

# Managing knowledge in the context of smart cities: An organizational cultural perspective

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## Abstract

*Smart cities need to take advantage of the opportunities that the knowledge-based economy and society can bring to the city. Therefore, cities planners and decision makers need to develop cities that take advantage of local knowledge and the intellectual capital of the population. Organizational culture is widely held to be a major barrier to creating and leveraging knowledge. Successful implementation of knowledge management (KM) almost always requires a culture change in order to promote a culture of knowledge sharing and collaboration. Hence, organizations implementing smart cities need to place great emphasis on the need to change organizational culture to pursue effective KM and its successful implementation. However, the management of culture change is a complicated task; its precise nature in smart-city development and the strategies required to be adopted remains underspecified. This study aimed to explore organizational cultural transformation needed for managing knowledge in the context of smart cities. The methodological approach for this study is a systematic review, covering publications on smart cities, KM, and organizational culture. The method used in this study involved three stages: planning the review, conducting the review, and reporting and disseminating the results. The findings revealed three key themes which are: organizational perspectives of smart cities; organizational change, innovation, and digital transformation; and the relationship between organizational culture and KM. The paper concludes that the cultural transformation required for the development of smart cities needs to facilitate the ability to integrate, create and reconfigure both internal and external competences to manage knowledge that*

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*originates from within and beyond projects boundaries. This study provides an insight into urban policymakers, planners, and scholars to prepare for the challenges that organizations face in their efforts to manage and implement smart cities successfully.*

**Keywords:** *culture, smart cities, knowledge management, transformation change*

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## INTRODUCTION

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The concept of smart cities has garnered increasing attention in recent years. There has been much written espousing the development of smart cities, and the need for adopting smart-city initiatives as a strategy to mitigate the unprecedented challenges of continuous urbanization, increasing population density and at the same time to provide a better quality of life to the citizens, and enhance sustainability and economic growth. Albino, Berardi, and Dangelico (2015) noted that the concept of smart cities is far from being limited to the application of technologies to cities. In fact, the use of the term is proliferating in many sectors with no agreed-upon definitions. This has led to confusion among urban policy makers, hoping to institute policies that will make their cities “smart.” Ardito et al. (2019) noted that the most recent view on smart-city development has recognized that the level of technology adoption in urban contexts is no more able to reflect the real smartness of cities.

Boulton, Brunn, and Devriendt (2011) noted that a smart-city is seen as a center of knowledge, education, and creativity. It comprises a concentrated diversity of people with different professional, cultural, and social backgrounds that are creative, skilled, and work flexibly in organizations. Furthermore, Leon and Romanelli (2020) work on six smart cities in Romania and Italy from a Knowledge Management (KM) perspective posited that the difference among cognitive, emotional and spiritual knowledge might influence the tools that policymakers could use for smart-city development. Therefore, knowledge is a fundamental source of value for cities and the practical base upon which smart-city plans must engage. The knowledge economy principles, KM, and KM frameworks have gained significant importance in both global and local strategic developments. This paradigm shift in strategic planning has strongly influenced urban development, with the result that knowledge is now perceived as the core component that makes cities smart. Moreover, Bakici, Almirall, and Wareham (2013) suggested that to take advantage of the opportunities that a knowledge-based economy and society can bring to the city, leaders and decision makers need to develop cities that take advantage of local knowledge and the intellectual capital of the population.

Organizations developing smart-city projects need to become learning organizations before they can formulate and implement smart-city policies

to create smart production and smart consumption of their services, so as to increase the outcome effectiveness of their policies and services (Anttiroiko, Ari-Veikko, Valkama, & Stephen, 2014; Owoc & Marciniak, 2013). Therefore, smart-city decision makers need to be aware of all possible kinds of knowledge resources and to consider these resources as crucial factors for organization strategic management techniques. The smart-city organizations need to design specific systems to acquire and analyze the use (re-use) of knowledge in order to make faster, smarter and better decisions, and to provide quality services and products so that they can achieve a competitive advantage.

Although smart cities' development requires incorporating more soft assets into city planning, the current literature on smart cities shows an exclusive focus on hard infrastructure and technology. But it ignores one of the most critical elements – the managerial aspects, and specifically, KM and the organizational cultural transformation needed to ensure effective and successful implementation. There is probably no work that explores the synergy of the three aspects, i.e. smart cities, KM, and organizational culture. Therefore, this paper discusses the theoretical background of smart cities, KM, and organizational culture. After that, it follows a systematic review of literature methodology to identify the authors' various works. Finally, this paper presents findings, discussion, and conclusion.

## **THEORETICAL BACKGROUND**

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### **Smart cities**

Smart cities are an emerging strategy to mitigate the problems generated by rapid urban population growth and rapid urbanization (Chourabi et al., 2012; Xu, Wu, & Wang, 2012). A smart-city strategy is global and long-term planning in a city's economic, social, and environmental development, ultimately to achieve sustainable urban development. Dameri and Ricciardi (2015) noted that being smart is about capitalizing on all available resources to build a better quality of life for all – including the next generations. Although there is an increase in the frequency of use of the phrase “smart-city,” there is still no clear and consistent understanding of the concept among practitioners and academia. Mora, Deakin, and Reid (2019) noted that disagreements over smart-city development status were first reported on by Hollands (2008). After reviewing the literature on smart cities produced between 1990 and 2007, his research identified and compared a number of attempts to formulate a definition of the smart-city, capturing both a lack of clarity and absence of any agreement on how this concept is

understood by the scientific community. According to Albino, Berardi, and Dangelico (2015), despite the intervening growth of research on smart-city development, these disagreements on what such a development represents are still firmly entrenched in the scientific literature. In summary, as Giffinger et al. (2007) concluded, there are several fields of activity that are described in the literature in relation to the term smart-city: industry, education, participation, technical infrastructure, and various 'soft factors.'

Anttiroiko, Ari-Veikko, Valkama, and Stephen (2014) noted that the smart-city phenomena attracts increasing attention from urban scientists, combining modern Information and Communication Technologies (ICTs) with organizational planning and design to unbundle economic processes, cut bureaucracy, streamline service processes and implement organizational innovations. Smart cities also provide the right environment to enable innovation and positive economic development. They are generally flush in high-quality education facilities, including universities and other establishments for life-long learning (Nam & Pardo, 2011). Moreover, ICT can also enhance the access to and exchange of knowledge between institutions and individuals. Such a concentrated environment of highly skilled citizens and a well-developed knowledge infrastructure also attracts businesses and even more educated individuals (Nam & Pardo, 2011; Angelidou, 2014).

Mora, Deakin, and Reid (2019) noted that strategies for smart-city development could be found all over the world and researchers have made significant efforts in investigating their design and implementation processes. Younes and Aljunaedi (2018) and Hollands (2008) defined smart-city as the facts of urban classification, mainly in terms of skimping and smacking the label philosophically. Despite this growing interest in smart cities and almost three decades of literature on the matter, research is still unable to clearly explain what needs to be done in order for urban environments to be successful when designing and implementing smart-city development strategies.

According to UNECE (2015), the comprehensive "smart cities" initiative aims at improving key dimensions of cities, including; urban environment (energy, buildings, transportation, water, waste), governance, social capital, economic conditions, and citizens' experience. For example, more focus is being placed on energy savings and fluctuating renewable energy sources. While electricity savings should be promoted heavily, an increasing emphasis is placed on the integration of fluctuating renewable energy into the electricity system to lower emissions. For example, the smart grid community has a strong focus on the use of ICT, smart meters and smart grids connected to existing electricity demands, Electric Vehicles (EVs) and individual heating technologies, flexible demand, storages and electricity storage, distributed generation and transmission (Mathiesen et al., 2015).

Smart-city projects and research are aimed at the sustainability, resilience, quality of life, and competitiveness of city systems (Chourabi et al., 2012; Dameri & Ricciardi, 2015). The smart-city community strongly believes that knowledge is the key to the future and that the pivotal strategies in the development of “smart” knowledge are technological innovation, collaborative networking, and participative social interactions (Schaffers et al., 2011; Dameri & Ricciardi, 2015; Ardito et al., 2019). Therefore, there is a need to link the role of knowledge and intellectual capital (IC) to the development and creation of smarter ecosystems and be regarded not as a single organization, but as a network of different actors and subjects rooted in different communities (Gray, 2006; Dameri & Ricciardi, 2015). According to Dameri and Ricciardi (2015), each smart-city entity should be viewed as a new form of knowledge-based, project-oriented network organization, which in most cases needs to be jointly managed by people from different traditional organizations, such as public administration bodies, universities, public transportation companies, etc. This novel type of project-based network organization should be at the center of a new stream of management studies in order to investigate which possible business models and organizational designs could be adopted for smart-city organizations. The smart-city organization requires the development of specific, intertwined knowledge management and project portfolio management approaches, capabilities, and tools (Dameri & Ricciardi, 2015).

City governments have to become learning organizations before they can formulate and implement smart-city policies to create smart production and consumption of their services so as to increase the outcome effectiveness of their policies and services (Anttiroiko, Ari-Veikko, Valkama, & Stephen, 2014). Yigitcanlar, Desouza, Butler, and Roozkhosh (2020), in addition to Xu, Wu, and Wang (2012), noted that information technology, KM, and innovative networks are shaping the face of our world, which makes our cities more knowledge-intensive and innovation-driven. Ardito et al. (2019) noted that, over time, the rationale underlying the development of smart-city projects has changed in terms of priorities and perspectives.

However, a significant body of research considers this technology-led theory of supply-push solutions inadequate and unable to cope with smart-city development’s complexity. It promotes a utopian and technologically deterministic interpretation of smart cities that serves nothing but the interests of companies working in the technology industry. The researchers such as Hollands (2008), Caragliu, Del Bo, and Nijkamp (2011), Scuotto et al. (2016), Yigitcanlar (2016), Mora, Deakin, and Reid (2019), raising objections to this interpretation, call for a much more progressive and holistic vision that conceives smart cities not as technological fixes resulting from the

agglomeration of ICT solutions in urban infrastructures, but as complex socio-technical systems in which technological development is aligned with human, social, cultural, economic and environmental factors.

## **Knowledge management**

Knowledge is one of the building blocks for an organization's success and acts as a survival strategy in this knowledge era (Renukkappa et al., 2020; Renukkappa, Hanouf, & Suresh, 2019; Suresh, Olayinka, Chinyio, & Renukkappa, 2017). Paterek (2017) noted that organizational knowledge is a value of learning from the theoretical perspective and KM is a value from a practical standpoint. Lin and Hwang (2014) indicated that knowledge resources reside in employees' minds and organizations have to utilize this valuable resource for their competitive advantage. At the heart of an organization's strategy process, it has been observed that it is a force, which has been termed as the 'knowledge force,' which is powered by the knowledge workers (Renukkappa et al., 2017).

