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Exploring the Motives of Citizen Reporting Engagement: Self-Concern and Other-Orientation

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Abstract In smart city contexts, voluntary citizen reporting can be a particularly valuable source of information for local authorities. A key question in this regard is what motivates citizens to contribute their data. Drawing on motivation research in social psychology, the paper examines the question of whether self-concern or other-orientation is a stronger driver of citizen reporting engagement. To test their hypotheses, the authors rely on a sample of users from the mobile application "Zurich as good as new" in Switzerland, which enables citizens to report damages in and other issues with the city's infrastructure. Data was collected from two different sources: motivation was assessed in an online user survey (n = 650), whereas citizen reporting engagement was measured by the number of reports per user from real platform-use data. The analysis was carried out using negative binomial regression. The findings suggest that both self-concern and other-orientation are significant drivers of citizen reporting engagement, although the effect of self-concern appears to be stronger in comparison. As such, this study contributes to a better understanding of what motivates citizens to participate in citizen reporting platforms, which are a cornerstone application in many smart cities.

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1 Introduction

Citizen reporting is a relatively new phenomenon of Internet-based interaction between governments and citizens. It is enabled by the digitalization of governmental information systems and Web 2.0 technologies (Nam 2012). Such reporting applications allow citizens to efficiently share knowledge that is relevant to governmental services via a web-based or mobile platform by means of information and communications technology (ICT). They are predominantly used to report infrastructure issues at certain locations using geolocation technology (de Reuver et al. 2013). Thus, in the context of smart cities, citizen reporting is of special interest because local governments require a multitude of data sources to enhance or expand their services in "smart" ways. Citizens who voluntarily provide information can in turn be particularly valuable sources of data since most public services are eventually geared to them and to creating public value (Bryson et al. 2014). Therefore, it is no surprise that a number of scholars have started scrutinizing this phenomenon.

However, while many of the publications on citizen reporting focus on classifying and structuring the concept as such (e.g., Linders 2012; Nam 2012) or on how the respective applications should ideally be designed (e.g., de Reuver et al. 2013; Lönn et al. 2016), to date, little is known about what motivates citizens to voluntarily engage in citizen reporting activities. In particular, with a few exceptions such as the study by Wijnhoven et al. (2015), there is a lack of empirical studies looking at what drives

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platform users to devote time and resources to support governments by means of their reporting. Wijnhoven et al. (2015) empirically examined various motivational factors and demographic variables as correlates of individuals' willingness to participate in citizen reporting to governments, transferring research insights from the free/libre open source software communities to the citizen reporting context. While they provide some interesting insights into motivational antecedents of citizen reporting, such as that fun and the opportunity to learn are relevant facets and that demographic factors do not appear to have any effects, the participants of the study did not actually participate in citizen reporting initiatives but only indicated their hypothetical willingness to do so. Thus, the validity of their findings in real-world settings which involve actual behavior remains somewhat questionable.

To our knowledge, no empirical studies that rely on actual use data, as opposed to merely users' intention to use, have been published thus far. Actual use, however, is a central indicator of success in any information system (Legris et al. 2003) and therefore the lack of citizen reporting studies with this focus presents a crucial gap in research. Our study is intended to fill this gap by examining actual participation in the FixMyStreet-based citizen reporting initiative "Zueri wie neu" (ZWN, translation: "Zurich as good as new") in Switzerland, which enables citizens to report damages in and other issues with the city's infrastructure. To this end, and expanding the findings by Wijnhoven et al. (2015), we draw on motivation research in social psychology and public management and examine the question of whether it is self-concern or other-orientation that is a stronger driver of citizen reporting engagement. Self-concern may be understood as the tendency to base one's behavior on the desire to protect and improve one's self-interest, whereas other-orientation is geared towards the needs and interests of others, highlighting the importance to take care of the weak and poor (De Dreu and Nauta 2009).

To test our two hypotheses (postulating that both self-concern and other-orientation are positively associated with citizen reporting engagement, although possibly to varying degrees), we relied on a sample of ZWN users (n = 650). Data was collected from two different sources: motivation was assessed in an online user survey, whereas citizen reporting engagement was measured by the number of reports that a user had filed on the platform. The analysis was carried out using negative binomial regression. Our findings suggest that both self-concern and other-orientation are significant drivers of citizen reporting engagement, although the effect of self-concern appears to be stronger in comparison.

