Citizen participation in public administration: investigating open government for social innovation

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In recent years, public sector organizations have increasingly focused on citizen contribution by adopting instruments known from open innovation. By collaborating with the periphery and leveraging external knowledge, government institutions initiate social innovation and stimulate a positive change for society. This article examines the involvement of citizens in an ideation platform initiated by a local government and investigates the motivations affecting participation intensity. Drawing on self-determination theory, we analyze what motivates citizens to participate in an open government platform and how these motivations influence participation quantity. Based on a survey among platform users and the analysis of usage data from the platform operator, we find that motivations of citizen participation in public administration greatly vary across forms of participation. Whereas, intrinsic motivation is positively associated with producing and consuming platform content, external and introjected regulation negatively relate to individuals' active contribution. At the same time, external regulation is positively associated with evaluation behavior.

1. Introduction

A more open approach to innovation has become dominant in innovation management during the last decade (Enkel et al., 2009; Chesbrough and Bogers, 2014). There has been a call for companies to rely on the external knowledge of customers, users, suppliers, or other external experts when developing new products and services (Piller and West, 2014; West and Bogers, 2014). Recently, scholars argued that open innovation is also relevant outside the private sector (Hilgers and Ihl, 2010; Chesbrough and Di Minin, 2014; Schmidthuber and Hilgers, 2018). In developing the concept of *open social innovation,* Chesbrough and Di Minin (2014) assert that open innovation relates not only to private benefits, but also to initiatives aiming at societal and public impact. Promoting openness in the public sector and integrating knowledge and ideas from external actors is intended to counter these challenges (Hilgers, 2012). Hence, we see an increasing number of governments on both the national and regional levels collaborating

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with externals, such as citizens, to stimulate social innovation by utilizing external knowledge (Criado et al., 2013).

In this study, we relate to *open government* as a part of *social innovation* that is transformed and enforced by new means of external contribution in a public setting. Social innovations build on new ideas to satisfy societal needs and create new relationships or collaborations and, ultimately, to benefit society and improve its capacity to act (Murray et al., 2010). In doing so, those who stimulate social innovation, such as the political-administrative system, companies, nongovernmental organizations, or self-organized citizens, collaborate with the periphery to leverage ideas and knowledge of the 'crowd' (e.g., Bekkers et al., 2013; Voorberg et al., 2015). Public sector institutions (e.g., a local government) catalyze and foster (open) social innovation by transforming external input into activities of policy formulation, urban planning, or public budgeting. Recent research has shown that the idea of integrating citizens into administrative tasks has enormous potential to strengthen citizens' trust in government and to improve the efficacy and effectiveness of public service delivery (Mergel, 2015; Wiewiora et al., 2016; Schmidthuber et al., 2019).

A necessary condition for collaborative value creation, however, is citizen involvement (Voorberg et al., 2015), meaning it depends on citizens' willingness to interact with governmental institutions and provide input on the given task (Bekkers et al., 2013). The success of an open government approach is thus influenced by the degree of citizen participation. This study defines citizen participation as citizens' response to an open call for participation issued by public administration. Accordingly, participation quantity refers to the individual's degree of producing platform content like sharing ideas or comments or evaluating platform content by liking or disliking ideas. Citizens have to be motivated to contribute their know-how, share their ideas, and state their preferences. In contrast to user innovation and open source software, citizens participating in open government (e.g., urban planning) are unlikely to benefit immediately from 'their' innovation, as the government can only consider a few citizens' ideas and idea realization takes a considerable time (Füller, 2006). This situation makes it even more pertinent to examine what motivates citizens to engage in open government projects. Deepening our understanding of motivational stimuli of open government participation is instrumental for guiding practitioners regarding which factors they should focus on to successfully support innovation-conductive knowledge sharing in online communities. So far, few studies have investigated what public organizations can do to organize online citizen participation and reap the benefits of such citizen–government interactions.

In this study, we are therefore interested in what motivates citizens to respond to an open call for participation issued by a public administration and how these motivations affect participation quantity. More specifically, we apply self-determination theory (SDT) (Deci and Ryan, 1985, 2000) to study citizens' motivation to share ideas online in a local open government initiative and to interact with the ideas of others. SDT provides us with a fine-grained framework for analyzing motivations and explaining knowledge-sharing behavior (Gagné, 2009). We test our theory-based assumptions using a sample of participants in a government-initiated idea generation platform. In doing so, we draw on an Austrian case in which a local government annually issues open calls for participation and invites externals to provide ideas on different topics. Our study focuses on the participants of that process in 2016, collecting ideas on open spaces in the city. Supplementing data from a primary survey among the participants with archival platform data, we test our hypotheses by employing multivariate regression analysis.