An increasing number of organizations are turning to KM as a key to leverage their distinctive core competencies in their pursuit of competitive advantage (Bhatt, 2001). Accordingly, Todericiu and Stanit (2016) noted that KM is one of the processes of new management techniques. It is the process of organizational knowledge to give value to the organizations, and it plays an essential role in achieving sustainable competitive advantage. KM ultimately aims at creating business value and generating a competitive advantage. Nguyen and Mohamed (2011) noted that organizations are interested in KM to boost their processes' efficiency, increase their productivity and the quality of their services, and achieve innovative solutions and products for their customers. Consequently, the contributions of KM to the overall success of an organization have been widely acknowledged. Prior research studies have demonstrated that organizational culture is widely held to be a major barrier to creating and leveraging knowledge (Bhatt, 2001; Dixon et al., 2017; Abdalla, Renukkappa, Suresh, & Al-Janabi, 2019).

Massingham (2014) noted that knowledge is an intangible resource, and it combines with other firm resources (e.g., financial and physical) to create capabilities. Knowledge resources are often classified as either tacit (implicit) or codified (explicit). Nonaka and Takeuchi (1996) make the distinction between two types of knowledge: explicit knowledge and tacit knowledge. Discussions of this concept are abundant in the KM literature. Explicit knowledge is defined as structured and codified knowledge. It is formal and systematic and is easily expressed in production specifications, scientific formulae, or computer programs; thus, it can be easily communicated and shared (Nonaka & Konno, 1998). Tacit knowledge, in contrast, is unconsciously

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understood and applied, challenging to articulate, and developed directly from experience and action. Tacit knowledge is highly personal, hard to formalize, and difficult to communicate or share with others (Nguyen & Mohamed, 2011; O'Dell & Hubert, 2011).

Abdalla, Renukappa, Suresh, and Al-Janabi (2019) noted that a smart-city notion is understood to refer more generally to the development of a knowledge economy within a city-region. Combining various sources of data together allows a city to develop an accurate understanding of societal challenges such as sustainability, mobility, health, and security. This understanding helps make better, smarter, data based choices (Dixon et al., 2017; North, Maier, & Haas, 2018; Abdalla, Renukappa, Suresh, & Al-Janabi, 2019). Therefore, to retain and rebuild competitive advantage, organizations implementing smart-city projects need to develop capabilities for digital renewal and learn how to create and implement digital business strategies and to adopt the needed changes to their culture and KM procedures.

## **Organizational culture**

Organizational culture is an anthropological metaphor used to inform research and consultancy and to explain organizational environments (Mannion, Konteh, & Davies, 2009). Several definitions of organizational culture can be found in the literature. They range from the extremely simple – “the way we do things around here” – to the more complex definition proposed by Schien (1985): “the pattern of shared basic assumption – invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration – that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relationship to those problems.” A consistent element of each of these definitions is that ‘organizational culture’ pertains to multiple aspects of what is shared among people within the same organization. These shared characteristics may include beliefs, values, norms of behavior, routines, traditions, sense-making, etc. (Parmelli et al., 2011). Culture is, therefore, a lens through which an organization can be understood and interpreted (Mannion, Konteh, & Davies, 2009). Mannion, Konteh, and Davies (2009) highlighted that culture is not merely the observable in social life, but also the shared cognitive and symbolic context within which a society can be understood. Parmelli et al. (2011) and Dalkir (2017) noted that understanding the culture is to understand your organization. Schein (1992) approaches this issue through his three levels (Table 1).



**Table 1.** Culture levels

Cultural level	Description
Artifacts	The visible organizational structures and processes.
Values	The stated strategies, goals, philosophies, and justifications.
Assumptions	The basic, underlying assumptions and unconscious, taken-for-granted beliefs, perceptions, thoughts and feelings.

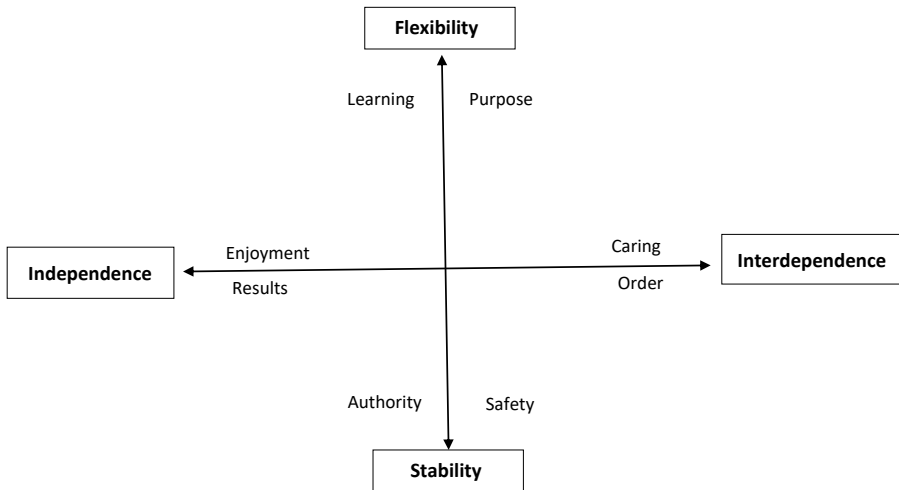
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Source: Schein (1992).

Akhavan, Sanjaghi, Rezaeenour, and Ojaghi (2014) noted that organizational cultures represent an organization’s characteristics, which direct its employees’ day-to-day working relations and guide them on how to behave and communicate within the organization, as well as how the company hierarchy is built. From this perspective, culture is one of the most essential features of an organization with contextual properties that can have supportive and deterrent effects on all areas and activities of the organization. According to Akhavan, Sanjaghi, Rezaeenour, and Ojaghi (2014), a review of the literature shows that organizational culture is usually a set of key values, assumptions, perceptions and norms shared between members of the organization and will be taught to newcomers as the correct way to behave and act.

Groysberg, Lee, Price, and Cheng (2018) noted that understanding an organization’s culture requires determining where it falls along two main dimensions: people’s interactions and response to change (Figure 1). An organization’s orientation toward people interactions and coordination will fall on a spectrum from highly independent to highly interdependent. Cultures that lean toward the former, place a greater value on autonomy, individual action, and competition. Those that lean toward the latter, emphasize integration, managing relationships, and coordinating group effort. People in such cultures tend to collaborate and to see success through the lens of the group. Moreover, whereas some cultures emphasize stability – prioritizing consistency, predictability, and maintenance of the status quo – others emphasize flexibility, adaptability, and receptiveness to change. Those that favor stability tend to follow the rules, use control structures such as seniority-based staffing, reinforce hierarchy, and strive for efficiency. Those that favor flexibility tend to prioritize innovation, openness, diversity, and a longer-term orientation (Groysberg, Lee, Price, & Cheng, 2018).





**Figure 1.** Organization culture styles

Source: Groysberg, Lee, Price, and Cheng (2018).

Schein (1999) uses the classic three-step approach to discuss change – unfreezing, cognitive restructuring, and refreezing. The key issue for leaders is that they must become marginal to a sufficient degree in their own culture to recognize its maladaptive assumptions and learn some new ways of thinking as a prelude to unfreezing and changing their organization. While organizational change is complicated and often lengthy to undertake, it is a critical requirement for most, if not all, KM implementation. The key lies in symbolic action, dealing with essential symbols of values, norms, and assumptions (Dalkir, 2017). By applying this fundamental insight about the dimensions of people interactions and response to change, Groysberg et al. (2018) have identified eight styles that apply to both organizational cultures and individual leaders (Table 2).

**Table 2.** Eight styles that apply to both organizational cultures and individual leaders

<b>Style</b>	<b>Description</b>
<b>Caring</b>	Focuses on relationships and mutual trust. Work environments are warm, collaborative, welcoming places where people help and support one another. Employees are united by loyalty; leaders emphasize sincerity, teamwork, and positive relationships.
<b>Purpose</b>	Exemplified by idealism and altruism. Work environments are tolerant, compassionate places where people try to do good for the long-term future of the world. Employees are united by a focus on sustainability and global communities; leaders emphasize shared ideals and contributing to a greater cause.
<b>Learning</b>	Characterized by exploration, expansiveness, and creativity. Work environments are inventive and open-minded places where people spark new ideas and explore alternatives. Employees are united by curiosity; leaders emphasize innovation, knowledge, and adventure.
<b>Enjoyment</b>	Expressed through fun and excitement. Work environments are light-hearted places where people tend to do what makes them happy. Employees are united by playfulness and stimulation; leaders emphasize spontaneity and a sense of humor.
<b>Results</b>	Characterized by achievement and winning. Work environments are outcome-oriented and merit-based places where people aspire to achieve top performance. Employees are united by a drive for capability and success; leaders emphasize goal accomplishment.
<b>Authority</b>	Defined by strength, decisiveness, and boldness. Work environments are competitive places where people strive to gain personal advantage. Employees are united by strong control; lead
<b>Safety</b>	Defined by planning, caution, and preparedness. Work environments are predictable places where people are risk-conscious and think things through carefully. Employees are united by a desire to feel protected and anticipate change; leaders emphasize being realistic and planning ahead.
<b>Order</b>	Focused on respect, structure, and shared norms. Work environments are methodical places where people tend to play by the rules and want to fit in. Employees are united by cooperation; leaders emphasize shared procedures and time-honored customs.

Source: Groysberg, Lee, Price and Cheng (2018).

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## Organizational culture and knowledge management

In the body of available literature about KM, the concept of 'culture' has been used repeatedly. This concept is mostly presented in expressions like 'knowledge-sharing culture' or 'knowledge culture.' Although other expressions like 'organizational culture' 'organizational climate' or 'national culture' are also propounded (Allameh, Zamani, and Davoodi, 2011), 'knowledge culture' is one of the specific branches of organizational culture. It is an indication of an organizational life method that uses people in the process of creation and exchange of information. Moreover, it uses its own, as well as the knowledge of others, to accomplish organizational goals and attain success (Allameh, Zamani, & Davoodi, 2011).

Allameh, Zamani, and Davoodi (2011) noted that KM systems go beyond technology; an organizational culture in which new roles are defined has a critical role in knowledge creation. Effective KM depends not merely on IT platforms, but more broadly on an organization's social ecology, and that IT is simply a facilitator. Allameh, Zamani, and Davoodi (2011) noted that most of the value added to the performance of KM is not the result of the technology used; rather, it was the result of the new organizational managing roles and also the people who used this technology in the most efficient manner. Moreover, Allameh, Zamani, and Davoodi (2011) noted that the presence of a specific culture in an organization is necessary for the effective performance of KM processes. The authors emphasized that an efficient culture is one that emphasizes knowledge exchange, trust in interactions and creativity, and that such knowledge would be successful in performing management processes. Furthermore, organizational culture is one of KM's key success factors because culture affects learning, acquisition, sharing, and other related areas of knowledge (Alavi & Leidner, 2001; Akhavan, Sanjaghi, Rezaeenour, & Ojaghi, 2014; Renukappa et al., 2020).

Effective KM, therefore, requires that attention be paid to the human and cultural aspects of business, particularly the experiences and tacit knowledge of employees (Nonaka & Konno, 1998). Accordingly, in order to effectively implement KM systems, managers need to diagnose the fit between their organization and KM objectives. However, organizational culture is the main obstacle in knowledge transfer (Allameh, Zamani, & Davoodi, 2011). Therefore, it is essential to articulate how organizational culture and leadership styles affect an organization's ability to create and apply knowledge. It is only then, that appropriate strategies can be designed to either adapt the organizational culture, or to try reshaping it in order to support KM objectives (Nguyen & Mohamed, 2011).