As such, this study contributes to a better understanding of what motivates citizens to engage in citizen reporting platforms, which are a cornerstone application in many smart cities. It sheds light on the question of the relative importance of both intrinsic and prosocial motives (focused on other-orientation) and extrinsic motives (focused on self-concern) in citizen sourcing contexts, which has been subject of theoretical debate (Schmidthuber and Hilgers 2017). Furthermore, this study's findings may provide information for the design and advertisement of existing and future citizen reporting initiatives, helping public sector practitioners to maximize the number of platform contributors by motivating citizens appropriately. At the societal level, this may lead to more efficient and effective public services for citizens and consequently to an increase in public value (Bryson et al. 2014) in the long run.

The remainder of this study is structured as follows: the following section contains a review of relevant literature on the motives behind citizen reporting engagement, focusing on the roles of self-concern or other-orientation. We then present in depth our hypotheses derived from theory before proceeding to an outline of the analytical methods we used. We continue with our data analysis and a presentation of the results. The final section presents the discussion and conclusions of our work.

2 Literature Review

2.1 Citizen Sourcing and Citizen Reporting

In the literature, citizen reporting is considered to be one of three sub-categories of citizen sourcing (Linders 2012). The goal for governments behind citizen sourcing, in turn, is to co-produce knowledge with citizens. The term is often used synonymously with eParticipation or mobile participation (de Reuver et al. 2013). The co-production perspective differs from the perspective of New Public Management, where citizens are treated as customers (Bryson et al. 2014). In citizen sourcing, the government remains fully responsible for its activities, but citizens improve the situational awareness by providing information (Linders 2012). Furthermore, citizen sourcing includes citizen activities such as executing governmental services or engaging in public innovation processes (Hilgers and Ihl 2010). Therefore, and in line with Lönn et al. (2016), we see citizen sourcing as a kind of crowdsourcing application for the public sector.

Citizen sourcing has its rootsin three different phenomena (Nam 2012). First, new technologies of the Web 2.0 allow citizens to communicate with governments with minimal transaction costs (Bächle 2008). Second, the success of the decentralized and distributed development of products and contents in the private sector by means of open source, open innovation and crowdsourcing have

inspired governmental actors to also incorporate such methods (Chesbrough and Crowther 2006; Leimeister 2010; Haller et al. 2011; Hammon and Hippner 2012). Third, former US-president Obama's top-down approach has facilitated open government by prioritizing the participation of and collaboration with citizens (Obama 2009).

In their recently published review of literature, Schmidthuber and Hilgers (2017) analyze the most frequently cited articles on citizen sourcing. In line with Lönn et al. (2016), they find that various authors of citizen sourcing literature put forward different frameworks to distinguish various different citizen sourcing initiatives. Most authors agree, however, to subsume citizen applications used to report issues to the government under the umbrella term of citizen sourcing (e.g., Hilgers and Ihl 2010; Linders 2012; Schmidthuber and Hilgers 2017). Most of these studies mention the application 'FixMyStreet' through which citizens can report issues regarding a city's infrastructure to a local government. The case under research in our study is a FixMyStreet application called "Zueri wie neu"/ZWN used in the city of Zurich in Switzerland.

In line with Linders (2012), we regard citizen reporting as one of the three sub-categories of citizen sourcing. According to this differentiation, citizen reporting comprises both service monitoring by citizens and efficiently sharing knowledge about governmental services via a web-based platform. Often, these platforms allow for anonymous reporting, which encourages people who might otherwise be put off from contacting the government directly. This can be of particular relevance when reporting crime (e.g., violence or tax fraud). The other two sub-categories of citizen sourcing are service design (citizens provide ideas and consult the government) and service delivery (citizens execute governmental services). The present research, however, is concerned with citizen reporting only.

2.2 Motivation to Contribute

For governments, it is important to know the motives behind citizen engagement because citizen reporting is voluntary and consequently works beyond organizational boundaries. This refers to the fact that citizens are not obliged to participate, especially not through organizational bonds (social or legal) (Kube et al. 2015; Schmidthuber and Hilgers 2017). Motivational reasons are usually considered as either intrinsic or extrinsic (Deci and Ryan 1985). Extrinsic motivation is the driver behind actions from which a person expects a personal benefit. In contrast, an intrinsically motivated person acts out of an inherent interest in a certain phenomenon of for the joy derived from performing an action (Von Krogh et al. 2012). This distinction holds for human actions in general,

including other voluntary web-based activities such as open innovation, crowdsourcing, open content, and open source communities (e.g., Hars and Ou 2001; Franke and Shah 2003; Hertel et al. 2003; Von Krogh et al. 2012).

