Smart City as Urban Innovation: Focusing on Management, Policy, and Context

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ABSTRACT
This paper sees a smart city not as a status of how smart a city is but as a city's effort to make itself smart. The connotation of a smart city represents city innovation in management and policy as well as technology. Since the unique context of each city shapes the technological, organizational and policy aspects of that city, a smart city can be considered a contextualized interplay among technological innovation, managerial and organizational innovation, and policy innovation. However, only little research discusses innovation in management and policy while the literature of technology innovation is abundant. This paper aims to fill the research gap by building a comprehensive framework to view the smart city movement as innovation comprised of technology, management and policy. We also discuss inevitable risks from innovation, strategies to innovate while avoiding risks, and contexts underlying innovation and risks.

Categories and Subject Descriptors
H.4.2 [**Information Systems Applications**]: Type of systems—e-government applications

General Terms
Management, Performance, Human Factors, Theory

Keywords
Smart city, Public sector innovation, Urban innovation, Sociotechnical perspective

1. SMART CITY: A RISING WAVE
Some quick numbers about cities over the globe merit attention. Ten percent of the world population lives in the top 30 metropolises, and 600 cities accommodate its quarter [36]. Currently half of the total population lives in cities. The world is at an unprecedented level of urbanization [33-35]. The trajectory of the rapid urban population growth is not just an interesting fact but requires a demanding imperative for sustainable development and better livability. The expansion of cities face a variety of challenges [101]. Although cities occupy less than two percent of the landmass of the earth, urban residents consume over three quarters of the world's natural resources and are primarily responsible for green-house gas emissions [70]. Problems arising from rapid urbanization indicate a loss of basic functionalities to be a livable place: for example, difficulty in waste management, scarcity of resources, air pollution, human health concerns, traffic congestion, and inadequate, deteriorating and aging infrastructures [12,96,101]. Another set of problems is social and organizational rather than technical, physical or material. Concerns are substantially associated with multiple diverse stakeholders, high levels of interdependence, competing values, and social and political complexity. In this sense, problems become wicked and tangled [28,88,102].

To prevent the rapid urbanization from being a crisis is to operate cities in an innovative way. To that end, making a city smart is a new approach to urban development. The popular saying that crisis is the mother of innovation applies for smart cities as well. The smart city approach is emerging as a way to solve tangled and wicked problems inherited in the rapid urbanization. Since the wicked and tangled problems of urbanization are social, political and organizational, smart city strategies for innovation must reflect consideration of management and policy as well as technology. While commentators tend to spotlight the technological sides of a smart city, its organization and policy issues have not gained much attention. The meaning of smartness in the urban or metropolitan context not only indicates utilizing cutting-edge of information and communication technologies (ICTs), but also importantly management and policy concerns. Furthermore, the adoption of technology is not an end, but a more vital thing is the smart use of technology adopted and, in turn, smart use also necessitates smart management and policy.

We identify a smart city as one with a comprehensive commitment to innovation in technology, management and policy. Innovation for a smart city entails opportunities and risks at the same time. There is a gap in existing literature of a smart city. Most writers address only technological aspects. So far the literature has viewed a smart city as a manifestation of innovative ideas, mostly neglecting considerations of the policy and managerial side of innovation. However, reviewing a wide array of literature on e-government projects, information technology innovation and urban innovation provides a lens to view a smart city as an innovation in management and policy and consider contexts where a smart city initiative is developed. Drawing from the broad literature, we discuss non-technological side of a smart city as innovation but substantially related to technology.

This paper is presented in six sections, including the foregoing introduction. Section 2 explores the concepts of smart city innovation and then constructs a framework of a smart city as innovation. Section 3 highlights organizational and managerial

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innovation for a smart city. Section 4 drills down into the policy innovation aspects of smart city. Section 5 discovers contexts of smart city innovation. The concluding section suggests implications for both practitioners and researchers. The implications represent propositions derived from rich discussion of smart city innovation.

2. SMART CITY IS INNOVATION

2.1 Conceptual Elements of Smart City

Before exploring details of a smart city as an innovation, we need to understand its core conceptual elements. The smart city concept itself is still emerging, and the work of defining and conceptualizing it is in progress [13,57].