Culture is an important, as well as complicated, issue in KM (Allameh, Zamani, & Davoodi, 2011). Organizational culture is considered the most influential factor in KM and organizational learning (Akhavan, Sanjaghi, Rezaeenour, & Ojaghi, 2014). The literature concluded that organizational culture is one of KM's key success factors because culture affects learning, acquisition, sharing, and other related areas of knowledge (Alavi & Leidner, 2001; Akhavan, Sanjaghi, Rezaeenour, & Ojaghi, 2014; Renukappa et al., 2020).

## **Smart cities, Knowledge Management and Culture**

City leaders should investigate how knowledge resources can be leveraged at the city and regional levels to build strong and sustainable social ecosystems where healthy organizations can flourish (Dameri & Ricciardi, 2015). Organizations implementing smart cities need to place great emphasis on the need to change organizational culture to pursue effective KM and successful implementation. However, cultural change management is a complicated task; its precise nature in smart-city development and the strategies to be adopted remain underspecified. Paterek (2017) noted that new project management methodologies adapted to complex and dynamically changing business environments and market competition are needed. The author states that introducing new project management methodologies results in organizational changes in technology, methodology, processes, strategy, and organizational culture. Hence, smart cities' development requires a complex and long-lasting number of organizational changes at all levels. Thus, smart cities necessitate organizational development in project management methodologies addressing several KM aspects, issues, and challenges.

Essawi and Tilchin (2013) noted that a favorable organizational environment is needed to realize effective KM. Such an environment can be created by changing organizational culture, which determines the new way of thinking and acting of employees. Organizational culture change is accomplished when the new results that an organization has to achieve are stated, actions of the employees providing attainment of the results are determined, the new organizational values guiding actions of employees are identified. The experiences that inspire new organizational values are formed. Since tacit knowledge, including mental models, expertise, cultural beliefs, and values is inseparable from organizational culture, KM culture that induces the employees' willingness to create, transfer, share, and use knowledge can promote the handling of tacit knowledge (Nonaka & Takeuchi, 1996; Essawi & Tilchin, 2013; Al Murawwi, Behery, Papanastassiou, & Ajmal, 2014).

According to Paterek (2017), the organizational learning process is necessary to continuously introduce innovations and keep pace with

organizational development. Organizational culture is the key determinant of both learning and technical innovation. Further, the author noted that a flexible, adhocracy culture supports organizational learning more than a hierarchy culture, especially for project organizations with many collaborating and interacting project teams. Smart cities aim to establish dense knowledge and information exchange environments by linking different stakeholders, such as local authorities, research universities, R&D units of large companies, and other individuals and institutions. Therefore, organizations implementing smart-city projects need to adopt a flexible culture to support organizational learning. Albino, Berardi, and Dangelico (2015) noted the importance of the organic integration of a city's various systems (transportation, energy, education, health care, buildings, physical infrastructure, food, water, and public safety) in creating a smart-city. The authors support this integrated view of a smart-city, which underlines that in a dense environment, like that of cities, no system operates in isolation (Vallicelli, 2018).

Smart-city initiatives are highly information-intensive and often use citizen-generated information, which raises many problems concerning how this information is actually collected and used (Mainka et al., 2016). Scuotto et al. (2016) noted that smart cities make innovation ecosystem, joining together different forces like knowledge-intensive activities, institutions for cooperation and learning, and web-based applications collective intelligence. In agreement with Kourtit and Nijkamp (2012), Albino, Berardi, and Dangelico (2015) noted that smart cities result from knowledge-intensive and creative strategies aimed at enhancing the socio-economic, ecological, logistic, and competitive performance of cities. Kourtit and Nijkamp (2012) noted the positive correlation between the presence of knowledge-intensive services and cities' innovative performance and "smartness."

According to Mainka et al. (2016), smart-city concepts follow the open innovation approach and involve all city stakeholders in decision-making processes. Organizations that want to benefit from this open-source innovation need to adapt their strategy and organizational model, and work long-term on culture change and openness from within and outside (North, Maier, & Haas (2018). Therefore, everyday learning through project team collaboration, experiments, problem solving, problem absorption, or lessons learned from issues and failures are necessary for knowledge creation. Paterek (2017) noted that learning by experience inside a collaborative group of people or among different project teams is a fundamental organizational learning enabler of a company's successful transformation.

North, Maier, and Haas (2018) noted that development towards digitized knowledge societies is taking place on a global scale. The move towards an increasingly digital world is rapidly changing the ways in which people and

organizations create, use and share data, information, and knowledge. The authors highlighted that a common definition of 'digital transformation' refers to 'the change associated with the application of digital technology in all aspects of human society.' The corresponding digitization of previously analog operations, tasks and managerial processes profoundly impact companies and organizations (Iansiti & Lakhani, 2014; Hess, Matt, Benlian, & Wiesböck, 2016).

North, Maier, and Haas (2018) noted that from an organizational perspective, researchers saw the way knowledge is handled as a source for competitive advantage advocated by the resource-based view (Grant, 1991) and the knowledge-based theory of the firm (Kogut & Zander, 1992). Organizations address the need for constant communication and acquisition of knowledge dispersed among employees by applying organizational and IT mechanisms to establish an environment supportive of knowledge work, also called KM systems (Alavi & Leidner, 2001; North, Maier, & Haas (2018). In a "digitized knowledge society," digital transformation strategies take on a different perspective and pursue different goals. From a business-centric perspective, they focus on transforming products, processes, business models, and organizational aspects due to new technologies (e.g., Internet of Things, Artificial Intelligence, and Big Data). From a human-centered perspective, KM focuses on the capturing and sharing of tacit and explicit knowledge. This includes connections between people and embracing social relations with their corresponding technology support, also called social knowledge environments (North, Maier, & Haas, 2018).

Increasingly high-performance data analytics enable the acquisition and analysis of vast volumes of data and its subsequent transformation into information as a basis for actionable insights (North, Maier, & Haas, 2018). For cities to select and develop appropriate citizen-focused technology, they must understand their citizens and develop appropriate technologies that will be well received. By providing citizens the access to information and the opportunity to participate, they may be more willing and able to develop initiatives and create solutions that are more "citizen centric." Moreover, smart-city, e-governance strategies are about creating a transparent and efficient exchange between the government and all city stakeholders (Albino, Berardi, & Dangelico, 2015; Holzer & Manoharan, 2016). It also incorporates the idea of creating an ecosystem of knowledge transfer and exchange (Albino, Berardi, & Dangelico, 2015). It creates a more robust dialogue between the government and its citizens, leading both sides to substantial knowledge gains. Their participation can create a stronger community feeling and spark the awareness, desire, and responsibility of citizens to promote an inclusive and equitable development of the city (Albino, Berardi, & Dangelico, 2015). Additionally, it can also positively contribute to the local entrepreneurial culture.

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Warner and Wäger (2019) noted that dynamic capabilities are innovation-based and can create, extend, and modify a firm's resource base. Thus, building dynamic capabilities can help leverage digital knowledge inside the firm and connect an organization's workforce in unexpected ways across functions, hierarchies, and locations. Digital platforms and social media technology can also play a significant role in the ongoing refreshment of organizational culture (Bresciani, Ferraris, & Del Giudice, 2018; Warner & Wäger, 2019).

Crafting a digital mindset and culture throughout the entire organization is essential for building sensing capabilities that will allow organizations to seize on the latest unexpected trends (Warner & Wäger, 2019). A firm's business model, collaborative approach, and culture are the three broad forms of strategic renewal for digital transformation (Warner & Wäger, 2019). Therefore, organizations implementing a smart-city project need to retain and rebuild their competitive advantage by developing dynamic capabilities for digital renewal and learn how to create and implement digital business strategies. Karimi and Walter (2015) ascertain the role of dynamic capabilities in response to digital disruption. The authors concluded that dynamic capabilities are positively associated with building digital platform capabilities and that these capabilities impact the performance of a company's response to digital disruption. The development of dynamic capabilities is closely linked to learning and managing knowledge acquisition, creation and sharing within and across organizations. KM has to support a number of conflicting knowledge activities such as "exploitation" and "exploration, or "sharing" and "protection." An organization's ability to manage such seemingly contradictory processes and practices increasingly gains importance with digital transformation (North, Maier, & Haas, 2018).

Developing smart cities also necessitates considering organizational culture values. The most important element of changing organizational values is helping employees adopt the behaviors corresponding to the desired values by inspiring and rewarding them. Hanson (2012) described a process of changing organizational culture values involving determination of the desired values, and the development and implementation of a plan for changing employee behaviors based on these values. Pasher and Ronen (2011) affirm that successful knowledge creation and knowledge sharing in an organization result from a management style based on shared values of organizational culture. The authors concluded that trust, innovation, and respect for employees' knowledge are the most important values. Therefore, smart-city leaders and decision makers must focus on organizational culture that encourages learning and knowledge sharing.

According to Groysberg, Lee, Price, and Cheng (2018), leaders who are more focused on results and learning may find the combination of caring



and order stifling when they seek to drive entrepreneurship and change. Savvy leaders make use of existing cultural strengths and have a nuanced understanding of how to initiate change. They might rely on the participative nature of a culture focused on caring and order to engage team members and simultaneously identify a learning-oriented “insider” who has the trust of his or her peers to advocate for change through relationship networks.

## Research methodology

The aim of this research is to investigate cultural transformation for managing knowledge in the context of smart cities. In order to achieve this aim, a robust methodology was considered essential. The methodological approach for this study was a systematic review, covering publications on smart cities, KM, and organizational culture. A literature review is a: “systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners” (Castaneda, Manrique, & Cuellar (2018)). A systematic review is a process that identifies, appraises, and analyses research evidence from primary studies to synthesize and map it. Although the systematic review has been primarily used in the medical sciences (Tranfield, Denyer, & Smart, 2003), this methodology is more widely applied and developed to review management literature. This method became one of the first explicitly recognized forms of literature reviews in the late 20th century and is now one of the most popular among scholars from various fields of research (Yigitcanlar, Desouza, Butler, & Roozkhosh, 2020). A systematic review aims at the common purpose of a literature review, including improving evidence-based decision making, identifying the synergies within the existing literature, and narrowing the gaps in the research field. However, its goal is distinctive, to the extent that it restricts the studied areas by setting inclusion and exclusion criteria and seeks to provide insights. It is essential that the literature reaches a certain level of maturity so that it can provide the most complete view for researchers and policymakers with a rigorous, transparent and reproducible process (Yigitcanlar, Desouza, Butler, & Roozkhosh, 2020).

In order to retrieve the group of articles to be included in the literature review, the study followed the principles for a systematic review originally proposed by Tranfield, Denyer, and Smart (2003). Indeed, as argued by various studies (e.g., Castaneda, Manrique, & Cuellar, 2018; Yigitcanlar, Desouza, Butler, & Roozkhosh, 2020), the systematic review can be considered as an analytical review scheme that is necessary to effectively evaluate the contributions of a given body of the literature, in that it entails the adoption of a clear and reproducible set of phases that allows scholars to improve the

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overall quality of the review process. The method used in this study followed that proposed by Tranfield, Denyer, and Smart (2003) with three stages: planning the review, conducting the review, and reporting and disseminating the results. The current review differed from traditional narrative reviews by using more systematic, rigorous, explicit, and reproducible methods for the selection of articles.