The concepts of intrinsic and extrinsic motivation have been used not only to investigate motivations in open source software development, but also in research on open content communities, social question & answer (Q&A) systems, and even citizen reporting (Sun et al. 2012; Wijnhoven et al. 2015; Choi and Yi 2015). According to this research, usually both motivational dimensions are responsible for human action to varying degrees (Von Krogh et al. 2012; see also Neumann 2016).

In this study, we therefore scrutinize both intrinsic and extrinsic factors as antecedents of citizen reporting engagement. More specifically, we draw on motivation research in social psychology and distinguish between other-orientation, which is an intrinsic and prosocial motive, and self-concern, which is an extrinsic motive (Bolino and Grant 2016). Self-concern may furthermore be understood as the tendency to base one's behavior on the desire to protect and improve one's self-interest, whereas other-orientation is geared towards the needs and interests of others, highlighting the importance to take care of the weak and poor (De Dreu and Nauta 2009).

3 Theory and Hypotheses

Citizens can be motivated to participate in citizen reporting either because they expect to benefit from their actions, for instance if the government settles an issue they previously reported because it personally annoyed them. In this case, citizens are mainly self-concerned. If, however, they report infrastructure issues because they want to help others, other-orientation is considered to be dominant.

In the literature on motivation in open source communities, the first concept is known as "own-use". Raymond first introduced this idea by explaining how developers solve problems and contribute to open source projects because they are "scratching an itch" (Raymond 2001). By fixing bugs and adding new features to the software, they benefit from their work themselves. Frequently, such an own-use motivation is the initial reason to start contributing to an open source project, but in the long run intrinsic motives such as fun and enjoyment become relevant (Shah 2006).

In open source literature, the second concept, other-orientation, manifests itself either as altruism or kinship (Von Krogh et al. 2012). Altruism is usually characterized as follows: "(a) it is an end in itself; it is not directed at gain, (b) is emitted voluntarily, and (c) does good" (Heider 1958 in Krebs 1970, pp 259). Such altruistic behavior is

caused by prosocial motives (Lindenberg 2001), leading programmers to contribute to open source projects with the goal of helping others. This was empirically observed in various studies of open source communities (Hars and Ou 2001; Hemetsberger 2002; Wu et al. 2007). The second form of other-orientation is kinship – belonging to a group. It was found in several studies on open source contributors who participated because they felt they were part of a group (Hemetsberger 2002; Lakhani and Wolf 2003; Zeitlyn 2003).

A lively debate among psychology and organizational researchers has discussed whether self-concern and other-orientation are one single or two different constructs (Bolino and Grant 2016). Advocates of the existence of only one construct have argued that self-concern and other-orientation are the extremes of a single continuum. The debate was resolved when De Dreu and Nauta (2009) empirically demonstrated that self-concern and other-orientation are two different constructs that may, however, occur at the same time (see also Neumann 2017). In the present paper, we adopt the notion that self-concern and other-orientation are two different constructs.

This is also in line with open source communities, where self-concern and other-orientation are among the main drivers behind contributing (Hars and Ou 2001; Wu et al. 2007; Oreg and Nov 2008; Choi and Yi 2015). This leads us to hypotheses H1 and H2:

H1:   Self-concern is positively associated with citizen reporting engagement.
H2:   Other-orientation is positively associated with citizen reporting engagement.

4 Case Selection

To investigate the hypotheses, we have drawn on data from the citizen reporting initiative ZWN in the Swiss city of Zurich. ZWN is a web-based service enabling citizens to report damages in and issues with the city infrastructure such as litter, graffiti, potholes, and broken street lights. In addition to the web-based application, citizens can also report their issue via a mobile app. Reports consist of a description of the issue and localization on the map. Photographs can be added to provide additional clarification. Within 1 day, the report will be validated and assigned to the responsible city department. Within 5 working days, the department will reply to the issue by posting a publicly visible response on the platform.

ZWN is a representative citizen reporting application for two reasons: first, ZWN is based on FixMyStreet, a widely used open source platform for citizen reporting. It has been developed continuously since 2007 by the UK non-profit

organization mySociety. In the UK, over 1.3 million reports have since then been published by citizens on http://www.fixmystreet.com. FixMyStreet is also used in several other countries such as Sweden, France, Australia, Malaysia, and India. Thus, it works in numerous languages and is accepted in different cultures. In addition, ZWN is not a new application, but a mature and stable platform which has been running in the city of Zurich since 2013 with over 12,000 issues reported by citizens. Moreover, the rate of reports is steadily increasing because the city government has decided to operate the platform as a regular city service.

