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Application of a Microeconomic Approach for Explanation of Citizen Participation in Open Government

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Abstract: The digital economy and the sharing economy have changed the role citizens may acquire in society. Citizens can perform at least two roles from the open government perspective: on the one hand, they can be passive users/demanders of information and, on the other hand, they can provide or produce the information in an active manner. The objective of this paper is to offer a theoretical model to explain citizens' incentives to participate in open government projects. Which is the opportunity cost of participation for the citizen? Which are the drivers of the preferences for the social good? This model is based on the utility function and consumption theory. We complement the theoretical framework with an exploratory–descriptive analysis based on a case study's primary data about citizen participation. In democracy projects where citizens actively collaborate and could earn monetary gains or become entrepreneurs, the opportunity cost of participation is lower than in a passive type and the amount of the social good depends on the preferences. Preferences for social goods are related to community experiences and e-government and they also affect the decision to participate. Very few studies in the field of open government have pretended to explain citizens' participation by using microeconomic foundations.

Keywords: citizen participation; utility function; social goods; sharing economy prosumer



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1. Introduction

Nowadays, individuals are interested in assigning part of their time to produce/consume social goods. Examples of social goods are citizen participation, consumer sharing of their product/service experience, and open innovations such as open source communities, among others. In a society, the participation of individuals yields a critical role. In this sense, citizens who are participants in a political community become involved with each other with the purpose of creating and re-creating their political circumstances [1].

In recent years, prosumerism has become a special feature [2,3] since individuals are not only consumers but also producers of the goods/services. Nowadays, users can affect companies by simultaneously playing two roles: as value creators and as consumers. This trend has been eased by new information and communication technologies, especially social media. Value co-creation turned into a co-creation activity as a result of the arrival of Web 3.0 and social platforms [4]. For instance, people consume media on their electronic devices, such as mobile phones, tablets, etc.

Many business models have been conducted in response to the prosumer role of customers in renewable energy sources [5–7]. Moreover, several e-commerce activities create value from users or clients. This situation has become more evident during COVID-19. The main product is now created with the participation of customers in the innovation process. This innovation process is closely linked to use, value in use, and the concept that value can be determined only by the customer [8].

Moreover, the American Marketing Association also improved the definition of marketing by adding the concept of customer value to its definition. Social media platforms are

used by several merchants for promotional activities encouraging consumers to forward information and invite online friends, so as to achieve the goal of spreading brands and promoting sales. Promotional information is not only transmitted from sellers to consumers but it is also more disseminated among consumers [9,10]. In this line, Hamidi [8] developed a conceptual framework for value co-creation in small- and medium-sized tourism agencies. On one hand, information technology and social media allow customers to give instant feedback to companies. On the other hand, companies can listen to their customers' interests and opinions. In the field of open government and modern public administration, citizens have the right to access public information and to participate in public decision-making processes [1,11]. Citizen participation is one of the fundamental principles of the open government paradigm. Hence, a deeper involvement and engagement of citizens in local government decision processes is desired [12]. There are some recent empirical studies on open government and citizen participation. However, there is a lack of theoretical research on the topic. Moreover, citizen participation in open government projects is a critical topic for the development of smart cities [13].

This paper offers a theoretical explanation of users'/citizens' contribution to building social goods by using elementary microeconomic foundations. The main contribution of the paper entails using a microeconomic approach to explain the phenomenon, not the theory or model in itself which is well known in the economics field. It is just a path toward deepening the theoretical understanding of the phenomenon where studies are scarce. The main research questions are the following: what are the economic incentives citizens have to participate in open government projects? Are there any differences depending on the type of participation? What is the socio-economic profile of participants based on the case study?

To complement the theoretical findings, we utilize case study data from a city in Argentina. Bahía Blanca is a city of nearly 400 thousand inhabitants settled in the southwest of Buenos Aires Province, Argentina. This city is one of the most data-opened in Argentina, being fourth at the top of the Open Data Index (ODI) ranking from the Open Knowledge Foundation. In the last few years, the city has improved its relationship between citizens and the municipal government. Many innovative actions and projects were adopted, with a more transparent government, open data, the promotion of citizens' engagement, and the adoption of new technologies. Based on this exploratory analysis, some empirical evidence is offered.