This study contributes to the state of the art of the research in several meaningful ways. While a large body of work has examined motivational stimuli of company-initiated open innovation projects (e.g., Piller and Walcher, 2006; Battistella and Nonino, 2012), platforms run by public bodies have been studied to a much lesser extent. Although initial studies indicate that citizens are willing to collaborate with governments online (Hilgers and Ihl, 2010; Linders, 2012; Nam, 2012), we know little about the motivational determinants of citizens' participation quantity. Other scholars have studied the determinants of open government initiatives (e.g., Kube et al., 2015; Wijnhoven et al., 2015; Schmidthuber et al., 2017), but it is a lack of studies examining a crowd's motivation with an established theoretical framework (Zhao and Zhu, 2014) to provide a more fine-gained picture of citizens' motivation. Our paper addresses this lack of research and goes beyond the classic intrinsic–extrinsic dichotomy by discussing the quality of citizens' motivation and providing insights into how different types of motivation (i.e., intrinsic and multiple non-intrinsic motivations) may affect participation quantity. Consequently, this study uses the structure of motivational factors, as suggested by SDT, and differentiates not only degrees of motivation (i.e., how much motivation) but also reasons for participation (i.e., type of motivation) (Battistella and Nonino, 2012). Our results can therefore help to design initiatives to facilitate larger citizen participation in future open government initiatives (Mergel and Desouza, 2013).

2. Theory and hypotheses

2.1. Open government

In recent years, cities all over the world have been leveraging modern information and communication technology to integrate citizens in public problem-solving and value creation activities (Hilgers and Ihl, 2010; Almirall et al., 2014; Mergel, 2015; Bogers et al., 2017). An 'open government' encompasses an increased level of openness in terms of information and decision-making (Grimmelikhuijsen and Feeney, 2017) and constitutes a 'multilateral, political, and social process' (Wirtz and Birkmeyer, 2015, p .2) that transforms governments (Hansson et al., 2015) and improves the relationship between government and the public (Lukensmeyer and Torres, 2008). First empirical studies confirm the positive effects of an open government. For example, Buell et al. (2018) have shown that operational transparency can stimulate both citizens' attitudes toward government and their levels of engagement. Furthermore, a more direct communication with citizens can strengthen perceived legitimacy of the police (Grimmelikhuijsen and Meijer, 2015), and judicial transparency is positively related to public trust (Grimmelikhuijsen and Klijn, 2015).

To create positive change for society, the government, representing the focal organization that initiates social innovation, lowers its boundaries and stimulates exchange with the periphery. This exchange is fostered by releasing organizational knowledge (e.g., open data) and integrating external knowledge into government decisions and actions. Collecting this external input has been largely supported by the rise of dedicated online platforms, a reason why we see more of these activities in recent years (Nam, 2012; Mergel, 2015; Hilgers and Schmidthuber, 2018). On such a platform, a government institution issues an open call for participation to an undefined, generally large group of people (citizens) and invites them to become part of an online community (Hilgers and Ihl, 2010). The responding external actors contribute by providing platform content (e.g., sharing ideas) or evaluating the content (e.g., liking ideas). Aims pursued in this manner encompass service design, service delivery, and execution, as well as service monitoring (Linders, 2012).

2.2. Self-determination theory (SDT)

As introduced in the opening section, we refer to SDT as our theoretical framework. SDT assumes that individuals are motivated for different reasons or goals that lead to action (Deci, 1980; Deci and Ryan, 1985; Ryan and Deci, 2000). It is based on the idea that it is not the total amount of motivation that predicts outcomes, such as creative problem-solving, but rather the type or quality of individual motivation (Deci and Ryan, 2008). According to SDT, motivation types differ according to the level of self-determination underlying human behavior, defined as 'a sense of choice in initiating and regulating one's own actions' (Deci et al., 1989, 580).