5 Methods

5.1 Sample and Data Collection

Data was obtained from two different sources. The independent variables, first and foremost the motivational constructs, the demographic variables, and the other control variables, were measured in an online survey, whereas the dependent variable, the number of reports that a user has filed, was taken directly from the platform's database. This procedure allowed us to avoid common method bias (Podsakoff et al. 2003). The online survey was sent to all 2613 users of ZWN who were active with the period from June 2013 to July 2016. Overall, 728 questionnaires were returned of which 650 were fully completed. To guarantee the anonymity of the ZWN users, the city of Zurich sent out the survey to all participants from their email server. Subsequently, they provided us with a list of anonymous user IDs, which allowed us to match the answers of the survey respondents with their actual use data, which we extracted from the ZWN database.

To add a qualitative component to our analyses, we coded the reports of the survey participants according to their quality. Quality was assessed by five coders based on three ratings: (1) comprehensibility of the report; (2) amount of information; (3) photograph attached.

5.2 Measures

5.2.1 Independent Variables

The items measuring the independent variables of other-orientation and self-concern (Table 1) were taken from Wu et al. (2007) and measured on a 7-point Likert Scale. Each construct was measured using two items. We used two differently worded statements measuring the same construct to ensure measurement reliability and validity. We would have preferred to use a broader range of items in the survey to measure the motivational facets, ideally four to

Table 1 Items on other-orientation and self-concern

Other-orientation_1 (Wu et al. 2007)	Bei "Züri wie neu" habe ich mitgemacht, da ich der Bevölkerung helfen konnte
	I took part in "Züri wie neu" because I could help society by doing so
Other-orientatiton_2 (Wu et al. 2007)	Bei "Züri wie neu" habe ich mitgemacht, da es mir die Möglichkeit gab, andern zu helfen
	I took part in "Züri wie neu" because it gave me the opportunity to help others
Self-concern_1 (Wu et al. 2007)	Bei "Züri wie neu" habe ich mitgemacht, da ich Probleme melden konnte, die mich selber betreffen
	I took part in "Züri wie neu" because I could report problems that concerned me personally
Self-concern_2 (Wu et al. 2007)	Bei "Züri wie neu" habe ich mitgemacht, da ich Probleme melden konnte, die mich bei der Erfüllung meiner Bedürfnisse gehindert haben
	I took part in "Züri wie neu" because I could report problems that prevented me from fulfilling my needs

The survey included other items not relevant for this study, relating to the following constructs: user satisfaction, net benefits, public service motivation, fun, ease of use, reciprocity and ideology

five (Hinkin et al. 1997). Unfortunately this was not possible due to survey length constraints. However, note that two-item and even single-item measures are not uncommon, for instance for job satisfaction (Nyberg 2010), moral commitment and IS misuse intention (D'Arcy et al. 2009), and job goal specificity and importance (Wright 2007). Since the survey was conducted in German, Table 1 is supplemented with the English translations of the original statements.

A pretest and a pilot test were conducted in order to eliminate possible ambiguities of the online survey. Three experts in the field of public management were invited to assess the questionnaire. Additionally, a pilot test involving 20 participants was conducted. Comments from the participants of the pilot and the pretest led to minor revisions. Table 1 presents the revised items.

5.2.2 Dependent Variable

Citizen reporting engagement, measured by the number of reports that a user has filed on the platform, was based on actual-use data from the platform database. These numbers were matched with the answers from the survey. Relying on actual-use data from objective sources (e.g., database, log files, etc.) instead of self-reported use data increases the validity of the conclusions. Frequent users of an application often tend to self-report their use as too low, while people who use applications only rarely tend to overestimate their use (Petter et al. 2008).

5.2.3 Control Variables

5.2.3.1 Time Since First Report
Since taking the raw number of reports of a user would not adequately account for the time that has passed since a user has first used the platform (e.g., users who filed their first report last week

versus 3 years ago), we decided to include a time component in our regression model. To differentiate between old and new users, this variable controls for the time (in months) since the first report of a given user.

5.2.3.2 Socio-economic Factors
In Switzerland, men have a higher rate of Internet use compared to women (Federal Statistical Office Switzerland 2016). This is in line with research on the digital divide (Ferro et al. 2011). In open source communities, this fact is referred to as the general gender gap in information technology (Ghosh et al. 2002).

Research on the digital divide also found a negative correlation between Internet literacy and age (Hargittai 2006; Niehaves and Plattfaut 2014). This correlation also holds for contributors to open content and open source projects (Choi and Yi 2015). Moreover, in Switzerland, the gap in Internet use is even more pronounced when the level of education is taken into account (Federal Statistical Office Switzerland 2016).