According to the principles for a systematic review, we carried out the following steps, so as to implement a transparent and replicable methodology (Tranfield, Denyer, & Smart, 2003). The first stage is planning, involving developing a list of keywords and criteria for the inclusion of articles, as well as defining the search string to be given in input to the data source. A university's library search engine, which gives access to various databases including: Directory of Open Access Journals, Science Direct, Scopus, TRID, Web of Science, and Wiley Online Library, was used to complete an online search. To this aim, we identified and, then, combined three keywords, namely "smart cities," "knowledge management," and "organizational culture." Thereby, the resulting search string is ("smart cities" OR "smart city") AND ("knowledge management" OR "KM") AND ("organizational culture") to search the titles, abstracts, and keywords of available articles. That means other perspectives of "culture" are not included in this study as they are not the focus of the paper.

In reference to the inclusion criteria, a strict selection criterion for the inclusion of studies was developed in order to provide the best quality evidence. Articles were reviewed according to their relevant subject. In particular, the articles must be published in peer-reviewed journals that were available online within the time frame from 2010 to 2020 in English language and had relevance with respect to the research aim. According to Natalicchio, Ardito, Savino, and Albino (2017), these choices are justified by the fact that those inclusion criteria may assure the identification of the most relevant articles related to the topic under investigation (see Table 3 for the selected articles). The abstracts were then read, and if the article was considered to be relevant to the research aim, the full text was reviewed to decide whether it was suitable for inclusion in the final analysis.

The second stage involved carrying out the review of relevant articles. The full text of the selected articles was read to determine the relevance with respect to the aim of the study. A total number of 18 articles were reviewed, categorized, and analyzed. The third and final stage is reporting and dissemination. This stage involved critically documenting and presenting the results from the analysis of the selected articles. A discussion of the cultural transformation necessary for managing knowledge in the context of smart cities is outlined.

**Table 3.** Analysis of the reviewed literature

Reference	Title	Journal	Methodology	Perspective / focus	Discussion
Allameh, Zamani, and Davoodi (2011)	The relationship between organizational culture and knowledge management	Procedia Computer Science	Case study	The relationship between organizational culture and KM	Knowledge is considered as a valuable key in competition. Culture represents the main obstacle and also an empowering factor in KM activities.
Nguyen and Mohamed (2011)	Leadership behaviors, organizational culture and knowledge management practices.	Journal of Management Development	Questionnaire-based survey	The effect of culture on leadership and KM	Both transformational and transactional leadership are positively related to KM practices. Effective KM requires that attention be paid to the human and cultural aspects of business, particularly the experiences and tacit knowledge of employees.
Dameri and Ricciardi (2015)	Smart-city intellectual capital: an emerging view of territorial systems innovation management.	Journal of Intellectual Capital	Long-term, in-depth ethnographic exploration	SC from managerial point of view	It suggests that knowledge management is crucial to better supporting managerial practices in smart-city organizations. SC organization requires the development of specific, intertwined KM management and project portfolio management approaches, capabilities, and tools.
Lara, Da Costa, Furlani, and Yigitcanla (2016)	Smartness that matters towards a comprehensive and human-centered characterization of smart cities. Journal of Open Innovation:	Technology, Market, and Complexity	Systematic literature review	Cultural and human-centric approach of SC	Smart cities necessitate providing quality of life (e.g., income, health, education, mobility) in addition to promoting a lifestyle aligned with the values and other constituents of local culture.
Mainka et al. (2016)	Open innovation in smart cities: Civic participation and co-creation of public services.	Proceedings of the Association for Information Science and Technology	Panel discussion	SC as an open innovation platform	Smart-city concepts follow the open innovation approach and involve all city stakeholders in decision-making processes. User-centric personal data ecosystem is an enabling condition for citizens' participation in smart-city initiatives as information providers.
Appio, Lima, and Paroutis (2019)	Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges.	Technological Forecasting and Social Change	Systematic literature review	Physical infrastructure, innovation, and quality of life	Proposed a hybrid framework attempts to avoid infrastructure-centric view of smart cities by emphasizing the role of infrastructure as a means to achieving more collaborative innovation ecosystems and ultimately leading to a higher quality of citizens' life.
Ardito et al. (2019)	The role of universities in the knowledge management of smart-city projects	Technological Forecasting and Social Change	Multiple case study	Managerial dynamics rather than technological advancement	KM Governance and KM processes are the main issues for effective implementation of KM are smart-city projects. Knowledge can reside in different domains within and beyond projects boundaries.
Brandt, Andersson, and Kjellstrom (2019)	The future trip: a story of transformational change	Journal of Organizational Change Management.	Case study	Transformational change	Transformational change is described as a fundamental change in culture, practices, and underlying assumptions of the organization. When an organization is confronted with a major change, it calls for transformation of the organization and culture.

Reference	Title	Journal	Methodology	Perspective / focus	Discussion
Mora, Deakin, and Reid (2019)	Strategic principles for smart-city development: A multiple case study analysis of European best practices.	Technological Forecasting and Social Change	Multiple case study analysis	Strategic principles drive smart-city development	Smart-city strategic framework should look beyond technology and adopt an integrated vision. SC needs to boost the organizational culture and accelerate the development of digital innovation initiatives.
Osman (2019)	A novel big data analytics framework for smart cities.	Future Generation Computer Systems	Systematic literature review	KM frameworks	SC domains necessitate comprehensive analytics based on datasets generated from different domains.
Pham, Paille, and Halilem (2019)	Systematic review on environmental innovativeness: A knowledge-based resource view	Journal of Cleaner Production	Systematic literature review	Environmental innovativeness at a firm level	Organizational culture has a strong effect on driving organizational behavior and success. A strong organizational culture is reluctant to change and can, therefore, resist innovation. One challenge of the leaders is to innovate culture to make it compatible with their strategy of innovation.
Praharaj and Han (2019)	Cutting through the clutter of smart-city definitions: A reading into the smart-city perceptions in India	Culture and Society	Multiple case studies/questionnaire survey	Various smart-cities perceptions	A city that promotes business and entrepreneurial culture and spearheads innovation. Smart cities should allow capacity for learning and innovation, which is built in the inventiveness of their population, their institutions of knowledge creation and their digital infrastructure for communication and knowledge management.
Sepasgozar, Hawken, Sargolzaei, and Foroozanfa (2019)	Implementing citizen-centric technology in developing smart cities: A model for predicting the acceptance of urban technologies.	Technological Forecasting and Social Change	Quantitative/structured questionnaire survey	Citizen-centric developed technologies for SCs	Giving insights about the importance of local identity, knowledge, and a citizen-centric approach in developing smart-cities strategies. SC must invest in their "analog" or social infrastructure to ensure that their SC technologies promote the objectives of efficiency, inclusion, and innovation
Warner and Wäger (2019)	Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal.	Long Range Planning	Multiple case studies	Building dynamic capabilities for digital transformation	Strategizing in a digital context must be based on crafting a strong digitally oriented culture. Firm's business model, collaborative approach, and culture are the three broad forms relating to the strategic renewal for digital transformation.
Wataya and Shaw (2019)	Measuring the value and the role of soft assets in smart-city development.	Cities	Co-value creation evaluation	Intangible and soft assets in SC development	SC development involves a combination of smart infrastructure, innovative technologies and the use of 'soft assets' to create more effective integration of the changes within each urban community. Outlines and analyses a framework to measure soft assets in SC implementation.
Mugge et al. (2020)	Patterns of Digitization: A Practical Guide to Digital Transformation	Research-Technology Management	Survey	Digital transformation	Transformation strategy establishes the foundations for success and defines the strategic initiatives needed to attain its future purpose. Transformation delivery addresses the mindset and organizational culture companies need to adopt, so they can implement the criteria established in transformation design.

Reference	Title	Journal	Methodology	Perspective / focus	Discussion
Yigitcanlar, Desouza, Butler, and Rookhosh (2020)	Contributions and risks of artificial intelligence (AI) in building smarter cities: Insights from a systematic review of the literature.	Energies	Systematic literature review	Artificial intelligence and SC	Generate insights into forming a better understanding of how AI can contribute to the development of smarter cities using knowledge maps
Zheng et al. (2020)	From digital to sustainable: A scientometric review of smart-city literature between 1990 and 2019	Journal of Cleaner Production	Systematic literature review	Understanding of the fragmented nature and critical paths of SC development	SC is a city of knowledge where technological innovation and people's creativity are supported and encouraged, with strong institutional leadership and organizational capacity, creating the best possible conditions to increase competitiveness and sustainability. Future SCs are inextricably linked to organization knowledge capabilities.

## FINDINGS AND DISCUSSION

### General observations

The first step in the analysis of the selected articles was to classify them by date of publication. More than half of the reviewed articles were published in 2019 (n=10; 56%), around 17% of the articles (n=3) in 2020, and two articles (11%) in 2016, one article in 2015 (5%), and another two articles in 2011 (11%), which are the earliest articles included in the literature review. Regarding the academic journals, the articles published in Technological Forecasting and Social Change appear most often (n=4), followed by Journal of Cleaner Production (n=2), and then one article in Journal of Organizational Change Management, Energies, Research-Technology Management, Culture and Society, Future Generation Computer Systems, Procedia Computer Science, Journal of Management Development, Journal of Intellectual Capital, Technology, Market, and Complexity, Long Range Planning, Cities (n=1). Articles were categorized under five groups (Table.4). These groups were based on the main themes of the reviewed articles and the key considerations of the culture transformation needed for managing knowledge in the context of smart cities. Slightly less than half of the articles (45%, n=8) were in the organizational perspectives of smart cities, around a quarter 22% (n=4) in the organizational change, innovation and digital transformation, 11% were in the relationship between organizational culture and KM (n=2), 11% on smart cities as an open innovation platform (n=2), and 11% on the difference between organizational and urban culture in the development of smart cities (n=2).

**Table 4.** Categories revealed from reviewed literature

Category	Reference
Organizational perspectives of smart cities	Ardito et al. (2019); Appio, Lima, and Paroutis (2019); Osman (2019); Zheng et al. (2020); Praharaj and Han (2019); Yigitcanlar, Desouza, Butler, and Roozkhosh (2020); Mora, Deakin, and Reid (2019); Dameri and Ricciardi (2015).
Organizational change, innovation, and digital transformation	Mugge et al. (2020); Pham, Paille, and Halilem (2019); Brandt, Andersson, and Kjellstrom (2019); Warner and Wäger (2019).
The relationship between organizational culture and KM	Allameh, Zamani, and Davoodi (2011); Nguyen and Mohamed (2011).
Smart cities as an open innovation platform	Mainka et al. (2016); Wataya and Shaw (2019).
The difference between organizational and urban culture in the development of smart cities	Sepasgozar, Hawken, Sargolzaei, and Foroozanfa (2019); Lara, Da Costa, Furlani, and Yigitcanla, (2016).