SDT differentiates between intrinsic motivation and different forms of extrinsic motivation (identified regulation, introjected regulation, and external regulation), and varies in the degree to which a motivation is autonomous versus controlled (Deci and Ryan, 2008). Autonomously motivated behavior is driven by enjoyment and interest or an underlying personal value, and experienced as freedom and volition. Autonomous motivation consists of intrinsic motivation and identified regulation. *Intrinsically* motivated individuals carry out an activity because they find it interesting and enjoyable. For example, individuals feel enjoyment when sharing their ideas, and thus show an inherently autonomous behavior. *Identified*-regulated behavior is based on identification with the value of a specific activity and is consistent with the respective individual's personal goals and identity. Identified-regulated individuals are moderately autonomously motivated, as they feel volition when pursuing their self-selected goals. Individuals may, for example, identify with the importance of sharing ideas on urban planning.

In contrast, controlled motivation comprises external and introjected regulation and refers to behavior that involves feelings of pressure to think, feel, or act in particular ways. *External*-regulated activities are based on external contingencies of reward or punishment. For example, individuals may share ideas to gain recognition from their friends and family or to win prizes. External regulation thus involves external pressure and the expectation of positive outcomes such as tangible rewards, and is the classic type of extrinsic motivation. *Introjected* regulation is characterized as partly internalized extrinsic motivation and moderately controlled motivation. While external regulation is driven by external factors, introjected regulation is partly internal and explained by factors such as avoidance of shame, reasons of approval, and ego-involvement. Consequently, the pressure comes from inside sources. For example, introjected-regulated individuals would participate in an idea generation contest because they feel they have to (Deci and Ryan, 2008).

SDT suggests that individual performance is influenced by the type of motivation underlying a particular activity (Sheldon and Elliot, 1998). The theory enables to study behavioral outcomes of self-determined motivation such as volunteer engagement (van Schie et al., 2015; Nencini et al., 2016), prosocial behavior (Weinstein and Ryan, 2010), work motivation (Chen and Bozeman, 2013), or knowledge-sharing (Gagné, 2009). Literature provides empirical proof that intrinsic motivation and identified regulation are associated with positive outcomes like well-being and need satisfaction (Millette and Gagné, 2008; Weinstein and Ryan, 2010), specifying that intrinsic motivation has a more significant effect than identified regulation. In contrast, introjected and external regulations are related to negative behavioral outcomes such as the intention to quit (Nencini et al., 2016) and turnover intention (Tremblay et al., 2009).

2.3. Linking self-determination with open government

By drawing on SDT, we develop four hypotheses and link the different types of motivation to participation quantity of participants in an open government initiative. First, SDT suggests that intrinsically motivated individuals engage in an activity because of interest and enjoyment (Deci and Ryan, 2008). Accordingly, they participate in a task entirely of their own volition. Intrinsically motivated behavior is explained by the satisfaction of three fundamental psychological needs: autonomy, competence, and relatedness.

Earlier studies on participation in open innovation contexts provide empirical evidence of a positive influence of intrinsic motivation on participation effort. For example, Lakhani and Wolf (2005) have identified enjoyment-based intrinsic motivation as a strong driver of contribution to open source software. Also in the context of open government initiatives, intrinsic motivation has been shown as an important antecedent of allocating effort to projects. Wijnhoven et al. (2015) showed that citizens intend to engage in open government due to fun and enjoyment. Moreover, Wirtz et al. (2018) recently reported that citizens' intentions to use open government data are due to personal interest and inner conviction. Mergel and Desouza (2013) also showed that online participation is influenced by personal interest in the respective issue. In a similar vein, we assume that citizens contribute when they are inherently interested in or passionate about the initiative (Gagné, 2009). Consequently, we hypothesize:

Hypothesis 1: *There is a positive relationship between individuals' intrinsic motivation and participation quantity in open government platforms.*

Individuals engage in activities that are consistent with their personal goals and identities. Identification is associated with perceived oneness with an organization (Mael and Ashforth, 1992). Oneness makes the organization an extension of the psychological structure of an individual and can determine individual performance (Brown, 1969; Davis et al., 1997). In such a state, both negative comments about an organization and organizational success are taken personally (e.g., Katz and Kahn, 1978).

