Role of Citizens in the Development of Smart Cities: Benefit of Citizen's Feedback for Improving Quality of Service

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Abstract: The initiatives around the involvement of citizens in smart city development is increasing significantly with the aim of enhancing the quality of life for the citizens of these cities through better public services. There is plethora of studies discussing various technologies and platforms to obtain citizen's feedback for smart city development. Nonetheless, there are very limited studies which provide guidance on how to utilise those feedbacks and improve quality of the services in order to provide better experience to the citizens. This paper examines past work regarding different aspects of citizen's involvement in smart cities and classify the existing literature through the lens of a smart city framework. This study offers an overview of diverse concepts and platforms associated with the role of citizens in smart city design and development by featuring possible linkages to the related layers of the adopted framework. This study further proposes a conceptual model to incorporate citizen's feedback in more structured way at architecture level in order to meet their requirements and to provide improved quality of services to them.

1 INTRODUCTION

A smart city needs to be implemented according to the local constraints and opportunities, taking into consideration the diverse culture, requirements, and features of cities in different geographical areas and countries (Dameri et al., 2019). Hollands, (2008) states that if smart cities want to empower social, environmental, economic, and cultural development, then it should not only be based on the use of ICT. There is an ignorance towards the non-technical problems which include management, policies, citizens and creating a void in the field (Habibzadeh et al, 2019; Nam and Pardo, 2011). There is a need to consider urban issues beyond technological innovation (Yigitcanlar et al, 2019). The smart city paradigm seems to have smoothly and generally replaced that of the sustainable city over the decades which is being modified by emerging claims of citizen-centeredness (Lorquet & Pauwels, 2020). In order to make citizen centred smart cities, many initiatives have been taken and one of them is open innovation (ibid). However, such initiatives are mostly used by public sector organisations to change the way citizens behave instead of giving them more influence in public sector processes (Pedersen, 2020). Nakamura and Managi, (2020) argued that citizen satisfaction is an important metric in evaluating city performance as it would ultimately affect the benefit and comfort to city inhabitants. Sustainable city development should not only be based on objective performance data and municipal service evaluations, but also on people's subjective city evaluation and life satisfaction (ibid). Thus, the requirements of the citizens should be considered as a critical component for the development of the successful smart cities (Heaton and Parlikad, 2019). However, these requirements have often been ignored over the technological and strategic development (ibid). Additionally, although the rate of citizen participation is low, but they often provide meaningful comments that have the ability to inform the decision-making process (ibid). Thus, for a smart sustainable city, a sense of community should be incorporated in policy

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making which consider citizen's evaluation on smart sustainable cities, public services and facilities (Macke et al, 2019). Citizens' engagement is a fundamental requisite for the accomplishment of a sustainable and inclusive urban development (Corsini et al, 2019). Thus, a socio-technical perspective is required when organizations embark on smart initiatives in order to address new challenges for enterprises and service providers (Ekman, Röndell, & Yang, 2019; Bednar and Welch, 2019). Moreover, there is a requisite for more suitable tools and protocols to assist greater public participation in the viability stage before stable options are decided in the smart city field (Corsini et al, 2019). Smart cities are already extremely complex System of Systems (SoS), and the emerging trend in urban planning is towards adding smart systems into the urban environment with the aim of improving the quality of life for the citizens of the city (Clement et al, 2017). Pourzolfaghar and Helfert, (2017), emphasise that citizen's requirements should be considered as a client requirement in the design process of the services. It has been further highlighted that the maintenance phase is crucial in delivering qualified and sustainable services to the citizens which has been neglected in majority of the enterprise architecture frameworks (Zachman, DoDAF, FEAF, TEAF, and TOGAF) for smart cities (ibid). In order to address the issue identified in those frameworks, Pourzolfaghar et al., (2019) proposed the 'Smart City Enterprise Architecture Framework' which incorporated two new layers (context layer and service layer). These new layers aimed to capture the viewpoints of different stakeholders including citizens. The aim of this study is also to understand the role of citizens in smart city development and how existing literature support their involvement. Therefore, this study finds the proposed framework suitable for analysing the existing literature from the citizens' viewpoint and to propose future research agenda for the further investigation. Thus, this paper aims to discuss citizen's involvement in smart city development, and provides new insights through the lens of a 'Smart City Enterprise Architecture Framework' proposed by Pourzolfaghar et al , (2019). The detail of this framework is discussed in section 2. The remaining sections of the paper are structured as follows: Section 2 provides the detail of literature review by examining the existing literature from the lens of adapted smart city framework. Section 3 discusses the identified research gap. In Section 4, a case study has been discussed and accordingly in Sec. 5 a conceptual model has been presented to direct the further research in the future. Finally, Sect. 6 summarizes the contributions of the paper and future work of the research.