This paper complements the theoretical analysis, with case study data being obtained from an online survey conducted on citizens. We collect data about the percentage of citizens that participate; types of participation; time spent in participation projects; the profile of the citizen; and so on. Although the city is one of the most data-opened, there are almost no open data indicators or statistics of citizen participation in the municipal portal or website, except for the number of participants in a couple of voting experiences and a municipal law project. Moreover, in recent years, those voting initiatives, which were virtual, have disappeared. Only face-to-face participation initiatives have remained. Since there is little open local government data with respect to citizen participation, this paper also contributes to stressing the significance of open data and transparency not only for promoting citizen involvement but also for setting a strategy to become a smart city [14]. By promoting open data and transparency, we can encourage citizen participation, which is another critical principle of open government.

The paper is structured as follows. In the next section, we describe the literature review. Later on, we explain the proposed model. Then, the case study is analyzed to provide some empirical evidence to the model. Afterward, there is a Section 5 with theoretical and practical implications. Finally, conclusions are shared.

2. Literature Review

Since Olson [15], we have understood there is a problem of collective action any time individuals are encouraged to produce a public good, that is, a good whose consumption

cannot be precluded to any individual. Public goods are characterized by non-exclusivity and indivisibility principles. Non-exclusivity means that once public goods are produced, it is not feasible to prevent (at a reasonable cost) any individual from the benefits of the good, including those individuals who do not participate in the production. The second principle argues that the use of the good by one member of the community does not reduce the stock available to others. Due to both principles, the production of public goods is subject to a social dilemma since any rational agent will be prone to benefit from the good without participating in its production [15]. Many contemporaneous problems suffer from the public goods dilemma and the free rider problem. Therefore, we wonder what the incentives that make a citizen participate in the production of social goods are; especially, we focus on those related to open government such as citizen participation and collaboration.

On the other side, the ability of providers and consumers to enlarge their role and turn into prosumers recently have been considered as one of the critical characteristics of the sharing economy and a fundamental area for future research [16]. As argued by [17], all participants of the co-creation process contribute as value co-creators, who attain new offers through the integration of resources. Therefore, co-creation is assumed as an updated view to raise value for the firms and their customers. In the co-creation approach, value is co-created over a learning process that is continuous and interactive [18,19]. The user/client is involved in a collaborative way in all phases of service development from the problem definition to problem solving. Therefore, users/clients assume a proactive role as a collaborative partner in the creation of value [19].

Social innovation is mainly based on models of “civil intelligence”, “distributive social intelligence”, new models of emergence, and “participatory democracy” that reconsider older concepts of organizational science and learning and action research models within a technologized framework of the public good that depends on harnessing the full effects of new social movements, collaborative problem solving, and Web 2.0 applications. Peters [20] argues that the concept of social innovation has been built based on the idea of “open innovation”. Many authors define open innovation in the public sector in terms of the active participation of citizens, which is known with the term engagement. The economic theory that had started using the principles of social media then turned into a political theory of social innovation dedicated to solving collective problems based on the co-creation, co-design, and co-evaluation of social goods and services. The role of engaged citizens is crucial. Hence, in the same way, it has direct applications to the public sector and government. Open innovation, therefore, encourages organizations to look for external solutions. By implementing open innovation, the public sector benefits from some positive effects, such as more awareness of social problems, of citizens’ experience to achieve more effective practices, and of the relationship of trust between citizens and governments.

However, the least references are found with respect to citizen participation. Grazian and Nahr [21] examine the e-democracy tools and the type of role citizens can play by distinguishing two dimensions (active–passive and independent–dependent). Citizens’ passive involvement means consuming information about the actions of political representatives. Therefore, citizens are capable of monitoring the work performed by administrations and lastly, of understanding the decision-making processes. This active–passive distinction only applies to the citizens that utilize online participation tools, not to all types of participation. Then, while some tools request citizens to have a kind of monitoring role (passive), others invite them to perform a more active role in discussions, deliberations, or voting. This is what the active–passive dimension aims to cover.