### Organizational perspectives and soft aspects of smart cities

Papers categorized under organizational perspectives of smart cities are those that provide insights into soft and managerial aspects of smart cities rather than technical and hard infrastructure aspects.

Research in this area focused predominately on the need to go beyond the “hard versus soft” infrastructure dichotomy and to also consider the “soft” strategies for smart-city projects. The contribution of organizational aspects of smart cities focused mainly on facilitating smart people and enabling innovation, supporting smart economy and promoting knowledge as a competitive advantage resource. Additionally, it focuses on managerial dynamics of managing smart cities and the associated organizational perspectives.

Developing unique innovation platforms for organizations implementing smart-city projects facilitates innovation and creativity by creating linkages among citizens, government, businesses, and educational institutions (Yigitcanlar, Desouza, Butler, & Roozkhosh, 2020). These innovative clusters foster the development of high added value activities of the “knowledge economy.” Smart cities necessitate creating unique collaborative platforms in which citizens, prosumers, industries, universities and research centers may develop innovative products, services, and solutions. Contrary to traditional double-sided marketplaces in which only two types of stakeholders participate (supply and demand), a smart-city ecosystem involves many

actors engaged in public and private consumption, production, education, research, entertainment, and professional activities (Praharaj & Han, 2019). This collaboration demands high levels of both human and social capital, as the innovation process is based on knowledge and learning. Thus, knowledge creation and application are major facilitators for creativity and innovation that lead to more competitive and attractive local environments (Appio, Lima, & Paroutis, 2019; Ardito et al., 2019).

Social capital must be reinforced by carefully targeted public policies. By attracting talent and investment and providing high standards of living in terms of security, health and leisure infrastructure, cities become a natural environment for creative minds to gather, share and learn (Yigitcanlar et al., 2018; Praharaj & Han, 2019; Yigitcanlar, Desouza, Butler, & Roozkhosh, 2020). Mora, Deakin, and Reid (2019) noted that hard infrastructure, as well as facilitating knowledge creation and sharing, could develop more competitive business environments within the smart cities. It also enables a knowledge economy environment based on social networks of trust, sharing and learning by creating technology hubs to facilitate the sharing of knowledge in the forms of research centers, start-up incubators, and accelerators, as well as innovation parks (Appio, Lima, & Paroutis, 2019; Mora, Deakin, & Reid, 2019).

Smart cities integrate and combine knowledge about technology, people, and the private sector before actions to create smart economy, smart environment, smart people, and smart living initiatives can be formulated and implemented (Appio, Lima, & Paroutis, 2019; Osman, 2019; Zheng et al., 2020). Such integration efforts require smart-city projects to be composed of public and private players, academia, and the wider community. Thus, it enables an increasing pool of available knowledge and the possibility to address the development of smart-city initiatives from multiple and complementary perspectives. Consequently, this calls for a more substantial governance capacity to cope with the complex set of dynamics and conflicts among the various project partners and stakeholders, especially to enable effective cross-organizational knowledge integration and sharing (Ardito et al., 2019).

The knowledge needed for the development of smart cities can be driven by combining knowledge generated and owned by projects partners with knowledge that originates elsewhere (Ardito et al., 2019; Osman, 2019). Governments and citizens need to provide local knowledge to shape cities with respect to local resources, priorities, values, and needs. Likewise, firms and universities working on smart-city projects are asked to contribute with their technical and scientific know-how to the development of smart cities. Moreover, the acquisition of best practices from other successful smart-city projects may also be beneficial (Yigitcanlar et al., 2018; Mora, Deakin, & Reid, 2019; Osman, 2019). In order to complement the internal knowledge base



of project partners, attraction and retention of skilled human capital is an important managerial issue. On the other hand, managing external knowledge comes with modifying or establishing novel KM processes that can favor the acquisition, internalization, and retention of knowledge. However, the acquisition, internalization and retention of external knowledge may pose further complexities in the project governance. Thus, project partners have to mitigate and reconcile internal conflicts and relationships with external actors must be managed (Ardito et al., 2019; Appio, Lima, & Paroutis, 2019).

Implementing smart cities successfully necessitates analyzing projects at a holistic level that comply with organizational resources and capabilities that align with organization strategy. Smart-city organizations, while inescapably exist in an interdependent environment with external actors, need both important critical resource exchanges and control over the exchange of such resources to manage and avoid the dependence (Pham, Paille, & Halilem, 2019). In this regard, they need an internally based resource to limit the influence attempts of the external and be able to rely on this resource for its own sake. In this regard, the knowledge-based resource is perceived as an essential capacity that needs to be deployed and developed over time. From a resource-based view, people and their intellectual assets are considered a competitive advantage resource when rare, valuable, inimitable, and non-substitutable. From a resource-based view, people and their intellectual assets are considered a competitive advantage resource when it is rare, valuable, inimitable, and non-substitutable. Meanwhile, the knowledge-based view considers the firm's knowledge the "input-output combinations achievable with all possible mixes and levels of activities known to the firm (Pham, Paille, & Halilem, 2019).

### **Organizational transformation and strategic renewal for building a culture of innovation**

Papers in this category provide insights into organizational transformation and the need for enabling creativity and innovation for organizations' differentiation and competitive advantage. Research in this area focused predominately on the impact of culture on an organization's performance and success, challenges for culture transformation, and the need for digital transformation.

To sustain their competitive advantage, smart-city organizations need to differ not only in values, resources and competence but also in their vision; thus, strategy focuses on making a future that requires continuous improvement and innovation (Pham, Paille, & Halilem, 2019). This requires putting humans at the center of strategy, treating strategy as a dynamic process, and having a social agenda. A unique idea and differentiation create

organizational competitive advantages. Therefore, facilitating creativity is becoming a core skill of organizational capabilities. In this regard, creativity deals with effective brainstorming and slow thinking that is uncomfortable (Pham, Paille, & Halilem, 2019).

Developing smart cities requires encouraging a culture where knowledge can be constantly created, transferred, and codified (Pham, Paille, & Halilem, 2019). Smart cities require enabling open innovation; by directing efforts towards searching for knowledge external to the organizational boundary; this can be via employing individuals, liaisons or technology license. From the knowledge-based view, the creation of the firm's knowledge necessarily involves both inflows and outflows for organizational learning and the evolution of knowledge. Hence, open innovation is a good tool to enhance smart cities' development provided that the organization knows the right actors and the right moment to exchange ideas (Pham, Paille, & Halilem, 2019).

Organizational culture has a significant effect on driving organizational behavior and success. However, strong organizational culture is reluctant to change and can, therefore, resist innovation. As such, innovating company culture represents significant challenges for smart-city organizations to make it compatible with their smart-city strategy (Pham, Paille, & Halilem, 2019). Transformational change is a lengthy process because it must include sense making and a gradual re-evaluation of practices and assumptions. Employees must be given time to adopt new ways of working and thinking to make change stick (Brandt, Andersson, & Kjellstrom, 2019). However, around 70%–80% of all change initiatives fail on numerous improvement projects. Precisely, in cultural transformation efforts, approximately 90% of these change efforts never reach their targets (Brandt, Andersson, & Kjellstrom, 2019). Among others, lack of attention to corporate culture, employee resistance to change, and the leader's lack of ability to drive change are the key causes of failure.

Among the types of changes an organization may have to handle, transformational change is the most challenging and lengthy one. Compared with less radical changes, transformational change affects the entire organization. It is described as a fundamental change in culture, practices, and underlying assumptions of the organization. Several perspectives have to be considered, and the balance between context, content, and process is crucial (Brandt, Andersson, & Kjellstrom, 2019). Smart cities must understand that major change takes time and the lack of long-term orientation can be identified as an explanation of failure in change efforts (Mugge et al., 2020).

Digital transformation has gained significant attention in consulting publications and management journals, illustrating a profound interest – if not an outright economic need – to better define, understand, and manage digital

transformation. Knowledge, tools, and the will to undergo change are the key factors in achieving digital transformation (Mugge et al., 2020). However, the rapid speed of disruptive innovation has been identified as a key strategic threat to organizations. Yet, organizations are concerned that new technologies will outpace their ability to keep up or remain competitive, and whether they are agile enough to respond to new business and market expectations (Mugge et al., 2020). Implementing a data-driven culture is one of the biggest challenges in digitally transforming one's business model. The need for culture change and associated behavioral changes are the major obstacles to digital effectiveness. Transformation delivery addresses the mindset and organizational culture companies need to adopt, so they can implement the criteria established in transformation design (Mugge et al., 2020).

Smart cities must invest in new technologies to build new businesses; not simply automating current business processes. Similarly, smart cities need breakthrough business models that include key stakeholders from outside the boundaries of the enterprise (Ardito et al., 2019; Mugge et al., 2020). Developing a breakthrough business model with external partners is by far, one of the hardest things for established firms to learn and do.

Developing capabilities for digital transformation is necessary for smart cities. The vision for digital transformation needs to be communicated across the organization. Communication is a vital feature of a change management process. Once a vision for change is created, leaders need to communicate the message frequently and powerfully. The message about digital transformation will likely compete with other day-to-day communications, so it needs to be embedded in everything leaders do (Mugge et al., 2020). Smart-city leaders need to foster timely, transparent, and open communications. Communications are the formal and informal rules and behaviors of how information is exchanged between individuals and/or organizations. Communications greatly influence the success and speed of digital transformation within an organization (Mugge et al., 2020).

The strategic renewal of organizational culture is more apparent at an advanced stage of digital transformation. Transforming the business model and/or collaborative approach serves as preconditions to trigger more profound corporate culture changes. Organizations can refresh their corporate culture with a wide range of digital initiatives. However, it is important to notice that digitalization should not replace historic values but should rather continue to refresh the roots of corporate culture (Warner & Wäger, 2019). Digital transformation also consists of a cultural orientation (e.g., a specific mindset) that recognizes the importance of fast and flexible decision making for competing in an uncertain context. Warner and Wäger (2019) also noted that strategizing in a digital context must be based on

crafting a strong, digitally oriented culture. The promotion of digital culture will accelerate the company's digital transformation.

### **The relationship between organizational culture and KM**

How organizational culture can affect KM in an organization is the focus of this set of papers. Research in this area has focused predominately on the importance of KM as a strategic competitive advantage, the impact of culture on KM success and the effectiveness in an organization, and the challenges for cultural transformation to facilitate KM.

An increasing number of organizations are turning to KM as a key to leverage their distinctive core competencies in their pursuit of competitive advantage. KM goes beyond technology; organizational culture in which roles are defined has a critical role in knowledge creation and transfer (Nguyen & Mohamed, 2011). Effective KM depends not only on IT platforms, but more broadly on social ecology and the organizational culture of an organization. However, organizational culture is widely held to be a major barrier to creating and leveraging knowledge and is located at the top of a list of obstacles in knowledge transfer (Allameh, Zamani, & Davoodi, 2011). Therefore, in order to achieve effective KM in organizations implementing smart-city projects, attention must be paid to the human, environmental and cultural aspects of business, particularly the experiences and tacit knowledge of employees (Nguyen & Mohamed, 2011).