2 ROLE OF CITIZEN FROM THE LENS OF SMART CITY FRAMEWORK

In this section various platforms and concepts associated with the involvement of citizens in the design and development of smart cities are considered based upon smart city framework proposed by Pourzolfaghar et al., (2019). The motivation for selecting this framework is to understand existing literature from different layer's perspective which support citizens through various platforms and technology in the development of smart cities. This framework would provide a holistic viewpoint by positioning the research about citizen's involvement in different layers (Context, Application, Technology, Service). The framework consists of four layers. First layer is service layer which define appropriate goals, scope, etc. for the services with regard to the smart city requirements, concerns, and priorities. Second layer is a context layer which encapsulates the information regarding the strategies, priorities, stakeholders and their concerns to deliver effective services to the citizens. The third layer is information layer identifying the data elements, the data interrelations, and data flows required to support service function (Minoli, 2008; Pourzolfaghar et al, 2019). The last layer is technology layer which supports the information and application functions from the information layer. The following sections provide insight into the existing literature on the involvement of citizens in the development of smart cities from the lens of these layers.

2.1 Service Layer

This layer defines aim and scope for the services that are related with smart city requirements, concerns, and priorities (Pourzolfaghar et al., 2019). One of the activities of this layer is to define an experience and value proposition that the service is intending to provide. For instance, providing the improved quality of the services to the citizens (ibid). Therefore, in this layer, the emphasis is on considering citizen's feedback to understand the smart city requirements, concerns and priorities from their perspective (ibid). E-participation in the form of providing service feedback has positive impact on the performance of service delivered (Allen et al, 2020). However, it

remains unconvincing whether new government-citizen interface collaboration has achieved the fundamental goal of improving service quality for citizens (ibid). Soft assets such as organizational capital, social capital, and information and knowledge-related capital help to understand citizen's role in order to support building and maintaining the key areas that reinforce Smart City (SC) development (Wataya & Shaw, 2019). These are further linked to the cycle of improving the quality of services and also a prime source of innovative value creation for SC development (Wataya & Shaw, 2019). Citizens can also use mobile Apps to report damages and other issues with the city's infrastructure which can result in providing better quality of services to the citizens (Abu-Tayeh, Neumann & Stuermer, 2018). However, it is possible that we have outstanding performance indicators for the services but if citizens are not satisfied with the delivered services, then it can disappoint them at the end (Sofiyabadi, Kolahi, & Valmohammadi, 2016). Therefore, once actions are implemented, monitoring has to be carried out to determine if the actual impact varies from the anticipated impact in the servcies from the citizen's perespective (Abella et al, 2019). A rich collection of citizen's behaviour data can be helpful in further optimising the services (Solaimani, Bouwman, & Itälä, 2015). E-government systems are more likely to be re-used by the citizens if they recognise that the experience with those new systems are better than the traditional ones (Alruwaie et al, 2020). These system types should be evaluated through citizens' prior experience based on their level of expectations (ibid). However, at present there are very limited studies which provide guidance on how to evaluate such systems based on citizen's quality of experiences. Ballesteros et al (2015) defined Quality of Experience (QoE) from the end user's (citizens) perspective as:

Usability: The usage of a product by identified users to accomplish desired goals with effectiveness, satisfaction and efficiency in a specified context.

