



Dijital Çağda Akıllı Şehir Uygulamaları: Gelişmiş İnceleme ve Eleştiri Türkçe Makale Başlığı

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ÖZET

Akıllı şehirler, tüm dünyada çok fazla sayıda -uluslararası örneklerle- hem bilimsel hem de sektörel anlamda yoğun bir ilgi görmektedir. Ancak, akıllı şehirlerin güncel kentsel zorluklarla başa çıkmada oynayabileceği önemli role rağmen, potansiyelini gerçekleştirilememek ve bir pazarlama operasyonu olmasından dolayı konsepti eleştiriliyor. Bu çalışma, akıllı şehir uygulama, araştırma çalışmalarının özellikle uygulamadaki bilimsel alan olarak gelişimini araştırmaktadır. Bu amaçla, yönetim bilişim sistemlerinde ve yönetim uygulama odaklı dergilerde ve işletme / yönetim dergilerinde yayınlanmış olan uygulama alanları ile ilgili 472 akıllı şehir makalesinde eş-kelime analizi yapılmıştır. Araştırma hatları “nesnelerin interneti”nin en yüksek kullanım yüzdesine sahip olduğunu, ardından “büyük veri analitiği”, “bilgi iletişim sistemleri” ve “şehir uygulaması” olduğunu göstermektedir. Güvenlik, mobil uygulamalar, yenilenebilir enerji gibi araştırma hatları araştırmacılar arasında çok az ilgi görüyor. Mevcut çalışma, bu alandaki araştırma hatlarının nasıl ilerletilebileceğini tartışan ilk alanlardan biridir. Ayrıca, bu makale akıllı şehir uygulama konseptinin farklı kavramsallaştırmasını, kıyaslamalarını ve değerlendirmelerini gözden geçirmektedir.

Smart City Applications in Digital Age: State-Of-Art Review and Critique

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ABSTRACT

Smart cities have attracted an extensive and emerging interest from both science and industry with an increasing number of international examples emerging from all over the world. However, despite the significant role that smart cities can play to deal with recent urban challenges, the concept has been being criticized for not being able to realize its potential and for being a vendor hype. This study explores the evolution of smart city application research lines in the especially, application as a scientific field. To this end, co-word analysis is employed for 472 smart city articles related to their applications field that were published in management information systems and management application focused journals and business/ management journals. The research lines indicate that the “internet of things” has the highest usage percentage, followed by “big data analytics”, “information communication systems” and “city application”. Research lines, such as security, mobile applications, renewable energy, receive minimal interest amongst researchers. The current study is amongst the first in this field that discusses how research lines in the field could be advanced. Moreover, this paper reviews different conceptualization, benchmarks and evaluations of the smart city application concept.

1. INTRODUCTION (GİRİŞ)

There is no common consensus about what “smart” really means in the context of the information and communications technology [1]. Similarly, it is not easy to locate a common definition for the term city, while most people can conceptualize it according to individual experiences. A city is considered as an urban area, which according to the United Nations (2005) typically begins with a population density of 1500 people per square mile but it varies across countries. Smart systems should not be limited to ICT-based ones, but intelligence can refer even to creative design or new organizations etc. In this regard, the “smartness” of a city describes its ability to bring together all its resources, to effectively and seamlessly achieve the goals and fulfill the purposes it has set itself [2].

Digital describes electronic technology that generates, stores, and processes data in terms of two states: positive and non-positive [3]. Positive is expressed or represented by the number 1 and non-positive by number 0. The digital age, computer science, and cybersecurity are essential foundational ingredients of technological innovation, economic growth, and cybersecurity that span all industries. In this digital age, government, professional, and education institutions that extensively utilize computing technologies have reached the point of no return in which they can no longer function, and be successful, without them. Today, computing devices, the Internet, and the web are vital technology tools that affect every aspect of everyday life and success because most daily tasks require the use of these tools[4].

The concept of the smart city has been introduced to highlight the importance of Information and Communication Technologies (ICTs) in the last 20 years [5]. A new mobility ecosystem is emerging as a result of converging technological and social trends, specifically growth in mobility sharing systems and services, electric, connected and autonomous vehicles, and innovations in materials for transportation [6]. These transformations are impacting business as usual for many industries beyond auto manufacturers, including energy and utilities, insurance, information technology, city infrastructure, and others. This session provides insights into how this fundamental shift in mobility is transforming companies and industries both incrementally and disruptively. There are various components of this new ecosystem vehicle development, infrastructure enablers, management of mobility and the in-transit experience are driving changes for industries impacted by this new mobility ecosystem as well as the implications of those changes

and the opportunities for enabling the future of mobility. Today, more than ever, it is important for the novelties to reach the market faster and to be implemented in the city infrastructure and buildings. Thanks to these, cities are digitized and transformed into sustainable and intelligent systems.