Nelson and Wright [22], for example, emphasize the participation process as a transformative tool for social change. In addition, citizen involvement is intended to produce better decisions and, thus, more efficient benefits to the rest of society [23,24]. Thus, Irvin and Slansbury [25] have two tiers of benefits to consider (process and outcomes) and two beneficiaries (government and citizens) in evaluating the effectiveness of the citizen-participation process.

On the one hand, some theoretical frameworks have been published based on managerial models [4]. Ciasullo et al. [4] assess a theoretical model to examine the interactions happening between culture organizations and users that contribute to (co)-create values in the cultural domain. On the other hand, other studies offer a theoretical explanation by using microeconomic foundations [5,26]. Meade [5] models the impact of distributed energy resources DER on household electricity demands and investments from microeconomic principles. These models provide a theoretical explanation of DER, residual electricity demand, and prosumer welfare. Alderete [26] offers a theoretical framework based on some microeconomic models for the analysis of prosumerism. In the prosumerism model, the results obtained predict the abundance of the prosumer good relative to private goods. Therefore, this confirms the concept of Ritzer and Jurgenson [27] that prosumer capitalism online is increasingly a world of abundance.

If we explore the e-democracy tools yielded in the last years in different countries, one common characteristic observed is the shift from voluntary collaboration and labor to professionalization through the project development stage [21]. For instance, in times of elections, WhoCanIVoteFor offers lists of candidates together with their contact information and election statements in the United Kingdom, including local elections. By means of this tool, citizens could vote easily and more efficiently. This innovation has also been utilized by local and regional governments and by the Electoral Commission due to its data. WhoCanIVoteFor became a democracy tool by virtue of a team of volunteers. Moreover, since anyone is capable of downloading and utilizing the datasets, volunteers are prone to contribute or have incentives to. Moreover, the project managers used traditional media channels, social media, and a set of other organizations to promote the tool among voters. Another example is swap my vote in the UK, an online platform that matches voters across British constituencies. Most of the project managers of the e-democracy tools described before have become professionals in their projects. Hence, by participating citizens can become entrepreneurs.

Furthermore, in Romania, Harta Banilor Publici (a Public Procurement Map) provides an open-source application to raise transparency and accountability of public institutions. To this end, they provide information about how public funds are spent and show the existent procurement contracts on a map. Hence, citizens and other stakeholders such as journalists and researchers become aware of the problem. This tool was developed and implemented in-house by a team of volunteers. This democracy tool has been awarded an international grant for its impact on democracy.

Moreover, there is a smart city people-centered approach that assumes that technologies empower democracy and enhance citizens' engagement and co-creation. Citizens are co-designers, co-creators, and co-learners with the government [28]. "Successful smart cities of the future will combine the best aspects of technology infrastructure while making the most of the growing potential of 'collaborative technologies', and above all the citizens who power them" (Saunders and Baeck 2015, cited by [29] (p. 11)). In this vein, citizen engagement, co-creation, and collaboration between government–academia–industry–civil society are key areas of the city's strategy "Medellin Smart City". For example, the co-creation platform MiMedellin.org encourages citizens' participation through open innovation methodologies, which is led by the city council and a public entity called Ruta N.

Gamification is another recent trend to promote citizens' participation [30]. In Stockholm, safe driving conduct was encouraged by connecting a speed camera to distinguish people who broke the speed limit. By obeying the rule, a person could receive a reward (some money) from a lottery collected from the defaulters. Due to this mechanism, in three days, the traffic speed was reduced by 22 percent [31]. This initiative suggests that entertainment and rewards could force people to adapt their behavior.

Furthermore, it is worth noting the impact of open government data and the transparency aspect in participation and collaboration in open government. There are some recent studies on open government and citizen participation [31–34]. Milic et al. [34] analyze the existing initiatives on data and government transparency evaluation and examine

their advantages and disadvantages. With respect to government transparency, user involvement becomes a critical indicator that expresses the government’s degree of readiness to include the citizens’ perspectives. As one of the open government principles, transparency enforces the significant and productive usage of data. The more open the data are, the fewer obstacles to citizen data usage there will be. Moreover, Wirtz et al. [33] examine the citizens’ determining factors of open government data usage in Germany. Among the results obtained, transparency, participation, and collaboration expectancies significantly affect the citizens’ intention to use open government data. In this vein, Petrović et al. [32] examine the creation of value from published data. As the authors stress, one strategy to take advantage of the economic value of open government data is by making high-quality data accessible.