In an open innovation contest, identification with the project's objectives might heighten individuals' emotional involvement (Allen and Meyer, 1996) and stimulate their participation, as identifying individuals seek to increase organizational success, help to solve problems, and overcome barriers (Davis et al., 1997). Empirical results confirm this assumption. For example, individuals identifying as members of the open-source virtual community (VC) are more willing to contribute to the VC (Hars and Ou, 2002). Furthermore, a sense of belonging strengthens the intention to share knowledge in a VC (Zhao et al., 2012). In the case of open government, we argue, a local sense of belonging and the perception of personal meaningfulness of the initiative stimulate involvement in the project. We thus hypothesize:

Hypothesis 2: *There is a positive relationship between individuals' identified regulation and participation quantity in open government platforms.*

While intrinsic motivation and identified regulation assume that citizens engage in open government volitionally, introjected and external regulation are associated with internal and external pressure to participate, respectively. Introjected-regulated individuals engage in activities due to pressure that comes from inside sources. They want to demonstrate their knowledge and boost their self-esteem (Weinstein and Ryan, 2010). Accordingly, these users aim at gaining recognition from other users of the same platform (Brabham, 2010) and would feel ashamed when not participating. A sense of obligation to contribute thus increases the probability of active participation in open-source platforms (Lakhani and Wolf, 2005). Similarly, Wijnhoven et al. (2015) found that the perception that 'good citizens' should engage in such projects is driving participation. We thus hypothesize:

Hypothesis 3: *There is a positive relationship between individuals' introjected regulation and participation quantity in open government platforms.*

Externally regulated activities comprise external pressure and embrace expectations of positive outcomes such as tangible rewards. While some studies showed that open innovation participation can be stimulated by financial rewards (e.g., Brabham, 2010; Zhao and Zhu, 2014), we follow Gagné (2009) in arguing that idea sharing is difficult to motivate through rewards and pressure (Frey, 1993). Evidence further shows that helping behavior decreases when using tangible rewards (e.g., Fabes et al., 1989). Citizens involved in an open government initiative help both public employees and the community to increase public service delivery quality by sharing local knowledge, experience, or ideas. Consequently, we hypothesize in terms of idea sharing:

Hypothesis 4: *There is a negative relationship between individuals' external regulation and participation quantity in open government platforms.*

3. Data and methods

3.1. Setting and data collection

In May 2015, the local government of the city of Linz (Austria) implemented *meinlinz.at* ('My Linz'). The platform intends to provide a channel for citizen involvement in local government decisions (Schmidthuber and Hilgers, 2018). On a regular basis, the city government invites its citizens to become engaged in administrative processes by communicating their needs, expectations, and ideas regarding urban development and planning. In June 2016, for example, the city government asked citizens for their ideas to improve existing open spaces and for the design of new ones. Users were invited to post ideas as well as to comment on and evaluate the contributions of others.

We selected this particular idea platform as our empirical data set for several reasons: First, 'My Linz' allows citizens to make contributions to tasks requiring no specialized knowledge, which allows a broad group of users to contribute meaningful solutions. Second, the platform focuses on idea generation. This allows us to consider the actual behavior of platform users in rather large numbers of relatively similar tasks. Third, users have created a sufficient amount of input on that platform. In total, 1,161 registered users have shared 230 ideas. Finally, the platform uses elements of gamification to motivate users to visit the platform and to contribute actively. Users are able to collect points for sharing ideas, writing comments, and evaluating contributions. Users with a high number of points can also turn them in for small awards. This allowed us to test different aspects of motivational incentives.

We collected our data from two sources. First, we conducted a quantitative survey among users registered on the platform in autumn 2016. The survey aimed at understanding the platform users, their motivation, and perceived outcomes of participation (see also Schmidthuber, Stütz, and Hilgers, 2019). To identify problems with the framing and wording of the questions, the questionnaire was reviewed by colleagues with expertise in both methodology and the subject areas. In addition, the questionnaire was pilot tested with individuals familiar with the platform, revised, and then sent to the 1,161 registered users of the platform via e-mail. One hundred and twenty e-mails were undeliverable. In total, we reached 1,041 users, 169 of whom participated in the survey and returned a completed questionnaire. Seventy-three of the 169 respondents participated in the 2016 contest and, due to the focus of our study, were included in the following analysis. Since a web-based survey design might hold possible biases (Roztocki, 2001), we tested for response bias as the most important possible bias. First, we examined differences between respondents and nonrespondents with respect to gender. A t-test analysis showed no significant difference between the two groups. Second, some users might have more interest in participating in the survey than others (Armstrong and Overton, 1977). In our study, this means that active users (e.g., individuals who share more ideas) might be more likely to participate in the survey than passive users. In testing for a potential bias (Armstrong and Overton, 1977), we compared the earliest 10% of respondents with the last 10% of the sample and tested for higher platform performance answering in the early part (see Jeppesen and Frederiksen, 2006). Several t-test analyses on different types of platform activity indicate no bias.

