

## Understanding Smart Cities: An Integrative Framework

### Comprender las ciudades inteligentes: un marco integrador

#### 1. Componente Temático

##### 1.1 Referencia Bibliográfica

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##### 1.2 ¿Quién produce el texto? (texto académico, de ONG, de organismo internacional, etc.), autor, organización, entidad

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##### 1.3 Tesis centrales y argumentación?

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.” [56]

“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” [58] (Gil-Garcia et al., 2012, p. 2290)

La innovación de la ciudad inteligente se basa en la implementación de tecnologías de la información y la comunicación (TIC) para mejorar la calidad de vida de los ciudadanos, la sostenibilidad y la eficiencia de las operaciones urbanas. La creación de una ciudad inteligente implica una estrecha colaboración entre el sector público y privado y requiere la participación activa de los ciudadanos.

##### 1.4 Referencias teóricas y conceptuales del texto

- [1] Al-Hader, M., & Rodzi, A. (2009). *The smart city infrastructure development & monitoring. Theoretical and Empirical Researches in Urban Management*, 4(2), 87-94.
- [2] Al-Hader, M., Rodzi, A., Sharif, A.R., & Ahmad, N. (2009). *Smart city components architecture. In Proceedings of the International Conference on Computational Intelligence, Modelling and Simulation, Brno, Czech Republic, September 7-9.*

- [3] Al-Hader, M., Rodzi, A., Sharif, A.R., & Ahmad, N. (2009). SOA of smart city geospatial management. In *Proceedings of the 3rd UKSim European Symposium on Computer Modeling and Simulation*, Athens, Greece, November 25-27.
- [4] Anthopoulos, L., & Fitsilis, P. (2010). From digital to ubiquitous cities: Defining a common architecture for urban development. In *Proceedings of the 6th International Conference on Intelligent Environments*, Kuala Lumpur, Malaysia, July 19-21.
- [5] Anthopoulos, L., & Fitsilis, P. (2010). From online to ubiquitous cities: The technical transformation of virtual communities. In Sideridis, A. B., & Patrikakis, C. Z. (Eds.), *Next Generation Society: Technological and Legal Issues* (Vol. 26, pp. 360-372). *Proceedings of the Third International Conference, e-Democracy 2009* (Athens, Greece, September 23-25), Berlin, Germany: Springer. Available from <http://www.springerlink.com/content/g644776482968k36/fulltext.pdf>.
- [6] Barzilai-Nahon, K. (2006). Gaps and bits: Conceptualizing measurements for digital divide/s. *The Information Society*, 22(5), 269-278.
- [7] Barzilai-Nahon, K. (2009). Gatekeeping: A critical review. *Annual Review of Information Science and Technology*, 43(1), 1-79.
- [8] Belissent, J. (2011). *The Core of a Smart City Must Be Smart Governance*. Cambridge, MA: Forrester Research, Inc.
- [9] Bellamy, C. (2000). The politics of public information systems. In G. D. Garson (Ed.), *Handbook of Public Information Systems*. New York: Marcel Dekker.
- [10] Borja, J. (2007). Counterpoint: Intelligent cities and innovative cities. *Universitat Oberta de Catalunya (UOC) Papers: E-Journal on the Knowledge Society*, 5. Available from <http://www.uoc.edu/uocpapers/5/dt/eng/mitchell.pdf>.
- [11] Boulton, A., Brunn, S.D., & Devriendt, L. (2011). Cyberinfrastructures and "smart" world cities: Physical, human, and soft infrastructures. In Taylor, P., Derudder, B., Hoyler, M., & Witlox, F. (Eds.), *International Handbook of Globalization and World Cities*. Cheltenham, UK: Edward Elgar. Available from [http://www.neogeographies.com/documents/cyberinfrastructure\\_smart\\_world\\_cities.pdf](http://www.neogeographies.com/documents/cyberinfrastructure_smart_world_cities.pdf).
- [12] Bronstein, Z. (2009). Industry and the smart city. *Dissent*, 56(3), 27-34. Available from [http://www.community-wealth.org/\\_pdfs/articlespublications/cross-sectoral/article-bronstein.pdf](http://www.community-wealth.org/_pdfs/articlespublications/cross-sectoral/article-bronstein.pdf).
- [13] Brown, M. M., & Brudney, J. L. (2003). Learning organizations in the public sector? A study of police agencies employing information and technology to advance knowledge. *Public Administration Review*, 63(1), 30-43.
- [14] Cairney, T., & Speak, G. (2000). *Developing a 'Smart City': Understanding Information Technology Capacity and Establishing an Agenda for Change*. Sydney, Australia: Centre for Regional Research and Innovation, University of Western Sydney. Available from [http://trevorcairney.com/file\\_uploads/cgi\\_lib.30886.1.IT\\_Audit.pdf](http://trevorcairney.com/file_uploads/cgi_lib.30886.1.IT_Audit.pdf).
- [15] Castells, M. (1996). *Rise of the Network Society: The Information Age*. Cambridge, MA: Blackwell.
- [16] Dawes, S. S., Cresswell, A. M., & Pardo, T. A. (2009). From "need to know" to "need to share": Tangled problems, information boundaries, and the building of public sector knowledge networks. *Public Administration Review*, 69(3), 392-402.

