



City attachment and use of urban services: Benefits for smart cities



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ABSTRACT

Increasing uses of urban services enhance urban management efficiency and also favor social, environmental, and economic sustainability. This research analyzes how users' city attachment levels and other personal determinants contribute to their uses of urban services. Focusing on the city of Zaragoza (Spain), the empirical study reveals that personal attitudes and needs, possession of user cards, and education levels have positive influences on the use of urban services. City attachment affects use indirectly through attitude. This study also presents some innovative approaches to advance the development of smart cities and suggests implications for managing citizen-oriented urban services to achieve higher living standards.

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1. Introduction

Cities worldwide compete to attract resources and increase their citizens' quality of life (Jung, Lee, Yap, & Ineson, 2015). Smart cities face this challenge with development plans focused on intense uses of innovative information technologies as integral to local governments' modernization and urban retrofit (King & Coterill, 2007). To shift urban management toward a citizen orientation, cities personalize and improve the efficiency of their local services, provide citizens with choice and detailed urban information, and facilitate citizen–infrastructure interactions, among other strategies (King & Coterill, 2007). These development actions aim to meet citizens' current needs and demands, seeking an actual and fluent interrelation among citizens, local services, and infrastructure. Previous research establishes that the success of these initiatives strongly depends on achieving a critical mass of regular users, to guarantee the efficiency and sustainability of local services in the medium term (e.g., Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014). Despite the enormous effort and investment devoted to modernizing local services though, these initiatives sometimes fail, because citizens do not make a frequent use of them (Mulley & Moutou, 2015).

Development plans focused on increasing the use of public services confront several notable difficulties. From users' perspectives, citizens perceive accessing and using local services, such as public transport, as time consuming, inconvenient, or unsafe (Tiwari, Cervero, & Schipper,

2011). Some development actions might induce benefits only temporarily (e.g., Sydney's multimodality transport for the Olympic Games), because residents refuse to add urban services and facilities to their daily routines (Mulley & Moutou, 2015). Lower density urban forms associated with the geographical expansion of cities also tend to result in lower accessibility to local services and longer average transport distances, which increase citizens' preferences for private alternatives (Mattingly & Morrissey, 2014). City technological developments also create technical and managerial difficulties. For example, outdated infrastructures and incompatible information systems complicate the execution of citizen-oriented smart plans (Angelidou, 2014) and increase implementation costs (King & Coterill, 2007).

Therefore, local governments must find ways to motivate citizens to use urban services regularly (Mulley & Moutou, 2015). A relationship marketing perspective suggests that public managers should seek to establish closer links between citizens and the city to maintain their successful, long-term relationship (Belanche, 2012). In this case, city attachment represents a critical relational variable, associated with such positive benefits as increased citizen support for environmental programs and greater commitment to civic community activities (e.g., Zenker & Rutter, 2014). Theoretically, place attachment refers to an affective bond that people establish with specific physical areas (Hernández, Hidalgo, Salazar-Laplace, & Hess, 2007), usually toward their place of residence, which generally evokes close relations (Casakin, Hernández, & Ruiz, 2015). However, most research on city attachment focuses on characterizing the concept or describing its formation process from a sociological or environmental psychology perspective (e.g., Hernández et al., 2007; Lalli, 1992; Lewicka, 2008),

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ignoring its relevance for urban services management. Citizens' preferences for urban services also may depend on other factors, such as their own demographics or the options provided to facilitate access to public policies (e.g., offering multiservice smart cards).

To understand the optimal ways to increase usage of urban services, we analyze the influence of citizens' attitudes, city attachment levels, and demographic characteristics on usage behavior. The impact of personal needs, due to a lack of alternatives or the possession of a multiservice smart card, also enters the model. In contrast, prior literature on urban services management mainly focuses on performance measures, paying little attention to citizens' motivations to use these services and the related advantages for the city's welfare (James, 2009). Therefore, this study takes the case of Zaragoza, the fifth largest city in Spain in terms of population, which has implemented a smart city plan to integrate urban services and developed a marketing campaign to improve the city's image. The choice of Zaragoza is not arbitrary: It frequently has been used for market tests by companies, because its population characteristics generally reflect the average citizen profile in Spain; its urban public policy is based on social integration; and it offers a distinguished cultural background (Jung et al., 2015).

In the next section, we describe the benefits associated with an increase in the use of urban services. Then we define the key variables of our research framework (Section 3) and develop our research hypotheses (Section 4). Section 5 details the methodology employed in this study, and Section 6 presents the results derived from the statistical analyses. Finally, we discuss the key conclusions and implications for theory and urban management, along with some limitations of this study that suggest possibilities for further research.

