Acta Catallactics

časopis za ekonomska i opšta društvena pitanja

GODINA III · Broj 2 · Tuzla, 2022. · ISSN 2744-1296

Časopis „Acta Catallactics, časopis za ekonomska i opšta društvena pitanja“ od autora očekuje najviše standarde integriteta u istraživanju. Radovi koji su primljeni za razmatranje za objavu u časopisu trebaju sadržavati dovoljno informacija kako bi svaki kvalificirani istraživač mogao ponoviti rezultate.

Acta Catallactics
Acta Catallactics časopis za ekonomska i opšta društvena pitanja

Poštovani,

Pred Vama je šesti broj naučnog časopisa "Acta Catallactics, časopis za ekonomska i opšta društvena pitanja" koji je osnovan 2019. godine i izlazi dva puta godišnje u izdanju udruženja "Multi" i Visoke škole "Internacionalna poslovno-informaciona akademija" Tuzla. Nakon četiri godine djelovanja, sada već možemo navesti da je riječ o vrijednoj tradiciji izdavaštva, posebno razumijevajući da u Bosni i Hercegovini nema puno naučnih časopisa koji se bave tematikom ekonomskih i drugih društvenih pitanja.

"Acta Catallactics" je usmjeren prema naučnicima i stručnjacima koji se bave istraživanjem ekonomskih i opštih društvenih pitanja. Objavljuje radove koji doprinose teorijskom, metodološkim i empirijskim spoznajama u svim ekonomskim oblastima, kao i drugim oblastima koje pokrivaju društvene nauke. Radovi se mogu temeljiti na kvalitativnim i kvantita- tivnim analizama, mogu predstavljati sinteze dosadašnjih istraživanja i ukazivati na otvorena pitanja u izdvojenim područjima društvene i ekonomske prakse.

Prihvaćaju se radovi različitih nivoa istraživanja (od pojedinačnih slučajeva do manjih ili velikih uzoraka) i različitih kontekstualnih okvira (od mikro jedinica do širih društvenoekonomskih okvira). Radovi se objavljuju na engleskom, ali i bosanskom/srpskom/hrvatskom jeziku.

Časopis pruža mnoge koristi za autore poput besplatnog printanog izdanja časopisa u kojem je objavljen članak autora i popusta na učešće na naučnim i stručnim konferencijama u organizaciji uredništva časopisa. Također, određeni autori će na poklon dobiti aktuelna izdanja udruženja Multi i Visoke škole "Internacionalna poslovno-informaciona akademija" Tuzla.

Pozivam sve zainteresovane da pošalju svoje radove za novi broj časopisa koji izlazi krajem 2023. godine.

Svako dobro,
Admir Čavalić, MA,
glavni i odgovorni urednik

IZDAVAČI
Udruženje "Multi" i
Visoka škola "Internacionalna poslovno-informaciona akademija" Tuzla
Damira Hadžibeganovića 115,75.000 Tuzla, Bosna i Hercegovina
E-MAIL: udruzenjemulti@yahoo.com

Lektor i korektor
Edina Ferhatović

Dizajn i DTP
Jilduza Pajazetović i Selmir Pajazetović

Online izdanje
https://actacatallactics.ba/index.html

Acta Catallactics

Sadržaj

CAN "SMARTNESS" OF A DESTINATION BE MEASURED? BUILDING AND TESTING A GENERALIZED FRAMEWORK FOR MEASURING SMART TOURISM DESTINATION DEVELOPMENT ON THE EXAMPLE OF CROATIA

***Jurica Grzunov, PhD*[1]**

Abstract

Smart tourism is rapidly proving to be more than just a fancy buzzword in the tourism industry. It is a concept that highlights the already indispensable role of advanced technologies in tourism, but also emphasizes the importance of data and smart destination management. A review of the related literature shows that several authors have already tried to analyze the components of a smart tourism destination and build a general framework for measuring the state of development of such a destination. Therefore, this research aims at reexamining and testing the existing frameworks for analyzing the development of smart tourism destinations. The suggested framework should be flexible enough to allow analysis of the state of smart tourism development in destinations regardless of their size or tourism congestion, but it should also serve as a beacon for defining a possible direction of the development of a smart tourism destination. An extensive literature review was made and some of the related research findings were synthesized in order to describe a general framework for the analysis of the development of a smart tourism destination. The framework was subsequently tested on the example of Croatia, which can be considered a successful tourist destination. The suggested framework is just a theoretical construct which provides general guidelines on how to approach the implementation of a concrete apparatus and exact metrics for measuring smart tourism development. In practical terms, this research represents a small step towards building an operational framework that could be used in real life scenarios.

Key words: *Smart Tourism Destination, Measure, Framework, Croatia.*

1 Postdoctoral researcher, Department of Tourism and Communication Studies, University of Zadar (Croatia), Franje Tudjmana 24i, Zadar, jgrzunov@unizd.hr

1. Introduction

Tourism industry has undergone many significant changes in the past 50 years, most of which are in many ways related directly to the propelling advancements in technology. Some of the technologies that made the biggest mark on tourism in global where those related to transportation (such as commercial flights), which made travelling significantly easier, quicker and, above all – affordable to wider audiences. However, all of those advancements would probably not yield as much results as they did if it wasn't for the invention and growth of the information superhighway also known as the internet. The biggest value of the internet lays in its capacity to store and convey vast amount of data, which in turns enables quick and easy access to information worldwide. The development of internet enabled further advancements related to information and communication technologies, such as different information systems, mobile gadgets, and end-user applications, all of which have proven to be extremely important for the tourism industry. The role of technology in tourism has been especially emphasized in the past two decades, as the number of leisure travels worldwide grew by around 250% annually (UNWTO, 2019). This growth was abruptly stopped by the global pandemic caused by the COVID-19, but it is likely to continue in a similar pace after the pandemic comes to an end.

As a direct consequence of such a rapid growth in the numbers of tourist travels, many destinations have started struggling with overtourism, which can be directly responsible for mediocre tourist experience, reduced quality of life of the local population, degradation of public spaces and cultural heritage, appearance of monofunctional spaces, pollution caused by tourism, decline in local values and customs, conflicts between residents and tourists, rising prices and over dependence on tourism. (Nunkoo & Ramkissoon, 2010) These effects are often a result of poor destination management caused by a lack of knowledge, expertise and motivation among the decision makers and other important stakeholders, but also insufficient and inadequate information about visitors and available resources within the destination. Many researchers see the solution to some of these problems in the smart use of technology. With respect to that, in the past 15 years there has been an increasing interest in the concept of Smart tourism. The phrase "Smart tourism" first appeared as a result of the reflections on the impact of technology on tourism, and it primarily refers to a framework for understanding tourism in a new context in which information and communication technologies have already reshaped the entire industry and transformed the behavior of tourists (Femenia-Serra, Neuhofer, & Ivars-Baidal, 2019). Several authors have argued on the definition of smart tourism, and on of the most commonly used comes from Gretzel et al., who define it as: "… tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment" (Gretzel et al., 2015). From this definition it is clear that the concept itself is very complex and requires a great deal of knowledge, cooperation, resources and motivation from all of the important stakeholders in the destination. One of the crucial components of smart tourism according to Gretzel et al. is definitely the Smart Tourism Destination (STD) itself (Gretzel et al., 2015). According to López de Ávila Muñoz et al., STD can be defined as "… an innovative space, accessible for

all, established on a cutting edge technology infrastructure which guarantees sustainable development of the land, facilitates the interaction and integration of the visitor with the surroundings and increases the quality of their experience in the destination, as well as the quality of life of residents" (López de Ávila Muñoz et al., 2015). Given the complexity of this definition, the following question comes to mind: "Is it possible to measure the smartness of a destination?". Several authors have tried to reply to this question, and this paper reexamines their work and provides another small step towards such an apparatus.

2. Related research

After examining recent literature in the context of smart tourism, it can be argued that not many authors dealt with concepts such as metrics, ranking or any form of quantifying smartness for that matter. This may be due to the fact that the whole concept of smart tourism is still relatively vague and lacks proper theoretical foundations, which makes it even more difficult to implement in practice (Femenia-Serra & Neuhofer, 2018). On the other hand, there is substantially more research and papers addressing the problem of ranking when it comes to smart cities, which is actually not that different from the concept of smart tourism destinations. The basic difference between the two concepts is that smart tourism destinations also consider improving the tourist experience alongside enhancing the quality of life of local residents with the use of technology (Gretzel et al., 2015).

The literature review shows that there are only a few researchers who were dealing with problems related to measuring smartness in the context of tourism, and majority of them used a rather qualitative approach to describe or rank smart tourism destinations. For instance, in their work from 2018, Tardivo, Viassone and Santoro described a relatively simple framework for measuring smartness of a destination, and they applied that framework to the city of Turin, as one of the candidates for the 2020 Smart City competition. Their model was spread across five dimensions of smartness: smart people, smart mobility, smart living, smart environment and smart governance. They argued that a destination can be denoted as smart when all of the important stakeholders (such as firms, governmental bodies, tourists, etc.) interact constantly and continuously to collect data and analyze tourist behavior and activities within the destination. As one of the results of their research they present a sort of an index ordained to measure the level of smartness of a destination, as well as provide some important guidelines to policymakers for improving the smartness of the destination and creating additional value for all stakeholders. (Tardivo, Viassone, & Santoro, 2018) This research deals with measuring smartness in a way that it describes what a smart destination should encompass, and how "smartness" can be measured, but it does so using a mostly qualitative methodology which could be hard to generalize.

On a similar note, an initiative called "European Capitals of Smart Tourism" was started back in 2019 by the European commission, aimed at recognizing outstanding achievements in smart tourism in bigger European cities (with population over 100000, or the largest city in countries where no city has more than 100000 residents). The initiative started an annual competition that evolves around the idea that a smart tourism destination must be digitally accessible to all travelers and visitors, sustainable (to reduce impacts of tourism on the environment and to involve the local residents), digitalized (to en-

hance all aspects of the tourism experience and stimulate the growth of local businesses), and finally, protect the city's cultural heritage and stimulate creativity. Each city that applies to the annual competition is assessed in four categories: Accessibility, Sustainability, Digitalization and Cultural heritage & Creativity. Each category is evaluated based on 4 criteria, and each of the criteria rated with maximum of 5 points, to give a total of 80 points (with a 10-point threshold for every category). After the initial evaluation by a panel of independent experts, 7 cities are shortlisted as finalists and two of those cities are named the European Capital of Smart Tourism for that year, with an additional award presented for outstanding achievement in every of the 4 categories. (European Commision, 2022) The described ranking model used in this competition is fairly simple, in a sense that the experts award points subjectively based on a set of only 4 very general criteria for each category, without a specific set of indicators that would enable a transparent and uniform ranking process. Hence, it can hardly be considered as a general framework for ranking smart tourism destinations.

Last but not least, in 2017, Hà My, Huertas & Moreno suggested a new framework for the smart tourism destinations analysis called the (SA)6. (Hà My, Huertas, & Moreno, 2017) Their framework was based on the 6A's framework originally described by Buhalis in 2000 (Buhalis, 2000). Namely, Buhalis argued that there are 6 dimensions of any successful tourism destination: Accessibility, Attractions, Amenities, Activities, Ancillary services, and Available packages. The 6A's framework has subsequently been recognized by many researchers as very useful in both theory and practice related to tourism destinations. The (SA)6 framework was built basically by adding a smart layer on top of the 6A's framework, in such a way that all of the dimensions and indicators previously described by Buhalis have been upgraded and described in accordance with the definition and the context of smart tourism, especially in terms of the new disruptive technologies that made a significant mark on tourism and tourist behavior in the last two decades. Specifically, all of the dimensions of the 6A's framework were added a "Smart" prefix, so the (SA)6 framework consists of the following dimensions: Smart Accessibility (20 indicators), Smart Attractions (7 indicators), Smart Amenities (7 indicators), Smart Activities (5 indicators), Smart Ancillary services (12 indicators) and Smart Available packages (6 indicators). The indicators in the (SA)6 framework are described in more detail by Hà My, Huertas & Moreno in their paper titled "(SA)6: A New Framework for the Analysis of Smart Tourism destinations" (Hà My, Huertas, & Moreno, 2017, str. 198-201), in which they also tested the framework by comparing two Spanish destinations using a completely qualitative approach. In one of their later papers from 2019 those same authors suggested a quantitative upgrade to their (SA)6 framework by adding a hierarchical structure with weights for each of the 6 dimensions and all associated indicators (57 in total) and suggesting how the overall score of a destination can be obtained by aggregating all the weighted values. (Huertas, Moreno, & Ha My, 2019) Their original model with suggested weights is shown on Figure 1.

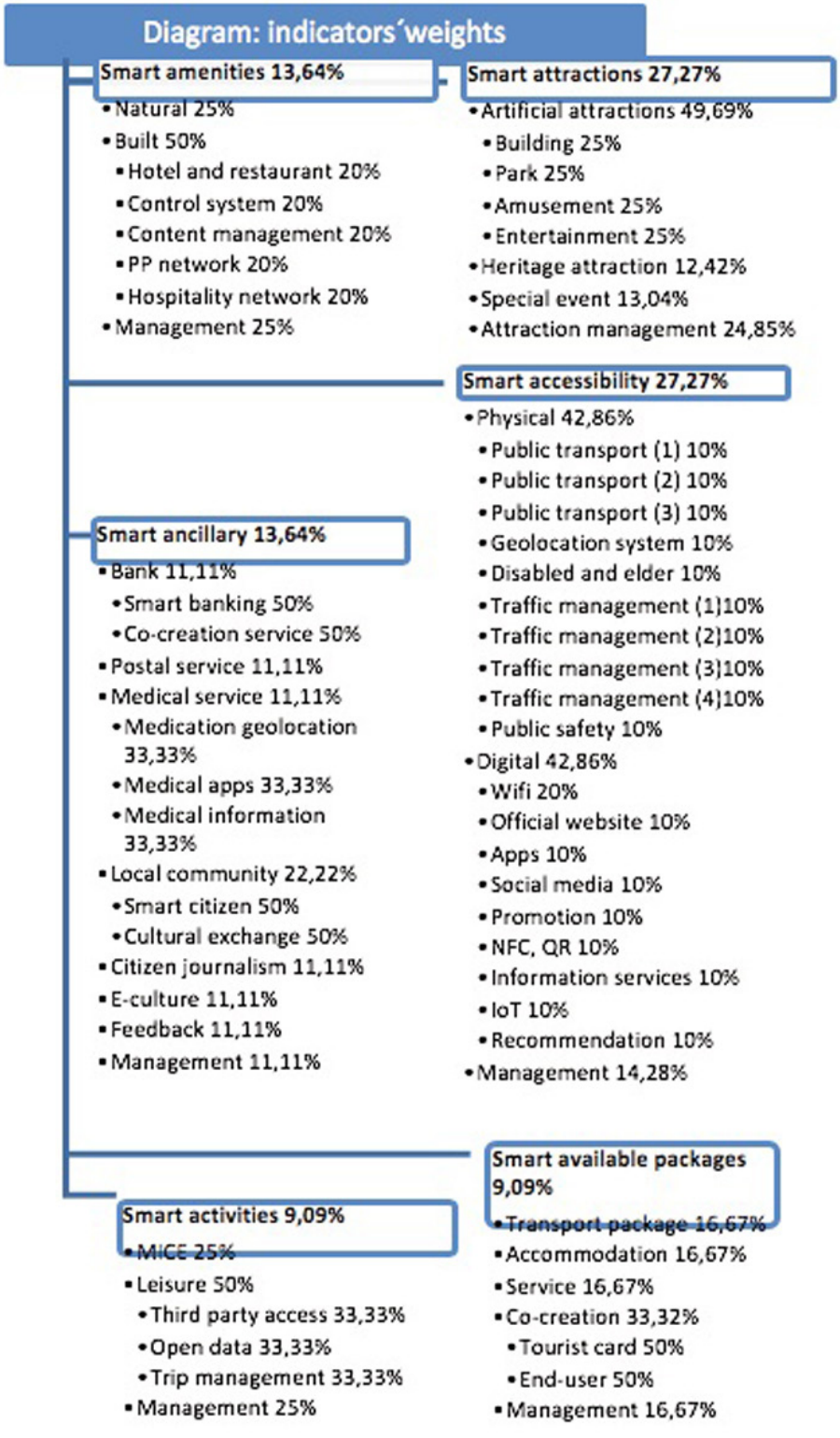


Figure 1. The hierarhical (SA)6 ranking model
Source: Huertas, Moreno & Ha My (2019)