Also important are the facts that full-time workers are politically more active and people with higher salaries have greater Internet usage (Brady et al. 1995; Federal Statistical Office Switzerland 2016). In the latter respect, however, a trend towards a lessening of the digital divide has been found (Seifert 2012).

5.2.4 Analytical Method

Since our dependent variable of interest – platform use as measured by the number of reports per user – is count data, a regression of the Poisson family was used (Coxe et al. 2009). More specifically, we chose negative binomial regression over Poisson regression because we detected overdispersion in our dependent variable (Gardner et al.

1995). In order to evaluate the hypotheses, one single model was estimated to analyze the relevant effects.

6 Results

6.1 Exploratory Factor Analysis of Measurement Scales

To assess the factor structure of the measurement constructs of the other-orientation and self-concern variables, we carried out an exploratory factor analysis. Above a threshold of 0.7, factor loadings are commonly considered good, which was the case for all items. The reliability of the multi-item variables was assessed by examining Cronbach's α, where values below 0.5 are unacceptable and values above 0.8 are considered good (Field 2009; Eid et al. 2013). In our study, the analyses of Cronbach's α indicated acceptable reliability (0.632) in the case of self-concern and good reliability (0.837) for other-orientation (Table 2). Thus, we used the measurement scales as indicated in Table 1.

6.2 Preliminary Analysis – Descriptive Statistics

Descriptive statistics show that the mean value of self-concern is higher than the one of other-orientation, based on a 7-point Likert Scale (Table 3).

In Table 4, the column "Swiss population" shows the demographic features of the Swiss population according to the Swiss Federal Statistical Office (2016). These numbers differ considerably from the ones of our ZWN sample (Table 4). We have divided the participants (n = 650) into two categories by means of cluster analysis (using the elbow method and splitting according to the mean both

resulted in the same two categories) based on the number of reports. The first category is best described as *occasional reporters* who participated only once or up to three times (494 participants). The second category is called *frequent reporters* and comprises 156 participants who participated 4 or more times. Table 5 provides a more detailed overview.

Overall, employed people are more active reporters than those not currently in employment (85% vs. 15%; Table 4). People with tertiary education are also more likely to report (69%). Our study shows – as expected – that men are a lot more likely to report than women: 74.8% of the reports came from men and 25.2% from women (Table 4). People aged 30–39 are more likely to participate (27.5%) and are overrepresented compared to their actual share in the Swiss population (14%).

6.3 Regression Analyses and Tests of Hypotheses

According to the results of the negative binomial regression, both self-concern and other-orientation are positively related with the number of reports and these relationships are both statistically significant. The strongest motive for citizen engagement was self-concern ($\beta = 0.140$), followed by other-orientation ($\beta = 0.115$). This means that for each one-unit increase in self-concern, the expected log count of the number of reports per user increases by 0.140, and for each one-unit increase in other-orientation, the expected log count of the number of reports per user increases by 0.115.

Regarding the socio-economic factors, gender ($p < 0.05$) and employment status ($p < 0.05$) are statistically significantly associated with the number of reports (Table 6). Employed people and men contribute to the citizen reporting initiative significantly more frequently. This implies that the motivation to participate in citizen reporting is not equally distributed among all demographic groups.

6.4 Additional Analysis of the Quality of Reports

Although descriptive data visualizations suggest a positive correlation between all four items of self-concern and other-orientation and the quality of reports (Fig. 1), no

Table 2 Exploratory factor analysis

	Component	
	1	2
Rotated component matrix[a]		
Other-orientation_1	0.923	
Other-orientation_2	0.906	
Self-concern_1		0.892
Self-concern_2		0.795
Eigenvalue	2.087	1.135
Cronbach's α	0.837	0.632
Total variance explained	80.55%	

Extraction method: Principal component analysis; Rotation method: Varimax with Kaiser normalization

[a]Rotation converged in 3 iterations

Table 3 Overview of key variables

	Mean	Median
Other-orientation	4.88	5
Self-concern	5.05	5
Number of reports per user	3.9	2

Table 4 Descriptive statistic of all participants compared with the Swiss population

	Count	%	Swiss population (%)
Gender			
Male	486	74.8	49.5
Female	164	25.2	50.5
Not currently employed			
Employed	555	85.3	69.3
Currently not employed/N/A	96	14.7	30.7
Level of education			
Primary level	154	23.9	19.2
Secondary level	46	7.1	48
Tertiary level	445	69.0	32.8
Age group			
Below 20	37	5.7	20.1
20–29	142	21.8	12.7
30–39	179	27.5	14
40–49	156	24.0	14.9
50–59	96	14.7	14.6
More than 60	41	6.3	23.7
Citizen type			
Occasional reporter (1–3)	495	76.0	
Frequent reporter (> 3)	156	24.0	
Citizen of Zurich			
No	122	18.7	
Yes	529	81.3	

evidence for a statistically significant relationship ($p > 0.05$) was found by running a linear regression model. Interrater reliability between the five coders was sufficient with an intraclass correlation coefficient (ICC) of 0.58 according to Koo and Li (2016).