2. Benefits of increasing the use of urban services

2.1. Local governments: Efficiency and strategic positioning

Classical studies of city management show that greater uses of urban services by citizens have great benefits for local governments, especially in economic terms. Wider usage leads to economies of scale for many urban services (Mohring, 1972), whereas a low level of use causes the service to run deficits (Jansson, 1993). Municipalities also benefit from economies of scope in providing local public services that share administrative fixed costs (e.g., invoicing; Grosskopf & Yaisawarng, 1990). To illustrate these benefits, Mulley and Moutou (2015) explain the process of infrastructure integration for the 2000 Sydney Olympics. They observe the advantages of introducing networked, multimodality transport, supported by an institutional resource plan and marketing actions. However, these authors also stress the absence of a single coordinating authority and the failure to implement integrated fares and ticketing as major weaknesses that hindered citizens' motivation to use the system regularly.

Prior literature also has established that the efficiency of urban services delivery improves when local governments have better knowledge of citizens' preferences and needs (Cuadrado-Ballesteros, García-Sánchez, & Prado-Lorenzo, 2013). Implementing dynamic, coordinated management units reduces bureaucratic processes, provides services faster, is closer to citizens' demands, and leads users to express greater satisfaction (Cuadrado-Ballesteros et al., 2013). Citizens' increased uses of urban services also relate to higher levels of satisfaction and performance, in a clear link to loyalty concepts commonly studied in the private sector (King & Coterill, 2007). Thus, efficiency in the provision of urban services depends on both coordination across local government activities and citizens' usage levels (Jansson, 1993; King & Coterill, 2007; Mulley & Moutou, 2015).

Finally, information-based services, which are common in smart cities, need high volumes of users to achieve network effects across urban, interconnected infrastructures (e.g., time, info-mobility; Neirotti et al., 2014). When information-based systems collect data

about the uses of urban services, intelligence generation and dissemination result, enabling the strategic positioning of smart cities (Neirotti et al., 2014). Therefore, a pertinent factor is the existence of an ecosystem of stakeholders, including private partners and app developers, that secure funding and collaboration in innovative ways (Angelidou, 2014).

2.2. Society and environment: Sustainability

Smart cities deal with physically hard domains, such as infrastructures, transport, mobility, and natural resources; they also do not ignore soft domains, such as culture, social inclusion, economy, and welfare (Neirotti et al., 2014). Local governments ensure accessibility to local services and facilities (e.g., libraries, sport and recreational centers), as a main geographical function for integrating and interconnecting city dwellers and areas (Dempsey, Bramley, Power, & Brown, 2009). In this sense, the quality of public transport and accessibility to local services shape the urban structure and city life. Recent studies indicate that an efficient urban transport system connecting different areas of the city has helped modernize and link communities in Jerusalem (Nolte & Yacobi, 2015), and local investments in public goods such as subway systems have spurred the gentrification of underdeveloped areas in Beijing (Zheng & Kahn, 2013). In addition, a well-structured, efficient network of urban services benefits a wide range of citizens, including vulnerable groups such as the elderly, who can rely on these services instead of using other alternatives (Webb, Netuveli, & Milet, 2012). In turn, cities that provide better urban services, in terms of widespread accessibility and mobility, achieve greater spatial and social equity (Chang & Liao, 2011).

The increased use of urban services also must lead to sustainability in terms of the social, environmental, and economic dimensions of urban management (Neirotti et al., 2014). Smart cities aim to provide businesses with opportunities, by improving their infrastructures and information-based services (Dempsey et al., 2009; King & Coterill, 2007). More frequent use of urban services relates closely to good service performance, more satisfaction with urban management, and a better quality of life in the city (James, 2009; Zenker & Rutter, 2014). Previous research confirms that using public transport or cycling, instead of using private vehicles, produces substantial savings for citizens (Mattingly & Morrissey, 2014). However, perhaps the most important benefit of increased uses of urban services is in the environmental domain. Cycling and urban transport reduce air pollution, CO₂ emissions, and the danger of traffic injuries (Tiwari et al., 2011). Better city planning, placing car parks next to urban transport stations, or supplying multiservice smart cards could increase the use of urban services, which then would benefit the environment (Mulley & Moutou, 2015; Webb et al., 2012).

3. The use of urban services and main determinants

We refer to the use of urban services as actual citizens' frequency of use at the local level, a critical issue for guaranteeing the sustainability of these services in the medium term (Neirotti et al., 2014). The nature of this variable suggests that it should be measured as a formative construct of the urban services provided by local authorities, to be used by citizens. In our case, this formative latent variable refers to requests for key, in-demand municipal services among residents, according to municipal records: public urban transport, municipal bicycle rental, sports facilities, public car parks, and public libraries. A resident may access public libraries but not use public car parks or *vice versa*. That is, these observable items do not need to correlate, and omitting any one of them may change the meaning of the latent variable. We briefly define the main antecedents considered in this research next.

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