The weights suggested within this model have been calculated by the respective authors using the Analytic Hierarchy Process (AHP) originally defined by Saaty in 1980 as a tool for the analysis of multi-criteria decision making problems. Although the overall score

can be aggregated in many different ways once the indicator values are known, the authors also suggested a possible aggregation operator which could enable calibration of the model if needed. Namely, they suggested the use of the so called Weighted Ordered Weighted Averaging (WOWA) operator originally defined by Torra in 1997. The WOWA operator is defined with:

$$WOWA(v) = \sum_{j=1}^{k} \omega_j v'_j$$

where k-dimensional vector represents the original indicator scores, and vector consists of the same values as vector but in a descending order , while the components of the weighting vector are defined with:

$$\omega_j = g\left(\sum_{i=1}^{j} p_i\right) - g\left(\sum_{i=1}^{j-1} p_i\right)$$

using any monotone increasing function on a [0, 1] interval. The authors also suggest a particular generating function that can be used for the calculation of the components of the weighting vector . To be more specific, they suggest a function described by Kasperski & Zielinski in 2016, defined with:

$$g_\alpha(x) = \frac{1 - \alpha^x}{1 - \alpha}$$

where the value of the parameter α can be chosen in such a way that it can influence the overall aggregation score in different ways if necessary. To be more specific, the lower value of the parameter α can increase the overall score for destinations with higher values of only a small number of indicators, while the higher value of the parameter α results in a better overall score only if most of the indicators have higher values, thus enabling different scoring models be used by only tuning the parameter α. (Huertas, Moreno, & Ha My, 2019)

The proposed aggregation operator with different α values was also tested by Huertas, Ha My & Moreno in the aforementioned paper as a part of their case study which included several destinations in Spain, suggesting that the framework can be applied to different types of destinations. Therefore, the framework was chosen to be tested in this research, with respect to the weights and the methodology suggested by the authors.

3. Methodology

The research was conducted using an online questionnaire which was distributed online via e-mail directly to the mayor (mayor's office) of every city (N=127) and head (head's office) of every municipality (N=429) in Croatia. The reason why mayors and heads of municipalities were chosen as respondents is because according to the Croatian legislation on local self-government, they are the decision makers, and therefore directly responsible for the development and management of information and other public infrastructure (e.g. energy, telecommunications, water supply, transport, waste disposal, security and health, etc.), as well as creating and implementing tourism development strategies when it comes to Croatian cities and municipalities. The questionnaire was sent three times in the period from July 2019 to January 2020, in order to receive as many answers as possible. Finally, out of the 293 (52.69%) questionnaires collected in total, only 123 (22.12%) were fully completed and taken into consideration.

The questionnaire consisted of a total of 15 questions, the first 11 of which were composite scales with multiple particles. All the questions and sub-questions were closed-ended, whereby the answers to the sub-questions in the first 11 questions were formed using a five-point Likert scale. Also, questions from 2nd to 11th contained the option "I don't know/Not sure" for every particle, and it was possible to add an "other" answer. In the 12th question, respondents could choose their city or municipality from the drop-down menu, but it was pointed out within the question that the answer is not mandatory, in order to avoid a possible failure to complete the questionnaire if the respondent felt uncomfortable because they didn't know the answer to some of the questions. The 13th question examined the regional affiliation of the respondent's destination, according to the NUTS-2 classification (*Nomenclature of territorial units for statistics*) whereby Croatia was divided into 2 regions – Adriatic and Continental Croatia[2]. The final two questions examined the size of the destination (in terms of the number of residents) and the number of tourists overnight stays in the past year. The most important questions with respect to this research were those addressing the dimensions and the individual components of a smart tourism destination according to the previously described model (questions from 4th to 9th).

The six dimensions of a smart tourism destination (as described in the model) were examined within the questionnaire through six composite scales, each consisting of 5 or more particles (57 in total). Each particle represented one of the indicators of development of a particular smart tourism dimension according to the previously mentioned (SA)6 model. Particles were rated using a five-point Likert scale, where 1 represented very low and 5 represented very high level of development of a particular indicator. The obtained ratings were analyzed both individually and with respect to the regional affiliation of the destination. Additionally, the examinees had to provide some general information about the size of the destination and the number of tourists overnight stays in the past year (both were categorized with respect to the actual statistical data available at the webpage of the Croatian Bureau of Statistics at https://podaci.dzs.hr/en/).

2 This NUTS-2 classification was revised in 2021, when Croatia was divided into 4 regions (Pannonian, Adriatic, Northern and the city of Zagreb).

4. Results

The structure of the destinations included in this research is shown on the following charts, with respect to their size (in terms of population), number of tourist overnight stays, and geographical affiliation:

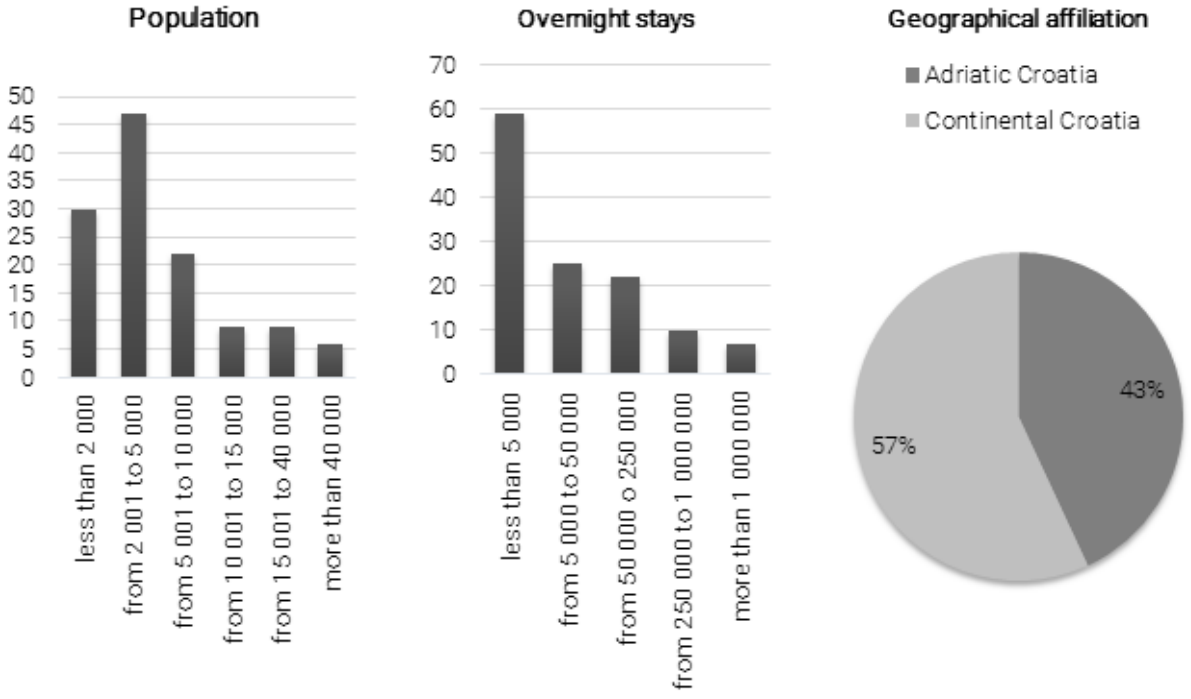
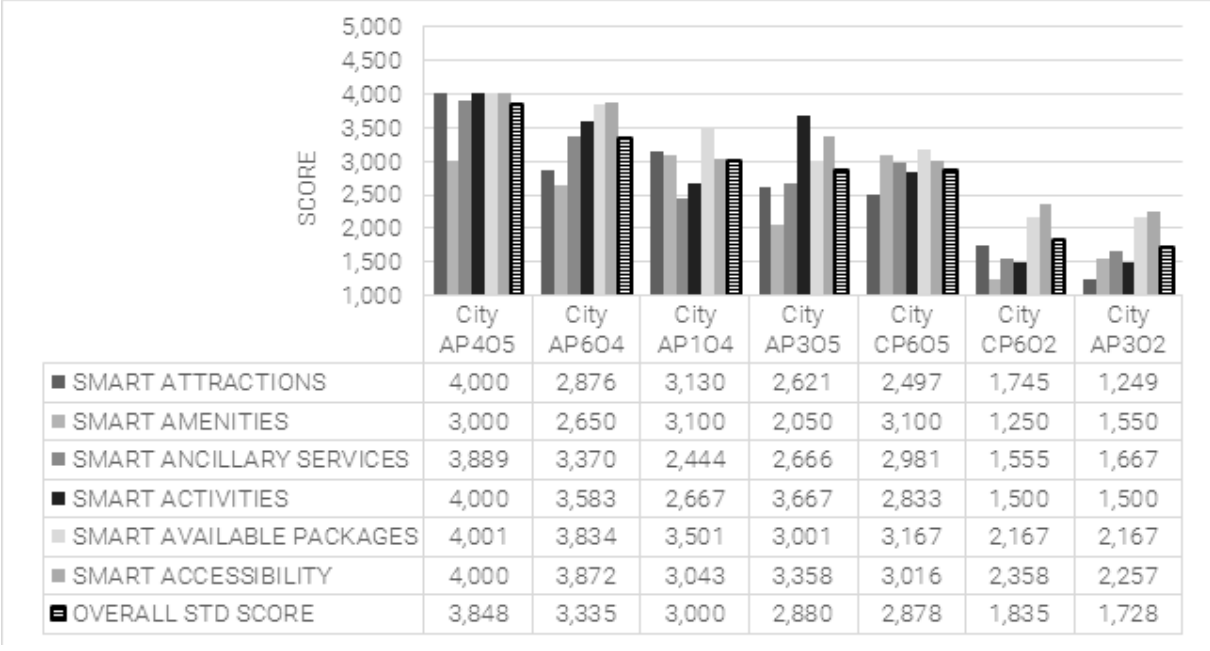


Figure 2. The structure of the sample with respect to the population size, number of overnight stays and geographical affiliation
Source: authors work

As far as it can be seen from the authors description (Huertas, Moreno, & Ha My, 2019), the (SA)6 model by default doesn't necessarily consider the size of the destination nor the level of tourism saturation (in terms of e.g., number of tourist visits or overnight stays) as variables when it comes to calculating the STD score. Therefore, to further explore how the (SA)6 model corresponds with different sizes and tourist loads of a certain destination, the (SA)6 model was applied to 6 different destinations in Croatia whose mayors participated in this research. Considering that the question related to the name of the destination wasn't mandatory (to maximize the possibility of completion of the questionnaire), most of the answers were submitted anonymously (only questions related to geographical affiliation, size and number of overnight stays were mandatory). Therefore, the destinations in this test were differentiated based on their geographical affiliation (Adriatic or Continental Croatia), number of residents (6 population categories: P1: "less than 2000", P2: "from 2000 to 5000", P3: "from 5000 to 10000", P4: "from 10000 to 15000", P5: "from 15000 to 40000" and P6: "more than 40000"), and number of tourist overnight stays (5 categories : O1:"less than 5000", O2: "from 5000 to 50000", O3: "from 50000 to 250000"; O4: "from 250000 to 1000000" and O5: "more than 1000000"), and described accordingly with codenames. For example, a destination located in Adriatic Croatia (A), with a population

between 5000 and 10000 residents (P3) and more than 1000000 overnight stays in the past year (O5) is labeled as AP3O5 city. These 6 destinations for which overall STD scores were calculated, were chosen so that they represent different types of destinations with respect to their location, size and tourism load. Namely, 4 out of 6 destinations are cities in the Adriatic region, which is accountable for almost 95% of all visits and overnight stays in the Republic of Croatia (CBS, 2018), with all 4 somewhat different in size and tourist numbers. The remaining 2 destinations are bigger cities from Continental Croatia, one with high number and one with significantly lower number of overnight stays.

The obtained results are presented in Figure 3. These results were calculated with original weight factors suggested by the authors of the (SA)6 model, without any corrections to either the individual indicator weights or dimension weights.



	City AP4O5	City AP6O4	City AP1O4	City AP3O5	City CP6O5	City CP6O2	City AP3O2
SMART ATTRACTIONS	4,000	2,876	3,130	2,621	2,497	1,745	1,249
SMART AMENITIES	3,000	2,650	3,100	2,050	3,100	1,250	1,550
SMART ANCILLARY SERVICES	3,889	3,370	2,444	2,666	2,981	1,555	1,667
SMART ACTIVITIES	4,000	3,583	2,667	3,667	2,833	1,500	1,500
SMART AVAILABLE PACKAGES	4,001	3,834	3,501	3,001	3,167	2,167	2,167
SMART ACCESSIBILITY	4,000	3,872	3,043	3,358	3,016	2,358	2,257
OVERALL STD SCORE	3,848	3,335	3,000	2,880	2,878	1,835	1,728

Figure 3. Dimension scores and overall STD scores for 6 different destinations in Croatia according to the proposed (SA)6 model
Source: authors work

The same results were subsequently calculated using the aforementioned WOWA operator with the generating function (where α=0.1) in order to see if it would make a difference when it comes to overall scores of these destinations (reduce the possible imbalances between different dimension scores). The results of these WOWA corrected overall STD scores are shown in Figure 4. It can be seen that the overall STD scores have increased for all destinations (from 2,71% to 12.69%) after the use of WOWA operator, with the most significant increase (12.69%) in the case of the city AP3O2 which had the worse original overall STD score out of all 6 destinations. However, it is also notable that after the application of WOWA operator, the ranking order of some of the destinations has changed. Namely, city AP3O5 had lower overall rating compared to the city AP1O4 prior to the use of WOWA operator (3.000 : 2.880), but was ranked higher after the WOWA operator was applied (3.145 : 3.166). This is likely due to the fact that the dimension scores related to the city AP3O5 were considerably less uniform compared to the city AP1O4, as WOWA operator with the generating function and a smaller alpha value applies more weight to

the components with greater initial value, thus emphasizing the strong suit of a destination (as opposed to the higher alpha values, which favors consistency and higher initial scores). These differences confirm that the use of WOWA operator with the generating function , where alpha has a lower value (e.g. α=0.1) can help in reducing the score gap between destinations in different development stages. This is particularly important when it comes to comparing the well-developed destinations with smaller ones who struggle with financing expensive infrastructural issues, as not all destinations have the resources or the manpower to develop all of the smart dimensions equally.