In addition to the capability to integrate the daily activities of employees to reach the planned goals, organizational culture can also help organizations adapt well to the external environment for rapid and appropriate responses (Nguyen & Mohamed, 2011). An organizational culture context conditions people actions, beliefs, and widely held values. Thus, culture determines a large part of what organizations do and how they do it. Therefore, promoting a supportive organizational culture is important to support KM and enhance organizational innovation (Allameh, Zamani, & Davoodi, 2011). However, smart cities need to understand that KM may be hindered by organizational culture that is highly formalized and heavily dependent on standard operating procedures, rules, and regulations. It is also important to recognize that secondary cultural embedding mechanisms and contextual factors such as organizational structures, existing systems and procedures, formal arrangement of works, and workspaces' physical arrangement are all essential parameters for managing knowledge effectively (Nguyen & Mohamed, 2011).

Organizational culture is considered the most influential factor in KM and organizational learning as it affects behaviors related to knowledge creating and sharing (Nguyen & Mohamed, 2011). 'Knowledge culture' is one of the specific

branches of organizational culture. It is an indication of an organizational life method that uses people to create and exchange information. Moreover, it uses its own as well as other's knowledge to accomplish organizational goals and attain success (Allameh, Zamani, & Davoodi, 2011).

Most of the added value that is gained through technical changes via KM was not the result of the technology used; rather, it was the result of the adopted culture and the organizational managing roles and also the people who used this technology in the most efficient manner. Thus, smart cities must understand that culture is an important as well as a complicated issue in KM. The presence of a specific culture in an organization is necessary for the effective performance of KM processes. Developing an efficient culture for managing smart-city related knowledge requires a culture that emphasizes knowledge exchange, trust in interactions, and creativity. Such knowledge would be successful in performing management processes.

Organizational values can result in various behaviors that impact KM processes. For example, a positive aspiration and motivation for exchanging knowledge, the dominance of a good context in an organization, and reciprocal trust between personal factors would affect knowledge management positively. However, negative competition and unwillingness for sharing knowledge are among factors that affect KM adversely. Shared values are a crucial part of organizational culture. Smart-city organizations need to encourage more supportive and open value tendencies that have more potential to show behaviors that enhance knowledge creation and sharing. The issue of knowledge possession depends on people's viewpoint about the possession of their personal knowledge. Here, shared organizational values would also affect personnel's perception of knowledge possession. An organization's social interaction is also greatly dependent on organizational culture, which can impact KM and creation. Culture also formulates some processes for knowledge production and selection. Personnel's perception of an organization's view about defeats and mistakes are among the important factors of this role (Allameh, Zamani, & Davoodi, 2011).

### **Smart cities as an open innovation platform**

Smart-city development necessitates processes that aim to fulfill different areas of expertise/function and this requires broad cross-sectional collaboration to provide objective results. Such efforts encourage scaling-up the activities to meet higher outcomes. Therefore, open communications across different and similar levels of staff in a firm are important. This facilitates an open environment with a balanced top-down and bottom-up

culture. The process of creating values needs the involvement of all levels of stakeholders in an iterative process (Wataya & Shaw, 2019).

With the advent of the knowledge society, participation and co-creation of public services have become crucial in smart-city decision-making processes. The transfer of knowledge through face-to-face interaction and the transfer of information through digital networks are spurring the process of innovation. The combination of both dimensions needs particular attention in the field of information science to enable suitable methods of knowledge management at the city level (Mainka et al., 2016).

Smart-city initiatives are highly information-intensive and often use citizen-generated information, which raises many problems concerning how this information is collected and used (Mainka et al., 2016). Open innovation is understood to mean the free flow of knowledge and innovative ideas between different stakeholders. This term originates from economics and describes the flow of ideas from inside and outside of a company and from inside to the outside of a market. What is genuinely new is that the role of external ideas is acknowledged as being equally important as internal ideas. Smart-city concepts follow this approach and involve all city stakeholders in decision-making processes (Schaffers et al., 2011). Cities have become “collaborative innovation platforms” (Tukiainen, Leminen, & Westerlund, 2015). Innovation in cities can refer to creating something new, such as start-up businesses or to improving existing things and processes, e.g. through the use of information and communication technology (ICT). The idea of smart cities becoming an open innovation platform is rather new, and in only a few cases, this approach has been realized.

Cities that try to meet the needs of the knowledge society, e.g., through case studies to improve processes or establish new ideas, are “living laboratories” (living labs) (Tukiainen, Leminen, & Westerlund, 2015). Whether they are from public services, local firms, or the citizens, stakeholders of the city work together and spur each other on. Innovative ideas can come from each stakeholder. To implement open innovation at the city level is as difficult as in companies that are mostly deadlocked in hierarchical structures. Thus, open innovation approaches have mostly been implemented experimentally in different cases (e.g., the citizen relationship management system, which has been implemented in a few cities in the US) (Mainka et al., 2016).

### **The difference between urban culture and organizational culture in the development of smart cities**

Local identity and knowledge are a fundamental source of value for cities and the practical base upon which smart-city plans must engage (Yigitcanlar,

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Desouza, Butler, & Roozkhosh, 2020; Sepasgozar, Hawken, Sargolzaei, & Foroozanfa, 2019). Despite this, the smart-city has been presented as a global phenomenon with little attention to local contexts. Sepasgozar, Hawken, Sargolzaei, and Foroozanfa (2019) noted that current smart-city plans have tended to picture the city as a “blank canvas upon which powerful, sophisticated technology can simply be overlaid and made to work in straightforwardly useful, new ways.”

According to Lara, Da Costa, Furlani, and Yigitcanla (2016), smart cities can be defined as “a city that gives inspiration, shares culture, knowledge, and life, a city that motivates its inhabitants to create and flourish in their own lives. Zhao (2011) also defined smart cities as “improving the quality of life in a city, including ecological, cultural, political, institutional, social, and economic components without leaving a burden on future generations.” Hence, developing smart cities can be understood as promoting a lifestyle aligned with the values and other constituents of local culture as well as providing quality of life (e.g., levels of income, health, education, and mobility) (Lara, Da Costa, Furlani, & Yigitcanla, 2016). For cities to select and develop appropriate citizen-focused technology, they must understand their citizens and develop appropriate technologies that will be well received. Such smart-city research frameworks are described as “citizen centric” (Lara, Da Costa, Furlani, & Yigitcanla, 2016; Lee & Lee, 2014). The World Bank reinforces this view by suggesting that future smart cities must invest in their “analog” or social infrastructure to ensure that smart-city technologies promote the objectives of efficiency, inclusion, and innovation. The development of appropriate smart-city technologies can provide access to development and economic opportunities. One of the most well-known examples of a breakthrough, smart technology for developing contexts, is M-Pesa, the mobile phone-based money transfer, and microfinancing service. Such digital technologies have dramatically expanded access to finance, lowered transaction costs, and made a whole range of other industries more viable (World Bank, 2016).

## CONCLUSION

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The study reported in this paper offers a novel contribution to the literature by mapping out the scientific landscape of the understudied ‘managing knowledge in the context of smart cities from an organizational culture perspective.’ This study helps identify the current and potential contributions of the organizational perspectives of managing knowledge for the development of smart cities and in determining the gaps in the literature to bridge them in prospective studies. The study also gives a heads up for urban policymakers,



planners, and scholars to prepare for the challenges that organizations face in their efforts to manage and implement smart cities successfully.

This paper generates insight into forming a better understanding of the cultural transformation needed for managing knowledge in the context of smart cities by undertaking a systematic review of the literature. Table 3 lists the analysis highlights of the reviewed literature. The findings of our systematic literature review reveal that: (a) A smart-city is a city of knowledge where technological innovation and people's creativity are supported and encouraged to increase competitiveness and sustainability; (b) Smart cities emerge as a result of the knowledge economy highlighting the capacity to exploit ICTs for supporting human learning, technological advance, and innovation procedures in cities; (c) Organizational culture is a significant driver to organizational behavior and success and is the primary enabler of strategy implementation; (d) Cultural transformation establishes the foundations for success and defines the strategic initiatives needed to attain the company's future purpose; (e) Organizational cultural changes is a challenging task and efforts hardly reach their targets. Lack of attention to corporate culture is the key causes of failure; (f) Smart cities must promote digital transformation and an open innovation culture that facilitates efforts to search for knowledge external to the organizational boundary. Smart-city concepts follow the open innovation approach and involve all city stakeholders in decision-making processes. For example, the Manchester Smart City initiative includes many experiments with digital technologies such as using the Internet of Things in city lighting. The fourth and final form of collaborative innovation in cities views a city as a platform for creating new business opportunities. Helsinki's effort to open up public data is one example of a city stimulating innovation by creating new business opportunities (Tukiainen, Leminen, & Westerlund, 2015).

Knowledge is a fundamental source of value for cities and the practical base upon which smart-city plans must engage. Organizations developing smart-city projects have to become learning organizations, so as to improve their performance and enhance competitive advantage. However, knowledge management systems go beyond technology, as organizational culture, in which new roles are defined, has a critical role in knowledge creation and sharing. Therefore, smart cities must simultaneously consider culture styles and key organizational and market conditions in order to enhance their performance and competitiveness.

Organizations implementing smart-city projects need to build a knowledge culture. Therefore, they should transform, develop and nurture systems and processes to ensure knowledge creation, storing, codification and sharing in a meaningful way to expand tacit knowledge into explicit knowledge, which can

in turn, be used for continuous learning and enhance competitive advantage. It is also important for smart-city organizations to encourage employees to contribute their knowledge, and to promote interactions in order to foster knowledge creation, capture and sharing. The challenge for smart-city leaders is to develop an organizational culture encouraging the sharing of knowledge and where learning becomes the norm.

The move towards an increasingly digital world is rapidly changing the ways in which people and organizations create, use and share data, information and knowledge, which is specifically relevant in the context of smart-city development. For example, according to an iGov (2019) survey, in London and its outskirts, authorities identified the need to deliver better public services for citizens and connecting public services to support service integration (such as health and social care, and justice and emergency services) as the most significant drivers behind a digital strategy for their cities. Thinking about digital transformation, they also identified cost efficiencies and the need to increase citizen engagement and future-proof services as key factors (iGov, 2019).

Research findings have theoretical contributions, academic contributions, and practical implications. The theoretical contributions are twofold. First, from theoretical perspectives, the paper tried to provide an insightful understanding of organizational perspectives of managing knowledge in smart cities and the cultural transformation needed for successful implementation. Second, no study has ever synthesized the antecedents of culture transformation as an organizational prerequisite for knowledge management in the context of smart cities; this systematic review, therefore, fills this research gap. From an academic perspective, this paper contributes to education and organizational training by offering an overview of the importance of organizational culture in managing knowledge in the context of smart cities, as well as the roadmap to achieve along with the organizational preparedness for the necessary resources and capabilities. From a practical perspective, knowing the determinants and the facilitators of smart-city development from organizational and KM perspectives will keep city leaders and decision makers on the right track. This will enable them to plan for the challenges and obstacles and avoid unsuccessful implementation.