7 Discussion

The aim of this study was to examine to which degree self-concern and other-orientation are related to the number of reports filed by users of a citizen reporting platform. After having laid out the theoretical assumptions on the motivations behind citizen reporting, we empirically investigated two hypotheses based on a sample of users from the citizen reporting initiative ZWN in Switzerland. ZWN is a web-based service allowing citizens in Zurich to report damages in the city infrastructure such as litter, graffiti, potholes, and broken street lights.

Descriptive statistics show that male, middle-aged, well-educated and employed individuals are more active users of this particular citizen reporting initiative. The unequal distribution implies that the reports in citizen reporting do not proportionately represent all societal groups. This finding is of particular importance since co-production between citizens and governments is likely to be based increasingly on digital platforms (Lim et al. 2012). The distribution of the socio-economic characteristics of the participants in our study differs from prior research by Wijnhoven et al. (2015). This difference may be explained by the fact that in Wijnhoven et al. (2015) individuals were asked whether they hypothetically would or would not participate, while our study relied on actual participants.

A subsequent regression analysis showed that self-concern and other-orientation are statistically significantly related to the number of reports of a participant. This is in line with previous research in open source and open content contexts. Interestingly, the interaction between self-concern and other-orientation was not found to be statistically significantly related to the number of reports per user (Table 6). This suggests that the separate effects of these two types of motivation neither reinforce nor diminish one another.

In organizational research, it is often assumed that people with highly pronounced concern both for themselves and for others generate the most persistent contributions to others (Frimer et al. 2012; Grant 2014; Bolino and Grant 2016). Grant (2014) suggests that organizational performance benefits most from people with a high emphasis on both types of motivation at the same time. Therefore, it could be questioned whether our main dependent variable (number of reports per user) does in fact measure contribution to governmental performance or to public value (Bryson et al. 2014): people with high emphasis on one of the two constructs may be too concerned either with their own (respectively with others) interests, causing them not to act in favor of the community other than by reporting the issue at hand.

It would be interesting to examine the reports of people motivated by self-concern and other-orientation in regard to their impact on governmental performance. Our research simply assumed the higher the number of contributions, the better for the government. However, while a high user reporting rate is necessary to keep the system running, not every report is necessarily helpful. Therefore, an examination of whether self-concerned or other-oriented people contribute more reports furthering governmental performance could also be useful. We believe that even the quality of a report does not sufficiently reflect its value for the government or the public (Newcomer 2007).

Our findings lead to three main implications for managers in public administration. First, in order to increase the number of reports per participant, advertising should be focused on people with either a high emphasis on self-concern or on other-orientation. Second, attention should be paid to the influence of socio-economic characteristics

Table 5 Descriptive statistics of citizen type

	Mean self-concern	Mean other-orientation	Citizen type			
			Occasional reporter (1–3)		Frequent reporter (> 3)	
			Count	Column, N %	Count	Column, N %
Gender						
Male	4.97	4.95	361	73.1	125	80.1
Female	5.30	4.67	133	26.9	31	19.9
Age group						
Below 20	4.95	5.11	30	6.1	7	4.5
20–29	5.20	5.10	113	22.8	29	18.6
30–39	4.99	4.79	136	27.5	43	27.6
40–49	4.97	4.78	112	22.6	44	28.2
50–59	5.03	4.73	71	14.3	25	16.0
More than 60	5.20	5.04	33	6.7	8	5.1
Citizen type						
Occasional reporter (1–3)	5.00	4.81	495	100.0	0	0.0
Frequent reporter (> 3)	5.20	5.09	0	0.0	156	100.0
Level of education						
Primary level	4.95	5.18	120	24.5	34	21.8
Secondary level	5.17	4.96	31	6.3	15	9.6
Tertiary level	5.06	4.76	338	69.1	107	68.6
Not currently employed						
Employed	5.02	4.86	423	85.5	132	84.6
Currently not employed	5.23	5.02	72	14.5	24	15.4

on the level of participation and the number of reports per participant in citizen reporting. The ever-increasing digitalization of governments may lead to the exclusion of parts of the population, for instance those who use digital media less or not at all. Regarding citizen reporting initiatives such as ZWN, our findings identify women, older people, not currently employed and less educated people. Third, the willingness to participate does not necessarily correspond to actual participation. This is of particular importance when the launch of a new project is intended to be based on a survey of citizens concerning their willingness to participate.