It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will live in urban areas, that nearly all global population growth from 2017 to 2030 will be absorbed by cities about 1.1 billion new urbanites over the next 13 years [7]. New insights and solutions are urgently needed in order to manage the scarce resources that will be impacted by this trend, as well as operate new and regenerated urban spaces. New generations of sensor networks, Big Data analytics, and the Internet of Things (IoT) applications are being deployed in public and privately managed physical spaces to meet these requirements, though many challenges remain. Municipal governments around the world are currently formulating their Smart City strategies now is the time to engage and learn from industry peers at the forefront of this key trend [8].

To address these challenges to sustainable growth what we require are “Smart Cities”. A number of definitions of the term “smart city” exist, but there is still no consensus on what a smart city is since several synonyms of the word “smart” are often used interchangeably such as “intelligent” or “digital” or “innovating” or “knowledge”. A Smart City is defined as a set of instruments across many scales that are connected through multiple networks and provide continuous data regarding people and the environment in support of decisions about the physical and social form of the city. Moreover, Cocchia summarizes various definitions and discovers shared features characterizing smart cities, which concern the role of innovation and technology; environmental requirements; and social development [9]. This process cannot be completed without technology advancements. However, smart cities have not been limited to ICT and they shifted to ‘smart people’ and their corresponding creativity [10]. Moreover, a Smart City cannot be established without an involving citizen (smart people).

The beginnings of the smart city initiative can be traced back to the introduction of traffic lights in the 1900s [11]. Recently, scholars have started criticizing the use of smart city concept and potential [12][13]. Some scholars argue that smart city is mostly the outcome of vendors’ marketing campaigns [13]. Others say that smart cities reflect little more than usual urban innovations [12], while Brown criticizes the whole concept of smart city by questioning their

effectiveness [14]. Moreover, many scholars argue about technological adjectives to the “city”.

Many of the challenges facing cities around the world are common in nature, but rarely common in context. Each and every city and town are different, but many of the required solutions are the same. This study explores the evolution of smart city application research lines in the special application as a scientific field. To this end, the co-word analysis is employed for 473 smart city articles related to their applications field that were published in management information systems and management application focused journals and business/ management journals.

2. CRITICAL ISSUES IN SMART CITY APPLICATION RESEARCH (AKILLI ŞEHİR UYGULAMA ARAŞTIRMASINDA ELEŞTİREL KONULAR)

Cities have already become testbeds for new and disruptive technologies, and are committed to building inclusive economies, attracting great talent, and increasing citizen quality of life. They are upending outdated models and legacy infrastructure to bring efficiency and transparency to “future-proof” their cities for the 4th Industrial Revolution. Traffic collapse, parking lot emergency and fine dust alarm. Intelligent use of energy. Secure data for citizens and administration. More voice and transparency in decisions. Designing the city of tomorrow to be livable and sustainable. Decision-makers, concepts, and solutions are in demand. And geodata: Because without precise data on time and space, there is no Smart City.

Becoming a smart city is not a goal but a means to an end. The entire point is to respond more effectively and dynamically to the needs and desires of residents. Technology is simply a tool to optimize the infrastructure, resources, and spaces they share [15]. Smart cities need to focus on improving outcomes for residents and enlisting their participation in shaping the places they call home.

In order to create smart cities and regions, city leaders must leverage data and technology while also implementing programs that promote civic engagement to help make citizens’ lives better and boost economic development. Since there is no clear smart city application yet, there have been several attempts by international organizations to standardize smart city solutions, such as for smart water, energy, transportation, buildings etc.

3. RESEARCH APPROACH AND METHODOLOGY (ARAŞTIRMA YAKLAŞIMI VE METODOLOJİSİ)

Instead, scholars in the late 1990s started discussing city and ICT from different perspectives and with the use of different terms, in their attempts to describe ICT project initiation within the urban space or the utilization of the ICT to treat local needs. First evidence regarding smart city appears in literature in 1997 [16], where it is claimed that over 2000 virtual cities and urban web pages existed in 1997, which introduced the term web or virtual city in an attempt to describe local ICT network initiatives, which enabled the development of local cyber-based (virtual) communities (decentralized, interactive, one-to-one and one-to-many media networks).