- [17] Dawes, S. S., & Pardo, T. A. (2002). *Building collaborative digital government systems*. In McIver, W. J., & Elmagarmid, A. K. (Eds.), *Advances in Digital Government: Technology, Human Factors, and Policy*. Norwell, MA: Kluwer Academic Publishers.
- [18] Dirks, S., Gurdgiev, C., & Keeling, M. (2010). *Smarter Cities for Smarter Growth: How Cities Can Optimize Their Systems for the Talent-Based Economy*. Somers, NY: IBM Global Business Services. Available from <ftp://public.dhe.ibm.com/common/ssi/ecm/en/gbe03348usen/GBE03348USEN.PDF>.
- [19] Dirks, S., & Keeling, M. (2009). *A Vision of Smarter Cities: How Cities Can Lead the Way into a Prosperous and Sustainable Future*. Somers, NY: IBM Global Business Services. Available from <ftp://public.dhe.ibm.com/common/ssi/ecm/en/gbe03227usen/GBE03227USEN.PDF>.
- [20] Dirks, S., Keeling, M., & Dencik, J. (2009). *How Smart is Your City?: Helping Cities Measure Progress*. Somers, NY: IBM Global Business Services. Available from <ftp://public.dhe.ibm.com/common/ssi/ecm/en/gbe03248usen/GBE03248USEN.PDF>.
- [21] Ebrahim, Z., & Irani, Z. (2005). E-government adoption: Architecture and barriers. *Business Process Management Journal*, 11(5), 589-611.
- [22] Eger, J. M., & Maggipinto, A. (2010). *Technology as a tool of transformation: e-Cities and the rule of law*. In A. D'Atri & Saccà, D. (Eds.), *Information Systems: People, Organizations, Institutions, and Technologies*(pp. 23-30). Berlin/Heidelberg, Germany: PhysicaVerlag.
- [23] Florida, R. (2002). *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday life*. New York: Basic Books. Available from <http://www.washingtonmonthly.com/features/2001/0205.florida.html>.
- [24] Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., & Meijers, E. (2007). *Smart Cities: Ranking of European Medium-Sized Cities*. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology. Available from [http://www.smart\\_cities.eu/download/smart\\_cities\\_final\\_report.pdf](http://www.smart_cities.eu/download/smart_cities_final_report.pdf).
- [25] Giffinger, R., Kramar, H., & Haindl, G. (2008). *The role of rankings in growing city competition*. In *Proceedings of the 11th European Urban Research Association (EURA) Conference*, Milan, Italy, October 9-11, Available from [http://publik.tuwien.ac.at/files/PubDat\\_167218.pdf](http://publik.tuwien.ac.at/files/PubDat_167218.pdf).
- [26] Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*, 22(2), 187-216.
- [27] Griffith, J. C. (2001). Smart governance for smart growth: The need for regional governments. *Georgia State University Law Review*, 17(4), 1019-1062.
- [28] Hall, R. E. (2000). *The vision of a smart city*. In *Proceedings of the 2nd International Life Extension Technology Workshop*, Paris, France, September 28, Available from <http://www.osti.gov/bridge/servlets/purl/773961-oyxp82/webviewable/773961.pdf>.
- [29] Harrison, C., Eckman, B., Hamilton, R., Hartswick, P., Kalagnanam, J., Paraszczak, J., & Williams, P. (2010). *Foundations for Smarter Cities*. *IBM Journal of Research and Development*, 54(4).
- [30] Hartley, J. (2005). Innovation in governance and public services: Past and present. *Public Money & Management*, 25(1), 27-34.
- [31] Hollands, R.G. (2008). Will the real smart city please stand up? *City*, 12(3), 303-320.