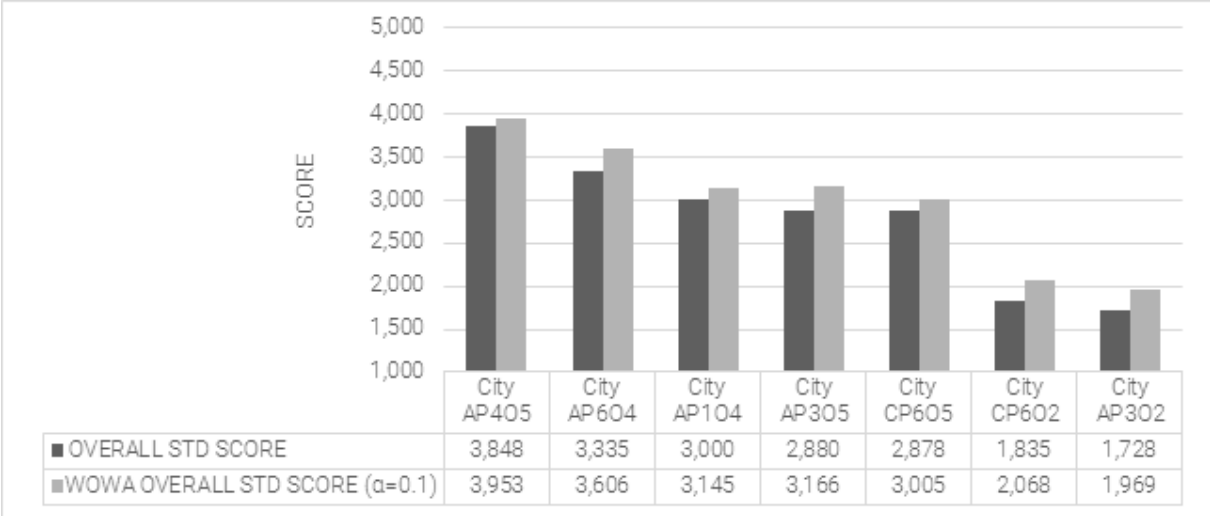


Figure 4. A comparison of overall STD scores for 6 different cities prior and after the application of WOWA operator (α=0.1)
Source: authors work

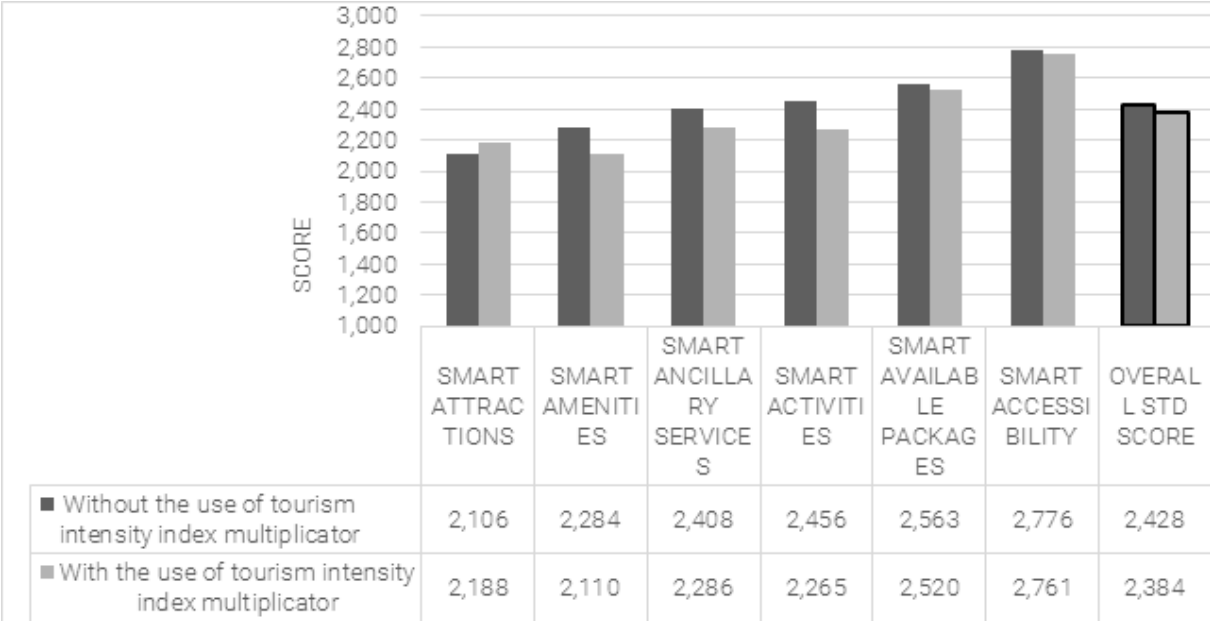
To obtain an overall STD score of the entire sample, average ratings of all indicators were calculated, multiplied with individual indicator weights (described in the previous section) and summed up to form the indicator weighted score sum (*Iwss*). The *Iwss* score was subsequently multiplied by the appropriate dimension weight factor (*Dwf*) which resulted in a composite dimension score for each of the six dimensions of the (SA)6 model for all 123 cities and municipalities taking part in this research. The composite dimension scores were then added together to get the overall STD score. The overall STD score is a decimal number from the [1, 5] interval which can be seen as a general "smartness" score or a level of development of a region (to simplify, it could be considered the overall STD score for Croatia presuming the sample is statistically representative, which would be possible to prove only if the names of all participating cities and municipalities were known). All of the aforementioned scores and weights are visible in Figure 5. Composite STD score for Croatia based on the proposed (SA)6 model, including all individual indicator scores, weighted indicator scores, composite dimension scores for all 6 dimensions, and overall STD score which (rounded to three decimals) equals 2.428.

Finally, besides the suggested weights within the original (SA)6 framework, and those calculated using the WOWA operator, an additional approach to aggregating the indicator values was tested when calculating the overall STD score for the entire sample. Namely, the suggested (SA)6 framework didn't consider the level of tourism saturation of the des-

tinations. Considering many studies have shown that in urban destinations with a lower saturation in terms of tourist visits or overnight stays, there is much less thought given to the problems and opportunities related to the development of tourism in the destination (Klarin, 2017), these indicators could therefore have an impact on the overall score (in addition to the indicators already described). Hence, an index of tourism intensity was calculated as the ratio of the number of tourists overnight stays and the number of residents of each destination, and it was applied to the values of the indicators as a multiplicator when calculating the average values of the indicators on the given sample. The obtained results for the entire sample, with and without the use of the tourism intensity multiplicator, are shown in Figure 6. From the obtained results it can be seen that the use of the multiplicator has generally decreased the scores by the dimensions, as well as the overall score, which can be explained by the structure of the sample, i.e., a high percentage of destinations within the sample with a relatively low tourism intensity index (which can be seen from the structure of the destinations included in this research, as shown on Figure 2).

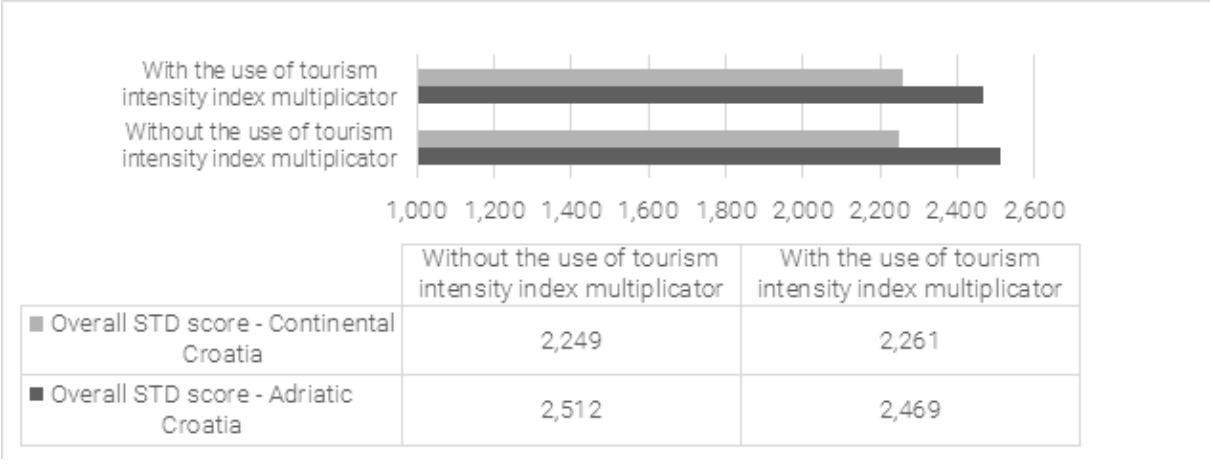
DIMENSION (Dimension weight factor)	Categories	Indicators & Individual weigths							Weighed indicator score sum (Iwss)	Dimension weight factor (Dwf)	Composite dimension score (Iwss*Dwf)
SMART ATTRACTIONS (27,27%)	Indicator section	Artificial attractions				Heritage attractions	Special events	Attraction management			
	Indicator sub-section	Buildings	Parks	Amusement centers	Entertainment						
	Individual indicator weight	12,42%	12,42%	12,42%	12,42%	12,42%	13,04%	24,85%			
	Indicator score	1,739	1,605	1,550	1,846	1,934	1,713	3,242			
	Weighed indicator score	0,216	0,199	0,193	0,229	0,240	0,223	0,806	2,106	27,27%	0,574
SMART AMENITIES (13,64%)	Indicator section	Natural amenities	Built amenities					Amenities management			
	Indicator sub-section		Hotel and restaurant	Control system	Content management	PP network	Hospitality network				
	Individual indicator weight	25%	10%	10%	10%	10%	10%	25%			
	Indicator score	1,794	1,798	2,147	1,917	1,681	1,660	3,661			
	Weighed indicator score	0,449	0,180	0,215	0,192	0,168	0,166	0,915	2,284	13,64%	0,312
SMART ANCILLARY SERVICES (13,64%)	Indicator section	Bank services		Postal services	Medical services			Local community			
	Indicator sub-section	Smart banking	Co-creation services		Medication geolocation	Medical apps	Medical information	Smart citizen			
	Individual indicator weight	5,56%	5,56%	11,11%	3,70%	3,70%	3,70%	11,11%			
	Indicator score	3,310	2,390	2,135	2,069	1,823	1,802	1,964			
	Weighed indicator score	0,184	0,133	0,237	0,077	0,068	0,067	0,218			
	Indicator section	Local community	Citizen journalism	E-culture	Feedback	Ancillary services management					
	Indicator sub-section	Cultural exchange									
	Individual indicator weight	11,11%	11,11%	11,11%	11,11%	11,11%					
	Indicator score	2,171	2,037	2,080	2,157	4,385					
	Weighed indicator score	0,241	0,226	0,231	0,240	0,487			2,408	13,64%	0,328
SMART ACTIVITIES (9,09%)	Indicator section	MICE activities	Leisure activities			Activities management					
	Indicator sub-section		Third party access	Open data	Trip management						
	Individual indicator weight	25%	16,67%	16,67%	16,67%	25%					
	Indicator score	1,822	2,240	1,919	1,781	4,043					
	Weighed indicator score	0,456	0,373	0,320	0,297	1,011			2,456	9,09%	0,223
SMART AVAILABLE PACKAGES (9,09%)	Indicator section	Transport packages	Accommodation packages	Service packages	Co-creation packages		Available packages management				
	Indicator sub-section				Tourist card	End-user apps					
	Individual indicator weight	16,67%	16,67%	16,67%	16,67%	16,67%	16,67%				
	Indicator score	1,536	2,448	1,721	2,364	3,256	4,050				
	Weighed indicator score	0,256	0,408	0,287	0,394	0,543	0,675		2,563	9,09%	0,233
SMART ACCESSIBILITY (27,27%)	Indicator section	Physical accessibility									
	Indicator sub-section	Destination public transport	Public transport between attractions	Intercity public transport	Geolocation systems	Disabled and elder	Realtime Traffic management	Smart parking management			
	Individual indicator weight	4,28%	4,28%	4,28%	4,28%	4,28%	4,28%	4,28%			
	Indicator score	2,598	2,775	3,025	2,632	2,099	1,907	1,580			
	Weighed indicator score	0,111	0,119	0,129	0,113	0,090	0,082	0,068			
	Indicator section	Physical accessibility			Digital accessibility						
	Indicator sub-section	Intermodal transport	Traffic congestion management	Public safety	Free Wi-fi	Official websites	Mobile apps	Social media			
	Individual indicator weight	4,28%	4,28%	4,28%	8,56%	4,28%	4,28%	4,28%			
	Indicator score	1,386	1,435	2,171	3,231	3,269	2,518	2,861			
	Weighed indicator score	0,059	0,061	0,093	0,277	0,140	0,108	0,122			
	Indicator section	Digital accessibility					Accessibility management				
	Indicator sub-section	NFC & QR codes	Online promotions	Information services	IoT	Recommendation systems					
	Individual indicator weight	4,28%	4,28%	4,28%	4,28%	4,28%	14,40%				
	Indicator score	3,155	2,931	2,500	2,061	2,321	4,513				
	Weighed indicator score	0,135	0,125	0,107	0,088	0,099	0,650		2,776	27,27%	0,757
OVERALL STD SCORE (sum of all composite dimension scores)											2,428

Figure 5. Composite STD score for Croatia based on the proposed (SA)6 model
Source: authors work



	SMART ATTRACTIONS	SMART AMENITIES	SMART ANCILLARY SERVICES	SMART ACTIVITIES	SMART AVAILABLE PACKAGES	SMART ACCESSIBILITY	OVERALL STD SCORE
Without the use of tourism intensity index multiplicator	2,106	2,284	2,408	2,456	2,563	2,776	2,428
With the use of tourism intensity index multiplicator	2,188	2,110	2,286	2,265	2,520	2,761	2,384

Figure 6. The smartness scores calculated with and without the use of the tourism intensity index multiplicator
Source: authors work



	Without the use of tourism intensity index multiplicator	With the use of tourism intensity index multiplicator
Overall STD score - Continental Croatia	2,249	2,261
Overall STD score - Adriatic Croatia	2,512	2,469

Figure 7. The overall scores for Adriatic and Continental Croatia
Source: authors work

In addition to the overall scores *calculated on the base* of the entire sample, the same calculations were made with respect to the geographical affiliation of the destination. The aim was to identify whether the less touristically developed areas (such as Continental Croatia) differ significantly when compared to better developed areas such as Adriatic Croatia (from a touristic development point of view). The results were calculated with and without the use of tourism intensity index multiplicator, and the results can be seen in Figure 7. The overall scores for Adriatic and Continental Croatia. It is obvious that the Adriatic Croatia has a better overall score, and it is only reasonable to presume that this is a direct consequence of the higher tourism development level. Also, it is worth noting that the overall scores haven't changed much after the use of the tourism intensity multiplica-

tor index, as most of the destinations within each of the regions have relatively uniform tourism intensity (relatively low in the Continental Croatia, and relatively high in the Adriatic Croatia).