The same work [16], introduced the term digital city too, which was a more socially inclusive and discourse-driven virtual city. In this respect, the first forms of digital cities included thematic spaces for citizen interactions. Digital city was mentioned in the second work, only a year later by van den Besselaar and Beckers [17] who named the term as a large infrastructure for virtual communities. Communities concern associations between people, which are coordinated through communication-based on shared norms and interests.

The digital city concept became synonymous to information city, which was understood as a metropolitan environment where ICT is the key driver in delivering innovative online services [18]. Another term which is also being discussed is the intelligent city, which focuses on the city performance regarding producing innovation in the following three dimensions: (1) Intelligence, inventiveness and creativity; (2) Collective intelligence and (3) Artificial intelligence [18].

To get the objective literature was reviewed using the following source: www.sciencedirect.com, with searches only in journals that publish smart city articles [1], with the combination of terms “smart city” and “applications”. Article search was performed within the period of 1991 (appearance of smart city concepts in literature) to early 2019. More than 480 articles were returned from this crawl, where screening was used to leave out irrelevant publications like editorial, measurements on individual smart solutions as well as articles discussing issues mostly focused on an application like “application” or data and management in general.

The method which was followed in this article can be found in most of the literature studies that include the

critical analysis of the current body of knowledge, particularly associated with examining the empirical studies of any literature. The identification of the relevant studies, establishing a coding procedure and maintaining the reliability of this coding procedure are the main constituents of the method.

4. RESULTS (BULGULAR)

This section highlights major important points regarding the descriptive results of the examination of each factor/variable used in the study. The results were presented in a structural way with tables. Here authors highlight some of the paper which appear on Elsevier's research website, which is relevant to the areas of filtration and separation. These abstracts are available at www.sciencedirect.com. Science Direct is the world's leading source for scientific, technical, and medical research.

The table represents the distribution of the selected articles. The time period covers approximately 20 years starting from 1999 to 2018. More than half of the studies were published in the last 2 years. It is not shown in figure 1 because the year just started when this article was written but early 2019 more than 70 articles were published until March. Besides, the following period we can talk about an increase in the average number of publications. It shows that the subject which is “smart city applications” is still in its infancy and has not reached maturity.

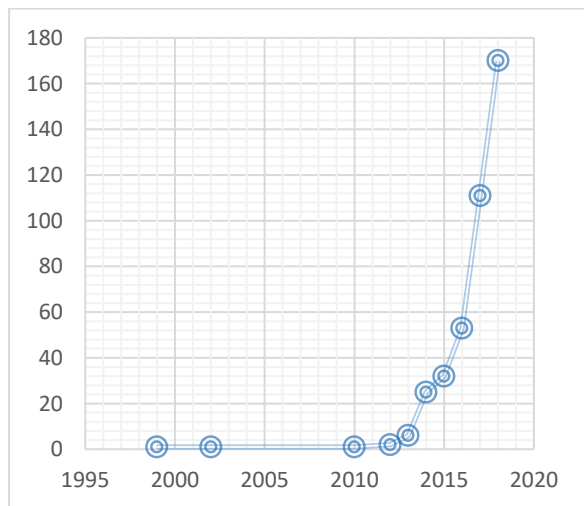


Figure 1: Publication by Year

If we look at the distribution of the articles in terms of the journals in which they were published in figure 2, it could easily be seen that more than 50 of the publications belong to one particular journal, namely, Future Generation Computer Systems. Also, an interesting point is that, only one article was published

in 59 different journals. Therefore, only journals with more than 5 articles published were counted and totally 89 articles were not counted in this figure.

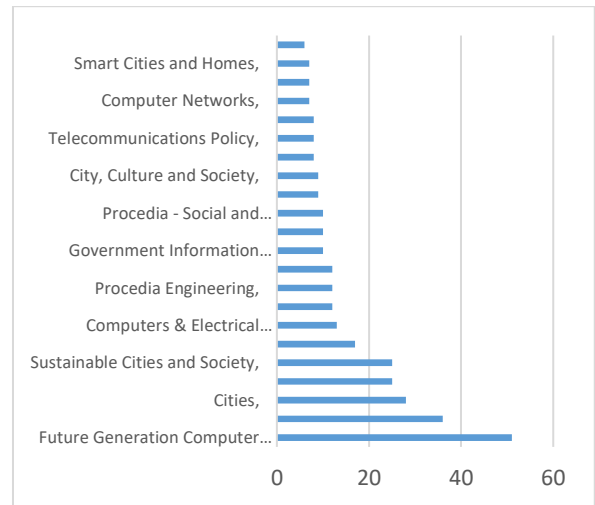


Figure 2: Publications by journal name

When we look at the figure 3, articles about the smart city application, they written by number of 3, 4, and 2 authors generally. Only 11 per cent of those studies have written by one author. Besides, there are 2 paper which are written by 12 authors, interestingly.