Personalization: The capacity to deliver services as per the individual's need based on the analysis of their behaviour and inclinations.

Usefulness: It is associated with the satisfaction or needs of the users and how the functions or features of the product being valued by the users that is available to them.

Transparency: It should be convenient for everyone to recognise what actions are being performed in terms of the operation of the services.

Effectiveness: Users can finish the defined tasks in order to achieve the objectives of the service or product and they should be able to do what they want to do.

These quality factors could be useful in understanding the citizen's requirements in a better way which would result in improved QoS.

2.2 Context Layer

This layer captures the smart city context information about strategies, priorities, stakeholders and their concerns to deliver effective services to the citizens (Pourzolfaghar et al., 2019). From this layer's perspective smart city initiatives focus on the strategies, and priorities from the citizen's viewpoint (ibid). Linders et al, (2018), highlighted that there is a requirement to flip the service delivery model by shifting from the "pull" approach of traditional e-government towards a "push" model. Through this model government proactively and impeccably delivers just-in-time services to citizens designed around their specific needs, circumstance, preferences, and location (ibid). Four governance paradigms have been introduced i.e. bureaucratic, consumerist, participatory and platform to categorize the citizen- administration relationships (Janowski, 2018). These models facilitate a better understanding of governance arrangements resulting from visualization, simulation and analysis; which could additionally lead to better sustainable development (ibid). Nevertheless, an evolving problem is that there is a lack of appropriate tools to support citizens in many parts of co- design process (Wolff et al, 2020). A set of design templates have been introduced to enable citizens in converting their ideas into technology applications which can be used during the design process (ibid). These types of methods and tools certainly assist in obtaining citizen's ideas and their inputs for designing the services. However, there is a lack of understanding on how these ideas are to be implemented in the actual design of services and if those ideas really have any impact in improving the quality of the services. Cellina et al., (2020), proposed a framework where the key application functionalities were co-designed with a group of interested citizens which resulted in even more significant impacts in terms of urban governance practices. Vidiasova & Cronemberger, (2020) identified different levels of understanding regarding how citizens identify the smart city initiatives; Although many respondents were direct and elaborated on many aspects of a smart city, their understanding remains diffused and vague despite high levels of engagement with traditional e-government technologies (Vidiasova & Cronemberger, 2020). Major public resources are

invested in technical solutions, but the appropriate means of assessing success (social value) is still unclear or remain uncultivated in light of the expectations of citizens (ibid). When it comes to engagement, social media and online communication have transformed the way citizens engage in all aspects of lives from shopping and education, to how communities are planned and urbanised, and therefore governments need new ways to listen to its citizens (Alizadeh et al, 2019). De Guimarães *et al.*, (2020), identified multiple strategic drivers and can help smart city rulers in the development of public policies and to improve QoL, such as Transparency (TRANS), Collaboration (CO), Participation and Partnership (PP), Accountability (ACC), and Communication (COM).