Second, we obtained access to a database of the platform provider that accumulated data related to the number of ideas a user had shared, the number of comments and responses to comments a user had written, and the number of likes and dislikes a user had made. These archival data offer an objective view of the users' platform participation behavior. The use of two data sources contributes to validity, as variables are based on two methods of measurement and thus common-method bias can be avoided (Donaldson and Grant-Vallone, 2002; Podsakoff et al., 2003).

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3.2. Measures

3.2.1. Dependent variables
Using data provided by the platform operator, we measure participation quantity threefold: (1) The *number of ideas* counts the ideas each user posted on the platform. (2) The *number of comments and responses* refers to the comments and responses to comments users made to an idea. (3) The *number of likes and dislikes* indicates how often a user evaluated a contribution by pressing the corresponding buttons.

3.2.2. Independent variables
For measuring citizens' motivation to participate in the idea platform, we developed a multi-item scale based on SDT literature (Millette and Gagné, 2008; Gagné et al., 2010; Weinstein and Ryan, 2010; van Schie et al., 2015). Each item was rated on a scale from 1 (completely disagree) to 7 (fully agree). A principal component analysis (PCA) with varimax rotation, an orthogonal rotation method (Hair et al., 2006) for generating hypotheses (Bortz and Schuster, 2010), was performed to extract factors. PCA identified four factors with eigenvalues greater than 1.0

(Kaiser's criterion; Kaiser, 1960). Adequate internal reliability was achieved (Cronbach alphas range between .61 and .81). Although reliability is lower than commonly accepted, it is comparable to other SDT research, reflects the low-item count in the subscale (2–3) (e.g., Breaugh et al., 2018), and is at an acceptable level for explanatory research (Nunnally, 1978). Average Variance Extracted (AVE) is above .5 for all four constructs, indicating a good convergent validity (Fornell and Larcker, 1981). Table 1 outlines the four factors and corresponding items measuring citizens' motivation to participate in idea generation. Furthermore, results from reliability analysis and validity assessment are reported.

3.2.3. Control variables
We controlled for respondents' age, gender, and previous experience with the idea platform. *Age* was measured categorically (< 30, 30–59, 60+). *Gender* is included as a dummy variable, taking the value '1' for male. *Platform experience* is also a dummy variable and indicates if the respondent has already participated in the idea generation platform in 2015 (value '1') or if he or she participated the first time (value '0').

Table 1. Constructs to measure citizen motivation

	1	2	3	4
Factor 1: External Regulation (Millette and Gagné 2008; Gagné et al. 2010)				
Because my friends and/or family expect me to participate	0.826			
To gain recognition from others	0.823			
Because then others respect me more strongly	0.769			
Because I wanted to win prizes	0.711			
Factor 2: Identified Regulation (Gagné et al. 2010; van Schie et al. 2015)				
Because it aligns with my values to participate in [Project]		0.856		
Because I personally consider it important to participate in [Project]		0.852		
Because I think it is important		0.822		
Factor 3: Introjected Regulation (Millette and Gagné 2008; Gagné et al. 2010; Weinstein and Ryan 2010)				
Because I thought I should participate			0.859	
Because I thought I had to participate			0.666	
Because I would feel guilty if I had not participated			0.563	
Factor 4: Intrinsic Motivation (Millette and Gagné 2008; Gagné et al. 2010)				
Because I have fun at participation				0.863
Because the participation is exciting				0.782
Statistics for factor scores				
Cronbach's Alpha	0.81	0.81	0.61	0.68
Composite Reliability	0.86	0.88	0.74	0.81
AVE	0.61	0.71	0.50	0.68

Notes: Principal component analysis with varimax rotation. KMO = .712, Bartlett's Text of Sphericity: 297.54***, df = 66. First component accounts for 23.66% of the variance in all items; based on 73 observations. To ensure reliability, items from the respective constructs were eliminated if factor loading on their intended constructs was below the minimum recommended level of 0.5 (Hair et al., 2006). Items per factor were averaged for each respondent.