## References

- Abdalla, W., Renukappa, S., Suresh, S., & Al-Janabi, R. (2019). Challenges for managing smart cities initiatives: An empirical study. In *3rd International Conference on Smart Grid and Smart Cities (ICSGSC)* (pp. 10-17). IEEE. Retrieved from <http://dx.doi.org/10.1109/ICSGSC.2019.00-26>

- Alavi, M., & Leidner, D.E. (2001). Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107–136. <http://dx.doi.org/10.2307/3250961>
- Albino, V., Berardi, U., & Dangelico, R.M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*, 22(1), 3-21. <https://doi.org/10.1080/10630732.2014.942092>
- Allameh, M., Zamani, M., & Davoodi, S.M.R. (2011). The relationship between organizational culture and knowledge management: (A case study: Isfahan University). *Procedia Computer Science*, 3, 1224-1236. <http://dx.doi.org/10.1016/j.procs.2010.12.197>
- Al Murawwi, M.A., Behery, M., Papanastassiou, M., & Ajmal, M. (2014). Examining the relationship between organizational culture and knowledge management: The moderation effect of organizational divisions at an Abu Dhabi gas company. *SAM Advanced Management Journal*, 79(2), 48-59.
- Angelidou, M. (2014). Smart city policies: A spatial approach. *Cities*, 41, S3-S11. <http://dx.doi.org/10.1016/j.cities.2014.06.007>
- Anttiroiko, A.-V., Valkama, P., & Bailey, S.J. (2014). Smart cities in the new service economy: Building platforms for smart services. *AI & Society*. 29 (3), 323–334. <http://dx.doi.org/10.1007/s00146-013-0464-0>
- Akhavan, P., Sanjaghi, M.E., Rezaeenour, J., & Ojaghi, H. (2014). Examining the relationships between organizational culture, knowledge management and environmental responsiveness capability. *VINE: The Journal of Information and Knowledge Management Systems*, 44(2), 228-248. <http://dx.doi.org/10.1108/VINE-07-2012-0026>
- Appio, F.P., Lima, M., & Paroutis, S. (2019). Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges. *Technological Forecasting and Social Change*, 142, 1-14. <http://dx.doi.org/10.1016/j.techfore.2018.12.018>
- Ardito, L., Ferraris, A., Petruzzelli, A.M., Bresciani, S., & Del Giudice, M. (2019). The role of universities in the knowledge management of smart city projects. *Technological Forecasting and Social Change*, 142, 312-321. <http://dx.doi.org/10.1016/j.techfore.2018.07.030>
- Bakici, T., Almirall, E., & Wareham, J. (2013). A smart city initiative: The case of Barcelona. *Journal of the Knowledge Economy*, 4(2), 135-148.
- Bhatt, G.D. (2001). Knowledge management in organizations: Examining the interaction between technologies, techniques, and people. *Journal of Knowledge Management*. 5(1), 68-75. <http://dx.doi.org/10.1108/13673270110384419>
- Boulton, A., Brunn, S.D., & Devriendt, L. (2011). 18 cyber infrastructures and 'smart' world cities: Physical, human and soft infrastructures. *International Handbook of Globalization and World Cities*, 198. <http://dx.doi.org/10.4337/9781781001011.00028>
- Brandt, E.N., Andersson, A.C., & Kjellstrom, S. (2019). The future trip: A story of transformational change. *Journal of Organizational Change*

- Management*, 32(7), 669-686. <http://dx.doi.org/10.1108/JOCM-09-2017-0358>
- Bresciani, S., Ferraris, A., & Del Giudice, M. (2018). The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart city projects. *Technological Forecasting and Social Change*, 136, 331-338. <http://dx.doi.org/10.1016/j.techfore.2017.03.002>
- Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18(2), 65-82. <http://dx.doi.org/10.1080/10630732.2011.601117>
- Castaneda, D.I., Manrique, L.F., & Cuellar, S. (2018). Is organizational learning being absorbed by knowledge management? A systematic review. *Journal of Knowledge Management*, 22(2), 299-325. <http://dx.doi.org/10.1108/JKM-01-2017-0041>
- Chourabi, H., Nam, T., Walker, S., Gil-Garcia, J.R., Mellouli, S., Nahon, K., Pardo, T.A., & Scholl, H.J. (2012). Understanding smart cities: An integrative framework. In *45th Hawaii International Conference on System Sciences* (pp. 2289-2297). IEEE. <http://dx.doi.org/10.1109/HICSS.2012.615>
- Dalkir, K. (2017). *Knowledge Management in Theory and Practice*. 3<sup>rd</sup> ed. Cambridge, MA: MIT Press. <http://dx.doi.org/10.4324/9780080547367>
- Dameri, R.P., & Ricciardi, F. (2015). Smart city intellectual capital: An emerging view of territorial systems innovation management. *Journal of Intellectual Capital*, 16(4), 860-887. <http://dx.doi.org/10.1108/JIC-02-2015-0018>
- Dixon T., Wetering J., Sexton M., Ling Lu S., Williams D., Duman D., & Chen X. (2017). *Smart Cities, Big Data and the Built Environment: What's Required?* Research Report Series. Project Report. London: RICS.
- Essawi, M., & Tilchin, O. (2013). A model of knowledge management culture change. *American Journal of Industrial and Business Management*, (3), 467-471. <http://dx.doi.org/10.4236/ajibm.2013.35053>
- Giffinger, R. Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. (2007). Ranking of European medium-sized cities. Retrieved 31 May, 2020, from [http://www.smart-cities.eu/download/smart\\_cities\\_final\\_report.pdf](http://www.smart-cities.eu/download/smart_cities_final_report.pdf)
- Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. *California Management Review*, 33(3), 114-135. <http://dx.doi.org/10.2307/41166664>
- Gray, R. (2006). Social, environmental and sustainability reporting and organisational value creation? *Accounting, Auditing & Accountability Journal*, 19(6), 793-819. <http://dx.doi.org/10.1108/09513570610709872>
- Groysberg, B., Lee, J., Price, J. & Cheng, J. (2018). The leader's guide to corporate culture. *Harvard Business Review*, 96(1), 44-52
- Holzer, M. & Manoharan, A.P. (2016). *Digital Governance in Municipalities Worldwide (2015-16)*. Seventh global e-governance survey:

- A longitudinal assessment of municipal websites throughout the world. Newark: National Center for Public Performance.
- Hanson, D. (2012). Built on values: Creating an enviable culture that outperforms the competition. *People & Strategy*, 35(4), 59-60
- Hess, T., Matt, C., Benlian, A., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive*, 15(2), 123-139.
- Hollands, R.G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?. *City*, 12(3), 303-320. <http://dx.doi.org/10.1080/13604810802479126>
- Iansiti, M., & Lakhani, K. R. (2014). Digital ubiquity: How connections, sensors, and data are revolutionizing business. *Harvard Business Review*, 92(11), 90–99.
- iGov. (2019). Smart cities and the digital transformation of local government. Virgin Media Business. Retrieved 02 June, 2020, from <https://www.virginmediabusiness.co.uk/pdf/Insights%20Guides/Built-Environment-Report.pdf>
- Karimi, J., & Walter, Z. (2015). The role of dynamic capabilities in responding to digital disruption: A factor-based study of the newspaper industry. *Journal of Management Information Systems*, 32(1), 39-81. <http://dx.doi.org/10.1080/07421222.2015.1029380>
- Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383–397. <http://dx.doi.org/10.1287/orsc.3.3.383>
- Kourtit, K., & Nijkamp, P. (2012). Smart cities in the innovation age. *Innovation: The European Journal of Social Science Research*, 25(2), 93-95. <http://dx.doi.org/10.1080/13511610.2012.660331>
- Lara, A.P., Da Costa, E.M., Furlani, T.Z., & Yigitcanla, T. (2016). Smartness that matters: Towards a comprehensive and human-centered characterization of smart cities. *Journal of Open Innovation: Technology, Market, and Complexity*, 2(2), 8. <http://dx.doi.org/10.1186/s40852-016-0034-z>
- Lee, J., & Lee, H. (2014). Developing and validating a citizen-centric typology for smart city services. *Government Information Quarterly*, 31, S93-S105. <http://dx.doi.org/10.1016/j.giq.2014.01.010>
- Leon, R.D., & Romanelli, M. (2020). Rethinking Romanian and Italian smart cities as knowledge-based communities. In *Exploring Digital Ecosystems* (pp. 11-23). Cham: Springer. [http://dx.doi.org/10.1007/978-3-030-23665-6\\_2](http://dx.doi.org/10.1007/978-3-030-23665-6_2)
- Lin, H., & Hwang, Y. (2014). ‘Do feelings matter? The effects of intrinsic benefits on individuals’ commitment toward knowledge systems’. *Computers in Human Behavior*, 30(1), 191–198. <http://dx.doi.org/10.1016/j.chb.2013.07.056>
- Mainka, A., Castelnovo, W., Miettinen, V., Bech-Petersen, S., Hartmann, S., & Stock, W.G. (2016). Open innovation in smart cities: Civic participation and co-creation of public services. *Proceedings of the Association for Information Science and Technology*, 53(1), 1-5. <http://dx.doi.org/10.1002/pr2.2016.14505301006>

- Mannion, R., Konteh, F.H., & Davies, H.T.O. (2009). Assessing organizational culture for quality and safety improvement: A national survey of tools and tool use. *BMJ Quality & Safety*, 18(2), 153-156. <http://dx.doi.org/10.1136/qshc.2007.024075>
- Massingham, P. (2014). An evaluation of knowledge management tools: Part 1 – managing knowledge resources. *Journal of Knowledge Management*, 18(6), 1075-1100. <http://dx.doi.org/10.1108/JKM-11-2013-0449>
- Mathiesen, B.V., Lund, H., Connolly, D., Wenzel, H., Østergaard, P.A., Möller, B., Nielsen, S., Ridjan, I., Karnøe, P., Sperling, K., & Hvelplund, F.K. (2015). Smart Energy Systems for coherent 100% renewable energy and transport solutions. *Applied Energy*, 145, 139-154. <http://dx.doi.org/10.1016/j.apenergy.2015.01.075>
- Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change*, 142, 70-97. <http://dx.doi.org/10.1016/j.techfore.2018.07.035>
- Mugge, P., Abbu, H., Michaelis, T.L., Kwiatkowski, A., & Gudergan, G. (2020). Patterns of digitization: A practical guide to digital transformation. *Research-Technology Management*, 63(2), 27-35. <http://dx.doi.org/10.1080/08956308.2020.1707003>
- Nam, T., & Pardo, T.A. (2011). Smart city as urban innovation: Focusing on management, policy, and context. In *Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance* (pp. 185-194). <http://dx.doi.org/10.1145/2072069.2072100>
- Natalicchio, A., Ardito, L., Savino, T., & Albino, V. (2017). Managing knowledge assets for open innovation: A systematic literature review. *Journal of Knowledge Management*, 21(6), 1362. <http://dx.doi.org/10.1108/JKM-11-2016-0516>
- Nguyen, H.N., & Mohamed, S. (2011). Leadership behaviors, organizational culture and knowledge management practices. *Journal of Management Development*, 30(2), 206-221. <http://dx.doi.org/10.1108/02621711111105786>
- Nonaka, I., & Takeuchi, H. (1996). The knowledge-creating company: How Japanese companies create the dynamics of innovation. *Long Range Planning*, 29(4), 592. [http://dx.doi.org/10.1016/0024-6301\(96\)81509-3](http://dx.doi.org/10.1016/0024-6301(96)81509-3)
- Nonaka, I., & Konno, N. (1998). The concept of “Ba”: Building a foundation for knowledge creation. *California Management Review*, 40(3), 40-54. <http://dx.doi.org/10.2307/41165942>
- North, K., Maier, R., & Haas, O. (Eds.). (2018). *Knowledge Management in Digital Change. New Findings and Practical Cases*. Heidelberg: Springer International Publishing. <http://dx.doi.org/10.1007/978-3-319-73546-7>
- O’Dell, C., & Hubert, C. (2011). *The New Edge in Knowledge: How Knowledge Management is Changing the Way We Do Business*. London: John Wiley & Sons. <http://dx.doi.org/10.1002/9781119200802>