In addition to the practical implications for public sector managers, this study holds a number of implications both for society and for theoretical debates on the motivations behind citizen sourcing engagement. As for the societal implications, it is often assumed that people do not contribute personal effort to a community if they expect multiple individuals to profit from the effort as well. This problem is called the collective action problem (Olson 1971). The results of our study lead us to the assumption that citizen reporting can reduce the collective action problem for the infrastructure of cities to some degree. Moreover, if citizens can be motivated appropriately to participate in citizen reporting, this new form of

collaboration between governments and citizens can be a valuable tool to enhance the efficiency and effectiveness of public services, consequently leading to an increase in public value (Bryson et al. 2014) – a concept that has received increasing attention in Information Systems research in recent years. Regarding the theoretical implications, our study contributes to the debate on whether intrinsic and prosocial motives (focused on other-orientation) or extrinsic motives (focused on self-concern) are the more important driver of citizen sourcing engagement (Schmidthuber and Hilgers 2017). In line with the notion that individuals usually do not pursue just one single but several motives at the same time (Neumann 2016), we were able to illustrate that both self-concern and other-orientation are important drivers of citizen reporting engagement, although self-concern is indeed a slightly stronger factor.

This study has several strengths and limitations. As for the strengths, first, basing our data collection strategy on two different sources, namely a user survey for the independent variables and actual use data for the dependent variable, allowed us to avoid common method bias (Podsakoff et al. 2003), which often is an issue in social sciences. Second, our sample was relatively large (n = 650), improving the precision of our estimates. Third, our focus

Table 6 Results negative binomial regression

Parameter	β	Std. error	95% Wald confidence interval		Wald Chi square	p value
			Lower	Upper		
Intercept	0.611	0.5450	− 0.457	1.679	1.257	0.262
Other-orientation	0.115	0.0489	0.019	0.211	5.523	0.019*
Self-concern	0.140	0.0507	0.040	0.239	7.603	0.006*
Other-orientation * self-concern	0.037	0.0470	− 0.055	0.129	0.630	0.427
Gender	− 0.379	0.1187	− 0.612	− 0.146	10.199	0.001*
Age	0.008	0.0041	0.000	0.016	3.714	0.054
Not currently employed	− 0.625	0.2217	− 1.059	− 0.190	7.933	0.005*
Level of education	0.037	0.0576	− 0.076	0.150	0.416	0.519
Working hours per week	− 0.011	0.0113	− 0.033	0.011	0.966	0.326
Time since first report	0.048	0.0046	0.039	0.057	106.958	0.000*
Citizen of Zurich	0.352	0.1272	0.103	0.601	7.663	0.006*
Mother tongue	0.125	0.0484	0.030	0.219	6.625	0.010*

