

Crowdsourcing service delivery using mobile apps: perceptions of millennials

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Abstract—The delivery of government services is a known challenge for many African countries. The magnitude of the challenge is heightened even further by an ever more demanding citizenry whose life experiences are steeped in ICT. With the cellphone penetration in Africa nearly reaching the 100% mark and the increasing affordability of smartphones, this research sought to understand the perceptions towards participating using mobile apps in decision-making with government about services delivered among millennials. This is crowdsourcing service delivery. The quantitative results reveal that millennials have a general degree of optimism that service delivery can be improved using mobile apps. The qualitative results confirm the digital inclination of millennials in their trust of mobile apps and expectation of government to go mobile.

Keywords—Crowdsourcing, mobile apps, service delivery, government

I. INTRODUCTION

The millennials represent a generation of individuals born from 1981-to-present [1], and are the fastest growing segment of the global workforce [2]. Millennials share a common experience of a digital and globalised world and have lived in fairly better economic conditions [2]. They are tech savvy, more open to global citizenry, highly individualistic and place more emphasis on quality of life than work ethic [3, 4]. It is considered a demanding group which struggles to delay gratification [2]. To engage with millennials, an emphasis has to be placed on digital content delivered on mobiles, creativity and constant engagement [2].

In this paper, we sought to understand the perceptions about government service delivery by millennials and to understand the millennials attitude towards crowdsourcing service delivery using mobile apps. We adopt the view of crowdsourcing as the ability to source tasks to a crowd of online users [5]. Crowdsourcing is a model that centres on users on the internet to solve tasks at the individual, organizational, and societal level [6]. The crowd of users is not necessarily always paid to participate in tasks and in some instances offers their services for free. The millennials being a generation that has grown in an internet age and are constantly online deserve special attention to understand what for them would appear as normal participation with others in a crowd in government decision-making using mobile apps.

Mobile apps are a piece of software that runs off a mobile platform. From a user perspective, mobile apps are designed to help improve an individual's well-being, lifestyle and to assist in making important decisions. For example for entertainment or even health where users are able measure their sugar level to monitor behavioural changes [7]. There are different apps for different types of mobile phones.

A. Problem statement

Service delivery is a challenge that faces many governments, especially those in developing countries. In South Africa, the millennials also represent a generation that has lived without experiencing much of the government, historical and political challenges that plagued South Africa before the country's first free elections in 1994. The research therefore sought to answer the question: What are the perceptions towards participating using mobile apps in decision-making with government about services among millennials?

The remainder of the paper is structured as follows. The next section briefly reviews the literature on crowdsourcing and service delivery. The research approach used to explore the perceptions is described in the following section. The analysis and discussion of the findings follow. The paper ends with the conclusions and the areas for further research.

II. LITERATURE REVIEW

A. Crowdsourcing

Crowdsourcing is seen as the collective intelligence of a group to solve problems [5]. Pedersen et al [6, p. 579] in reviewing literature on crowdsourcing to come up with its conceptual foundations define crowdsourcing as “a collaboration model enabled by people-centric web technologies to solve individual, organizational, and societal problems using a dynamically formed crowd of interested people who respond to an open call for participation”. From a business and societal perspective, crowdsourcing deserves special attention today as it presents great opportunities for business, individuals and government [8]. For example, business has picked a great interest in crowdsourcing using related concepts such as crowd funding where funds are generated from an open call from masses of people online and across the globe.

Pedersen et al [6] from the holistic review of literature on crowdsourcing identified 6 foundational components of crowdsourcing:

- **Problem:** This represents the statement that reflects the desired outcome. It could be complex as in government service delivery or even simple as in finding an appropriate picture.
- **Process:** These are the sets of actions which the actors in a crowd undertake to achieve the outcome. Many of these tasks resemble collaboration as understood in IS [9]
- **Governance:** These are the actions and means to effectively manage the crowd and steer them in the correct direction
- **Technology:** This is the technology used by the crowd to form and facilitate interaction. For example, mobile apps.
- **People:** There are three types of people in a crowdsourcing engagement; the owner of the problem, the individuals, and the crowd as the group of individuals.
- **Outcome:** This is the final output of the crowdsourcing process

In this paper, the focus was placed on understanding the perceptions of millennials with regards service delivery, discussed in the next section.