Table 1. Working Definitions of Smart City

	Definition
[45]	"A city well-performing in a forward-looking way in various characteristics, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens"
[52]	"A city that monitors and integrates conditions of all of its critical infrastructures"
[54]	A city "connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city."
[96]	A city "combining ICT and Web 2.0 technology with other organizational, design and planning efforts to de-materialize and speed up bureaucratic processes and help to identify new, innovative solutions to city management complexity, in order to improve sustainability and livability"
[101]	"The use of Smart Computing technologies to make the critical infrastructure components and services of a city—which include city administration, education, healthcare, public safety, real estate, transportation, and utilities—more intelligent, interconnected, and efficient."

Table 1 describes several working definitions currently used. We recognize three key themes in those definitions. First, infrastructures are central to the smart city concept. Technology is an enabler of a smart city, but it is not necessarily the most critical factor [79]. Combination, connection and integration of systems and infrastructures are fundamental to a city being smart [2-4]. Core systems are not discrete, and become a complex multi-dimensional network of diverse systems interconnected in a synergistic fashion that promotes optimum performance [34,96]. Second, processes—how to make a city smart—are important in the working definitions. A major element of a smart city is a fundamental change to the way that services are delivered, and delivering the smart city is not primarily about technology but about service transformation and improvement [21]. Finally, visions for the better future are also important. A smart city should envision smart economy, smart governance, smart mobility, smart environment, smart people, and smart living [44,45,72,96].

2.2 Smart City Innovation

Innovation simply denotes "novelty in action" [5] and "new ideas that work" [77]. These short definitions commonly emphasize not just a new idea but a new practice. When we treat a smart city not as a status of how smart a city is but as a city's effort to make itself smart, the connotation of a smart city represents city innovation. The label smart city points to innovation for dealing with urban problems associated with urban agglomerations [18]. A smart city is ICT-enabled public sector innovation made in urban settings. It supports long-standing practices for improving the operational and managerial efficiency and the quality of life by building on advances in ICTs and infrastructures [53]. Innovation links between the definitional components of a smart city discussed above. Smart city innovation occurs at infrastructures and processes to realize visions.

Previous literature of public sector innovation and urban innovation provides categories or dimensions of innovation. Damanpour's [26] typology distinguishes between technical and administrative/organizational innovations. Smith and Taebel [93] suggested the three dimensions of innovation in municipal government bureaucracies: management, technology, and administration. According to Hartley [54], innovation could be made in product, service, process (new ways in which organizational processes are designed, and administrative reorganization into front-office and back-office processes), position (new contexts), strategy (new goals or purposes), governance (new forms of citizen engagement and democratic institutions), and rhetoric (new language and new concepts).

2.3 Smart City Risk

All innovations have opportunities and risks. A smart city characterized as innovation becomes a living laboratory for experiment [17], which necessarily entails unavoidable risks (generated by new, untested trials). A smart city initiative is not only an innovation driver but also an effort to manage risks of innovation. Risks of smart city innovation are of interest in this paper, because previous research has underestimated the possible negative effects by the development of new technological and networked infrastructures needed for a city to be smart [18,57]. A smart city initiative as innovation may introduce a new level of complexity. The initiative extends beyond technology, integrating technology, people, capability, and global reach into systems that are sufficiently complex for unexpected emergent properties to develop [62].

The failure in managing high risks leads to total failure in technology-driven public sector projects. 85 percent of IT projects fail because of the challenges by non-technical aspects of innovation in large part—policy, organization, and management-related risks [41,104]. Common reasons include poor planning, weak business case, lack of top management support, lack of leadership, lack of professional skills, misalignment between organizational goals and project objectives, vulnerability to policy swings, too much technology-driven enthusiasm, and political hyper-activism [15,19,25,29,48,55].