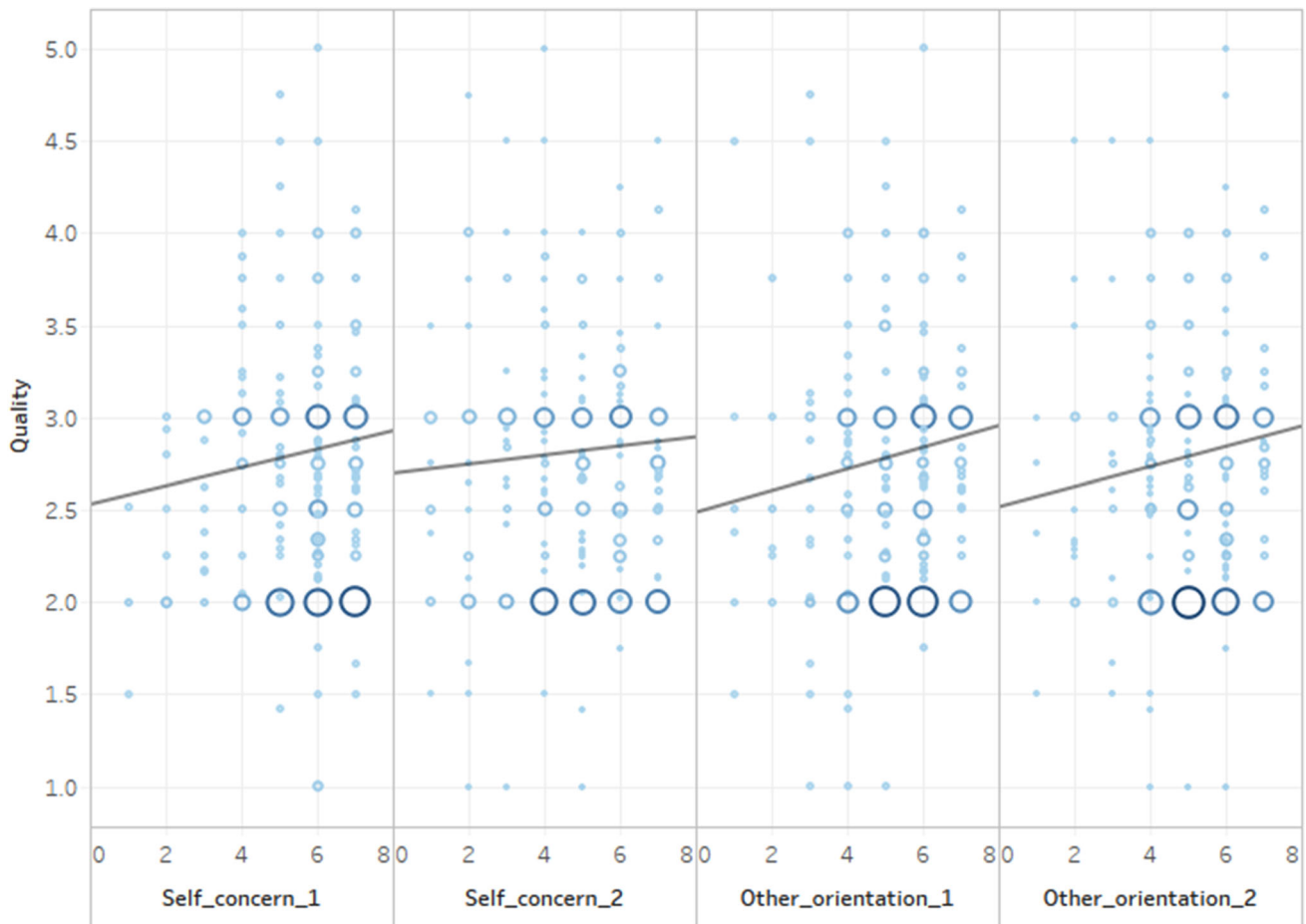DV: number of reports per user

*p < 0.05

Fig. 1 Quality of reports for each item

on actual use data allowed us to correlate the motivational constructs used in this study with actual behavior, as opposed to merely the intention to use the platform, which is not necessarily a robust predictor of actual use. Regarding the limitations, it should be noted that, first, this study relies on cross-sectional survey data which does not allow for definitive statements on the causality of the investigated variable relationships. Second, since our sample was drawn entirely from the application ZWN, the generalizability to other contexts such as other types of citizen sourcing applications, more rural instead of urban areas, or even other countries is questionable. Finally, the operationalization of the motivational constructs of other-orientation and self-concern is somewhat simplistic as it relies on just two items per construct, which could be improved in future studies.

We recommend that future research should, in addition, compare the motivations of users from platforms with different aims of citizen reporting (e.g., damaged infrastructure reporting versus crime reporting). Moreover, the socio-economic characteristics and motivational reasons for participation in various kinds of citizen sourcing other than reporting (consultation, ideation, crowdsourcing, and co-delivery) need to be examined. Another interesting line of inquiry would be to compare socio-economic characteristics and motivational reasons for an initiative similar to ZWN in a city in a developing country. Zurich is one of the most livable cities in the world and, therefore, problems may be less urgent than in cities with a lower quality of living. It would furthermore be worthwhile to investigate how the urgency of problems affects participation in citizen reporting. Finally, although, Schmidthuber et al. (2017) did not find ease of use to be a significant driver of platform activity, it would be interesting to validate this finding with actual use data. We did not incorporate ease of use in this study because the focus of this paper was not on the user's perception of the application, but on the citizens' motives to participate.

8 Conclusion

We conclude that citizen reporting is of great interest to local authorities, especially in smart city contexts. Our study of the ZWN platform in Switzerland indicates that both self-concern and other-orientation motivate citizens to voluntary support government in this way, although self-concern is a slightly stronger driver. However, there are also a number of inherent issues that should be taken into account: actual participation in a citizen reporting project is influenced by socio-economic characteristics; for instance, the average number of reports a participant submits varies by gender. Managers in public administration need to be aware of such correlations. Nevertheless, citizen reporting

can be a valuable tool to support government activities, similar to the way that open innovation and open source are used to support the activities of many businesses and software communities, and it is likely to become increasingly popular in the future.

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