B. Service delivery and mobile apps

The demand for faster and more efficient service delivery is growing every year in every government in the world. The increased demand ranges from services such as free and higher levels of education, employment, health, and even a better quality of life. Crowdsourcing changes the meaning of service delivery by radically moving away the traditional views of service delivery which have usually been defined in a top-down approach from government to its citizens. Crowdsourcing redefines the parameters of service delivery by providing for a bottom-up approach, from the citizens to the government.

Regardless of the service delivery approaches, there are five dimensions that are common when dealing with citizens or even customers [10];

- **Tangibles:** This includes the equipment, appearance of service staff, visually appealing materials
- **Empathy :** The degree of caring, individual attention, understanding customer needs

- **Reliability:** The extent to which the service is delivered as promised and free from errors
- **Responsiveness:** The speed with which the service is offered and the help available
- **Assurance (satisfaction):** The extent to which the service is delivered such that the citizen feels confident and safe to interact further

Because of the nature of the millennials in their short attention spans and use of a different set of language, the above dimensions were redefined as follows:

- **Tangibles** were renamed service quality since the design of the interface mobile app represents the tangibles that the millennial will interface with
- **Empathy** was equated to service transparency, the ability for an individual to perceive that his individual needs are being met and is receiving individual attention.
- **Reliability** was renamed into the decision-making processes such that it is efficient and capable of not failing at any moment.
- **Responsiveness** was renamed as service accessibility since mobile apps are often designed to be fast and often are intuitive enough such that help is not required and if required, is easily available.
- **Assurance** was renamed satisfaction as it similarly relates to the ability for customers to feel safe and confident of the service being received.

In the next section, we present the research approach used to understand the millennials with regards government service delivery using mobile apps.

III. RESEARCH APPROACH

The research adopted a quantitative approach as it sought to understand the perceptions of millennials as an independent variable and by creating an abstraction of their views on interacting with government using mobile apps [11]. Data was collected using an online survey created using Forms on Google Drive®. The questions in the survey followed the same dimensions as service delivery in the literature review and adopted a 4 point Lickert scale.

After obtaining voluntary permission to participate in the survey, the date of birth, educational qualifications and employment status of the respondents were requested. They were they asked the following questions:

Crowdsourcing can affect:

- Service quality

- Service transparency
- Decision-making
- Service accessibility
- Customer satisfaction
- *Resource management*
- *Governance*¹

The above questions were answered based on a 4-point Likert scale where 1=Certainly not, 2=Maybe, 3=Sometime and 4=Definitely.

The respondents were then given an opportunity to offer their opinion by finally asking:

- What else do you suggest on how service delivery can be crowdsourced using mobile apps?

The data was collected over a period of 5 days between 25-30 October 2013 from the area surrounding one of the largest residential universities in South Africa in Pretoria. There were 49 respondents in total.

IV. ANALYSIS AND FINDINGS

Of the 49 respondents, the data was cleaned to remove cases of those who did not give their date of birth, and for those who were born before 1981 and for those who answered giving 2013 as the year of birth. This left a convenient sample of 39 respondents.

Crosstabulation as an exploratory data analysis technique was used to understand the results of the survey. Crosstabulation is a basic technique for examining the relationship between two categorical variables.

Thematic analysis was used to elicit themes from the qualitative opinions of the millennials. Thematic analysis searches for themes in qualitative data such as text by connecting similar concepts into established patterns as themes.

A. Service transparency

TABLE 1: SERVICE TRANSPARENCY BY EMPLOYMENT STATUS

Employment_status	A student	Count	Service_transparency				Total
			1=Certainly not	2=Maybe	3=Sometimes	4=Definitely	
A student		Count	1	11	12	2	26
		% within Employment_status	3.8%	42.3%	46.2%	7.7%	100.0%
		% within Service_transparency	25.0%	100.0%	63.2%	40.0%	66.7%
		% of Total	2.6%	28.2%	30.8%	5.1%	66.7%
Employed		Count	3	0	7	3	13
		% within Employment_status	23.1%	0.0%	53.8%	23.1%	100.0%
		% within Service_transparency	75.0%	0.0%	36.8%	60.0%	33.3%
		% of Total	7.7%	0.0%	17.9%	7.7%	33.3%
Total		Count	4	11	19	5	39
		% within Employment_status	10.3%	28.2%	48.7%	12.8%	100.0%
		% within Service_transparency	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	10.3%	28.2%	48.7%	12.8%	100.0%

Table 1 indicates that millennial students are more optimistic than employed millennials about the ability of government to offer undivided attention when interacting with them. Overall, there is a fair degree of optimism about service transparency.