In order to obtain user value, the smart city governance should work closely with citizens and diverse stakeholders to identify the set of services by prioritising citizen's requirements for a long term city transformation that can fast-track smart city development (Kumar et al, 2019). However, current standards, guidance and specifications have little focus on the requirements of the citizens within a Smart City framework (Heaton & Parlikad, 2019). To address this issue, Heaton & Parlikad, (2019) proposed a framework which offers a direct line-of-sight from citizen requirements, the infrastructure assets supporting used services, and the services used within the city to meet that requirements, and then validating if citizen requirements have been fulfilled. Satisfaction surveys can be used as the product of strategic planning (evaluation of the strategy success) and secondly as the input to strategic planning (problem issues should be dealt with in strategy) which are vital for the public policy planning (Kopackova, 2019). The rise of platform technologies such as social media, IoT, and data analytics has the potential to fundamentally change the role of transparency in policy making (Brunswicker et al, 2019). It is further highlighted that citizens as participants in policy making, move to the centre of the discourse on transparency, and their opinions, challenges, and responses to policies and policy-related information come to be observable, sharable and interpretable (ibid). In order to optimize citizen's participation outcomes, platform administrators might consider either increasing private value perceived by the citizen or public value where private value has a greater effect on continuous e-participation intentions than public value creation (Ju et al, 2019). There is a requirement for cities to involve non-traditional stakeholders in urban planning processes such as social change initiatives, citizen groups and informal sector representatives (Schröder et al., 2019). Andreani *et al.*, (2019) presented a reference model in relation to citizen-centred built environments, in the process of co-creating the proposals by sharing a common design path between public authorities, private citizens, associations at different levels, and research centres, and resulting in engaging the local community in creating and providing feedback to the design proposals (Andreani et al., 2019).

2.3 Information Layer

This layer identifies the data elements, data flows, and the interrelations between data required to support service function (Pourzolfaghar et al., 2019). This layer plays a vital role in identifying the data that has originated from the citizen's side and how does it further support any function of the service. For instance, data collected from all geo-participation approaches can be brought together to support decision-making, service delivery and government operation (Zhang, 2019). It is imperative to leverage data requirements of both the government and the citizens to produce techniques in order to provide feedback and initiate secondary uses of geospatial data. For instance, using data for Application development, producing public services, etc. (Zhang, 2019). Likewise, Alizadeh et al ,(2019) analysed data from social media (Twitter) where citizens discussed their concerns on urban projects and leaving meaningful observations that have the capacity to inform the decision-making process. Recent innovations in mobile, data, and cloud offer new prospects for enhancing the quality of government and governance and fulfil the expectations of citizens (Linders, et al). The aim of open data is towards improving government transparency, motivating citizen participation and unlocking commercial innovation (Ma & Lam, 2019). However, there are many interlacing barriers which hinder the adoption of open data for instance, the non-existence of a public participation mechanism, unsatisfactory public feedback and consumption statistics create the stakeholders unknowing of the true requirements of citizens (ibid).

2.4 Technology Layer

This layer focuses on supporting information and the system/application functionality with the help of technological components (Pourzolfaghar et al., 2019). It provides advanced technologies supporting citizen's inputs with the help of information or

application functions in order to deliver effective services to the citizens (ibid). While technology provides cheap and effective ways to engage citizens in addressing various issues, there is no replacement for offline face-to-face engagement (Horgan & Dimitrijević, 2019). Salvia & Morello, (2020) argued that hybrid forms of interaction that combine online and offline platforms, have an important role to play in reaching citizens. Nonetheless, it is vital to understand that the greater direct access to public information may improve transparency and facilitate citizen engagement, but at the same time it may overwhelm citizens with too much information as well (Lee, Lee-Geiller, & Lee, 2020; Jae & Viswanathan, 2012). Textual information tended to cause greater information overload, specifically for those with an inclination for visual information processing (Lee, Lee-Geiller, & Lee, 2020). El-Haddadeh et al., (2019) highlighted that the use of IoT, offers a unique opportunity to both governments and citizens to work closely together in order to improve current public services despite various challenges associated with it. While citizens feel empowered and add value to existing services through consuming and co-creating, governments will have the opportunity to utterly exploit the potential of innovative technologies to better optimise their distribution of public services (El-Haddadeh et al., 2019). For example, senior citizens require elderly-friendly urban environments along with particular municipal services to respond to their specific needs and we require technologies which can fulfil such requirements (Jelokhani-Niaraki et al, 2019). In the above section, various platforms, models and technology have been discussed which support citizens in the development of smart cities. This discussion highlights how current literature supports citizens in the development and how their feedback at service layer could be beneficial for designing better quality of services.