- [32] Johnson, B. (2008). *Cities, systems of innovation and economic development*. *Innovation: Management, Policy & Practice*, 10(2-3), 146-155.
- [33] Johnston, E. W., & Hansen, D. L. (forthcoming). *Design lessons for smart governance infrastructures*. In Ink, D., Balutis, A., & Buss, T. F. (Eds.), *American Governance 3.0: Rebooting the Public Square?* National Academy of Public Administration.
- [34] Kanter, R. M., & Litow, S. S. (2009). *Informed and interconnected: A manifesto for smarter cities*. *Harvard Business School General Management Unit Working Paper*, 09-141. Available from [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1420236](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1420236).
- [35] Lam, W. (2005). *Barriers to e-government integration*. *The journal of Enterprise Information Management*, 18(5), 511-530.
- [36] Landsbergen, D. J., & Wolken Jr., G. (2001). *Realizing the promise: Government information systems and the fourth generation of information technology*. *Public Administration Review*, 61(2), 206-220.
- [37] Luna-Reyes, L. F., Gil-García, J. R., & Cruz, C. B. (2007). *Collaborative digital government in Mexico: Some lessons from federal Web-based interorganizational information integration initiatives*. *Government Information Quarterly*, 24(4), 808-826.
- [38] Lynn, L. E., Heinrich, C. J., & Hill, C. J. (2000). *Studying governance and public management: Challenges and prospects*. *Journal of Public Administration Research and Theory*, 10(2), 233-262.
- [39] Mahler, J., & Regan, P. M. (2002). *Learning to govern online: Federal agency Internet use*. *American Review of Public Administration*, 32(3), 326-349.
- [40] Marceau, J. (2008). *Introduction: Innovation in the city and innovative cities*. *Innovation: Management, Policy & Practice*, 10(2-3), 136-145.
- [41] Mauher, M., & Smokvina, V. (2006). *Digital to intelligent local government transition framework*. In *Proceedings of the 29th International Convention of MIPRO, Opatija, Croatia, May 22-26*
- [42] Mitchell, W. J. (2006). *Smart City 2020, Metropolis*. March 20, Available from <http://www.metropolismag.com/story/20060320/smartcity-2020>.
- [43] Mooij, J. (2003). *Smart governance? Politics in the policy process in Andhra Pradesh, India*. *ODI Working Papers*, 228. Available from <http://www.odi.org.uk/resources/download/1793.pdf>.
- [44] Nam, T. & Pardo, T. A. (2011). *Conceptualizing Smart City with Dimensions of Technology, People, and Institutions*. In *Proceedings of the 12th Annual Digital Government Research Conference, College Park, Maryland, June 12-15*.
- [45] Natural Resources Defense Council. *What are smarter cities?*, Available from <http://smartercities.nrdc.org/about>.
- [46] Nfuka, E. N., & Rusu, L. (2010). *Critical success factors for effective IT governance in the public sector organizations in a developing country: The case of Tanzania*. In *Proceedings of the 18th European Conference on Information Systems (ECIS), Pretoria, South Africa, June 7-9*.
- [47] Norris, P. (2001). *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*. New York: Cambridge University Press.
- [48] Odendaal, N. (2003). *Information and communication technology and local governance: Understanding the difference between cities in developed and emerging economies*. *Computers, Environment and Urban Systems*, 27(6), 585-607.