TABLE 2: SERVICE TRANSPARENCY BY EDUCATION

Education	Bachelor's degree	Count	Service_transparency				Total
			1=Certainly not	2=Maybe	3=Sometimes	4=Definitely	
Bachelor's degree		Count	1	2	11	3	17
		% within Education	5.9%	11.8%	64.7%	17.6%	100.0%
		% within Service_transparency	25.0%	18.2%	57.9%	60.0%	43.6%
		% of Total	2.6%	5.1%	28.2%	7.7%	43.6%
Matric		Count	2	7	7	2	18
		% within Education	11.1%	38.9%	38.9%	11.1%	100.0%
		% within Service_transparency	50.0%	63.6%	36.8%	40.0%	46.2%
		% of Total	5.1%	17.9%	17.9%	5.1%	46.2%
Professional degree		Count	1	0	0	0	1
		% within Education	100.0%	0.0%	0.0%	0.0%	100.0%
		% within Service_transparency	25.0%	0.0%	0.0%	0.0%	2.6%
		% of Total	2.6%	0.0%	0.0%	0.0%	2.6%
Some high school		Count	0	2	1	0	3
		% within Education	0.0%	66.7%	33.3%	0.0%	100.0%
		% within Service_transparency	0.0%	18.2%	5.3%	0.0%	7.7%
		% of Total	0.0%	5.1%	2.6%	0.0%	7.7%
Total		Count	4	11	19	5	39
		% within Education	10.3%	28.2%	48.7%	12.8%	100.0%
		% within Service_transparency	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	10.3%	28.2%	48.7%	12.8%	100.0%

Table 2 goes deeper to reveal that while there is a general optimism, millennials with Bachelor's degrees are more optimistic about service transparency.

B. Service quality

TABLE 3: SERVICE QUALITY BY EMPLOYMENT STATUS

Employment_status	A student	Count	Service_quality				Total
			1=Certainly not	2=Maybe	3=Sometimes	4=Definitely	
A student		Count	2	11	7	6	26
		% within Employment_status	7.7%	42.3%	26.9%	23.1%	100.0%
		% within Service_quality	100.0%	68.8%	77.8%	50.0%	66.7%
		% of Total	5.1%	28.2%	17.9%	15.4%	66.7%
Employed		Count	0	5	2	6	13
		% within Employment_status	0.0%	38.5%	15.4%	46.2%	100.0%
		% within Service_quality	0.0%	31.3%	22.2%	50.0%	33.3%
		% of Total	0.0%	12.8%	5.1%	15.4%	33.3%
Total		Count	2	16	9	12	39
		% within Employment_status	5.1%	41.0%	23.1%	30.8%	100.0%
		% within Service_quality	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	41.0%	23.1%	30.8%	100.0%

Table 3 shows that there is ambivalence about the extent to which the mobile app will be appealing.

¹ Resource management and governance were not considered in this research.

TABLE 4: SERVICE QUALITY BY EDUCATION

		Service_quality				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Education	Bachelor's degree	Count	1	4	6	6	17
		% within Education	5.9%	23.5%	35.3%	35.3%	100.0%
		% within Service_quality	50.0%	25.0%	66.7%	50.0%	43.6%
		% of Total	2.6%	10.3%	15.4%	15.4%	43.6%
Matric	Count	0	10	3	5	18	
		% within Education	0.0%	55.6%	16.7%	27.8%	100.0%
		% within Service_quality	0.0%	62.5%	33.3%	41.7%	46.2%
		% of Total	0.0%	25.6%	7.7%	12.8%	46.2%
Professional degree	Count	0	0	0	1	1	
		% within Education	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Service_quality	0.0%	0.0%	0.0%	8.3%	2.6%
		% of Total	0.0%	0.0%	0.0%	2.6%	2.6%
Some high school	Count	1	2	0	0	3	
		% within Education	33.3%	66.7%	0.0%	0.0%	100.0%
		% within Service_quality	50.0%	12.5%	0.0%	0.0%	7.7%
		% of Total	2.6%	5.1%	0.0%	0.0%	7.7%
Total	Count	2	16	9	12	39	
		% within Education	5.1%	41.0%	23.1%	30.8%	100.0%
		% within Service_quality	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	41.0%	23.1%	30.8%	100.0%

Table 4 similarly gives a more revealing picture that matriculants are most ambivalent about service quality.