Furthermore, public sector innovation itself could be an oxymoron [11], since public sector innovation projects have conditions less friendly for innovation. Government agencies are monopolies without competitive pressure to innovate as well as bureaucracies structured to perform core tasks with stability and consistency, and resist change or disruption of those tasks. The public sector cannot easily burden varying costs of learning, experimentation and improvisation. The avoidance of failure is an organizational priority in the public sector and is highly valued because of accountability [29,85]. Risk taking through experimentation is likely to be institutionally blocked in government. Public sector e-services has a legacy of a risk-averse environment where the focus is on the politically charged short-

term delivery of goals and results, lacking a long-term strategy of service innovation [24].

2.4 Framework

A comprehensive view of smart city innovation is comprised of technology, management, and policy innovations. The two non-technical sides (management and policy) of a smart city merit further consideration. Table 2 presents the multidimensional framework of smart city innovation, placing value on an equal importance of technology, organization, policy and context dimensions.

Table 2. The Framework of Smart City Innovation

Dimension	Innovation How can we change the way government delivers service?	Risk What are risks from innovation?	Way to Success How can we deal with risks while innovating?
Technology (to serve as a tool for innovation)	▪ Leveraging transformational potentials of advanced ICTs	▪ Lack of knowledge ▪ Incompatibility ▪ Too much hope ▪ Security	▪ System interoperability ▪ Integration of systems and infrastructures
Organization (to manage innovation)	▪ Enhancing efficient, effective management (front-office and back-office) ▪ Improving interoperability within or across organizational boundaries	▪ Organizational conflict ▪ Resistance to change ▪ Misalignment between goals and projects	▪ Enterprise interoperability and business modeling ▪ Cross-organizational management and managerial interoperability ▪ Leadership
Policy (to create an enabling environment)	▪ Redesigning relationships between government and actors ▪ Policy experiment	▪ Inconsideration of multiple stakeholders ▪ Political pressure ▪ Conflict with other policies	▪ Policy integration ▪ Marketing ▪ Governance ▪ Collaboration ▪ Partnership
Context	▪ Physical dimension ▪ Environment ▪ Level of interactions		▪ Consideration of context

A smart city as an innovation harnesses the transformational potential of smart technologies (for example, instrumentation with intelligent sensors), mobile technologies, virtual technologies, cloud computing, and digital networks such as Mobile wireless and Metropolitan Area Networks (MANs) [106]. These technological innovations induce technology-related risks such as incompatibility between old and new systems, the lack of technological knowledge, and too much hope over technological feasibility [29]. Interoperability is fundamental to technological innovation in a smart city context. A smart city provides interoperable services that enable ubiquitous connectivity to transform government processes, both internally across agencies and externally to citizens and businesses [2-4]. To make a city smart, technologies should be readily integrated across systems and organizations [15].

Technological performance is not to be taken for granted as a logical progression from technological advancement, but rather performance depends on effective management of technological systems and infrastructure. Smart communities are not just exercises in deploying and using technology [39]. Organizational and policy innovation enables technological potentials, and thus technological innovation requires organizational and policy innovation [68]. Innovation is thus a shift in both policy and management practices to better meet a city's technology needs [15]. Advanced technologies increase complexity and uncertainty. The greater the risk, the more necessary to look beyond technology for effective managerial and policy tools necessary to deal with the risk [62]. Alongside advances in technology, advances in city management and policy are necessary for innovation.

We simply define smart city innovation in terms of technology, organization, and policy as follows:

- **Technology innovation**: a mechanism to change and upgrade technological tools to improve services and create conditions where the tools can be better used.
- **Organization innovation**: a mechanism to create managerial and organizational capabilities for effective use of technological tools and conditions.
- **Policy innovation**: a mechanism to address institutional and non-technical urban problems and create conditions enabling for a smart city.

In addition, context of innovation needs to be considered. Contextual components vary with characteristics of cities. The unique context of each city shapes the technological, organizational and policy aspects of that city. A smart city can be considered a contextualized interplay among technological innovation, managerial and organizational innovation, and policy innovation.

This paper does not emphasize the role of technology again in parallel to the prior literature that already sufficiently has discussed technological innovation for a smart city. Instead we will contribute to a balanced view through filling a research gap between much-addressed issues and less-addressed ones by considering management, policy and context. Table 2 presents a framework that helps understand smart city efforts from the perspective of the four dimensions. The next sections outline the organizational-managerial, policy, and contextual dimensions of a smart city.

