T. Brandsen, and M. Honingh. 2014. "Restoring Trust through the Co-Production of Public Services: A Theoretical Elaboration." *Public Management Review* 16 (3): 424–443. doi:10.1080/14719037.2013.848920.
- Gebauer, H., M. Johnson, and B. Enquist. 2010. "Value Co-Creation as A Determinant of Success in Public Transport Services: A Study of the Swiss Federal Railway Operator (SBB)." *Managing Service Quality* 20 (6): 511–530. doi:10.1108/09604521011092866.
- Guerrini, A., P. Carvalho, V. Romano, R. C. Marques, and C. Leardini. 2017. "Assessing Efficiency Drivers in Municipal Solid Waste Collection Services through a Non-parametric Method." *Journal of Cleaner Production* 147: 431–441. doi:10.1016/j.jclepro.2017.01.079.
- Handley, D. M., and M. Howell-Moroney. 2010. "Ordering Stakeholder Relationships and Citizen Participation: Evidence from the Community Development Block Grant Program." *Public Administration Review* 70 (4): 601–609. doi:10.1111/puar.2010.70.issue-4.
- Harder, M. K., N. Stantzos, R. Woodard, and A. Read. 2008. "Development of a New Quality Fair Access Best Value Performance Indicator (BVPI) for Recycling Services." *Waste Management* 28 (2): 299–309. doi:10.1016/j.wasman.2006.12.015.
- Hardyman, W., K. Daunt, and M. Kitchener. 2015. "Value Co-Creation through Patient Engagement in Health Care: A Micro-Level Approach and Research Agenda." *Public Management Review* 17 (1): 90–107. doi:10.1080/14719037.2014.881539.
- Isett, K., and J. Miranda. 2015. "Watching Sausage Being Made: Lessons Learned from the Co-Production of Governance in a Behavioural Health System." *Public Management Review* 17 (1): 35–56. doi:10.1080/14719037.2014.881536.
- Iyer, E. S., and R. K. Kashyap. 2007. "Consumer Recycling: Role of Incentives, Information, and Social Class." *Journal of Consumer Behavior* 6 (1): 32–47. doi:10.1002/cb.206.
- Johnston, R., and G. Clark. 2008. *Service Operations Management: Improving Service Delivery*. Harlow: Prentice Hall.
- Judd, D. 1979. *The Politics of American Cities: Private Power and Public Policy*. Boston, MA: Little, Brown.
- Kang, S., and G. G. Van Ryzin. 2019. "Coproduction and Trust in Government: Evidence from Survey Experiments." *Public Management Review* 21 (11): 1646–1664. doi:10.1080/14719037.2019.1619812.
- Lindenmeier, J., A. K. Seemann, O. Potluka, and G. Von Schnurbein. 2019. "Co-production as a Driver of Client Satisfaction with Public Service Organizations: An Analysis of German Day-care Centres." *Public Management Review*: 1–23. on press. doi:10.1080/14719037.2019.1674366.
- Mazziotta, M., and A. Pareto. 2013. "Methods For Constructing Composite Indices: One For All Or All For One?" *Rivista Italiana di Economia Demografia e Statistica LXVII* (2). [https://www.istat.it/en/files/2013/12/Rivista2013\\_Mazziotta\\_Pareto.pdf](https://www.istat.it/en/files/2013/12/Rivista2013_Mazziotta_Pareto.pdf).
- Meijer, A. 2012. "Co-Production in an Information Age: Individual and Community Engagement Supported by New Media." *Voluntas* 23 (4): 1156–1172. doi:10.1007/s11266-012-9311-z.
- Nabatchi, T., A. Sancino, and M. Sicilia. 2017. "Varieties of Participation in Public Services: The Who, When, and What of Co-production." *Public Administration Review* 77 (5): 766–776. doi:10.1111/puar.12765.
- Nabatchi, T., T. Steen, M. Sicilia, and D. Brand. 2016. "Understanding the Diversity of Coproduction: Introduction to the IJPA Special Issue." *International Journal of Public Administration* 39 (13): 1001–1005.
- Nambisan, S., and P. Nambisan. 2013. *Engaging Citizens in Co-Creation in Public Services: Lessons Learned and Best Practices*. Washington, DC: IBM Center for the Business of Government.

- Normann, R. 1991. *Service Management: Strategy and Leadership in Service Business*. Chichester: John Wiley and Sons.
- OECD Directorate for Public Governance and Territorial Development. 2011. *Together for Better Public Services*. Paris: OECD.
- Osborne, S., and K. Strokosch. 2013. "It Takes Two to Tango? Understanding the Co-Production of Public Services by Integrating the Services Management and Public Administration Perspectives." *British Journal of Management* 24 (S1): S31–S47. doi:10.1111/1467-8551.12010.
- Osborne, S., Z. Radnor, and G. Nasi. 2012. "A New Theory for Public Service Management? toward A (Public) Service-Dominant Approach." *American Review of Public Administration* 43 (2): 135–158. doi:10.1177/0275074012466935.
- Osborne, S., Z. Radnor, and K. Strokosch. 2016. "Co-Production and the Co-Creation of Value in Public Services: A Suitable Case for Treatment?" *Public Management Review* 18 (5): 639–653. doi:10.1080/14719037.2015.1111927.