Based on the literature review, we state the following hypotheses: (1) the decision to participate in open government projects depends on the opportunity cost of the citizen. (2) The opportunity cost of participation is lower in active types of participation than in passive ones. (3) Preferences for social goods (i.e., open government projects and citizen participation projects or experiences) also matter in the decision to participate. (4) The higher the opportunity cost, the lower the amount of the social good will be.

3. The Proposed Model

For simplicity, we suppose an individual can consume his/her time for two reasons: to consume a private good (we need time to consume the goods and services that we can afford with wages) or to participate in the provision of a social or public good at a salary per hour equal to wages (opportunity cost). Both activities generate utility and, therefore, we suppose the individual will assign time to both activities to improve his/her utility or welfare.

First, we assume a utility function between two goods: a private good (C_p) and a social good (C_s). We suppose the social good behaves as leisure. Leisure is a term that describes pleasant activities not related to labor and represents the neoclassical basis of the labor supply curve which is the tradeoff between labor and leisure. Then, it has a price equal to its opportunity cost, the amount of money an individual resigns or wages. Moreover, labor only benefits individuals because of the income generated. An agent has flexibility to choose between the number of daily hours to work or any other activity. We should focus on the number of hours per day dedicated to participating in social goods; to participate means to consume hours per day for the social good. Utility comes from dedicating budget and time to the consumption of both goods.

3.1. The Baseline Model: A Passive Participation

To maximize utility, an individual is limited by two restrictions: (1) a time restriction, the time available to perform both activities which is limited by 24 h per day, and (2) a budget restriction that represents the cost of acquiring any type of goods, either private or public (opportunity cost).

We assume a Cobb Douglas utility function between C_p and C_s

$$U = C_p^\alpha \cdot C_s^\beta \tag{1}$$

where α and β represent the preferences for the private and social good, respectively.

Therefore, the budget constraint becomes

$$Y = P_c \cdot C_p + w \cdot C_s = C_p + w \cdot C_s \tag{2}$$

where P_c is the price of the private good and w is the price of the public good. We assume P_c as a numeraire, $P_c = 1$

From Equation (1), the marginal rate of substitution is $MRS = \frac{\alpha C_s}{\beta C_p}$. From Equation (2), the slope of the budget constraint is $\frac{dC_s}{dC_p} = -\frac{1}{w}$. From the equilibrium condition $MRS = \frac{dC_s}{dC_p}$ we achieve

$$C_s = \frac{1}{w} \frac{\beta}{\alpha} C_p \tag{3}$$

Since we add a time restriction, $24 = C_p + C_s$ (the citizen uses a day to consume goods), C_p then becomes

$$C_p = 24 - C_s \tag{4}$$

If we substitute C_p (4) into (3) we obtain $C_s = \frac{24\beta}{w\alpha + \beta}$ hours dedicated to consuming the social good (to participate in political surveys and participatory budgets, among others). The higher β , the higher C_s will be. The derivative with respect to β which is positive must be checked. The higher w , the lower C_s will be (the opportunity cost reduces C_s). If $w = 0$ then $C_s = 24$; the individual uses all the daily hours to participate. The higher the value of α , the lower C_s (since there is substitution between goods); $C_p = \frac{Y - 24w\beta}{w\alpha + \beta}$. Income has no effect on C_s but exerts an impact on C_p . The presumption of the social good is neutral or independent of the income per day. However, it depends on the opportunity cost of social contribution.

3.2. An Active Participation or Collaboration Model

In the second step, we assume the citizen gains some benefits from the social good (not just welfare/utility). For instance, the citizen becomes an entrepreneur, he receives a gift for accomplishing a public goal (i.e., to limit the speed of cars in some streets by gamification) or he achieves more reputation in the community and a better image that helps improve his private business value, among other benefits. Those benefits are introduced in the budget constraint as the actual value of the social good. The citizen decides to participate if the net actual value of participation is positive. The social good, as any public good, is indivisible and each citizen consumes the whole stock.