3. ORGANIZATIONAL INNOVATION

This section introduces organizational and managerial strategies for smart city innovation. According to Moon and Norris [76], managerial innovativeness is the most compelling reason why municipal governments adopt new ICTs in their core functions. Managerial innovation affects the degree of technological innovation and administrative innovation [100]. Successful organizational change in the public sector should be managed [42]. A smart city is the application of intelligence to city management [12]. Various strategic approaches are applicable to smart city innovation.

3.1 Enterprise Architecture

Smart city innovation can be characterized as an enterprise interoperability initiative. Ross, Weill, and Robertson [90] defined enterprise architecture as "the organizing logic for core business processes and IT infrastructure reflecting the standardization and integration of a company's operating model (p. viii)." In their view, enterprise architecture boils down to two concepts: business process integration and business process

standardization. Thus enterprise architecture is not an IT issue—it's a business issue. Enterprise architecture is not only applied for companies but also to governments. Enterprise architecture and business process modeling are a way to organizational and managerial innovation to change traditional bureaucracy. The term *enterprise* refers to the scope of architecture, denoting a distinct, interdependent group as a whole consisting of multiple agencies working jointly and a defined network of those organizations sharing a policy area to provide services that no single agency provides alone [81]. It is considered a requisite for *whole-of-government* collaboration [20,31,61]. According to Ebrahim and Irani [38], the e-government architecture defines "the standards, infrastructure components, applications, technologies, business model and guidelines for electronic commerce among and between organizations that facilitates the interaction of the government and promotes group productivity (p. 591)." Enterprise architecture is crucial for designing and developing systems that are aligned with business process management, identified within the enterprise architecture not as project-specific but rather as whole of government [38,60,89,91,92]. The readiness for business model and enterprise architecture [23] is thus an important capability for innovation toward a smart city.

3.2 Cross-organizational Management

Smart city innovation necessitates advanced levels of sharing and integration of information and knowledge. To that end, managerial interoperability across organizations and applications is a key enabler of cross-organizational information and knowledge integration necessary for ICTs to deliver on the promise of government transformation [80]. Governments are increasingly turning to cross-organizational interoperability as a strategy for maximizing the value of information. The growing support for interoperability transcends political partisanship and crosses policy areas and institutions. Achieving interoperability across boundaries of agencies and levels of government requires leadership appropriate for cross-boundary settings, network, and governance.

3.3 Extensive Roles of Leadership

Top-management support and commitment to organizational change play an especially crucial role in success of innovation [1,16,30,42,64,107]. An important role of both executive and managerial leaders is also to champion the cause of innovation, establish unambiguous reasoning for change, identify and encourage champions, and develop a single set of goals which people can commit to [21,42]. Especially, Chief Information Officers (CIOs) in metropolises are identified as enablers of a smart city [101].

Leadership in cross-organizational settings represents various capabilities of leaders and managers. Leadership is not only exercised for a single agency, department or team, but extending to a network and enterprise of organizations. This does not suggest that central leadership is unimportant, but notably ICT-driven organizational, structural changes such as network encourage coordination among diverse actors rather than hierarchical command and control [56]. Thus leaders should develop their network leadership skills. Successful implementation of a smart city initiative needs strong leadership [21]. City leaders can develop a social infrastructure for collaboration through which multiple organizations join their efforts across boundaries of jurisdictions and sectors [65].

4. POLICY INNOVATION

While technology is a tool, innovation in policy can lead to using the tool in a smart way. Innovative government stresses changes in policy, because government cannot innovate without a normative drive [40]. Whereas innovation in technology can be observed and broadly agreed, innovation in policy is more ambiguous [54]. We suggest three key policy directions for smart city innovation.