C. Customer satisfaction

TABLE 5: CUSTOMER SATISFACTION BY EMPLOYMENT STATUS

		Customer_satisfaction				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Employment_status	A student	Count	1	8	8	9	26
		% within Employment_status	3.8%	30.8%	30.8%	34.6%	100.0%
		% within Customer_satisfaction	50.0%	72.7%	57.1%	75.0%	66.7%
		% of Total	2.6%	20.5%	20.5%	23.1%	66.7%
Employed	Count	1	3	6	3	13	
		% within Employment_status	7.7%	23.1%	46.2%	23.1%	100.0%
		% within Customer_satisfaction	50.0%	27.3%	42.9%	25.0%	33.3%
		% of Total	2.6%	7.7%	15.4%	7.7%	33.3%
Total	Count	2	11	14	12	39	
		% within Employment_status	5.1%	28.2%	35.9%	30.8%	100.0%
		% within Customer_satisfaction	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	28.2%	35.9%	30.8%	100.0%

Table 5 shows a higher level of optimism about customer satisfaction if mobile apps were used. The optimism is highest among millennial students.

TABLE 6: CUSTOMER SATISFACTION BY EDUCATION

		Customer_satisfaction				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Education	Bachelor's degree	Count	0	2	7	6	17
		% within Education	0.0%	11.8%	41.2%	47.1%	100.0%
		% within Customer_satisfaction	0.0%	18.2%	50.0%	66.7%	43.6%
		% of Total	0.0%	5.1%	17.9%	20.5%	43.6%
Matric	Count	2	7	6	3	18	
		% within Education	11.1%	38.9%	33.3%	16.7%	100.0%
		% within Customer_satisfaction	100.0%	63.6%	42.9%	25.0%	46.2%
		% of Total	5.1%	17.9%	15.4%	7.7%	46.2%
Professional degree	Count	0	0	0	1	1	
		% within Education	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Customer_satisfaction	0.0%	0.0%	0.0%	8.3%	2.6%
		% of Total	0.0%	0.0%	0.0%	2.6%	2.6%
Some high school	Count	0	2	1	0	3	
		% within Education	0.0%	66.7%	33.3%	0.0%	100.0%
		% within Customer_satisfaction	0.0%	18.2%	7.1%	0.0%	7.7%
		% of Total	0.0%	5.1%	2.6%	0.0%	7.7%
Total	Count	2	11	14	12	39	
		% within Education	5.1%	28.2%	35.9%	30.8%	100.0%
		% within Customer_satisfaction	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	28.2%	35.9%	30.8%	100.0%

Table 6 appears to contradict the student perspective in Table 5 in showing that it is those with Bachelor's degrees

who are mostly optimistic. The perceptions of the matriculants are varied.

D. Decision-making

TABLE 7: DECISION-MAKING BY EMPLOYMENT STATUS

		Decision_making				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Employment_status	A student	Count	1	9	7	9	26
		% within Employment_status	3.8%	34.6%	26.9%	34.6%	100.0%
		% within Decision_making	50.0%	90.0%	63.6%	56.3%	66.7%
		% of Total	2.6%	23.1%	17.9%	23.1%	66.7%
Employed	Count	1	1	4	7	13	
		% within Employment_status	7.7%	7.7%	30.8%	53.8%	100.0%
		% within Decision_making	50.0%	10.0%	36.4%	43.6%	33.3%
		% of Total	2.6%	2.6%	10.3%	17.9%	33.3%
Total	Count	2	10	11	16	39	
		% within Employment_status	5.1%	25.6%	28.2%	41.0%	100.0%
		% within Decision_making	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	25.6%	28.2%	41.0%	100.0%

Table 7 indicates that both students and employed millennials believe that decision-making can be improved and will be free of errors, it also shows a degree of trust in the reliability of mobile apps.