3 IDENTIFIED RESEARCH GAP

The challenge in smart cities is to evaluate, design and standardize new solutions, not only to ensure high performance with respect to the technological components, but also to ensure high levels of Quality of Experience (QoE) as perceived by end users (Ballesteros et al., 2015). Thus, there is a requirement to improve the current performance of the services with the aim of improving efficiency, usefulness and quality of life for the citizens (ibid). In the previous sections, it has been discussed how existing literature supports citizens in the design of the smart city services. However, it is not clear from the literature how their feedback could assist in further design improvement at the service layer; which is also associated with the experience of the citizens and performance of the services. In order to understand this, a case study was conducted to analyse the feedback of citizens during the later stages (i.e. After the deployment of the service) at service layer and to examine how this feedback could be transformed into more structured requirements in order to provide improved quality of the services to them. The service layer has components which are associated with the experience of the end users after delivering the services. The aim of this study is also to understand the research problem from citizen's (users) viewpoint and to examine their experience towards these services, therefore this research specifically emphasis on this layer for understanding their requirements in more effective way.

4 CASE STUDY: E-PARKING SERVICE

A case study approach investigates and explores a contemporary phenomenon within its real-life context, most specifically when the boundaries between context and phenomenon is not clearly evident (Yin, 2013). Therefore, an exploratory and deductive case study approach was used to investigate the research problem from the real environment. The detail of the conducted case study can be found in table 1 which has been designed according to the template and guidance provided by (Greenwood, 2011; Baxter et al, 2008).

This case study is based on one of the smart services (i.e. e-parking) provided by many of the City/County Councils in the Republic of Ireland. This service was chosen in order to understand how Quality of Service (QoS) could be improved at service level and to position citizen's requirements in more structured format at architecture level. In order to conduct the case study, interviews were carried out at the County Council with the key individuals involved with this service. Additionally, online data (review comments) was collected and analysed for a smart service (e-parking) which allows users to pay for their parking via an application platform. This App requires registration details and vehicle related information from the users. It does not require users to display a parking disc while their car is parked.

Table 1: Case Study Design on Smart Service Design.

Context: According to the literature citizen's play vital role in the design and development of the smart city services in order to provide effective services to them. Therefore, this study investigates their role in the design of the smart city services in Irish context and highlights existing issues from citizen' end based on the feedback they provided for one of the smart services in Ireland.
The Case: E-parking service in City/Counties of Ireland
Objective: • To understand the experience of citizens towards this service. • To understand how requirements are provided to design such smart city services.
Study Design: Exploratory deductive approach.
Data Collection: Interviews, online review comments from end users.
Analysis: Qualitative data were analysed to identify the challenges from citizen's viewpoint and from Council's perspective. Based on this analysis, feedback was classified against the associated requirements for other layers of the architecture.
Key Findings: • The feedback obtained from the citizen's end can be useful in identifying a set of requirements for the services. • Citizens have no formal role in the design of the services that leads to lower quality of the service at the end. • There is a lack of understanding how to incorporate citizen's feedback for designing the effective services. • There is a challenge in mapping citizen's requirements with existing resources.