Hence, the budget constraint becomes

$$Y + \frac{C_s}{(1+t)} = C_p + wC_s \tag{5}$$

where t is the interest rate. The slope of the new budget constraint is $\frac{dC_s}{dC_p} = \frac{1}{w - \frac{1}{1+t}}$. From the equilibrium condition, $MRS = \frac{1}{w - \frac{1}{1+t}}$. Then, we achieve

$$C_s = \frac{\beta C_p}{\alpha \left(w - \frac{1}{1+t} \right)} \tag{6}$$

and by introducing (4) into the Equation (6) we obtain

$$C_s = \frac{\beta 24}{\alpha \left(w - \frac{1}{1+t} \right) + \beta} \tag{7}$$

C_s is positive if $\frac{\beta}{\alpha} > \frac{1}{1+t} - w$. The presumption of the social good is positive if the relative preferences for the social good are higher than its marginal benefits (incomes: costs). The presumption of the social good is higher in this second case than in the baseline model because the citizen can appropriate some benefits.

In a third step, we suppose the citizen, who is not just a consumer but a producer of the social good, pursues other objectives rather than utility maximization. Since the citizen is or has become an entrepreneur of the social good, his/her second objective is to maximize benefits (benefits: cost).

The benefit function B is income minus the cost of producing social goods

$$B = \frac{Cs}{1+t} + Cp - wCs \tag{8}$$

where Cp represents the citizen’s income from his/her labor activity (excluding the production of social goods as a source of monetary income). In this vein, we suppose $wL = Cp$ (L is working hours, we suppose all income is consumed).

If we introduce (4) into (8) we obtain

$$B = \frac{Cs}{1+t} + (24 - Cs) - wCs \tag{9}$$

To achieve the value of w we calculate

$$\frac{\partial B}{\partial Cs} = \frac{1}{(1+t)} - w - 1 = 0; \text{ hence, } w = \frac{1}{(1+t)} - 1; \frac{1}{1+t} - w \geq 1$$

To maximize the benefit, the marginal benefits of participating (marginal income less opportunity cost) should be at least equal to 1. Hence, by joining the solutions from the second and third steps [(7) and (9)] we conclude

$$1 < \frac{1}{1+t} - w < \frac{\beta}{\alpha} \tag{10}$$

The marginal benefits of prosumption of social goods should be into this range to achieve a positive consumption and production of the social good.

Finally, in a fourth step, we suppose the amount of the social good available to any citizen depends on the number of citizens that participate in its production. Besides, since the production of a social good suffers from the free-riding problem, some citizens prefer not to participate. Based on this idea and following [35], we define a social good as a continuous production function

$$L = 1 - \left(\frac{D}{N}\right)^F \tag{11}$$

where the production level (L) is a function of the number of defections (D) (that is people that desert or abandon or do not participate) in relation to the total population or inhabitants (N) and a parameter (F) which is empirically determined.

If we replace L with Cs from Equation (9) we obtain:

$$\frac{w + 1 - \frac{1}{1+t}}{24} = \left(\frac{D}{N}\right)^F \tag{12}$$

Thus, to know how many citizens are needed to provide the social good we calculate $N = C + D$ (contributions + defections):

$$C = D \cdot \left[\left(\frac{24}{w + 1 - \frac{1}{1+t}} \right)^{\frac{1}{F}} - 1 \right] \tag{13}$$

C is positive if and only if $\frac{1}{(1+t)} - w > 1$, the marginal benefits of participating are higher than 1, which is also guaranteed by (12) since Cs is positive. Moreover, by definition of L , the term in brackets is positive $\left(\frac{D}{N}\right)^F > 1$ (we know $F < 1$ as a parameter).