- Osman, A.M.S. (2019). A novel big data analytics framework for smart cities. *Future Generation Computer Systems*, 91, 620-633. <http://dx.doi.org/10.1016/j.future.2018.06.046>
- Owoc, M., & Marciniak, K. (2013). Knowledge management as foundation of smart university. In *Federated Conference on Computer Science and Information Systems* (pp. 1267-1272). IEEE.
- Pham, D., Paille, P., & Halilem, N. (2019). Systematic review on environmental innovativeness: A knowledge-based resource view. *Journal of Cleaner Production*, 211, 1088-1099. <http://dx.doi.org/10.1016/j.jclepro.2018.11.221>
- Parmelli, E., Flodgren, G., Beyer, F., Baillie, N., Schaafsma, M.E., & Eccles, M.P. (2011). The effectiveness of strategies to change organizational culture to improve healthcare performance: A systematic review. *Implementation Science*, 6(1), 33. <http://dx.doi.org/10.1186/1748-5908-6-33>
- Pasher, E., & Ronen, T. (2011). *The Complete Guide to Knowledge Management: A Strategic Plan to Leverage Your Company's Intellectual Capital*. London: John Wiley & Sons.
- Paterek, P. (2017). Agile transformation in project organization: knowledge management aspects and challenges. *Academic Conferences and Publishing International Limited*.
- Praharaj, S., & Han, H. (2019). Cutting through the clutter of smart city definitions: A reading into the smart city perceptions in India. *City, Culture and Society*, 18, 100289. <http://dx.doi.org/10.1016/j.ccs.2019.05.005>
- Renukappa, S., Suresh, S., Al Nabt, S., Sarrakh, R., & Algahtani, K. (2020). An ISM approach to evaluate critical success factors for knowledge management in the Kingdom of Saudi Arabia. In A. Hessami (Ed.), *Harnessing Knowledge, Innovation and Competence in Engineering of Mission Critical Systems*. Rijeka, Croatia: InTech Publishing. <http://dx.doi.org/10.5772/intechopen.90069>
- Renukappa, S., Suresh, S., & Alosaimi, H. (2019). Knowledge management-related training strategies in Kingdom of Saudi Arabia construction industry: An empirical study. *International Journal of Construction Management*, 1-11. <http://dx.doi.org/10.1080/15623599.2019.1580002>
- Renukappa, S., Algahtani, K., Al Nabt, S., Suresh, S., & Alosaimi, H. (2017) Investigating the use of knowledge management tools within the Saudi Arabian public sector organizations. *Middle East Journal of Management*, 4(4), 355–371. <http://dx.doi.org/10.1504/MEJM.2017.087522>
- Schaffers, H., Komninos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011). Smart cities and the future internet: Towards cooperation frameworks for open innovation. In *The Future Internet Assembly* (pp. 431-446). Heidelberg, Berlin: Springer. [http://dx.doi.org/10.1007/978-3-642-20898-0\\_31](http://dx.doi.org/10.1007/978-3-642-20898-0_31)
- Schein, E. (1985). *Organizational Culture and Leadership*. San Francisco, CA: Jossey-Bass.
- Schein, E. (1992). *Organizational Culture and Leadership*. 2<sup>nd</sup> ed. San Francisco, CA: Jossey-Bass.



- Schein, E. (1999). *The Corporate Culture Survival Guide: Sense and Nonsense about Cultural Change*. San Francisco, CA: Jossey-Bass.
- Scuotto, V., Ferraris, A., Bresciani, S., Al-Mashari, M., & Del Giudice, M. (2016). Internet of Things: Applications and challenges in smart cities. A case study of IBM smart city projects. *Business Process Management Journal*, 22(2), 357-367. <http://dx.doi.org/10.1108/BPMJ-05-2015-0074>
- Sepasgozar, S.M., Hawken, S., Sargolzaei, S., & Foroozanfa, M. (2019). Implementing citizen centric technology in developing smart cities: A model for predicting the acceptance of urban technologies. *Technological Forecasting and Social Change*, 142, 105-116. <http://dx.doi.org/10.1016/j.techfore.2018.09.012>
- Suresh, S., Olayinka, R., Chinyio, E., & Renukappa, S. (2017) Impact of knowledge management practices on construction projects. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law*, 170(1), 27-43. <http://dx.doi.org/10.1680/jmapl.15.00057>
- Todericiu, R., & Stanit, A. (2016). Knowledge management practices improvement in public sector administration. *Review of General Management*, 24(2), 33–39.
- Tukiainen, T., Leminen, S., & Westerlund, M. (2015). Cities as collaborative innovation platforms. *Technology Innovation Management*, 5(10), 16-23.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence informed management knowledge by means of systematic review. *British Journal of Management*, 14(3), 207-222. <http://dx.doi.org/10.22215/timreview/933>
- UNECE. (2015). United Smart Cities: Smart urban solutions for transition and developing countries. United Nations. Economic Commission for Europe. Retrieved 30 May, 2020, from [https://www.unece.org/fileadmin/DAM/hlm/projects/SMART\\_CITIES/United\\_Smart\\_Cities\\_Project\\_Document.pdf](https://www.unece.org/fileadmin/DAM/hlm/projects/SMART_CITIES/United_Smart_Cities_Project_Document.pdf)
- Vallicelli, M. (2018). Smart cities and digital workplace culture in the global European context: Amsterdam, London and Paris. *City, Culture and Society*, 12, 25-34. <http://dx.doi.org/10.1016/j.ccs.2017.10.001>
- Warner, K.S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326-349. <http://dx.doi.org/10.1016/j.lrp.2018.12.001>
- The World Bank, & World Bank Group. (2016). *World Development Report 2016: Digital Dividends*. World Bank Publications. <http://dx.doi.org/10.1596/978-1-4648-0671-1>
- Wataya, E., & Shaw, R. (2019). Measuring the value and the role of soft assets in smart city development. *Cities*, 94, 106-115. <http://dx.doi.org/10.1016/j.cities.2019.04.019>
- Xu, Q., Wu, Z., & Wang, L. (2012). Study on strategic schema of smart cities. In *International Symposium on Management of Technology (ISMOT)* (pp. 308-312). IEEE. <http://dx.doi.org/10.1109/ISMOT.2012.6679482>
- Yigitcanlar, T. (2016). *Technology and the City: Systems, Applications and Implications*. New York: Routledge. <http://dx.doi.org/10.4324/9781315739090>

- Yigitcanlar, T., Desouza, K.C., Butler, L., & Roozkhosh, F. (2020). Contributions and risks of artificial intelligence (AI) in building smarter cities: Insights from a systematic review of the literature. *Energies*, 13(6), 1473. <http://dx.doi.org/10.3390/en13061473>
- Yigitcanlar, T., Kamruzzaman, M., Buys, L., Ioppolo, G., Sabatini-Marques, J., da Costa, E.M., & Yun, J.J. (2018). Understanding 'smart cities': Intertwining development drivers with desired outcomes in a multidimensional framework. *Cities*, 81, 145-160. <http://dx.doi.org/10.1016/j.cities.2018.04.003>
- Younes, M., & Aljunaedi, B. (2018). Smart city and e-government components. *International Journal of Engineering & Technology*, 7(4), 3941-3945.
- Zhao, J. (2011). *Towards Sustainable Cities in China: Analysis and Assessment of Some Chinese Cities in 2008*. Berlin: Springer Science & Business Media. <http://dx.doi.org/10.1007/978-1-4419-8243-8>
- Zheng, C., Yuan, J., Zhu, L., Zhang, Y., & Shao, Q. (2020). From digital to sustainable: A scientometric review of smart city literature between 1990 and 2019. *Journal of Cleaner Production*, 120689. <http://dx.doi.org/10.1016/j.jclepro.2020.120689>

### **Abstrakt**

*Inteligentne miasta (ang. smart cities) mają ambicje wykorzystywać w pełni możliwości, jakie przedstawia perspektywa „gospodarki i społeczeństwa opartego na wiedzy”. Dlatego planiści i decydenci muszą rozwijać miasta, które wykorzystują lokalną wiedzę i kapitał intelektualny ludności. Kultura organizacyjna jest powszechnie uważana za główną przeszkodę w tworzeniu i wykorzystywaniu wiedzy. Skuteczne wdrożenie zarządzania wiedzą (KM) prawie zawsze wymaga zmiany kultury w celu promowania kultury dzielenia się wiedzą i współpracy. Stąd też organizacje wdrażające smart cities muszą kłaść duży nacisk na konieczność zmiany kultury organizacyjnej miasta. Jednak zarządzanie zmianą kulturową miasta stanowi wyzwanie. Dokładny charakter, strategia i kultura wspierająca rozwój inteligentnych miast, którą należy przyjąć pozostaje wciąż nieokreślona. Badanie przedstawione w niniejszym opracowaniu miało na celu zbadanie organizacyjnej transformacji kulturowej potrzebnej do zarządzania wiedzą w kontekście inteligentnych miast. Metodologiczne podejście do tego badania to systematyczny przegląd literatury, obejmujący publikacje dotyczące kultury organizacyjnej i kultury wiedzy inteligentnych miast. Metoda zastosowana w tym badaniu obejmowała trzy etapy: planowanie, przeprowadzenie oraz raportowanie i upowszechnianie wyników. W wyniku analizy literatury ujawniono trzy kluczowe tematy wymagające dalszej eksploracji: perspektywy organizacyjne inteligentnych miast; zmiany organizacyjne, innowacje i transformacja cyfrowa; oraz związek między kulturą organizacyjną a KM. Ustalono, że miejska transformacja kulturowa niezbędna do rozwoju inteligentnych miast powinna w efekcie ułatwić integrację, tworzenie i rekonfigurację kompetencji wewnętrznych i zewnętrznych do zarządzania wiedzą, która pochodzi z projektów miejskich i spoza nich. Sformułowane spostrzeżenia i zidentyfikowane kierunki badawcze dostarczają naukowcom, decydom i planistom miejskim informacji, które pozwalają im przygotować się na wyzwania, przed*

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którymi stoją organizacje miejskie w swych wysiłkach na rzecz skutecznego zarządzania i wdrażania idei inteligentnych miast.

**Słowa kluczowe:** kultura, inteligentne miasta, zarządzanie wiedzą, zmiana transformacyjna

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## Conflicts of interest

The authors declare no conflict of interest.

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