Other user benefits include saving their time with hassle free parking and also reduce CO2 emission in the environment. Based on the interviews carried out, it was found that the there is a challenge in mapping citizen's requirements with existing available resources (e.g. "*...like major block is how do we map their requirements*..."). Despite the fact that there are so many engagement programs be it offline or online, it is still not clear if citizens have any formal role in the design process of the services (e.g. "…. *I am not sure if there is any input from the citizens in the actual design process of the services*…"), on the other hand requirements are usually provided by the Council to service providers for designing any new service in the City (e.g. "…...*requirement for the existing services are given by considering already implemented similar systems in other locations*…."). There are two key issues which emerged from the interviews, first it was not clear if citizens have any actual role in the design of the services. Secondly, even if there are various platforms to support their feedback, it is not evident how those feedbacks are transformed into more structured requirements for the service design. To investigate this issue further from citizen's end, this study also analysed the review comments of end users who were using the e-parking service. In order to analyse the online review comments (textual data), this study followed a thematic research approach (Mason, 2002;Young and Hren, 2017). Which followed the guidelines provided by (Braun & Clarke, 2012). Authors provided six phases to perform the analysis of dataset and based on this methodology, this study firstly read and reread the review comments provided by end users and took notes on preliminary ideas and thoughts about connecting those feedbacks with their experience towards the service. During the second phase, initial codes were formed which were common among the data set, for instance people Complaining about extra 1euro charge (E.g. *"10% top up fee without warning. Total scam"*) were coded as "No Information on Additional Charged Fees". Then as a part of third phase, codes were converted into more organised themes which provide meaning within dataset. The identified codes from phase two were further linked to the predefined themes, for instance the code "No Information on Additional Charged Fees" has been classified as a Quality Factor (Transparency) of the service which can further provide guidance towards understanding and structuring requirements from citizen's end. The fourth phase is about reviewing potential themes whereby the developed themes are being reviewed with respect to the coded data and the complete data set. Therefore, all generated themes which are in relation to the Quality factors of the service were revised and checked to ensure if they belong to correct category of the identified reviewed comment or to other. In the fifth phase, the coded themes were further linked to the identified requirements of the service as described in table 2. In the final phase, the analysis has been reported as a case study for e-parking service. This analysis was carried out by using Excel sheet which followed a method proposed by (Bree and Gallagher, 2016). This methodology describes the steps for analysing the data based on the colour coding scheme provided in Excel. There were around 46 review comments per county that were being downloaded in the form of Excel sheet from the app store using the website Heedzy (https://heedzy.com). The review comments were further analysed and classified against the factors (Themes) associated with the Quality of Experience (QoE) based on different coding colours, which stems from the experience of user's expectations with respect to the utility of the application or service

(Ballesteros et al., 2015). After conducting this case study, it was found that there are many engagement programs and projects which involve citizens and identify challenges from their end. However, it is not evident how those challenges are further addressed in order to meet their requirements. Furthermore, role of citizens in the actual implementation of those services is still vague which is in line with what has already been emphasised by many researchers in the field (Allen et al, 2020; Wolff et al, 2020; Heaton & Parlikad, 2019; Sofiyabadi et al., 2016).

Table 2: Sample of Impacted Quality Factors, Corresponding Themes, and their Links to Identified Requirements.

Sample of Online Reviews *(Source: https://play.google.com/store)*	**Codes**	**Identified Impacted Quality Factors from Service Layer (Themes)**	**Associated Requirements (Adopted from Bastidas et al, (2018))**	**Link to Other Layers for Associated Requirements**
"App will not load so cannot access my account, nor can I park my car. It's not an internet issue as my other apps work fine. I uninstalled and then reinstalled it and now it won't let me log in as it says there's no available host... I rely on this almost every day and cannot believe that this has happened"	Applica-tion Issue	Effectiveness	Availability / Software Engineering Tools	Technology
"10% top up fee without warning. Total scam."	No Informa-tion on Additional charged Fees	Transparency	Trust	Context
"Charged a processing fee for adding cash to account. It's the last time I'll be using this."	No Informa-tion on Additional charged Fees/ Usage	Transparency /Usefulness	Trust/ City Oriented	Context /Information
"Appallingly bad. Only used it a few times and some of the roads don't have a code applicable. Also if you move to another street within the time you've to pay again, whereas with the disk you can use it for the 2 hours (or whatever the limit is in the area)."	Applicati on Issue	Personalisa-tion	Flexibility	Context/ Information
"It won't even accept my car registration. There's no guidance provided or feedback the city council haven't responded to emails either."	Applicati on Issue	Usability	Extensibili ty	Informa tion

5 CONCEPTUAL MODEL

In this paper, it has been discussed how existing literature supports citizens in the development of the smart city services. For instance, at context level, citizens contribute their ideas for developing new applications. At information and technology level, various platforms and technologies have been discussed which provide assistance in obtaining their feedback and in designing new services based upon the requirements of the citizens. It has been highlighted that feedback at the service layer could further guide smart city stakeholders in designing better quality of services. Existing studies provide various platforms to support citizen's feedback in the design of the smart city services. However, there is a lack of understanding how those feedbacks are utilised to design effective services for them. Therefore, with this study it has been highlighted how their feedback could be incorporated into more structured format at architecture level. Based on literature presented and the conducted case study, the following conceptual model has been proposed (Figure 1).