4. Case Study: A Group of Citizens from an Argentinean City

We conduct an online survey addressed to the inhabitants of the city of Bahía Blanca on the citizen participation topic. The online survey was conducted between August and October 2022. Such a survey received 249 valid responses. Moreover, the sample excludes citizens without Internet access because the survey was online. It was spread by adding a link at the research institute of the project by using social media and by conducting some interviews at local radios and newspapers. Therefore, empirical results obtained should be analyzed with caution as they are not representative of the overall population but of the citizens with internet access and interest in the topic.

We built the questionnaire based on some public online surveys on citizen participation from Navarra, Spain; Medellín Colombia; and Nueva León, México; among others. Also, we considered the literature sources on citizen participation and smart cities mentioned in the theoretical framework. The survey includes information about the citizens' profile (age, level of education, labor condition, and ICT use), smart cities, and citizen participation. Questions were closed and most of them were Likert-scaled.

The size of the sample is 249 observations and is considered enough for a finite population sampling (equal to or lower than 100,000) [36]. The sample responded to the following formula:

$$n = \frac{Z^2 x N x P(1 - P)}{(N - 1)x K^2 + Z^2 x (1 - P)} \quad (14)$$

where N is the population under study. In this case, citizens from Bahía Blanca in August 2022 are equal to $N = 335,000$.

Z is the value obtained from significance levels. If the population distribution is normal at a significance level of 95%, the z -value is 1.96. In this case, with a significance level of 90%, the corresponding z is 1.645 and so on.

K is the error or maximum difference between the sample proportion and the population proportion to be accepted based on the significance level proposed. For a significance level of 95%, K is 0.05; similarly, for a significance level of 90%, K is 0.1, as in this case.

P is the population fraction of interest, a parameter that indicates the percentage of the population interested in citizen participation or related topics. In this case, we used the 20% proportion interested in smart cities published by [37]. Usually, it is suggested to use the most unfavorable value of 50%.

The population was asked if they were part of any citizen participation experience in the last year. The survey also enquires about the type of participation such as neighborhood meetings, talks/debates, and participatory budget, among others. As a result, we found that 139 of the 249 respondents (55.8%) have a citizen participation experience.

In the survey, we first ask respondents to select if they have experienced any type of citizen participation during the last year and then to choose (multiple choice) the different types.

The most popular types of citizen participation from this sample are neighborhood boards (50.4%) and talks (47.5%). Nearly half of the surveyed citizens have experienced any of these initiatives. On the other side, deliberative councils and hackatons are the least experienced or selected (Table 1).

Moreover, we explore the relationship between the type of citizen participation and income or salary. Based on the model, we suspect that the decision to participate could be associated with the opportunity cost. When we compare people that participate and those that do not, we cannot find a statistically significant difference in wages.

Nevertheless, on average, those who participate in participatory budgets have a lower sector salary than the rest of the citizens, followed by others (such as diners, etc.), and neighborhood councils (Table 2). On the other hand, among the initiatives whose citizens receive a higher salary than the average, and therefore whose opportunity cost is higher, are the council (bank 25), debates, and hackathons. Moreover, these initiatives are mainly linked to citizens working in the public sector or academia.

Table 1. Types of citizen participation frequency.

		Count	% of Answers by Column (Base: Count)
Types of citizen participation	Talks	66	47.5%
	Deliberative Council	4	2.9%
	Discussions	12	8.6%
	Hackaton	5	3.6%
	Neighborhood boards	70	50.4%
	Others	33	23.7%
	Participatory Budget	20	14.4%
	Voting	44	31.7%
Total		139	

Source: own elaboration.

Table 2. Average sectorial wages per hour by type of citizen participation.

		Media Wages per Hour *
Types of citizen participation	Talks	921.80
	Deliberative Council	1234.24
	Discussions	1122.91
	Hackaton	1028.60
	Neighborhood boards	906.12
	Others	888.28
	Participatory Budget	800.57
	Voting	935.13
Total		918.63

Source: own elaboration. * Represents the average wage of the activity sector in current Argentinean pounds (August 2022).

Citizen participation initiatives have an opportunity cost measured by the hourly wage of the occupation sector. The most massive types (types with a high percentage of the population) have a lower average wage than less popular initiatives such as the council, debate, or hackathon (although in the latter case the differences are not statistically significant).