- Osborne, S. P. 2018. "From Public Service-dominant Logic to Public Service Logic: Are Public Service Organizations Capable of Co-production and Value Co-creation?" *Public Management Review* 20 (2): 225–231. doi:10.1080/14719037.2017.1350461.
- Ostrom, E. 1972. "Metropolitan Reform: Propositions Derived from Two Traditions." *Social Science Quarterly* 53: 474–493.
- Parliament of Australia. 2011. *Citizens' Engagement in Policymaking and the Design of Public Services*. Canberra: Parliament of Australia.
- Parrado, S., G. G. Van Ryzin, T. Bovaird, and E. Löffler. 2013. "Correlates of Co-Production: Evidence from a Five-Nation Survey of Citizens." *International Public Management Journal* 16 (1): 85–112. doi:10.1080/10967494.2013.796260.
- Passarini, F., I. Vassura, F. Montia, L. Morselli, and B. Villani. 2011. "Indicators of Waste Management Efficiency Related to Different Territorial Conditions." *Waste Management* 31 (4): 785–792. doi:10.1016/j.wasman.2010.11.021.
- Pestoff, V. 2006. "Citizens and Co-Production of Welfare Services." *Public Management Review* 8 (4): 503–519. doi:10.1080/14719030601022882.
- Pestoff, V. 2009. "Towards a Paradigm of Democratic Participation: Citizen Participation and Co-Production of Personal Social Services in Sweden." *Annals of Public and Cooperative Economics* 80 (2): 197–224. doi:10.1111/j.1467-8292.2009.00384.x.
- Pestoff, V., S. P. Osborne, and T. Brandsen. 2006. "Patterns of Co-production in Public Services." *Public Management Review* 8: 591–595. doi:10.1080/14719030601022999.
- Putnam, R. D. 1993. *Making Democracy Work. Civic Traditions in Modern Italy*. Princeton NJ: Princeton University Press.
- Radnor, Z., S. Osborne, T. Kinder, and J. Mutton. 2014. "Operationalizing Co-Production in Public Services Delivery: The Contribution of Service Blueprinting." *Public Management Review* 16 (3): 402–423. doi:10.1080/14719037.2013.848923.
- Roberts, A., S. Townsend, J. Morris, E. Rushbrooke, B. Greenhill, R. Whitehead, T. Matthews, and L. Golding. 2013. "Treat Me Right, Treat Me Equal: Using National Policy and Legislation to Create Positive Changes in Local Health Services for People with Intellectual Disabilities." *Journal of Applied Research in Intellectual Disabilities* 26 (1): 14–25. doi:10.1111/jar.12009.
- Sangiorgi, D. 2012. "Transformative Services and Transformation Design." *International Journal of Design* 5: 29–40.
- Scottish Government. 2010. *Self-directed Support: A National Strategy for Scotland*. Edinburgh: Scottish Government.
- Simões, P., and R. C. Marques. 2012. "On the Economic Performance of the Waste Sector. A Literature Review." *Journal of Environmental Management* 106: 40–47. doi:10.1016/j.jenvman.2012.04.005.
- Thøgersen, J., and Ölander, F. 2003. Spillover of environment-friendly consumer behaviour. *Journal of Environmental Psychology*, 23(3), 225–236. https://doi.org/10.1016/S0272-4944(03)00018-5
- Van Eijk, C., and T. Steen. 2014. "Why People Co-Produce: Analysing Citizens' Perceptions on Co-Planning Engagement in Health Care Services." *Public Management Review* 16 (3): 358–382. doi:10.1080/14719037.2013.841458.
- Vargo, S. L., P. P. Maglio, and M. Archpru Akaka. 2008. "On Value and Value Co-creation: A Service Systems and Service Logic Perspective." *European Management Journal* 26: 145–152. doi:10.1016/j.emj.2008.04.003.

- Venetis, K., and P. Ghauri. 2004. "Service Quality and Customer Retention: Building Long-Term Relationships." *European Journal of Marketing* 38 (11/12): 1577–1598. doi:[10.1108/03090560410560254](https://doi.org/10.1108/03090560410560254).
- Verschuere, B., T. Brandsen, and V. Pestoff. 2012. "Co-Production: The State of the Art in Research and the Future Agenda." *Voluntas* 23 (4): 1083–1101. doi:[10.1007/s11266-012-9307-8](https://doi.org/10.1007/s11266-012-9307-8).
- Voorberg, W. H., V. J. J. M. Bekkers, and L. G. Tummers. 2015. "A Systematic Review of Co-Creation and Co-Production: Embarking on the Social Innovation Journey." *Public Management Review* 17 (9): 1333–1357. doi:[10.1080/14719037.2014.930505](https://doi.org/10.1080/14719037.2014.930505).
- Whitaker, G. P. 1980. "Co-Production: Citizen Participation in Service Delivery." *Public Administration Review* 40 (May/June): 240–246. doi:[10.2307/975377](https://doi.org/10.2307/975377).
- Wiewiora, A., R. Keast, and K. Brown. 2015. "Opportunities and Challenges in Engaging Citizens in the CoProduction of Infrastructure-Based Public Services in Australia." *Public Management Review*. doi:[10.1080/14719037.2014.999820](https://doi.org/10.1080/14719037.2014.999820).