4.1 Policy Integration

Urban policy plays an important role in shaping and changing the regional, national and even global linkages of cities [9]. Coordination of policies—across a variety of spatial scales, across organizational practices, and across all levels of governance—is of vital importance to innovation in a city [70,84]. In particular, metropolitan areas are receivers of a plethora of policies from a number of bodies, but policies from different levels of governments may be often poorly coordinated, fragmented, overlapping, or even conflicting, and thus producing perverse outcomes. Integration is not merely for technologies, systems, infrastructure, services or information but for policies. "Packages of policies," not single-focused interventions, are essential to successful innovation [63,73,99].

Van Winden [99] suggested a distinction between three types of policy integration: sectoral, horizontal, and vertical. Sectoral integration relates to the coordination of policy fields and sectors: e.g., economic policy, transportation policy, and housing policy. Horizontal integration denotes the alignment of policies between actors in an urban area [82,83]. Most metropolitan areas are governed by many municipalities that interact with each other and share resources. Vertical integration concerns the coordination between different layers of government—typically federal (central or national), state (provincial or regional), local (or municipal), and international context.

Creating a comprehensive vision for a metropolitan region can be an important step in achieving greater policy integration. Different visions for a smart city may conflict with each other, but successful modern cities combine multiple visions [73]. For example, increasing accessibility to transportation could be detrimental to the urban environment, while the improvement of air quality might result in restricting the accessibility. A challenge for that city is to maintain economic growth, stay accessible and improve quality of life at the same time. Possible is a situation where one stone catches two birds. A policy approach for that is "decoupling" [10], which originally arises from a set of policies that contribute to reducing the transport intensity of activities while at the same time maintaining economic growth. In this case, decoupling economic growth from negative externalities of transport must be recognized as a priority issue for policy. For this approach, policies need integration. Linking health to transport policies, by including references to healthy lifestyles and related concerns, is a useful way of persuading citizens to change transport choices. In this way, transport policies integrate other policy areas: health care, public safety, and economic development.

4.2 Branding for Marketing

Policy rhetoric is necessary for city marketing [7]. Innovation in the policy dimension requires a branding strategy [69]. A brand is also a public promise that a city government makes to urban residents and external people or organizations. Image making is not a minor issue but pivotal to the transition to a smart city because a popular brand makes a city well-known to the outside world [58]. Cities, not nations, now compete for people, ideas and capital, and a city's smartness is increasingly becoming a major selling point. City marketing is necessary for cities that act as a magnet to attract new talent, resources and investments.

A city brand should tell its differentiating strengths [33-35]. Labeling a city as a smart one or an alternative equivalent nickname has the risk that the ambiguous naming is no better than hype, illusion, fad or empty rhetoric [22]. In contrast, there are some telling examples where hard-charging rhetoric underpins constructive policy developments. Hospers [58] offered three examples as a result-targeted and broadly-supported branding strategy to promote a city's sustainable growth and differentiate itself from others: "Austin: USA's Live-Music Capital," "The Øresund: The Human Capital," and "Manchester: Original and Modern." Austin, the capital of Texas, is the hang-out for the domestic pop and rock industry. The Øresund, the Danish-Swedish border city, is now famous for good to live, work and play. The nickname of Manchester, UK, sounds like repeating its glorious past as a historical cradle of the Industrial Revolution, and thereby making the city a modern as well as classic industrial metropolis.

4.3 Demand-focused Initiative

Policies in successful smart cities are demand-driven rather than supply-driven, or well-balanced between the two approaches. The difference between demand and supply does not only account for economic activities but a contrast between governmental push for a smart city initiative and non-governmental parties' engagement in the initiative. At the most fundamental level, smarter government means making operations and services truly citizen-centric [59]. Supply-side (government-driven) policies alone are insufficient and need complementing with demand-side initiatives. Smart city policies need to be balanced with more on the demand side and encourage diversity, social networks and cross-sector innovation. Successful innovation is oftentimes made by involvement of key stakeholders [49-51,54].

Demand-focused policies may lead to better governance. Governance is a form of concerted action by a number of actors and the capacity to get things done in the face of complexity, conflict and social change [99]. In particular, ICT-enabled governance is the interplay between ICTs and governance processes [74,75,103]. Governance empowered by digital networks reflects a shift from existing and increasingly ineffective hierarchical structures toward frameworks better understood in terms of the negotiated involvement of multiple public and private stakeholders operating at different scales [43,56,84,86,97,98].