TABLE 8: DECISION-MAKING BY EDUCATION

		Decision_making				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Education	Bachelor's degree	Count	0	3	7	7	17
		% within Education	0.0%	17.6%	41.2%	41.2%	100.0%
		% within Decision_making	0.0%	30.0%	63.6%	43.8%	43.6%
		% of Total	0.0%	7.7%	17.9%	17.9%	43.6%
Matric	Count	2	5	4	7	18	
		% within Education	11.1%	27.8%	22.2%	38.9%	100.0%
		% within Decision_making	100.0%	50.0%	36.4%	43.8%	46.2%
		% of Total	5.1%	12.8%	10.3%	17.9%	46.2%
Professional degree	Count	0	0	0	1	1	
		% within Education	0.0%	0.0%	0.0%	100.0%	100.0%
		% within Decision_making	0.0%	0.0%	0.0%	6.3%	2.6%
		% of Total	0.0%	0.0%	0.0%	2.6%	2.6%
Some high school	Count	0	2	0	1	3	
		% within Education	0.0%	66.7%	0.0%	33.3%	100.0%
		% within Decision_making	0.0%	20.0%	0.0%	6.3%	7.7%
		% of Total	0.0%	5.1%	0.0%	2.6%	7.7%
Total	Count	2	10	11	16	39	
		% within Education	5.1%	25.6%	28.2%	41.0%	100.0%
		% within Decision_making	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	5.1%	25.6%	28.2%	41.0%	100.0%

Table 8 also confirms the trust in mobile apps as being reliable tools to interact with government especially amongst those with Bachelor's degrees.

E. Service accessibility

TABLE 9: SERVICE ACCESSIBILITY BY EMPLOYMENT

		Service_accessibility				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Employment_status	A student	Count	2	7	5	12	26
	% within Employment_status		7.7%	26.9%	19.2%	46.2%	100.0%
	% within Service_accessibility		50.0%	70.0%	50.0%	80.0%	66.7%
	% of Total		5.1%	17.9%	12.8%	30.8%	66.7%
	Employed	Count	2	3	5	3	13
% within Employment_status		15.4%	23.1%	38.5%	23.1%	100.0%	
% within Service_accessibility		50.0%	30.0%	50.0%	20.0%	33.3%	
% of Total		5.1%	7.7%	12.8%	7.7%	33.3%	
Total	Count		4	10	10	15	39
	% within Employment_status		10.3%	25.6%	25.6%	38.5%	100.0%
	% within Service_accessibility		100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total		10.3%	25.6%	25.6%	38.5%	100.0%

Table 9 suggests that millennials especially students believe that mobile apps can provide a fast and efficient service with assistance where required. Those who are employed had varied opinions.

TABLE 10: SERVICE ACCESSIBILITY BY EDUCATION

		Service_accessibility				Total	
		1=Certainly not	2=Maybe	3=Sometimes	4=Definitely		
Education	Bachelor's degree	Count	2	3	5	7	17
	% within Education		11.8%	17.6%	29.4%	41.2%	100.0%
	% within Service_accessibility		50.0%	30.0%	50.0%	46.7%	43.6%
	% of Total		5.1%	7.7%	12.8%	17.9%	43.6%
	Matric	Count	2	6	4	6	18
% within Education		11.1%	33.3%	22.2%	33.3%	100.0%	
% within Service_accessibility		50.0%	60.0%	40.0%	40.0%	46.2%	
% of Total		5.1%	15.4%	10.3%	15.4%	46.2%	
Professional degree	Count		0	0	0	1	1
	% within Education		0.0%	0.0%	0.0%	100.0%	100.0%
	% within Service_accessibility		0.0%	0.0%	0.0%	6.7%	2.6%
	% of Total		0.0%	0.0%	0.0%	2.6%	2.6%
	Some high school	Count		0	1	1	1
% within Education		0.0%	33.3%	33.3%	33.3%	100.0%	
% within Service_accessibility		0.0%	10.0%	10.0%	6.7%	7.7%	
% of Total		0.0%	2.6%	2.6%	2.6%	7.7%	
Total	Count		4	10	10	15	39
	% within Education		10.3%	25.6%	25.6%	38.5%	100.0%
	% within Service_accessibility		100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total		10.3%	25.6%	25.6%	38.5%	100.0%

Table 10 does not confirm the students' optimism with results being more varied.

F. Qualitative opinion

Using thematic analysis, four themes emerged; collaboration (5 times), centralised data (2), advertisement (1) and cost (1). Collaboration and how it can be achieved appeared 5 times as an important opinion. The second importance was that government data would need to be centralised in order to achieve this task. The need to advertise and also provide the mobile app for free appeared only once.

V. CONCLUSIONS

The paper set out to understand the perceptions among millennials about crowdsourcing government service delivery using mobile apps. The results show a general degree of optimism that they would engage with government. In particular, they perceive collaboration as being the key element if mobile apps will be successfully used in government.

The paper makes a contribution to show the optimism and trust that millennials have in mobile apps as a platform to interact with government.

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