5. Conclusion

This research reexamines the hierarchical (SA)6 framework described by Huertas, Moreno and Ha My, and further addresses some of it positive and negative aspects. The results indicate that the (SA)6 framework has the potential to grow into a fully functional STD development rating tool. However, in order to get to that point, some of the shortcomings of the framework would have to be seriously studied and dealt with. For example, this framework requires additional work when it comes to taking into consideration the specifics of the destination in the ranking process, such as the size and the level of tourism saturation, which could have a strong influence on the overall results. Also, the smart tourism destination ranking must take into account not only the technologies and infrastructure, but also the end results of their use, in the sense of the quality of tourist experience and the satisfaction of the local population, as that is one of the main goals of the smart tourism concept. In other words, a successful smart tourism destination has to fulfill its primary goals in order to be considered successful, and that is to have satisfied visitors and happy residents, regardless of how well its infrastructure is developed or how much technology is utilized in the destination.

As for the obtained results, it must be pointed out that the rating of the indicator development was done subjectively, according to the examinee's current knowledge and opinion on the matter, which can be considered a serious limitation to the precision and representativeness of the obtained results. However, since this is a preliminary research, the rating system should not be treated as a major shortcoming. Nevertheless, before any real attempt to measure the "actual value" of indicators, it should be well thought-about on how to define a standard rating system. Moreover, a proper rating system would have to involve some sort of expertise (e.g. an expert committee) and an extensive research that would have to be performed *in situ*.

References

1. Buhalis, D. (2000). Marketing the Competitive Destination of the Future. *Tourism Management 21 (1)*, p. 97–116.
2. CBS: Croatian Bureau of Statistics (2018). *Tourist Arrivals and Nights in 2018.* Croatian Bureau of Statistics. (Accessed on January 31st 2020), URL: https://www.dzs.hr/Hrv_Eng/publication/2018/04-03-02_01_2018.htm
3. European Commision (2022). *European Capitals of Smart Tourism*. (accessed on June 15th 2022), URL: https://smart-tourism-capital.ec.europa.eu/about_en
4. EUROSTAT (2022). *Eurostat: statistics explained*. (accessed on June 15th 2022), URL: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Tourism_intensity
5. Femenia-Serra, F., & Neuhofer, B. (2018). Smart Tourism Experiences: Conceptualisation, Key Dimensions and Research Agenda. *Journal of Regional Research 42*, p. 129–150.
6. Femenia-Serra, F., Neuhofer, B., & Ivars-Baidal, J. A. (2019). Towards a Conceptualisation of Smart Tourists and Their Role within the Smart Destination Scenario. *The Service Industries Journal 39 (2)*, p. 109-133.
7. Gretzel, U., et al. (2015). Smart Tourism: Foundations and Developments. *Electronic Markets 25 (3)*, p. 179-188.
8. Hà My, T., Huertas, A., & Moreno, A. (2017). (SA)6: A New Framework for the Analysis of Smart Tourism destinations. A Comparative Study of two Spanish Destinations. *In II International conference on Tourism dynamics and Trends, Seville*, p. 190-214.
9. Huertas, A., Moreno, A., & Ha My, T. (2019). Which destination is smarter? application of the (SA)6 framework to establish a ranking of smart tourist destinations. *International Journal of Information Systems and Tourism (IJIST), 4 (1)*, p. 19-28.
10. Kasperski, A., & Zieliński, P. (2016). Using the WoWa operator in robust discrete optimization problems. *International Journal of approximate reasoning 68*, p. 54-67.
11. Klarin, T. (2017). Kreiranje modela održivog razvoja turizma u urbanim destinacijama Republike Hrvatske. *Doctoral thesis*. Croatia: University of Rijeka.
12. López de Ávila Muñoz, A., et al. (2015). *Smart Destinations Report: building the future.* Madrid: SEGITTUR.
13. Nunkoo, R., & Ramkissoon, H. (2010). Small Island Urban Tourism: A Residents' Perspective. *Current Issues in Tourism 13 (1)*.
14. Saaty, T. l. (1980). *The Analytic Hierarchy Process.* New york, USA : McGraw-Hill.
15. Tardivo, G., Viassone, M., & Santoro, G. (2018). How to measure the level of smartness of a destination? In: *Cybernetics and Systems: Social and Business Decisions* (p. 249-253). London: Routledge.
16. Torra, V. (1997). The weighted OWA operator. *International Journal of Intelligent Systems, 12 (2)*, p. 153-166.
17. UNWTO (2019). *International Tourist Arrivals Reach 1.4 Billion Two Years Ahead of Forecasts.* Accessed on April 12th 2021, URL: https://www.unwto.org/global/press-release/2019-01-21/international-tourist-arrivals-reach-14-billion-two-years-ahead-forecasts

SMART CITY – MAKING DIGITAL TRANSFORMATION

PhD Zijad Lugavić, docent[1]
Mr. Sci. Azra Rožajac[2]

Abstract

Smart cities are committed to sustainable and integrated urban development. Digital transformation offers cities and municipalities opportunities to move towards sustainability and promotes resource-friendly, needs-based solutions for meeting the key challenges of urban development. The main subject of the research refers to the presentation of digital technologies in the context of the bearer of digital transformation towards smart cities. Main goal of study was to research and present the importance of digital technology and digital transformation in smart city domain. The findings of literature review emphasise that digital transformation requires cities and municipalities to be open to new technologies, and to be aware of their broader values and goals in order to be able to apply those technologies with a long-term and considered view. Results of literature review stand out that core value lies in empowering people to make informed decisions in both the private and public domains and incorporates the smartness of citizens instead of referring merely to the deployment of smart technologies. Also it is important to emphasize the four guidelines ensuring that digital transformation is understood as the transition of cities into smart cities: digital transformation requires goals, strategies and structures; digital transformation requires transparency, participation and co-creation; digital transformation requires infrastructures, data and services; digital transformation requires resources, skills and cooperations.

Key words*: Smart City, Digital Transformation, Urban Development, Sustainability.*

1 Dr. sc. Zijad Lugavic, docent, Grad Tuzla, ZAVBOBIH-a No. 11, 75000 Tuzla, zijad.lugavic@tuzla.ba

2 Mr. Sci. Azra Rožajac, ASA banka naša i snažna d.d. Sarajevo, Fra Anđela Zvizdovića 1. 71000 Sarajevo, azra_l@hotmail.com

1. Introduction

Since the late 1980s, the digital revolution has transformed the economy and society. First came the development of a connected economy, characterized by mass take-up of the Internet and the roll-out of broadband networks. This was followed by the development of a digital economy via the increasing use of digital platforms as business models for the supply of goods and services. Now the movement is towards a digitalized economy whose production and consumption models are based on the incorporation of digital technologies in all economic, social and environmental dimensions (ECLAC, 2021).

The adoption and integration of advanced digital technologies (fifth-generation (5G) mobile networks, the Internet of things (IoT), cloud computing, artificial intelligence, big data analysis, robotics, etc.) means that we are moving from a hyperconnected world to one of digitalized economies and societies. It is a world in which the traditional economy, with its organizational, productive and governance systems, overlaps or merges with the digital economy, with its innovative features and dimensions in terms of business models, production, business organization and governance. This results in a new, digitally interwoven system in which models from both spheres interact, giving rise to more complex ecosystems that are currently undergoing organizational, institutional and regulatory transformation (ECLAC, 2018).

These dimensions of digital development are constantly evolving, in a synergistic process that affects activities at the level of society, the production apparatus and the State (see Figure 1.). This makes the digital transformation process highly dynamic and complex, and thus challenging for public policies insofar as it requires constant adaptation and a systemic approach to national development. Within this framework, 5G networks will make the convergence of telecommunications and information technologies viable, changing the structure and dynamics of the sector, while the adoption of digital technologies and artificial intelligence (as general purpose technologies) marks a new stage, that of the digitalized economy (ECLAC, 2021).

OECD (2019) points out that digitalisation is one of several megatrends, including globalisation, demographic change and climate change that are reshaping policies from the ground up. For two decades, digital innovation has been at the heart of discourse around "smart cities" to build more efficient and liveable urban environments. In a first instance the concept of "smart cities" was largely supply-side and sector-driven, with the private sector taking the leading role in defining both the problem and the solution for digital innovation to generate new economic opportunities, improve service delivery and facilitate citizen engagement. While digital innovation remains central to the smart city concept, a key policy question for local and national decision-makers is how to make the most for citizens' well-being of the costly investment in smart technologies, applications and digital innovations.

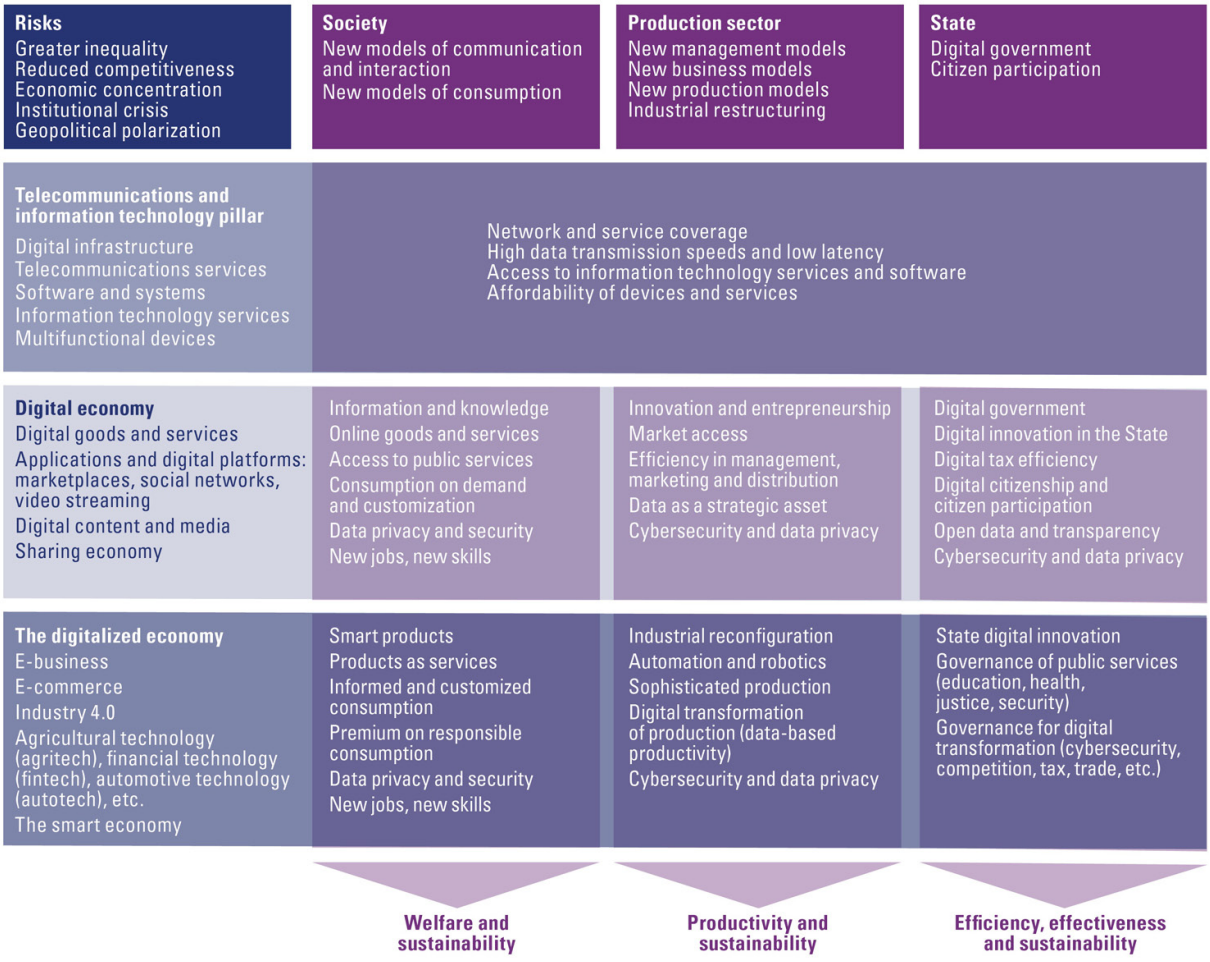


Figure 1. Dimensions of digital development and the effects on society, the production sector and the State
Source: ECLAC (2021)

European Parliament (2014) has defined smart cities as "a place where the traditional networks and services are made more efficient with the use of digital and telecommunication technologies, for the benefits of its inhabitants and businesses". The focuses of smart cities development are improvements in citizens' life (Neirotti et al., 2014), environment efficiency, security and sustainability (Niaros et al., 2017) with centrally controlled and monitored technological infrastructures. Giffinger et al. (2007) have defined smart governance, smart people, smart environment, smart economy, smart mobility and smart living as six major dimensions of a smart city. The smart cities would incorporate the ICTs (Kramers et al., 2014) and Internet of Things (IoT) (Elmaghraby and Losavio, 2014) embedded into most of the sector of urban development such as government functionality, city operations, services deliveries, and intelligent analytics to optimize the services, production and usability (Kumar et al., 2018). OECD (2019) emphasises that smart city concept is evolving and is still subject to debates. OECD also points out that there is a range of definition for "smart cities" across OECD countries and institutions. In most cases, smart cities have been defined as initiatives or approaches that use digital innovation (including digital-enabled innovation) to improve competitiveness in a community and efficiency of urban services.

OECD (2019) also point out that the concept of smart cities has changed significantly since the original (and narrow) usage combining ICT, digital usages and citizen participation and navigating a complex system of governance involving local administrations, public agencies, firms, citizens and communities. While digital innovation remains central to the smart city concept, a key question is whether investment in smart technologies and digital innovations ultimately contribute to improve the well-being of citizens. This is why the OECD defines smart cities as "initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process" (OECD, 2018a). This definition stresses (OECD, 2019):

- the need to document better the contribution of smart cities' to improving the life of people while continuing to deliver solutions to some of the most common urban challenges in a sectoral or multisectoral fashion;
- the importance of citizen engagement and collaborative partnerships to boost civic engagement (citizen participation and feedback; co-creation and co-production models; citizen-centred services and engagement platforms);
- the value of experimentation with public access to open data and collaboration within/between cities; private-public-people; national-regional-local scale; and
- the need for integrated, holistic approach to addressing urban challenges through digital innovation in a city's governance, planning, and infrastructure investment.

Yigitcanlar et al. (2021) stated that over 55% of the world's 7.7 billion human population is housed in urban areas, where this figure is expected to increase to over 70% by the end of the century (Sotto et al., 2019). The urban growth and city population are growing in a fast pace causing different issues to the environment, economic and social sustainability of cities (Bibri and Krogstie, 2017). Many countries today have already exceeded this projected global urbanisation level—e.g., Australia with 86% (Zhang, 2016). These rapid population and urbanisation trends are not only accelerating global natural resource and environmental depletion, along with food, water and energy insecurity, but they are also worsening socioeconomic inequity, and making our cities almost ungovernable (Yigitcanlar, Butler, et al., 2020). The traffic congestion, poor urban infrastructure, health issues, energy shortages, educational challenges (Lee et al., 2013), inadequate housing, increasing crime rates, higher unemployment, ageing infrastructure, power thefts, issues in supply connections, insufficient power generations capacity, high power loss in transmission, frequent power breakdowns and lack of real time data sharing are some of common concerns in existing cities mostly in developing countries like India, as the Bosnia and Herzegovina as well (Kumar et al., 2018). Kumar et al. (2018) also points out that the restrictions on critical infrastructures and resource availability constraints create challenges for the healthy food, energy and clean water supply for increasing population. The cities are under strains on public finances to reduce budgets along with cost cutting measures, paradigm shifts towards online services, concerns about climate changes, economic restructuring with reducing the unemployment. Therefore, smarter ways are needed to manage the urban challenges and to revamp urban life, efficient infrastructures and quality services to its citizens.