- [49] Partridge, H. (2004). *Developing a human perspective to the digital divide in the smart city. In Proceedings of the Biennial Conference of Australian Library and information Association (ALIA), Queensland, Australia, September 21-24, Available from <http://eprints.qut.edu.au/1299/1/partridge.h.2.paper.pdf>.*
- [50] Rios, P. (2008). *Creating "the smart city". Available from [http://dspace.udmercy.edu:8080/dspace/bitstream/10429/20/1/2008\\_rios\\_smart.pdf](http://dspace.udmercy.edu:8080/dspace/bitstream/10429/20/1/2008_rios_smart.pdf).*
- [51] Rittel, H. W. J., & Webber, M. (1973). *Dilemmas in a general theory of planning. Policy Sciences, 4(June), 155-169.*
- [52] Rocheleau, B. (2003). *Politics, accountability, and government information systems. In G. D. Garson (Ed.), Public Information Technology: Policy and Management Issues. Hershey, PA: Idea Group Publishing.*
- [53] Scholl, H. J., Barzilai-Nahon, K., Ahn, J-H., Olga, P., & Barbara, R. (2009). *E-commerce and e-government: How do they compare? What can they learn from each other?. Proceedings of the 42nd Hawaiian International Conference on System Sciences (HICSS 2009), Koloa, Hawaii, January 4-7.*
- [54] Scott, W. R. (2000). *Institutions and Organizations. Thousand Oaks, CA: Sage Publications.*
- [55] Servon, L. J. (2002). *Bridging the Digital Divide: Technology, Community, and Public Policy. Malden, MA: Blackwell Publishing.*
- [56] Toppeta, D. (2010). *The Smart City Vision: How Innovation and ICT Can Build Smart, "Livable", Sustainable Cities. The Innovation Knowledge Foundation. Available from [http://www.thinkininnovation.org/file/research/23/en/Toppeta\\_Report\\_005\\_2010.pdf](http://www.thinkininnovation.org/file/research/23/en/Toppeta_Report_005_2010.pdf).*
- [57] Vasseur, J. (2010). *Smart cities and urban networks. In Vasseur, J. & Dunkels, A. (Eds.), Interconnecting Smart Objects with IP: The Next Internet (pp. 360-377). Burlington, MA: Morgan Kaufmann.*
- [58] Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N. M., & Nelson, L. E. (2010). *Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, Its Drivers, and the Role of the CIO. Cambridge, MA: Forrester Research, Inc.*
- [59] Weber, E. P., & Khademian, A. M. (2008). *Wicked problems, knowledge challenges, and collaborative capacity builders in network settings. Public Administration Review, 68(2), 334-349.*
- [60] Yigitcanlar, T., & Velibeyoglu, K. (2008). *Knowledge based urban development: The local economic development path of Brisbane, Australia. Local Economy, 23(3), 195-207.*

## **2. Componente Metodológico**

### **2.1 Estructura del texto (introducción, sección teórica, sección de contexto)**

Introducción

Revisión de la literatura

Marco conceptual: Definición de una ciudad inteligente

Arquitectura de una ciudad inteligente

Componentes de una ciudad inteligente

Desafíos de implementación de una ciudad inteligente

Conclusiones y discusión futura

Referencias bibliográficas.

<b>2.2 Datos: Fuente de los datos: ¿quién los produce?</b>
Los autores mencionan varias fuentes de datos para respaldar su marco integrado de ciudades inteligentes. En particular, utilizan una revisión de la literatura existente en ciudades inteligentes, junto con estudios de caso de ciudades inteligentes y proyectos en curso
<b>2.3 Herramientas metodológicas (entrevistas, estadísticas, revisión de prensa, revisión normativa, cualitativo, cuantitativo, etc.)</b>
Los autores emplean una revisión de la literatura existente sobre ciudades inteligentes para identificar los elementos clave que componen una ciudad inteligente y proponer un marco integrador para entenderlas. Los autores también utilizan una serie de estudios de casos para ilustrar cómo se pueden aplicar los principios y elementos del marco en situaciones concretas. No se mencionan herramientas metodológicas específicas aparte de la revisión de la literatura y los estudios de caso
<b>Conclusiones</b>
<p>The smart city initiatives are designed to develop information technology capacities and establish an agenda for change by industry actions and business development [14]. Creating an environment for industrial development is pivotal to a smart city [12]. The economic outcomes of the smart city initiatives are business creation, job creation, workforce development, and improvement in the productivity.(Gil-Garcia et al., 2012, p. 2293)</p> <p>Las iniciativas de ciudades inteligentes están diseñadas para desarrollar capacidades de tecnología de la información y establecer una agenda para el cambio mediante acciones de la industria y el desarrollo empresarial [14]. La creación de un entorno para el desarrollo industrial es fundamental para una ciudad inteligente [12]. Los resultados económicos de las iniciativas de ciudades inteligentes son la creación de empresas, la creación de empleos, el desarrollo de la fuerza laboral y la mejora de la productividad.</p> <p>In order to reflect the differentiated levels of impact, the factors in our proposed framework are represented in two different levels of influence. Outer factors (governance, people and communities, natural environment, infrastructure, and economy) are in some way filtered or influenced more than influential inner factors (technology, management, and policy) before affecting the success of smart city initiatives. (Gil-Garcia et al., 2012, p. 2294)</p> <p>Para reflejar los niveles diferenciados de impacto, los factores en nuestro marco propuesto están representados en dos niveles diferentes de influencia. Los factores externos (gobernanza, personas y comunidades, entorno natural, infraestructura y economía) se filtran o influyen de alguna manera más que los factores internos influyentes (tecnología, gestión y política) antes de afectar el éxito de las iniciativas de ciudades inteligentes.</p>