Table 2. Descriptive statistics and correlation matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Number of ideas	1										
2	Number of comments/responses	0.75*	1									
3	Number of likes/dislikes	0.39*	0.58*	1								
4	External regulation	−0.18	−0.07	0.13	1							
5	Introjected regulation	−0.16	−0.13	−0.05	0.39*	1						
6	Identified regulation	−0.10	−0.16	−0.05	0.01	0.17	1					
7	Intrinsic motivation	0.07	0.16	0.19	0.27*	0.01	0.22	1				
8	Below 30	−0.05	−0.07	0.14	0.03	−0.04	−0.07	−0.03	1			
9	60 and older	−0.08	−0.11	−0.11	0.10	−0.00	0.13	−0.04	−0.19	1		
10	Gender	−0.04	−0.05	−0.19	−0.08	0.02	0.05	−0.10	−0.22	0.07	1	
11	Platform experience	−0.02	0.04	0.10	0.32*	−0.00	0.09	0.08	0.08	0.09	0.15	1
	Mean	2.41	6.78	30.16	1.90	3.02	5.79	4.61	0.18	0.14	0.62	0.30
	SD	3.97	17.31	65.51	1.67	1.40	1.06	1.56	0.39	0.35	0.49	0.46

Note: $N = 73$; *Values significant to 5%.

4. Results

Table 2 presents the descriptive sample statistics: Nearly 70% of respondents are aged between 30 and 59, about 60% are male, and 30% have previous platform experience. Correlations are also presented in Table 2. Furthermore, different checks of multicollinearity (including checking variance inflation factors) do not raise any significant concerns.

Table 3 presents the findings of the three regression analyses. As the dependent variables (i.e., number of ideas, comments, and likes) are count variables, take nonnegative integer values, and there is an excessive number of individuals with a count of zero, zero-inflated Poisson models might be adequate statistical approaches (Cohen et al., 2003; Karazsia and Van Dulmen, 2008). We conduct Vuong's test to confirm that zero-inflated models are indeed preferable to the standard Poisson model for our dataset and report the findings in Table 3. Furthermore, we present the regression coefficients along with standard errors. As the inflated model is a logit model, coefficients have to be interpreted as follows: The expected number of ideas/comments/likes changes by exp(Coef.) for each unit increase in the corresponding predictor.

Hypothesis 1, assuming a positive relationship between intrinsic motivation and participation quantity, finds empirical support in this study. Intrinsic motivation positively relates to idea sharing, commenting, and evaluating. Consequently, the positive effect of feeling fun and enjoyment holds for all models. Hypothesis 2 on the positive relationship between identified regulation and participation quantity is not confirmed by the study's findings. Identified regulation does not significantly relate to the number of ideas. However, model 2 indicates that the more users are motivated by identified regulation, the fewer comments they share. Identified regulation further has a negative effect of the number of likes/dislikes, however, to the 10% significance level. Consequently, results on the negative influence of identified regulation on the number of comments and the number of likes/dislikes contradict the relationship hypothesized in Hypothesis 2.

Hypothesis 3 on introjected regulation is not confirmed by the findings. Contrary to the relationship assumed, introjected regulation is negatively related to the number of ideas, comments, likes, and dislikes. In terms of number of ideas, however, the coefficient is significant only to the 10% level. Finally, Hypothesis 4 on the effect of external regulation is confirmed in terms of idea sharing. Accordingly, the results indicate that the more individuals are motivated by external regulation such as external pressure or rewards, the fewer ideas they share. However, external regulation is not significantly related to the number of comments posted. In addition, and contrary to the assumed relationship, external regulation positively affects the number of likes and dislikes. The more individuals are motivated by external regulation, the more they evaluate ideas by pressing the like/dislike button.

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Table 3. Regression analysis