Yigitcanlar et al. (2021) point out that with the increasing popularity of this city brand, city administrations across the globe have started to consider or develop various

strategies and initiatives for a smart city transformation (Fernandez-Anez et al., 2018). Nonetheless, besides a limited number of best practices, many cities have either failed or experienced a financial roadblock due to the heavy technocentric view of this city brand (Yigitcanlar, Hoon, et al., 2019). Subsequently, it was comprehended that digital data and technology are not the only key ingredients of the making of smart cities (Araral, 2020). In fact, increased technological reliance could bring new policy challenges related to data management, privacy, security (Vandercruysse et al., 2020), and accessibility to digital technology and infrastructure (Yigitcanlar, Desouza, et al., 2020). These could further complicate city governance where economic, social and environment challenges related to health care, employment, financial and resource management, air and water quality, social equity, housing, and mobility (Butler et al., 2020) persist.

2. Smart cities in the city century

This chapter represents a look at how technology enablers and AI will benefit how we live, including smart cities, tailored markets for one, industry, and cyber security.

2. 1. Urbanization is on the rise and question of money

Wang (2016) points out that worldwide demographic and technological trends are driving the need for cities to rethink how they use ICT, existing infrastructure, and core resources like government workers, citizens, and community and business groups. Many cities in both developed and developing countries face financial challenges that are exacerbated by current financial uncertainty and global austerity. In many countries, the aging workforce is felt more heavily in government, where a higher percentage of workers are nearing retirement age. City leaders must do more with less and look at problems in new and innovative ways to achieve change and digital transformation, both of which are necessary. They can then move seamlessly into the stage Augmented Innovation and the era of smart cities and digital economies can truly begin.

2. 2. A question of technology

Wang (2016) points out that as the next cycle of e-government innovation, the key objectives of smart cities are to improve economic development, sustainability, innovation, and citizen engagement. Progress requires building an ecosystem of partners to improve the quality of life for residents. Smart city projects, including citizen engagement, depend on the major technology enablers of Augmented Innovation: broadband, data centers, big data analytics, cloud, and the Internet of Things (IoT). Other crucial technologies in the smart city mix are AI and cognitive systems, robotics, 3D printing, next-gen security, augmented and virtual reality, and social networks. AI, in particular, will form the cornerstone of smart cities, a fact that telcos are waking up to. Transforming smart cities is a complex system and many parameters must be taken into account in the decision-making process.

The economic development of the city, the level of ICT infrastructure, the population of the city and its geographical features may be the determining parameters.

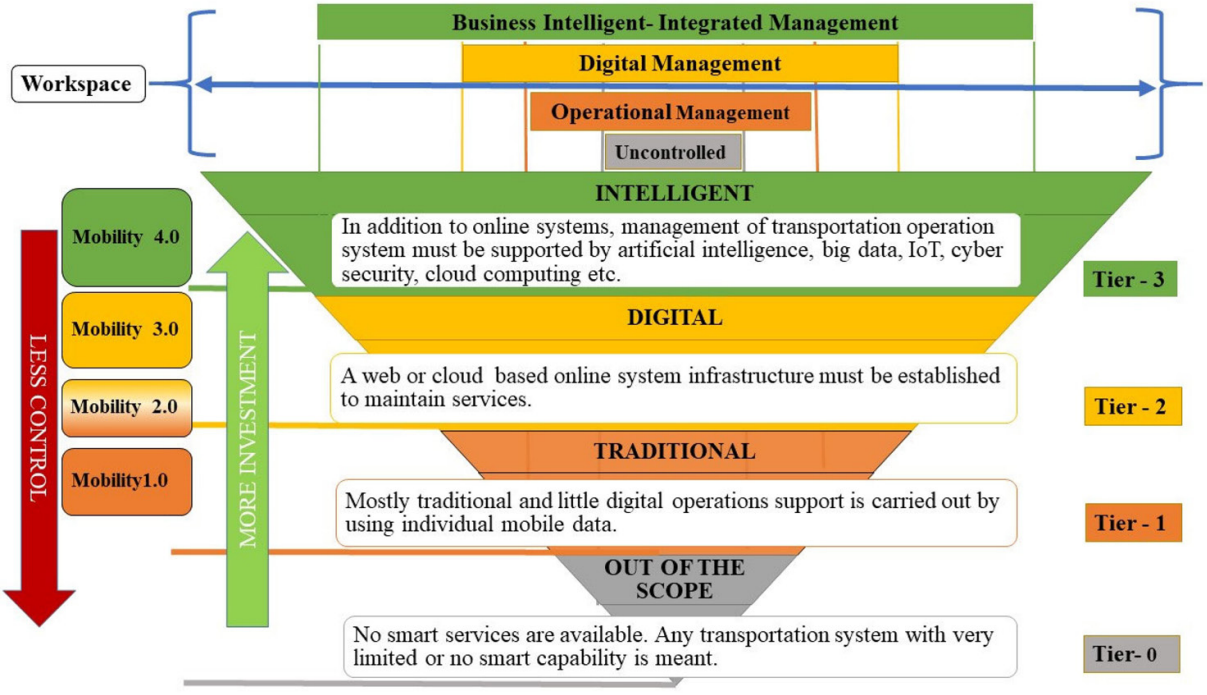


Figure 2. Component of the Mobility 4.0. reference model
Source: Inac & Oztemel (2022)

The reference model is designed as a 4-tier model, including "out of scope", "traditional", "digital" and "intelligent". Each tier indicates the level of smartness. Traditional systems are transforming themselves to digital ones, and digital services are transforming to autonomous systems, which are capable of self-decision making and performing operations with no or little human intervention. If the respective operations and services are running with no or little digital support, it considers that services run on a "traditional" level (Mobility 1). If the respective transformation services are conducted with fully or highly significantly digital processes, then, the system level is upgraded to "digital" level (Mobility 2 and Mobility 3) and last but not least, enriching the services with intelligent capabilities transform themselves to "intelligent" level (Mobility 4) (Inac & Oztemel, 2022).

Currently, smart city data collected from sensors is done so vertically and, according to Deutsche Telekom board member Claudia Nemat, is confined to a "landlocked lake." She believes that, "The content of such data 'oceans' will be so massive, and the relevant analysis so complex, that only artificial intelligence will be able to carry out the relevant data processing and forwarding with the necessary accuracy and speed." Technological progress will underpin the shift from second platform technologies to third platform technologies. Second platform tech focuses on cost cutting, sustainability, outsourcing, citizen engagement, and performance and risk management. Third platform tech centers on economic development; sustainability, resilience, and climate preparedness; partnerships and ecosystems; civic tech; open data, transparency, and accountability; and innovation management (Wang, 2016).

2. 3. Roadblocks to smart cities

All cities focus on driving economic development, foreign investment, and job creation. But, challenges exist in various areas (Wang, 2016):

- **Technology infrastructure**: includes fragmented, aging, outdated, or undeveloped infrastructures; information and process siloes; and bureaucratic and cultural issues.
- **Data use**: involves a lack of data interoperability standards within and across domains and a lack of policies or guidelines defining how to securely exploit the value of data in a multi-stakeholder environment.
- **City infrastructure**: includes traffic, crime, and poor waste and energy resource management.
- **Development path**: refers to the complex goal of achieving growth in a way that keeps pace with technology and the changing expectations of citizens and businesses.
- **Threats**: includes factors like financial, organizational, civil unrest, cyber security, and public safety.

Most cities don't look for a single silver bullet, and instead aim for shared goals and close partnerships between stakeholders, which tend to include government organizations, tech and domain suppliers, manufacturers, planners and developers, academia, NGOs, energy providers, users, and community groups.

2. 4. Citizen engagement

Large-scale transformation requires experimentation, collaboration, and new ideas that iteratively build upon successes and failures over time. One way is to engage citizen groups, business leaders, and IT vendors in IT organizations, city administration, and innovation. People have high expectations. They want 24/7 access to services through any channel — in person, by mobile device, or computer. They want these services with some level of personalization, or at least preference recognition, and consistent interaction. This influences mobile strategies in how cities interact with citizens, how services can be delivered, and how ICT works to support government departments and citizens. A strong digital infrastructure must exist alongside ways to engage citizens and business communities in designing the services they want to use. A key feature of the Augmented Innovation stage is that people will have the ICT tools to do this (Wang, 2016).

Cities can use open data and transparency initiatives to drive more private, citizen, or crowdsourced mobile apps for government services than cities, and this is a trend we expect to see.

By making high-value data and content openly available through web application programming interfaces (APIs) and websites, cities make it easier for departments to share key data internally and with other agencies. Additionally, developers can build applications around city data, which the public can find, use, and visualize on user-friendly charts,

graphs, and maps. The key steps for using open data strategically are choosing data sets to open up based on their impact and usability; providing a platform on which developers can build; balancing improved access to local government information against security and privacy issues based on the types of APIs used; and promoting the use of data via hackathons, ideas, challenges, and other means (Wang, 2016).

2. 5. Looking ahead to Augmented Innovation

Innovation, experimentation, and knowledge creation are no longer primarily in the hands of universities and research organizations. As people are enabled by more complete data sets alongside the technology and computing power to use them, innovators will emerge from business and community groups, individuals, government agencies, philanthropic organizations, and other nonprofits and private companies that serve government clients. The challenge is how to promote and harness the ideas from those inside and outside of government. Innovating to improve services for citizens and operate more efficiently is invariably the foundation of smart city projects and is often accompanied by an expectation of lower costs (Wang, 2016).

Figure 3. Smart cities become smart nations
Source: Wang (2016)

However, there are other benefits that innovation inspires: one, harnessing the collective wisdom of citizens and, two, attracting and retaining younger government workers. Innovation requires the ability to experiment and collaborate, which means policy makers must be willing to try new things and take risks, potentially expose themselves to failure, and use an iterative process built upon successes and failures over time. Notably, more mayors and CIOs with vision are getting the attention of constituents, other cities, and the media via high-profile projects with vendors, heavy involvement in the smart cities movement, and personal interaction with citizens via social media. As other key players watch their success, more are becoming open to using emerging technologies and fostering new relationships with citizens and stakeholders (Wang, 2016). Based on all the above, it can be said that smart cities contribute to the creation of smart nations.

The literature lists a large number of reasons why smart cities are interesting for citizens, businesses and all other actors. Some of these reasons are listed in the following figure.

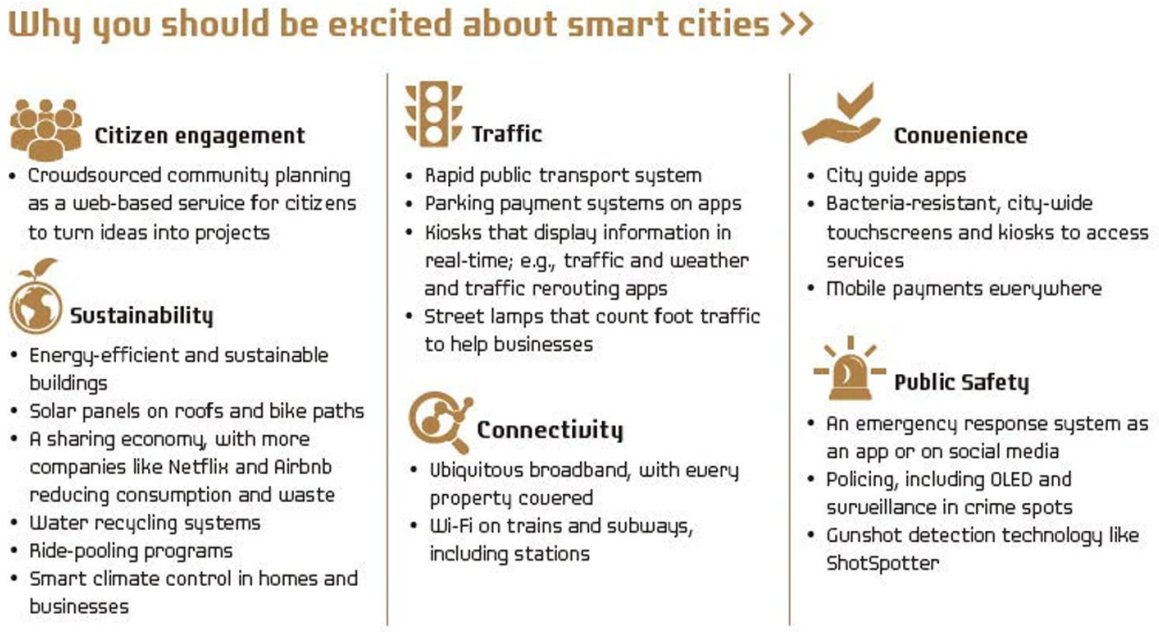


Figure 4. Why you should be excited about smart cities
Source: Wang (2016)

3. The technological transformation of urban planning in the age of 'smart cities'

Karvonen et al. (2020) point out that urban planning practices have always been closely intertwined with technological development. From the rise of nineteenth century infrastructure networks to the introduction of automobiles, streetlights, spatial analysis tools, personal computers, and the World Wide Web, planners have been tasked with mediating and aligning society and technology to produce contemporary cities (Rutherford, 2020). Today's smart city agendas embody the latest iteration of sociotechnical innovation with the promise of using information and communication technologies (ICT) to improve

the economic and environmental performance of cities while hopefully providing a better quality of life for residents. The rise of smart cities has catalysed numerous debates around the heightened role of technology firms in the management of collective urban services (Coletta, et al, 2019), the importance of global competition in attracting businesses and residents (Hollands, 2015), and the dangers of privatising infrastructure networks (Marvin et al., 2015). At the same time, the influence of urban planners has been surprisingly muted, despite the fact that smart city agendas are "challenging longstanding principles and practices of planning" (Späth & Knieling, 2020, p. 3). Indeed, the smart city competes with (and sometimes overshadows) sustainable urban development agendas (Parks & Rohracher, 2019; Yigitcanlar et al., 2019a) and tends to promote universal standards that reinforce a "reductionist mode of urban planning and development" (Joss et al., 2017, p. 31). Cowley and Caprotti (2019) go so far as to characterise the smart city as a form of 'anti-planning' that is rapidly replacing the normative foundations of the profession with notions of efficiency, standardisation, and corporate control. These critiques raise significant questions about how planners and incumbent planning practices are currently contributing to smart cities and more importantly, how they should contribute in the coming years. In short, what is the role of urban planning in the twenty-first century smart city? (Karvonen et al., 2020).

Parlikad et al. (2022) stated that the term "smart city", though poorly defined in academic terms, epitomizes a wide range of policy initiatives and corporate projects around the world that aim to utilize the power of data and digital tools for city planning, management, and operation. The transition to smart cities is driven by several factors and challenges, including increasing urbanization, growing stress on resources, inadequate infrastructure, rising environmental challenges, and rapidly improving technology capabilities. Given the wide diffusion of smart city initiatives across the globe, the variety of local contexts and purposes of these initiatives has made it hard to identify shared definitions and common interests at a global scale. To facilitate the policy discussion, Parlikad et al. (2022) proposes the following three key dimensions for disentangling the nexus of smart city initiatives (Figure 5).