In fact, there are statistically significant differences between the sectorial hourly wages of those who participate in debates or the deliberative council compared to the rest (Table 3). Therefore, the higher the opportunity cost, the lower the amount of the social good.

Table 3. Comparison of average sectorial wages per hour by participation in the deliberative council or discussion.

		Sum of Squares	fd	Quadratic Media	F	Sig.
Sectorial wages per hour * deliberative council	Inter-groups	445,271.969	1	445,271.969	2.742	0.089
	Intra-groups	37,181,246.337	229	162,363.521		
	Total	37,626,518.306	230			
Sectorial wages per hour * Discussion	Inter-groups	609,346.173	1	609,346.173	3.770	0.053
	Intra-groups	37,017,172.133	229	161,647.040		
	Total	37,626,518.306	230			

Source: own elaboration.

On the other hand, among all the initiatives, voting is the one that has achieved the highest virtual percentage of participation, while the participatory budget is the one with the greatest face-to-face involvement.

Apart from that, citizens can assume a more active role in the decision-making process in some types of citizen participation more than in others. Based on [21], the distinction between active and passive online tools matters. Deliberative council, voting, and discussions are the most virtual types and are also the most active ones. Moreover, as we have seen in Table 3, they are the types of participation with a higher opportunity cost.

Moreover, participation in debates such as municipal law projects, deliberative councils, and in hackathons are precisely those initiatives that are linked to the source of activity or work of the citizen. Thus, by participating in those initiatives citizens can co-create and build a source of income. In the case of hackathons, most of participants are or become entrepreneurs; in the case of debate, participants are usually from the academia or public sector; and in the case of the deliberative council, participants are mainly public officials and in a few cases citizens can participate.

We observe that citizens with experience in participatory budgets are less in agreement with the role the municipality places on citizen participation than citizens with no participation experience (Table 4). On average, they partially agreed with the importance the municipality assigns to citizen participation, while citizens with no participatory budget experience nearly totally agreed with this role. The same situation occurs with citizens who have participated in talks. These differences in opinions are statistically significant. Moreover, since most of these experiences are face-to-face rather than virtual, the opportunity cost of participating could be higher.

Table 4. Differences in the level of agreement about the municipality’s valuation of citizen participation for decision making.

	Participatory Budget		Talks	
	Media	n	Media	n
No	4.49	227	4.54	181
Yes	4.05	20	4.23	66
Total	4.45	247	4.45	247
Media difference	0.44 *		0.31 **	

Source: own elaboration. *, ** statistically significant at the 1 and 5% level, respectively.

Moreover, people that participate in the participatory budget or talks partially agree with the affirmation that the municipality values citizen participation for decision making. Meanwhile, people with other types of citizen participation totally agree on average (Table 5). In the other participation experiences (debates, hackatons, and voting), the level of agreement of participants is higher than the rest but not statistically significant. This result could partially explain why people engage on some type of participation experience instead of others. Moreover, as we have seen before, these initiatives have a lower opportunity cost than the rest in terms of missing salary.

Table 5. Differences in the level of agreement about the promotion of citizen participation by the municipality.

	Participatory Budget		Talks	
	Media	n	Media	n
No	2.25	227	2.48	181
Yes	2.90	20	2.53	66
Total	2.47	247	2.49	247
Mean difference	-0.65 *		-0.05	

Source: own elaboration. *, ** statistically significant at the 1 and 5% level, respectively.

Moreover, citizens with a participatory budget experience partially agree with the statement that the municipality promotes citizen participation (Table 5). Hence, citizens without this participatory experience partially disagree about the promotion of citizen participation by the municipality or local government.

About Preferences for the Social Good

The questionnaire also asks respondents to answer if they have any social (community) experience. We understand social experience as participation in non-governmental

organizations, foundations, and sports club, among others. We suppose that citizens with social experience are more prone to citizen participation.

In fact, as Table 6 shows, while 77% of people with a community participation practice have a citizen participation experience, only 34% of people without community participation have a citizen participation experience. Hence, preferences for social participation explain the decision to be involved in citizen participation. Moreover, these differences are statistically significant based on Chi-Square tests ($p > 0.000$) and symmetric measures.