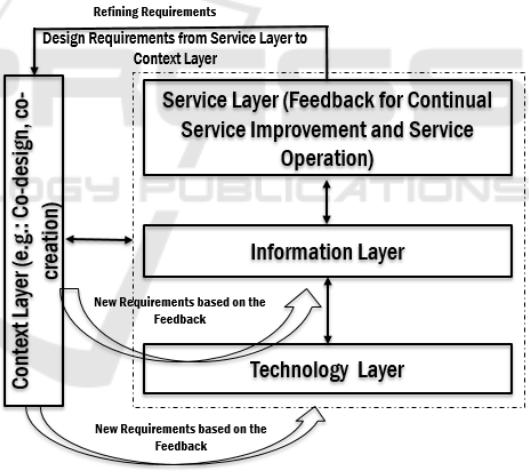

Figure 1: Conceptual Model (Architectural Layers adopted from Pourzolfaghar et al., (2019)).

This model indicates how identified quality factors could assist in further refining the requirements for the service. Based upon this model the identified quality factors can be associated with the type of requirements belonging to specific layer of the architecture. For example, the effectiveness factor (*"……. I uninstalled and then reinstalled it and now it won't let me log in as it says there's no available host……")* can be classified as functional requirement (Software Engineering Tools) in which smart city platforms are required to provide

a set of tools for the development and maintenance of services and applications. These tools can be positioned in technology layer which focusses on technological components and associated platforms with it. Another concerning issue found from those feedback was about additional fee that citizens were charged without their knowledge (e.g. *"....10% top up fee without warning. Total scam...."*) which is associated with the Transparency quality factor and could belong to context layer for classifying it as a non-functional requirement (Trust) of the service. Similarly, there were also some issues regarding the application functionality (e.g. *".... Appallingly bad. Only used it a few times and some of the roads don't have a code applicable..."*) and can assist in understanding the application requirements of the service which can be positioned in the information layer. With the e-parking service example, it was observed that the user satisfaction level was quite low and their feedback at the service level can assist in identifying the functional and non-functional requirements of the service for other layers too. This can further help City authorities and service providers in designing better quality of the services by considering the new requirements of the service. Feedback could be accessed either via online apps associated with the smart services or from other form of social media platform where users could provide their viewpoint and discuss the issues which are associated with the services. In order to analyse the feedback from the end users' side, machine learning algorithms could assist in classification process to understand the experience of the users (Sharma & Sharma, 2020). Moreover, requirement analysis could be done based on the end user's experience and feedback by following a Conjoint analysis approach (Kwon and Kim, 2007).

6 CONCLUSION AND FUTURE WORK

It has been found that there are many offline and online engagement programs, platforms, technologies which obtain citizen's feedback for the development of smart city services. However, there is a lack of understanding of how their feedbacks are transformed into more structured requirements in order to design effective services for the citizens. A case study was conducted to examine the feedback of citizens and to investigate their role in the design of the services. Based upon which this study proposes a conceptual model which elaborates how feedback could be converted into more structured requirements at architecture level which would further provide guidance to smart city stakeholders in designing better quality of services in the future. This would ensure that citizen's requirements are met based on the received feedback from their end. As a part of future work of this research, the aim is to evaluate the proposed conceptual model and investigate the missing constructs in the proposed model for designing better quality of the services by transforming citizen's feedback into more structured requirements at architecture level.

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