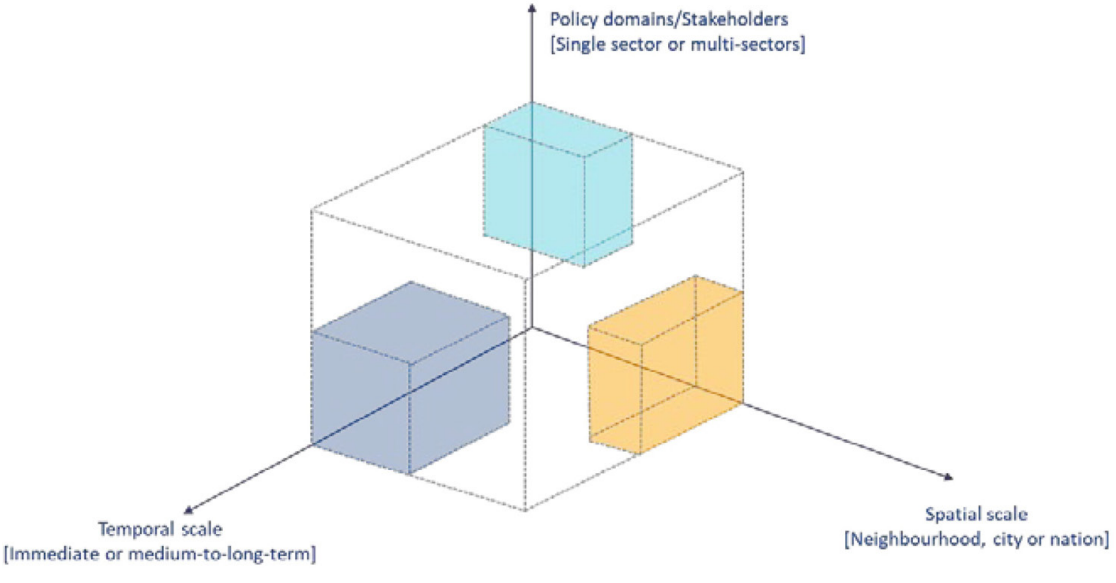


Figure 5. Key Dimensions of Smart City Initiatives
Source: Parlikad et al. (2022)

Parlikad et al. (2022) explains that the first dimension is the policy domain and main stakeholders that the smart city initiative targets. Some initiatives may focus on a single sector (e.g. energy-saving for office buildings), while others may be crosscutting and involve a wide range of stakeholders. The second dimension is the temporal scale related to either the initiative itself or the expected impacts. This dimension raises a critical question about mediating the relatively short political cycles and the continuity and durability that some smart city initiatives require in order to achieve the expected outcomes. The third dimension is the spatial scale, including both context and location and institutional and administrative scale in which the smart city initiative takes place. A common approach of implementing smart city initiatives is the creation of demonstrators or pilots, which tend to focus on a small geographic or sectoral domain. The majority of small-scale smart city pilots aim to address the main concerns about the political, financial, and technical risks, particularly when the application of an emerging technology is the main component of investment.

However, the scalability of such pilots (in terms of upscaling the initiative to a longer time span, other sectors, and/or larger spatial scale) has proven to be more complicated than previously anticipated. One reason for this is that "despite the continuous rhetoric around the smart city agenda seeking to solve city challenges, many demonstrators have ended up as technology demonstrations". In fact, although desired policy outcomes are expressed in most cases in order to justify investment, very few demonstrators present technology as part of a comprehensive solution package to address specific city challenges. It can be emphasized that Figure 5 summarizes the main policy domains of existing smart city initiatives. It is shown that existing smart city initiatives cover a wide spectrum of policy domains, ranging from interventions aimed at short- term (real-time) dynamics in cities (e.g. transport monitoring and control) to initiatives serving medium-to-long-term social outcomes (e.g. improving the mobility of the disabled, increasing productivity through labour-augmenting/saving technologies). Studies of existing smart city initiatives also reveal that the majority of initiatives involve the application of new technologies and data to improve the provision and operation of urban infrastructure and services. Given the wide spectrum of policy domains, a critical question arises regarding the dilemma of addressing multiple policy outcomes (Parlikad et al., 2022).

As illustrated at the Figure 6, the smart city agenda covers a wide range of policy domains. A relevant question has been raised by Hollands in his early critical review of smart cities: Can cities give the same priority to all aspects of the smart city agenda, or do some elements automatically take precedence over others? (Hollands, 2008). As all cities differ in their history, and economic and political make-up, prioritization of the smart city agenda needs to engage with the specific political and socioeconomic context of the city. Given the diversity of city functions and systems, digital transformation is unlikely to take place simultaneously over all policy domains. While some urban systems and policy domains may see immediate efficiency and productivity gains from digitalization (thus potentially taking up the digital agenda relatively quickly), some sectors tend to be more inertia-prone. However, the inherent inertia of these city functions does not necessarily indicate local protectionism or conservativism; and understanding the underlying causes of the inertia requires empirical investigation. The results of this investigation must inform the prioritization of the smart city agenda (Parlikad et al., 2022).

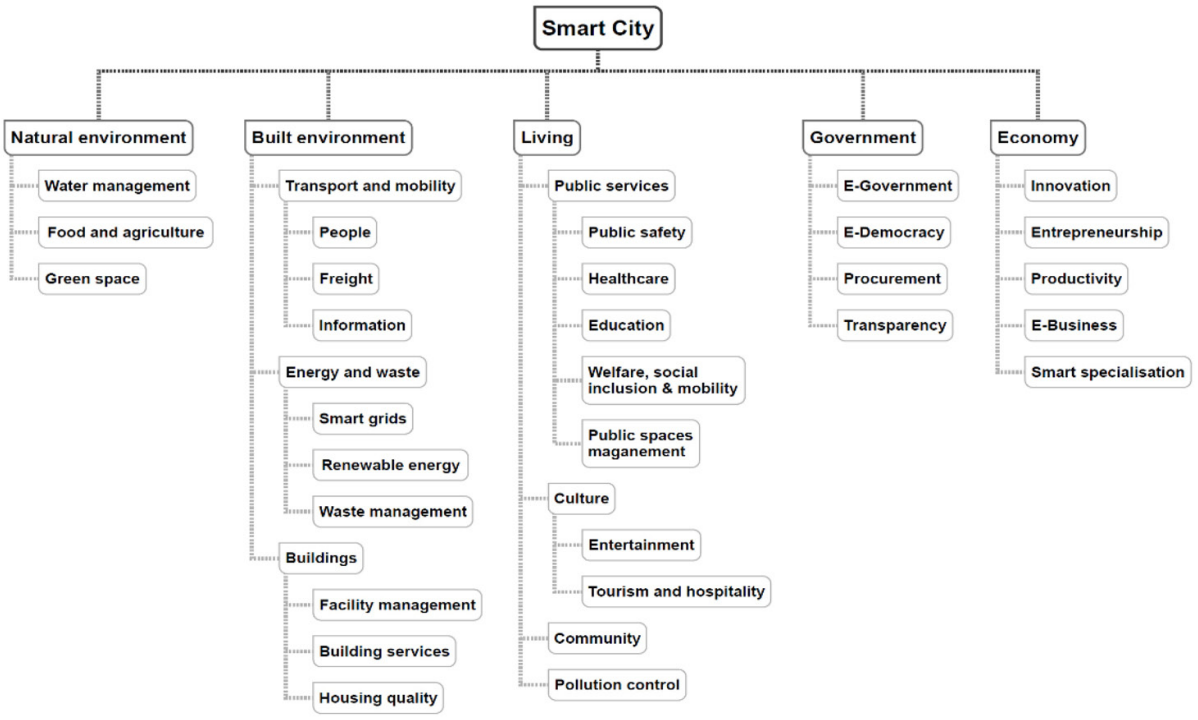


Figure 6. Main Policy Domains of Existing Smart City Initiatives
Source: Parlikad et al. (2022)

In conclusion, smart city development and implementation are progressive in nature, consisting of a combination of radical and incrementa,l changes. Their core value lies in empowering people to make informed decisions in both the private and public domains and incorporates the smartness of citizens instead of referring merely to the deployment of smart technologies. A shift in focus has been witnessed in smart city practice – from demonstrating technical functionality to a more citizen-centric solution design targeting specific urban challenges and policy goals.

4. Technology for smart cities: the pillars of urban planning of the future

Ramos (2021) points out that one of the most defining features of a smart city is its capacity to assimilate new technologies. However, what do we understand by technology for smart cities? No, it is not a list of devices "that make urban life easier". Self-driving cars, Big Data, robots, self-supply, remote public services… reveal the degree of urban intelligence on the surface. However, their integration is based on a more complex equation. To resolve it, it is important to note that these smart city solutions are closely interrelated and generate effects at many levels. Precisely, the value of the technological revolution we are living is that the introduction of technology brings with it consequences at other levels. Therefore, many experts use the organic description and imagine a smart city as a living entity.

4. 1. Which technologies are used by smart cities?

Knowledge and information are great powers. The key principle of empiricism in philosophy is transferred to our era in the development of Big Data. Now, the power not only consists of knowing, but in the mass management of that knowledge and its uses. That is why Big Data is understood to be the new oil. The use of vast masses of data is key for public administrations and private corporations in terms, for example, of processing millions of files or controlling flows of transport. Big Data should be aimed at strengthening the democratic values, security or social inclusion of cities. The luck of an oracle or "psychohistory" that aspires to solve current problems or before future ones make an appearance (Ramos, 2021).

a) Artificial intelligence

Artificial intelligence (AI) has proven useful in decision-making in various fields, including smart cities, medical tests and diagnostics, organizations, the public and private sector, and medicine. AI informs the decision-making process in the same manner that various computer technologies serve as the foundation of planning support systems. In terms of smart city planning, few tools have been produced to demonstrate how AI may advance the state of the art. As cities are becoming smart and digitized globally by installing sensors, computer cores, and other communication networks [48], as pushed by the modern notion of "Smart", this is becoming increasingly possible [1]. These digital ideas are linked to AI and machine learning technologies, which enable collecting near real-time data, allowing for a better knowledge of how cities change, adapt, and respond to diverse environments (Bokhari & Myeong, 2022).

b) Internet of things (IoT) in cities

IoT is one of the most palpable and organic advances of a smart city. The integration of sensors and objects on the cloud have opened up a world of possibilities in all urban departments, from controlling energy flows, traffic or any incident in real time. Gartner has reported that the investment in IoT will be crucial to build smart cities, services as data using will generate most of the revenues. Safety and security of smart homes will be the second largest market in terms of service revenues. As for services related to health and well-being, they should represent a market of $ 38 billion in 2020 (Hammi et al., 2017; Ramos, 2021).

c) Connectivity

If we talk about connectivity, we cannot ignore, in terms of infrastructure, another technological pillar of cities: smart communication networks. Today this is strongly related to the implementation of 5G, but it is not the only area in which telecommunications work. 5G will contribute to the improvement of IoT by allowing the interconnection of up to 20 billion devices. It will also help in terms of energy sustainability (Ramos, 2021).

d) Toward a model of sustainability

The reduction of energy bills by exploring new forms of producing and managing existing models is essential in order to talk of the future (or of life on the Earth's crust). This is another structural factor that is integrated in the genetics of technologies for smart cities. We can find it in the exploitation of renewable energies or in waste management. In this war against pollution, we may still have a few battles to lose (Ramos, 2021).

e) Smart lighting and transport network in a smart city

Smart Lighting comprises an heterogeneous and multidisciplinary area within illumination management, with the possibility of integrating a wide set of sensor and control technologies, together with information and communication technologies, with the aim of achieving a higher efficiency and a lower negative impact derived from the use of energy for illumination, in combination with enhanced intelligent functionalities and interfaces of lighting in the ambient, commercial and public domain. Regarding to cities, street lights are one of the most important assets to maintain and control, providing safe roads, inviting public areas, and enhancing security in homes, businesses, and city centers. However, this concrete asset is very costly to operate, with a share of about 40% of the total amount of electricity spent in a city (Castro et al., 2013).

Transport will be one of the areas that will see the most developments. Electrification and self-driving vehicles are directing the automotive industry today. The former entails the improvement of batteries; the latter, the enormous challenge of applying artificial intelligence to mobility. However, they are not the only trends. There are new forms of urban communication on the horizon, in which cars do not play such an important role and which sees the emergence of a new meaning of public mobility.

6. Local leadership for democratic digital transformation

Smart cities need to be governed, and there are new challenges when public management is set in digital contexts (European Commission, 2017) that are open to the interdisciplinary research field (Yildiz, 2013). As governments engage in rapid digitalization of their organizations and services, competence gaps and cost-effectiveness demands have led to the outsourcing of digital infrastructure development and maintenance to third party suppliers. This has, as OECD points out, generated lock-in effects and decreased the organizations' internal capability for policy and service delivery (Welby, 2019). These consequences have direct implications for coherence between the political strategy, policy aims, and the municipal services.

A recent literature review identified that public values are addressed in digital government to improve public services, public administration and the legitimacy of public services among the general public (Twizeyimana & Andersson, 2019). The orchestration of public services on digital platforms can enable public administration to deliver services in line with public values (Cordella & Paletti, 2019). The review also concluded that there is a lack of studies with a comparative focus and that there has been little focus on organi-

zational change, and on how to deliver services in line with public values (Twizeyimana & Andersson, 2019). Thus, we will here focus on how political leaders see values in relation to digital transformation towards smart cities.

Public leadership, in contrast to leadership in market-driven organizations, has to build on public values and deliver results and outcomes such as democratic legitimacy and trustworthy public services (Bergström & Eklund, 2019). To sustain citizens? High trust in local democracy and welfare provision in the digital age, there is a need to analyse and build new types of leadership for change. The public leadership of digital transformation is currently influenced by market-driven organizations (Dunleavy et al., 2006). There is a need for analyses of leadership styles that combine the individual perspective of the public leader with perspectives on the situations within which he acts (Alvesson et al., 2017). Leadership in the local digital transformation towards smart cities is expressed in strategic decisions, as well as in many daily practices that can range from information security policies to daily struggles with learning platforms in schools. In all such situations, the leaders have to reassemble and act in line with core public values (Gustafsson, 2017).

At a recent Cities Today Institute event in Philadelphia, US digitalisation leaders discussed their efforts to retain new-found agility without creating expectations that they can't fulfil. During the height of the pandemic city digitalisation leaders rapidly adapted the smart city plans they were gradually rolling out to saving lives, keeping essential services running and preventing businesses going to the wall. This saw them turn their tools and teams to facilitating COVID-19 testing, vaccinations and emergency disbursements, and launching new services in weeks and days rather than months and years. According to some, the crisis accelerated ten years of transformation and proved the value of digital technologies and data to solve real problems. It also imbued a new-found confidence in local government's ability to innovate despite bureaucracy and limited resources. As the pandemic evolves and cities look to the longer-term view, they are left asking themselves what their roles and responsibilities look like now, and whether they can truly maintain what they've started. Although they are taking steps to make sure their spending and innovation projects have longevity, some cities are still concerned about living up to new expectations. This is compounded by the influx of American Rescue Plan Act (ARPA) and other federal funds, which cities are working hard to make sure deliver benefits that are financially and practically sustainable (Wray, 2022).