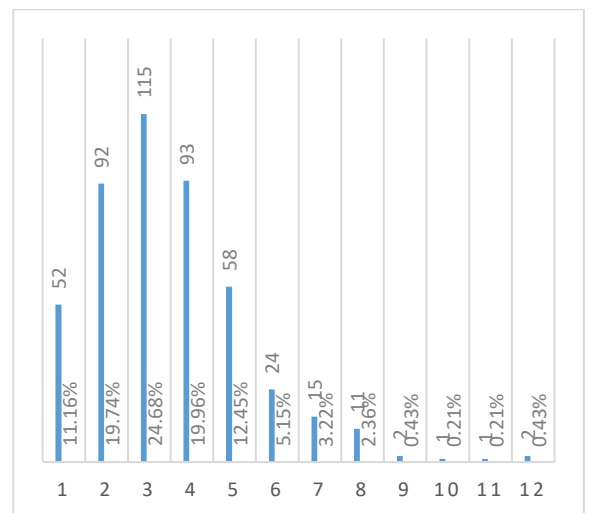


Figure 3: Number of Authors

These 472 articles which are mentioned before have about 2 thousand keywords. Exactly, most popular keywords are “smart city”. Besides, the result of the keywords that draws attention here is Internet of Things.

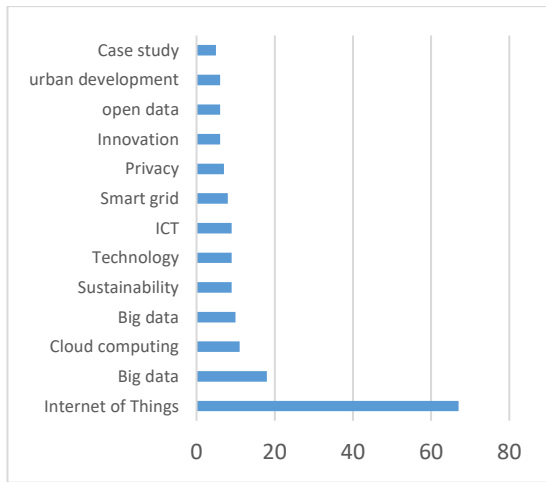


Figure 4: Publication keywords

5. DISCUSSION AND CONCLUSIONS (TARTIŞMA VE SONUÇLAR)

In the digital age, computing technologies drive our society, and computer science and cybergovern are the disciplines that protect and fuel digital innovation. As we enter the digital age, ‘smart cities’ provide a glimpse of the future, but a big gap between the hype and the reality remains. Few cities want to lag behind, but it is critical not to get caught up in technology for its own sake. Contrary to corporate storytelling no straightforward narrative about the ‘real smart city’ is in place yet. On the other hand, there are about 5 hundred different academic studies about smart city applications since 1999.

In order to create smart cities and regions, city leaders must leverage data and technology while also implementing programs that promote civic engagement to help make citizens’ lives better and boost economic development. As artificial intelligence technology develops, the applications begin to play a key role in government delivery of citizen services. Smart cities are entering to a new phase of Smart City 2.0 by integrating AI as well as IoT technologies into services. All the smart city papers will help the city mayor and responsible people when they are trying to new technologies and smart city application as well as our study. To put all thing in a nut shell, according to 472 studies abstract, most popular binary word groups are; “Internet things” “Big data”, “Real time”, “Information communication”, and “Decision making”. Moreover, a favoured triple word groups from the all those papers abstract is; “smart city initiatives”, “information communication technologies”, “smart city concept”, “smart city development”, “big data analytics”, “smart city projects” and “smart city applications”.

As each country already has its hubs of commerce and culture, most smart cities will be retrofits of existing urban centers. This brings its own set of challenges, but also facilitates the use of technology and data to improve city living for the incumbent population and tackle existing issues with digital solutions.

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