Policies for a smart city initiative should support collaboration and partnership as a strategy to overcome fragmentation by including key stakeholders. A smart city becomes a laboratory for collaboration among different functional sectors, and among different jurisdictions [39].

Demand-side policies also promote and facilitate active citizenship and citizen-centered network governance. A smart city initiative needs to create a community where all citizens can engage more easily and effectively [21,83]. Citizen engagement has the potential to develop citizens' sense of ownership of their city, enhance the local authority's awareness of their needs, and ultimately reshape the citizen-government relationship [67,97]. Web 2.0 gives government more opportunities to engage the public in a transparent and learning environment that provides feedback into governance [24]. Donovan et al. [37] highlighted a large-scale municipal e-government project in Ireland, *Innovative Cities for the Next Generation* (ICING). Its major principle, "the thin skinned city," connotes a city becoming more sensitive and responsive to the requirements of residents living in a city.

5. CONTEXT OF SMART CITY

Any normative claim about the future of cities is necessarily contextual [13]. Context characterizes and matters for innovation to a substantial degree [54]. Each city has unique contexts regarding innovation for a smart city, and the way any city designs its strategy can be unique [96]. Both innovation and risk should be identified in context. A thorough characterization of a set of likely risks given the context of a particular initiative should complement the presentation of strategies [47].

5.1 Physical Dimension: Distance Not Dead

Today's technologies are called "space-shrinking technologies" [32], which have enabled a knowledge society and a global community. One may say that place is no longer of importance and then all we need is a good cable connection to put the entire world within easy reach. Yet, the hyperbolic claim that distance is dead belies an important paradox [108]. Geographical concepts such as distance, location, place and space still matter for innovation of a city [14,63,68,84]. Face-to-face contacts between people remain of crucial importance. The proximity of people is still a necessary condition for intensive communication and exchange of knowledge.

There are a variety of reasons why the physical dimension matters in this digital age. A progressive reason is the feasibility of a hybrid (material plus virtual) city, which is an experiential blurring between cyberspace and material space [108]. The ambivalent relationship between the supposed placelessness of cyberspaces and the continued importance of place signals a core concern for smart cities [13]. As well, the context of urban proximity still matters due to many compelling reasons. The economic and technological attractiveness of cities is attributable to the presence of agglomeration economies [8]. Innovative organizations and people will continue to come together and cluster in specific sites such as financial districts, industrial districts, and cultural zones [6]. Urban agglomeration of talent and creativity induces innovation; the more concentrated the talent, the more innovative the output [105].

In turn, spatial concentration generates wicked urban problems. Poverty researchers report negative neighborhood effects such as growing income polarization and decaying community infrastructure [14]. Neighborhoods in the same city are not often equal in the accessibility and usability of traffic systems, digital infrastructures and other services. For example, the digital divide in some urban areas becomes a neighborhood-specific spatial

issue. Location context advantages some areas while disadvantaging others.

5.2 Larger Environmental Context

Urban policies are closely linked to and influenced by the larger environmental (social, political, economic, cultural, and demographic) context [47]. Odendaal [78] compared smart city initiatives in Brisbane and Durban in terms of the larger environmental context. Success of the two cities relies upon contextual differences in the relationships among key actors and the environment of politics and economy. Seeing the changing geopolitical context, Eger [39] claimed there is no one-size-fits-all approach for city innovation. City government's imperative is thus to establish a set of clearly articulated strategies that are well-situated in the environmental context.

Challenges in the larger environmental context reflect the increasing exclusion of particular segments of the population, on the basis of socioeconomic gaps [72]. A demographic gap is also obvious in access to online tools. Many cities are concerned with the impact of aging society on technology diffusion. In contrast, the proportion of Digital Natives, Digital Immigrants [87], or Net Generation [94]—those who have been born into and are familiar with new technologies—forms an important urban context that merits our attention, because the technology-savvy generation is likely to benefit from smart city innovation.