One issue is that during the pandemic, a lot of residents started shopping online for the first time. Now they expect the same level of service and speed from their city as they get from companies like Amazon, and could be left disappointed. Another is the wide range of responsibilities that cities have assumed during the pandemic. Many cities used funds from the Coronavirus Aid, Relief, and Economic Security Act (CARES) and now ARPA to support small businesses with grants, expedited processes, and marketing programmes. These funds are not recurring, though, so for maximum long-term impact, more effort is needed to build long-term resilience. Cities discovered that some small businesses have limited digital skills – for example, they don't have a website or use social media. Cash-only companies struggled to access support during the pandemic without the right paperwork. The City of South Bend, IN, launched a 'digital storefront' grant programme to help local businesses develop or enhance their online presence and capabilities. The city is also focusing on user experience to prevent small businesses being "overwhelmed" by too many resources. This includes rationalising processes between departments and merging

as many applications as possible, said Denise Riedl, Chief Innovation Officer at the City of South Bend. Also, the pandemic has highlighted the power of data to help cities solve challenges, from understanding COVID hotspots and recovery trends to getting support to those who need it most. But some cities still struggle to persuade certain departments to share their data, and others are concerned about the ability to sustain data efforts when priorities shift (Wray, 2022).

7. Conslusion

This paper employed a systematic review on digital transformation in smart cities. This paper contributes to the research on digital transformation within smart cities in oreder to support actors in co-creating individual, organisation value, and societal well-being from business strategies and IT initiatives. Smart cities have become a very popular approach to solving complex urban problems like environmental sustainability, economic recovery and social cohesion. Urban planning should go beyond digital transformation and beyond GDP and effectiveness to well-being, happiness and quality of life. Focusing on smart-people and smart-environment could bring quick and sustainable gains on efficiency. The analysis presented earlier highlights that smart cities represent a model of governance based on collaboration between local stakeholders, citizen participation, experimental innovation and a holistic approach to the development of local policies. In order to foster an integrated vision of the process of innovation and to facilitate collaboration with partners, public actors created different governmental structures, internal or external to the administration, and adopted various policy tools.

The findings from this study presents the importance of digital transformation in smart city domain. Findings reviewed that smart city governance would potentially support the digital transformation of traditional public administration into NPG (New Public Governance). As societies and businesses become intensively digital, so it needs to be the city and its institutions. Findings also reveal that regarding a lag in proper institutional digital advancement, a diversified approach to every singular city development smart dimension may be avail if identifying measures of digitisation, digitalisation and digital transformation pursuant to needs, readiness, and goals of the community.

Smart city initiatives visualise the culture and the ambitious of the society for a better life. Its understanding of the shared success is so much valid as it is its lack of understanding for the shared failure. It is as simple as to decide what city we want and to unit around clear and straight messages and objectives, then to fix the short and long run priorities and to execute properly the plan established. So, the core value of smart city lies in empowering people to make informed decisions in both the private and public domains and incorporates the smartness of citizens instead of referring merely to the deployment of smart technologies.

This study, as well as previous research, imposes a large number of open questions. The first and most important issue relates to the fact that there is no single definition of a smart city or digital transformation. Accordingly, it is necessary to work on harmonizing attitudes and views in terms of creating a generally accepted definition of a smart city. Another open question relates to digital infrastructure and political and constitutional ar-

rangements in the states. this is an important question considering that it constitutes the most significant factors in a successful digital transformation. therefore, the question is whether the different constitutional and political arrangements of the countries affect the success of the implementation of digital transformation? Also, another open question that remains relates to the influence of the executive power and citizens on the implementation and acceptance of all the changes that digital transformation brings?

The limitation of the study is based on the fact that only secondary data from the literature were employed. Further studies could be conducted by using real mobility data to validate the applicability of digital technologies for digital transformation in smart cities. Also, current research opens the doors for further research to deepen notably the analysis in every dimension of any smart city current state and prospective development.

References

1. Alvesson, M., Blom, M., & Sveningsson, S. (2017). *Reflexive leadership: Organising in an imperfect world*. London: Sage.
2. Araral, E. (2020). Why do cities adopt smart technologies?. *Cities*, 106, Article 102873.
3. Bergström, T., & Eklund, N. (2019). *Ett annorlunda ledarskap - Chef i politiskt styrd verksamhet*. Lund: Studentlitteratur.
4. Bibri, S.E. & Krogstie, J. (2017). Smart sustainable cities of the future: An extensive interdisciplinary literature review. *Sustain. Cities Soc*. 31, 183–212.
5. Bokhari, A.S.A. & Myeong, S. (2022). Use of Artificial Intelligence in Smart Cities for Smart Decision-Making: A Social Innovation Perspective. *Sustainability 2022*, 14, 620. https://doi.org/10.3390/su14020620
6. Butler, L., Yigitcanlar, T., & Paz, A. (2020). Smart urban mobility innovations. *IEEE Access*, 8, 196034–196049.
7. Castro, M., Jara, J.A. & Skarmeta, M. (2013). Smart Lighting Solutions for Smart Cities. *2013 27th International Conference on Advanced Information Networking and Applications Workshops*. pp. 1374-1379. https://doi.org/10.1109/WAINA.2013.254
8. Coletta, C., Evans, L., Heaphy, L., & Kitchin, R. (Eds.). (2019). *Creating smart cities*. London: Routledge.
9. Cordella, A., & Paletti, A. (2019). Government as a platform, orchestration, and public value creation: The Italian case. *Government Information Quarterly*, 36(4), 101409. https://doi.org/10.1016/j.giq.2019.101409
10. Cowley, R., & Caprotti, F. (2019). Smart city as antiplanning in the UK. *Environment and Planning D: Society and Space*, 37(3), 428–448.
11. Dunleavy, P., & Margetts, H., & Bastow, S. (2006). *Digital era governance: IT corporations, the state, and e-government*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199296194.001.0001
12. ECLAC (Economic Commission for Latin America and the Caribbean). (2018). *Digital Agenda for Latin America and the Caribbean (eLAC2020)*, Cartagena de Indias (Online available at:) https://conferenciaelac.cepal.org/6/sites/elac2020/files/cmsi.6_digital_agenda-en-23_april.pdf (Accessed on 8.2.2022).
13. ECLAC (Economic Commission for Latin America and the Caribbean). (2021). D*igital technologies for a new future*. (LC/TS.2021/43), Santiago, 2021
14. Elmaghraby, A.S., Losavio, M.M. (2014). Cyber security challenges in smart cities: safety, security and privacy. *J. Adv. Res*. 5 (4), 491–497.
15. European Commission. (2017). *Ministerial Declaration on eGovernment - the Tallinn Declaration*. (Online available at:) https://ec.europa.eu/digital-single-market/en/news/ministerial-declaration-egovernment-tallinn-declaration (Accessed on 11.4.2022)
16. European Parliament. (2014). *Mapping Smart Cities in the EU*. Study. Policy Department A: Economic and Scientific Policy, European Parliament, Brussels.
17. Fernandez-Anez, V., Fern´andez-Güell, J., & Giffinger, R. (2018). Smart city implementation and discourses. *Cities*, 78, 4–16. https://doi.org/10.1016/j.cities.2017.12.004

18. Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., Meijers, E. (2007). Smart Cities: Ranking of European Medium-Sized Cities. *Centre of Regional Science (SRF)*, Vienna University of Technology, Vienna, Austria.
19. Gustafsson, M. S. (2017). Reassembling Local E-Government. *Doctoral dissertation*. Linköping: Linköping University Electronic Press
20. Hammi, B., Khatoun, R., Zeadally, S. & Fayad, A. (2017). Internet of Things (IoT) Technologies for Smart Cities. *IET Research Journals*, pp. 1-14. https://doi.org/10.1049/iet-net.2017.0163
21. Hollands, R. G. (2015). Critical interventions into the corporate smart city. *Cambridge Journal of Regions, Economy and Society*, 8(1), 61–77.
22. Hollands, R.G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?. *City*. 12 (3): 303–320.
23. Ibrahim, M., Adams, C. & El-Zaart, A. (2015). Paving the way to smart sustainable cities: transformation models and challenges. *JISTEM - Journal of Information Systems and Technology Management*, Vol. 12, No. 3, Sept/Dec., 2015 pp. 559-576. https://doi.org/10.4301/S1807-17752015000300004
24. Inac, H. & Oztemel, E. (2022). An Assessment Framework for the Transformation of Mobility 4.0 in Smart Cities. *Systems 2022*, 10, 1. https://doi.org/10.3390/systems10010001
25. Joss, S., Cook, M., & Dayot, Y. (2017). Smart cities: Towards a new citizenship regime? A discourse analysis of the British smart city standard. *Journal of Urban Technology*, 24(4), 29–49.
26. Karvonen, A., Cook, M. & Haarstad, H. (2020). Urban Planning and the Smart City: Projects, Practices and Politics. *Urban Planning* (ISSN: 2183–7635), 2020, 5(1), 65–68, https://doi.org/10.17645/up.v5i1.2936
27. Kramers, A., Höjer, M., Lövehagen, N., Wangel, J. (2014). Smart sustainable cities–exploring ICT solutions for reduced energy use in cities. *Environ. Model Softw*. 56, 52–62.
28. Kumar, H., Singh Kumar, M., Gupta, M.P. & Madaan, J. (2018). *Moving towards smart cities: Solutions that lead to the Smart City Transformation Framework*. ELSEVIER. https://doi.org/10.1016/j.techfore.2018.04.024
29. Marvin, S., Luque-Ayala, A., & McFarlane, C. (Eds.). (2015). *Smart urbanism: Utopian vision or false dawn?*. London: Routledge.
30. Neirotti, P., De Marco, A., Cagliano, A.C., Mangano, G., Scorrano, F. (2014). Current trends in smart city initiatives: some stylised facts. *Cities*, 38, 25–36.
31. Niaros, V., Kostakis, V., Drechsler, W. (2017). Making (in) the smart city: the emergence of makerspaces. *Telematics Inform*. 34 (7), 1143–1152.
32. OECD (2019). *Enhancing the contribution of digitalisation to the smart cities of the future*. OECD
33. Parks, D., & Rohracher, H. (2019). From sustainable to smart: Re-branding or ressembling urban energy infrastructure? *Geoforum*, 100, 51–59.
34. Parlikad, A., Wan, L. & Nochta, T. (2022). *The technological transformation of urban planning in the age of 'smart cities'*. University of Cambridge, Department of Engineering and IfM Education and Consultancy Services. Online available at: https://ciip-group.org/media/uploads/files/IfM_ECS_Policy_briefs_combined_smartcities.pdf (accessed on 12.3.2022)
35. Ramos, J. (2021). *Technology for smart cities: The pillars of urban planning of the future*. Online available at: https://tomorrow.city/a/technology-for-smart-cities-the-pillars-of-urban-planning-of-the-future (Accessed on, 5.3.2022)
36. Rutherford, J. (2020). R*edeploying urban infrastructure: The politics of urban socio-technical futures*. London: Springer.
37. Sotto, D., Philippi, A., Yigitcanlar, T., & Kamruzzaman, M. (2019). Aligning urban policy with climate action in the global south. *Energies*, 12, 3418. https://doi.org/10.3390/en12183418
38. Späth, P., & Knieling, J. (2020). How EU-funded smart city experiments influence modes of planning for mobility: Observations from Hamburg. *Urban Transformations*, 2(1), 1–17.
39. Twizeyimana, J. D., & Andersson, A. (2019). The public value of E-Government - A literature review. *Government Information Quaterly*, 36 (2), 167-178. https://doi.org/10.1016/j.giq.2019.01.001
40. Vandercruysse, L., Buts, C., & Dooms, M. (2020). A typology of smart city services. *Cities*, 104, Article 102731.
41. Wang, G. (2016). Smart cities in the city century. *WinWin Special Edition*. Online avalilable at: https://www.huawei.com/en/technology-insights/publications/winwin/AI/smart-cities-in-the-city-century (Accessed on: 22.4.2022).
42. Welby, B (2019). *The impact on digital government on citizen well-being*. OECD Working Papers on Public Governance, No. 32. Paris: OECD Publishing.
43. Wray, S. (2022) Cities have turbocharged digital transformation – can they sustain it?. *CitiesToday*. Online available at: https://cities-today.com/cities-have-turbocharged-digital-transformation-can-they-sustain-it/ (Accessed on, 12.6.2022)
44. Yigitcanlar, T., Butler, L., Windle, E., Desouza, K., Mehmood, R., & Corchado, J. (2020). Can building artificially intelligent cities safeguard humanity from natural disasters, pandemics, and other catastrophes?. *Sensors*, 20, 2988. https://doi.org/10.3390/s20102988
45. Yigitcanlar, T., Degirmenci, K., Butler, L., Desouza, C. K. (2021). *What are the key factors affecting smart city transformation readiness? Evidence from Australian cities*. ELSEVIER. https://doi.org/10.1016/j.cities.2021.103434

46. Yigitcanlar, T., Desouza, K., Butler, L., & Roozkhosh, F. (2020). Contributions and risks of artificial intelligence (AI) in building smarter cities. *Energies*, 13, 1473.
47. Yigitcanlar, T., Hoon, M., Kamruzzaman, M., Ioppolo, G., & Sabatini-Marques, J. (2019). The making of smart cities. *Land Use Policy*, 88, Article 104187.
48. Yigitcanlar, T., Kamruzzaman, M., Foth, M., Sabatini-Marques, J., da Costa, E., & Ioppolo, G. (2019a). Can cities become smart without being sustainable? A systematic review of the literature. *Sustainable Cities and Society*, 45, 348–365.
49. Yildiz, M. (2013). Big Questions of e-government research. *Information Polity*, 17 (3), 260-262. https://doi.org/10.1145/2479724.2479763
50. Zhang, X. (2016). The trends, promises and challenges of urbanisation in the world. *Habitat International*, 54, 241–252. https://doi.org/10.1016/j.habitatint.2015.11.018

THE CHURCH IN CROATIAN INTERNET PORTALS

***Ines Grossi*[1]**
***dr. sc. Anto Mikić*[2]**

Abstract

Today's culture of communication is influenced by the internet and social networks. Therefore, being virtually present on social networks and internet portals has become an imperative of everyday life. In this regard, the authors analyze the status of the Catholic Church on the most widely read secular and religious internet portals by exploring their relationship to the Catholic Church. The main goal of the research is to examine and determine whether the status of the Catholic Church in the period that was the subject of the research was negatively or positively intoned on the researched internet portals. The authors try to find the answer to the research questions by analyzing the content of articles on the topic of the Catholic Church published on six internet portals and shared on the official Facebook pages of these media. Descriptive statistics in the paper present the results of the research. The obtained results lead to the conclusion that the articles placed in the media about the Catholic Church are mostly positively intoned. However, the negative article placed by the secular media on social networks has a greater impact and thus seemingly creates the image that the negative media connotation of the Catholic Church is predominantly represented. The results obtained in the conducted research can be used for further research and further shed light on the topic of the media's attitude towards the Catholic Church.

Key words: *Catholic Church, Social Networks, Internet, Communication.*

1 doktorantica Doktorske škole Sveučilišta J.J. Strossmayera u Osijeku, ines.benkovic@gmail.com

2 docent na Odjelu za komunikologiju, Hrvatsko katoličko Sveučilište, Zagreb, Ilica 242, anto.mikic@unicath.hr

1. Introduction

The Internet as a new media has a kind of direct influence on the communication culture, so that people spend most of their leisure time on the social media and web portals. Bogešić has defined the Internet as the medium which 'forms the opinions and attitudes of the people in society, whereas its virtual world becomes more challenging and attempting than the reality and distances the individual from the real world. The Internet has increased its influence in the Church media activities and spreading of the Bible and Christian messages to the general public. In Croatia all denominations are in a way involved in the Internet communication, most frequent by the use of the websites. '(Bogešić, 2019:105).