Table 6. Relationship between participation in NGO, clubs, and citizen participation.

			Citizen Participation		Total
			No	Yes	
Participation in NGO's, clubs,	No	<i>n</i>	80	42	122
		% row	65.60%	34.40%	100.00%
	Yes	<i>n</i>	28	97	125
		% row	22.40%	77.60%	100.00%
Total		<i>n</i>	108	139	247
		% row	43.70%	56.30%	100.00%

Source: own elaboration.

Secondly, we use the variable being a visitor of the Municipality of Bahía Blanca (MBB) webpage as a proxy of e-government experience (Table 7). We also obtained that 59% of people with a e-government experience (visiting the MBB webpage) are involve in citizen participation, while 38% of people without e-government have an experience of citizen participation. Similarly, these differences are statistically different based on Chi square tests and symmetric measures.

Table 7. Relationship between being a visitor of MBB website and citizen participation.

			Citizen Participation		Total
			No	Yes	
Visitor of the MBB webpage	No	<i>n</i>	19	12	31
		% row	61.30%	38.70%	100.00%
	Yes	<i>n</i>	89	127	216
		% row	41.20%	58.80%	100.00%
Total		<i>n</i>	108	139	247
		% row	43.70%	56.30%	100.00%

Source: own elaboration.

To sum up, the higher the preferences for the social good (i.e., e-government and community participation), the higher the probability will be of being part of an experience of citizen participation.

5. Discussion and Conclusions

This paper offers an alternative theoretical framework to explain citizens' incentives to participate in open government projects. As a result of the new ICT which spread digital devices and platforms to connect government and citizens, more citizen participation projects have been raised. In this scene, citizens assume different roles not just as passive agents that receive information in an informative or consulting manner but also as active agents that provide and produce new information or social goods. As we previously mentioned, we pretend to mainly explain the cases of citizen participation that usually emerged as volunteer projects (with no direct payment or remuneration for participate) but that finally turn into new businesses or entrepreneurships (and hence are likely to perceive an income).

Although there are a few models to explain social goods or the prosumer role of users/clients, in this model we joined different restrictions to the objective function. Differently from Alderete [26], which refers to utility function with network effects, this paper is

based on leisure theory. As a result, we confirm the hypothesis that citizen's decision to participate in open government projects will depend on the opportunity cost.

Limitations of this analysis comprise supposing that a second objective beyond utility maximization is to maximize benefits and that only one individual, the citizen, can enjoy the benefits of the social good. We do not add other actors such as the government or enterprises. Moreover, we impose a particular function such as Cobb–Douglas in individual consumption choices.

Furthermore, by using the theory of consumption, we accomplish the understanding that the higher the opportunity cost of the citizen, the lower the amount of the social good is. Fewer people are prone to participate and, therefore, the number of projects decreases, confirming Hypothesis 3.

Since the decision to participate also depends on the preferences for the social good (Hypothesis 2), some practical implications can be the promotion of policies to induce higher preferences for the social good. This type of activity could be some sort of gamification where citizens are prone to participate and accomplish social goals if they can gain any gift or reward. As we observed, the decision to participate or not to participate in citizen participation projects or open innovations is not linked to the level of individuals' income. However, based on the case study, the opportunity cost of participation differs by type of citizen participation. This result is in line with the model results in terms of income and salary, the second one being the significant factor. Therefore, policies to attract citizens to participate should focus on reducing the opportunity cost of participation. For instance, by promoting projects that can give rise to future incomes from participating in social goods.

In developing countries where macroeconomic uncertainty is frequent, large amounts of interest rates reduce the actual value of the social good and hence the marginal benefits of participating. Hence, in stable frameworks, public policies to induce citizen participation are more efficient. However, in countries where a large amount of people are unemployed and do not receive a minimum salary, the opportunity cost of participating in building social goods is lower.

Future research will address the objective of analyzing the determinants of the opportunity cost of participation by estimating an econometric model. For instance, a regression model to estimate the simultaneous effect of a set of independent variables such as socio-demographic variables, political experience, e-government experience, and other subjective factors (perception of the citizens).

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