Dependent	(1) Number of ideas				(2) Number of comments/responses				(3) Number of likes/dislikes			
			95% Wald confidence interval				95% Wald confidence interval				95% Wald confidence interval	
	Coef.	SE	Lower	Upper	Coef.	SE	Lower	Upper	Coef	SE	Lower	Upper
Predictors												
External regulation	−0.576***	0.121	−0.81	−0.34	0.104	0.072	−0.04	0.24	0.19***	0.022	0.147	0.232
Introjected regulation	−0.111+	0.059	−0.23	0.01	−0.089*	0.042	−0.17	−0.01	−0.125***	0.020	−0.165	−0.085
Identified regulation	−0.081	0.067	−0.21	0.05	−0.343***	0.040	−0.42	−0.27	−0.04+	0.022	−0.083	0.003
Intrinsic motivation	0.194***	0.052	0.09	0.30	0.271***	0.042	0.19	0.36	0.243***	0.018	0.209	0.278
Control Variables												
Age (ref. 30–59)												
below 30	−0.553*	0.251	−1.04	−0.06	−1.02***	0.159	−1.33	−0.71	0.278***	0.051	0.179	0.378
60 and older	−0.153	0.288	−0.72	0.41	−1.38***	0.258	−1.88	−0.87	0.11	0.098	−0.082	0.301
Gender (ref. female)	−0.077	0.168	−0.41	0.25	−0.168+	0.098	−0.36	0.02	−0.50***	0.047	−0.589	−0.406
Platform experience	0.661**	0.202	0.27	1.06	0.278*	0.115	0.05	0.50	0.54***	0.046	0.445	0.627
Constant	1.898***	0.462	0.99	2.80	3.304***	0.371	2.58	4.03	2.656***	0.164	2.335	2.978
Model fit												
Log likelihood	−190.170				−475.222				−1736.97			
Wald Chi²	42.33***				235.89***				941.42***			
z	1.76*				2.49*				2.38**			
Observations	73				73				73			

Notes: Zero–inflated Poisson regression. Inflation model: logit. On the basis of post hoc Vuong and LR tests, results from the zip model should be interpreted. The significance levels are indicated as follows: +P < 0.10, *P < 0.05, **P < 0.01, and ***P < 0.001. The number of likes and dislikes were also tested independently and similar patterns could be confirmed.

5. Discussion and implications

5.1. Key insights

This study sheds light on citizen participation in a local open government initiative and examines the motivational determinants of citizens' participation quantity. We drew on SDT to explain different levels of platform quantity and tested our hypotheses by conducting a survey among platform users and using behavioral usage platform data. Findings indicate several salient results.

First, participation quantity in open government is intrinsically motivated. Intrinsic motivation plays a significant role in all forms of platform participation, from producing content like sharing ideas or comments to evaluating platform content by liking or disliking ideas. Similar to research on participation in open innovation (Lakhani and Wolf, 2005) and open government (Mergel and Desouza, 2013; Wijnhoven et al., 2015), enjoyment and fun seem to drive individuals' knowledge generation in collaborative projects. Consequently, participation quantity in the open government context might be a matter of intangible rewards.

Second, identified regulation is negatively related to platform quantity. Although survey participants might identify with the initiative's goals and thus have registered on the idea platform, findings indicate that identification does not determine the extent with which they provide feedback to others. Contrary to our assumption, participation intensity is thus not associated with identified regulation, rather identified-regulated users seem to value the participation in the initiative per se.

Third, introjected regulation is negatively associated with the number of comments and likes/dislikes. Introjected-regulated individuals want to demonstrate their knowledge to other users. In terms of evaluating by pressing the like/dislike button, the negative relationship can be explained by the anonymous feedback process. It is not possible to identify the users liking or disliking a contribution. However, in terms of commenting, the author of the comment can be identified by his or her user name. We can conclude that boosting self-esteem might play a minor role among the study's participants, and the feeling of being 'a good citizen' might not be associated with knowledge sharing in this case.

Finally, external regulation has a positive and negative effect on participation quantity. On the one hand, the negative effect of external regulation on the number of ideas posted is in line with previous studies arguing that idea sharing is difficult to motivate through material rewards and external pressure (Frey, 1993; Gagné, 2009). On the other hand, external regulation positively relates to evaluation behavior. Accordingly, external-regulated individuals press the like/dislike button more frequently. Next to idea posting, evaluating others' contributions by commenting or pressing the like/dislike button qualifies for material rewards. Individuals aiming to collect points might choose the easy way of collecting them through pressing the like/dislike button. Material incentives might thus be less efficient at increasing users' idea sharing but, nevertheless, stimulate the community's online engagement.

Concluding, this study's findings demonstrate that participation quantity varies across different types of motivation. For example, intrinsic motivation plays a significant role in idea sharing, whereas identified regulation has no significant effect on the number of ideas shared. In addition, the strength and direction of the effect of motivation types depends on the form of participation. Whereas, extrinsic regulation is negatively associated with idea sharing, it is positively related to evaluation behavior. Consequently, we do not only have to differentiate between types of motivation but also have to distinguish between the forms of participation.