Another environmental context is that of urban competitiveness on international pressure. The intensity of competition among global cities may shape a suite of policies for a smart city. There are several evaluation metrics for ranking and rating smart cities and their innovation initiatives. A representative evaluation is European Smart Cities Ranking, which could be an effective instrument for positioning, benchmarking and branding cities. The metrics, however, generates some risks—i.e., neglecting complex interrelations, ignoring a long-term perspective, and touting current initiatives as stereotypes [45,46].

5.3 The Level of Interactions

The complexity of innovation and the uncertainty of the environment substantially influence innovation [95]. Levels of complexity vary with the nature of interactions. Smart city initiatives can be intergovernmental, interorganizational or intraorganizational, and they can be program-specific or enterprise-wide [80]. The scope of smart city initiatives can extend beyond city boundaries to multi-jurisdictional context. Objects of interaction include data, information, and knowledge. Activities for interaction can be sharing, communication or integration. Various possible combinations create the varying extent of complexity. Smart city initiatives in which more actors and higher levels are involved would be more complex. Success in smart city innovation requires the ability to understand the level and nature of the complexity.

6. CHALLENGING CONVENTIONAL BELIEFS

The discussion up to this point has explicitly focused on smart city initiatives as managerial and policy innovation to create a balanced perspective between already much-discussed technological issues and relatively little-discussed managerial and policy issues. We see that a majority of smart city studies are technology-oriented and optimistic for the future of smart city initiatives. Their findings are not wrong in themselves but limited and incomplete, so we offer a more comprehensive view of the smart city phenomena. This review on the extensive literature of e-government project, public sector innovation and urban innovation suggests counterclaims against usual (sometimes misleading) beliefs of a smart city. Conclusively, the following propositions are our message to government practitioners and researchers of a smart city.

Proposition 1. *A smart city is not only a technological concept but a socioeconomic development one*.

Technology is obviously a necessary condition for a smart city, but citizens' understanding of the concept is about the development of urban society for the better quality of life. The adoption of up-to-date technologies per se does not guarantee the success of smart city initiatives. Rather, innovation in management style and policy direction makes a city more livable. Success of smart city projects is not determined by technology or technical capital. Success is dependent on leadership and interorganizational coordination. Technology itself does not make any contribution to innovation [66].

Proposition 2. *A smart city is not system-driven but service-oriented.*

The ultimate goal of a smart city is to enhance the overall quality of city services. Establishing an integrative system is not an end in itself, but a mechanism through which service is delivered and information is shared. Organizational and policy innovation for a smart city is to effectively manage service and consider service demands identified through governance.

Proposition 3. *A smart city is not only a municipal phenomenon but also a national or global movement.*

World-renowned metropolises now reside in the context of global competitiveness. Smart city innovation initiatives in those cities are building strategies for marketing a city brand. The impact of a smart city is national and global, beyond the urban boundary.

Proposition 4. *A smart city is not a mono-sectoral concept but a multi-sectoral one.*

The scope of a smart city initiative goes beyond a single sector or organization. A smart city is a new concept of partnership and governance developed through electronic linkage of multi-level, multi-jurisdictional governments and all non-governmental stakeholders such as firms, nonprofits and citizens.

Proposition 5. *A smart city is not revolution but evolution.*

Some commentators derive an image of revolutionary change from a casual glance at current smart city cases. Paying attention to only technological aspects of a smart city renders its image revolutionary. However, that's only partly true. One may have confusion between low hanging fruits (seemingly revolutionary) and long-term strategies (actually evolutionary) [71,82,83,96]. Innovation is a long-term strategy, not a quick solution. One should track the long-run evolutionary trajectories of innovation. While technology changes rapidly, management changes slowly and even policy evolves more slowly [27]. Considering that, we claim a city can keep evolving to a smarter one through innovation.

Proposition 6. *A smart city is not a replacement of physical structures but a harmony between material and virtual world.*

The expectation that a smart city will transcend limitations from time and space is misleading, because the physical context of location and geography still matters for the way of life and the modus operandi of organizations. However, it is true that a smart city has a powerful potential to change our life, in some way and to some degree, by shrinking distance and time. A city in the near future should be able to achieve its visions by seamlessly connecting between both the material and digital world.

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