5.2. Implications for research

Our study contributes to the growing literature on open government by focusing on participants of a collaborative urban planning project. We advance pertinent theoretical arguments and provide empirical evidence of externals' willingness to contribute to the city's future. In more detail, we investigate the motivations of those citizens having responded to a call for participation and their relation to platform behavior by combining two data sources (i.e., subjective survey data and objective platform data). By drawing on SDT literature, we identified self-determination as an antecedent of individual participation quantity. The intrinsic motivation of platform users fosters knowledge sharing and interactions with other users, whereas identified-regulated individuals do not engage in online discussion. Introjected regulation hinders individuals' active engagement in idea generation and evaluation. External regulation is negatively associated with knowledge sharing but positively relates to idea evaluation. We conclude that the conventional intrinsic–extrinsic dichotomy may insufficiently account for user participation in open government. Instead, a multidimensional conceptualization of motivation seems better suited to cover varying degrees of autonomy in individual behavior.

In addition, we extend the open innovation literature by engaging public administration and social innovation as specific contexts for open approaches to innovation (Chesbrough and Bogers, 2014; Chesbrough and Di Minin, 2014). While the majority of open innovation research has focused on firms as catalysts of value creation (e.g., Piller and Walcher, 2006; West and Bogers, 2014), this study sheds light on open innovation in the public sector and investigates ICT-enabled knowledge transfer between government and citizens to accelerate social innovation (Bekkers et al., 2013; Voorberg et al., 2015). Participative decision-making and open collaboration can contribute to societal impact, as modern technology enables knowledge sharing among a large group of individuals (e.g., citizens). This research contributes by demonstrating how social innovation can create impact. The study's findings indicate that platform users enjoy assisting local government in urban planning and share their knowledge out of free will and a sense of choice with the local government and the online community alike. Consequently, the platform does not only organize ideas and collect feedback from citizens and thus support information processing, it also creates new relationships among online citizens and local government. Platform users collaborate with local government in evaluating contributions and finding solutions of high public service quality. For evaluating purposes only, users are motivated by external stimuli such as material rewards. This study concludes that there is great potential for open innovation in the public sector. Leveraging collective intelligence of previously untapped problem solvers might help to succeed in social innovation and solve complex social and political problems.

5.3. Practical implications

Our research provides important insights for practice, as it offers lessons for public organizations on how to design initiatives to increase citizens' participation quantity. Numerous public organizations promote open government initiatives by offering prospective users' the chance to win material rewards. Although our research shows that such rewards may not have a positive impact on idea sharing behavior, rewards seem to positively influence citizens' engagement in evaluating others' ideas. Consequently, if public managers aim to increase platform interaction among users, they would be well advised to implement reward systems.

In contrast, external regulation negatively influences the number of ideas users post on the platform.

Thus, if public innovation managers aim to stimulate idea-sharing behavior, they have to create conditions for participation that allow users to motivate themselves. In line with the study's findings, idea sharing corresponds with self-determined behavior, which means that individuals themselves decide how many ideas they share on the platform. Consequently, it seems imperative for public managers to invigorate the idea generation process with fun and enjoyment. For example, users' feelings of fun and enjoyment could be enhanced by including more elements of gamification and developing an attention management strategy.

5.4. Limitations and future research

While our study has focused on the quantity of participation, it neglects the quality of users' input. Future research should study how different types of motivation influence the kind and quality of users' contributions. Our empirical sample is restricted to a single initiative, an ideation platform created by the city of Linz. As the platform design, type of initiative and tasks can influence users' motivation (e.g., Battistella and Nonino, 2012), a multiple-case study approach could provide more detailed findings in this regard. Cultural differences, political systems, the general economic climate as well as previous activities by the local government in communicating with its citizens could influence the results. Comparing these differences across various contexts would be a fascinating aim for future studies.

There are further avenues for future research. First, there is a rather large unexplained variance in our results. Future investigations may want to combine SDT with other theoretical frameworks such as theory of planned behavior (Ajzen, 1991), goal setting theory (e.g., Locke and Latham, 2006), personal values (e.g., Bolzani and Foo, 2018), or theory of job design (Hackman and Oldham, 1980) to better understand citizen participation in open government platforms. Second, this analysis indicates that types of motivation are related to varying levels of platform activity. Whereas, investigating the link between motivation and platform quantity is important to draw conclusion about how to increase users' platform behavior, future research is recommended to explore the outcomes of an open government initiative for both citizens and local government. Investigating the outcomes and the impact of participative decision-making and collaborative innovation would contribute to research of open innovation and social innovation alike.

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