The social media, such as the *Facebook,* enable the two-way communication, effective content-sharing, so that the Catholic Church has the evangelization opportunity by the use of these communication channels. But, on the contrary, the 'opponents' of the Church commitments, i.e., those who perceive it as a negative social force, have also got the platform for effective negative content-sharing about the Catholic Church. The main objective of this research and paper is to enquire and examine whether the majority of contributions about The Catholic Church had a negative tone on secular web portals and positive one the Catholic web portals, i.e., whether the status of the Catholic Church during the assessed period had a positive or negative position on the required internet portals. Conducting research by focusing on articles in which the Catholic Church was the dominant topic in the observed period on the Internet portals of Croatian secular and religious portals, analyzes the presence of sensationalism in the titles of articles published on Internet portals, as well as the use of sources in published articles on the Catholic Church. Furthermore, the authors try to research the attitudes of the certain secular and religious portals about the Catholic Church, i.e., whether they publish just the most-read sensational content or also share the Catholic Church. positive stories and actual news. Since this paper analyses the status of the Catholic Church on the web portals and questioning of the web portal relationship with the Catholic Church, the comparative content analysis and implementation of the quantitative research approach has been chosen as the research methodology. The research implemented in this paper provided certain conclusion on the relationship of the web portal with the Catholic Church. Accordingly, the main aim of this paper is to question and specify whether the status of the Catholic Church was negative or positive positioned on the referred web portal during the period considered.

2. Theoretical Framework

Recently the web portals power has become crucial in creating of public opinion. However, media are not just the means of public information, but also the main creators of changes at each area of social, private and family lives of many people. The present media role is various: combined with the entertainment component, there are also educational and long-term public change creation components. In this context, some authors emphasize that Croatian media is often represented in a negative context, as the 'social parasite which just takes and gives nothing' by applying 'the strategy of creating mistrust '(Šola, 2017: 464). If so, we could wonder why the media try to influence on the public opinion

by creating the negative perception of the Catholic Church. As noted by some authors, the answer might be that the media are interested only in the 'conflict matter, especially if it has been connected with the Church hierarchy. The narrow religious topic is on the edge of the media interests, while the close attention is given to the other area: politics, sport, leisure time and entertainment' (Bogešić, 2019:103). Moreover, several Catholic prelates complain of the negative image of the Church, 'in order to achieve the greater circulation, but also to decrease and diminish its social influence' (Sladoljev, 2003:11, according to: Mikić, Novak, 2019).

In their paper Skoko and Bajs quoted the sentence of the American president Thomas Jefferson in 1807: 'Nothing can now be believed which is seen in a newspaper. Truth itself becomes suspicious by being put into that polluted vehicle (…) The man who never looks into a newspaper is better informed than he who reads them; inasmuch as he who knows nothing is nearer to truth than he whose mind is filled with falsehoods and errors.' (Skoko, Bajs, 2007:95). Judging by the part of audience, as seen in the web portal articles' comment sections, together with certain media and social processes analysts, these quotes highly reflect the content posted by some web portals. Due to the great influence of the media on society, more authors stress the social responsibility (Skoko, Bajs, 2007, Valković, 2013). 'The public has become merely audience', while main actors are media as the public opinion creators (Peruško-Čulek, 1999:59, according to Labaš, Vizler, 2005:282).

3. Social media and Catholic Church

In the digital time social media have become the main virtual means of communication. These are defined as 'a network of people, although it may sometimes be a network of groups of people. They form the vertices of the network and the edges represent connections of some kind between them, such as friendship.' (Newman, 201; according to Vidak 2014:49). The combination of technical improvement with the people communication needs creates the space for the unity marked with fast communication, interactivity and dynamics' (Strujić, 2016:443). One of the most popular internet social communication channels is certainly the *Facebook*. Authors Kovačić and Others define the *Facebook* as one of the most famous social networks in Croatia, which media use to 'promote their contents, interact with users and increased the followers. The users have the option to rate content by emotional expressions, commenting, participating in discussions and sharing the content.' (Kovačić, Musa, Tomić, 2019:16). The latter authors in their paper *Online Media and Journalism on Social Networks- Case Study Social Network Facebook* researched editorial policies of ten most read Croatian *news* portals on the *Facebook* social network in September 2019. They recognized that social networks are the 'crucial communication channel between the *news* portals and followers and also the important source of information for both social network users and journalists who often base their texts on the social media posts' (Kovačić, Musa, Tomić, 2019:25). Having considered the daily use of the Internet in everyday life, many authors define it as the 'seventh continent' (Strujić, 2017:476). By growing influence of technologies in the present, the everyday media contents shape and form our attitudes (Alić, 2009:273). As mentioned, the most attractive themes are delicate and sensational stories because they are best-sellers. The culture of reading positive stories has almost disappeared, while the negative content is the most

sought after. Kovačić and Others notice this and find that the main culprit for unethical online content is the lack of sustainable business models and fighting for every advertisement or PR. The online journalism is forced to distribute content which is not in accordance with the ethical principles; instead, thy follow the social media principles where the post publications., number of comments and likes are set as the main journalism measures (Kovačić, Musa, Tomić, 2019:25). Digital era and modern means of communication, especially social media, have entered the Catholic Church by creating a new dimension of communication (Ančić, 1995:408). Having considered the relationship between the Internet and Catholic Church, Henderson suggested some advantages of the use of the Internet for religious purposes and emphasized (Henderson, 2000 according to Duvnjak, 2015:59):

- 'fast and simple access to information about religious communities, their institutions and organisations and religious texts and documents,
- great potential for introduction, as well as advanced studies of religious topics from lowest to highest levels,
- online religious contents are presented in a modern and interactive way within the sophisticated technological environment, which has effect on the overall experience'.

Nowadays, the use of the Internet and social media has been recognize,d as the main means of fast information exchange. However, it should be pointed out that besides positive aspects, there are also negative ones, e.g., increased manipulation of information.

4. Case study and methods of empirical research

The main objective of this research and paper is to enquire and examine whether the majority of contributions about The Catholic Church had a negative tone on secular web portals and positive one the Catholic web portals, i.e., whether the status of the Catholic Church during the assessed period had a positive or negative position on the required internet portals, as well the use of sources throughout the published contributions about the Catholic Church.

According to the research goal, the initial hypotheses are:

H_1: *Most of the articles about the Catholic Church on the secular web portals have negative value orientation.*

H_2: *The articles about the Catholic Church on the Catholic web portals have mostly positive value orientation.*

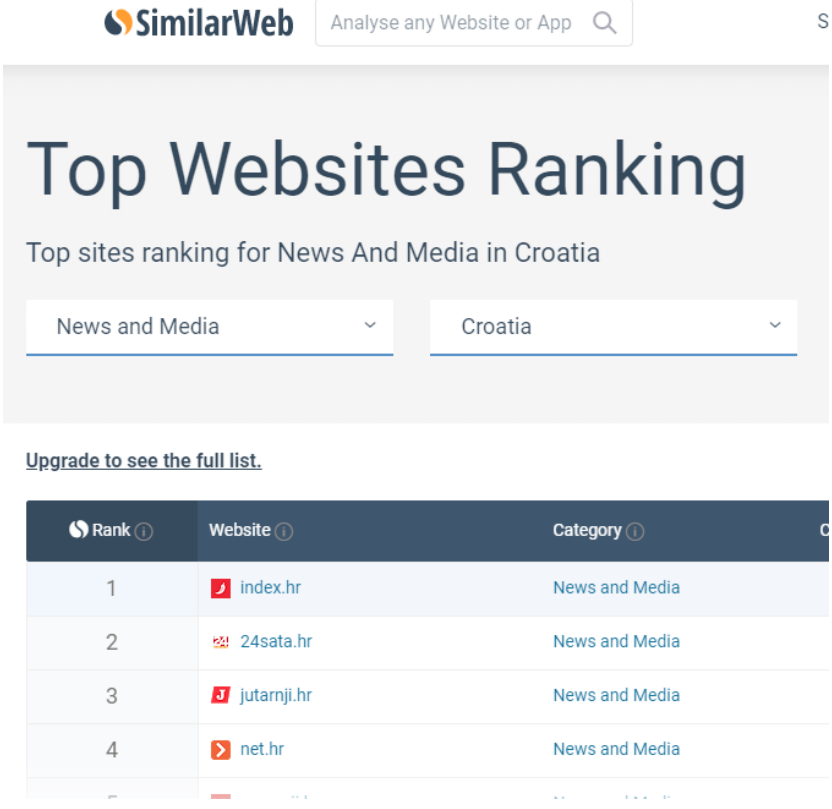
H_3: *The articles about the Catholic Church on the secular web portals are frequently sensational headlined.*

H_4: *The articles about the Catholic Church on the Catholic web portals do not have sensational headlines.*

The science research methodology is based on the scientific method od the comparative content analysis applying the quantitative research approach. The content analysis

is considered the appropriate method of information gathering and has great heuristical usefulness. The quantitative content analysis is also known as frequency one, because it is used to denote the frequency and volume of the content of the message. (Tkalac Verčić, Sinčić Ćorić, Pološki Vokić, 2014:92-94). The comprehensive analysis of the content of articles about the Catholic Church published on 6 web portals and shared on the official *Facebook* pages of these media lasted from the 1st to 31st January 2021. The published articles were examined in order to find the answer to the question whether the status of the Catholic Church during this period was positively or negatively toned, the contexts of editing of the articles on these secular and religious web portals combined with the headline's sensationalism connected with the Catholic Church. The analysis unit was the article about the catholic Church on the secular and religious web portals. The three most-read articles were chosen from both secular and religious web portals in the previous year, according to the Reuters and Similar Web research (Picture 1 and Picture 2).

Indeed, the most-read secular web portals in 2020 were Index.hr, 24sata.hr and Jutarnji.hr, while the most-read religious portals were Bitno.net, Medjugorje-info.com and Hkm.hr (Jw.org was not analysed, because it is the web portal of other non-Catholic denomination, Jehovah's Witnesses). As the Catholic web portals have more posts about the religious topics on both their websites and *Facebook* pages than the secular portals, the posts published on the religious portals on every fifth day in January were analysed. For secular portals all posts about the Catholic Church published from 1st January were analysed. According to the predetermined criteria, all web articles about the Catholic Church which were published on the above-mentioned web portals and shared to their official *Facebook* pages during the specified time period were analysed.



Picture 1. Most-read secular web portals in 2020
Source: https://www.similarweb.com/top-websites/croatia/category/news-and-media/

The research matrix was taken from the *Religious Topics in Croatian Media Space* project held by the Department of Communicology of the Catholic University of Croatia which was subsequently tailored for the research goals. The matrix contained 16 question categories. The sample of the content analysis was specified by the one-month time period and the content analysis unit were every article published about the Catholic Church and its activities on the above-mentioned web portals and shared on their official *Facebook* pages. The statistical data treatment was processed throughout the statistic software SPSS. The descriptive statistics was used in order to data analysis.

Picture 2. Most-read religious web portals in 2020
Source: https://www.similarweb.com/top-websites/croatia/category/community-and-society/faith-and-beliefs/

The indicator of the value orientation specification is set up by the (non) disclosure of the author's point of view in the article about the Catholic Church; positive denotes approval and affirmation, negative critic and judgements and neutral general description without the author's a clear attitude on the value orientation scale (Mikić, Novak, 2019:180). The variables were coded for the portal name, article type, author of the article, type of headlines, article value orientation and graphic design of images.

5. Research results

Table 1. The distribution of web portal articles (N=284)

WEB PORTAL NAME	NUMBER OF ARTICLES	PERCENTAGE	CUMULATIVE PERCENTAGE
Hkm.hr	108	38.0%	38.0%
Medjugorje-info.com	67	23.6%	61.6%
Bitno.net	85	29.9%	91.5%
Jutarnji.hr	7	2.5%	94.0%
24sata.hr	7	2.5%	96.5%
Index.hr	10	3.5%	100.0%

There were 284 articles about the Catholic Church published on the above-mentioned web portals and shared on their official *Facebook* pages considered for this research. Of the total number of analysed articles most were posted on the official *Facebook* pages of the Catholic web portals: 38.0 % at Hkm.hr, 23.6 % on Međugorje-info.com and 29.9 % on Bitno.net. On the contrary, the secular web portals, even after the analysis was narrowed to every fifth day, had far less posts during this period: 2.5 % on Jutarnji.hr, 2.5 % on 24sata.hr and 3.5 % on Index.hr. As aforementioned, in order to reduce the imbalance between the number of shared posts, religious portal posts published only on every fifth day of January were analysed, from the 1st January 2021.

Table 2. Number of sources of information in the article about the Catholic Church

	ANSWERS	PERCENTAGE
Provided three or more information sources	33	11.7%
Provided two sources	22	7.7%
Only one source provided	189	66.5%
Without sources of information	40	14.1%
Total	284	100.0%

Read from Table 2 about the sources of information used in articles, so the most articles used only one source (66.5 %) followed by those without any source of information (14.1%). The least are articles with two sources of information (7.7 %), then those with three or more (11.7%).

Table 3. Number of sources of information in the article about the Catholic Church

NUMBER OF SOURCES		Index.hr	24sata.hr	Jutarnji.hr	Bitno.net	Medjugorje-info.com	Hkm.hr	Total
Without sources of information	Number of articles	2	0	0	5	22	11	40
	Percentage	20.0%	0.0%	0.0%	5.9%	32.8%	10.2%	14.1%
Only one source provided	Number of articles	8	6	6	55	36	78	189
	Percentage	80.0%	85.7%	85.7%	64.7%	53.7%	72.2%	66.5%
Two sources provided	Number of articles	0	0	1	10	2	9	22
	Percentage	0.0%	0.0%	14.3%	11.8%	3.0%	8.3%	7.7%
Provided three or more sources of information	Number of articles	0	1	0	14	7	10	32
	Percentage	0.0%	14.3%	0.0%	16.5%	10.4%	9.3%	11.3%
Total	Number of articles-total	10	7	7	85	67	108	284
	Percentage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The table 3. summarises the representation of the number of the sources of information on each web portal. From the mentioned table it is obvious that 20.0 % of articles on Index.hr do not have any sources of information, while other two secular portals do not have those types of articles. Among the religious portals most articles without any source of information are published on Medjugorje-info.com (32.8 %), followed by Hkm.hr (10.2 %) and Bitno.net (5.9 %). If articles with no or one source of information are put together, they represent slightly more than 80% of analysed articles. The secular web portals are leading: Indeks.hr with 100 %, both 24sata.hr and Jutarnji.hr with 87.7 % of analysed articles. Among the religious web portals, most articles with no or one source of information has Medjugorje-info.com (86.5 %), followed by Hkm.hr (82.4 %) and Bitno.net (80.6 %). The most articles with three or more sources of information were published on 24sata.hr

(14.3 %) of secular portals and Bitno.net (16.5%) of religious portals, followed by Medjugorje-info.com (10.4 %) and Hkm.hr (9.3%), whereas the Index.hr and Jutarnji.hr do not have articles with three or more sources of information. Overall, there is a conclusion that the majority of secular web portals rarely provide more sources of information in their posts and articles: these are mainly the articles shared or written on the basis of their own resumes and the use of only one source of information. Among the religious portal special emphasis is given to Medjugorje-info.com with 32.8 % articles without any source of information, which is a large percentage compared with other secular and religious web portals.

These results confirm the research finding of some previous papers in which there were a few newspaper articles with two, three or more sources of information used, which is advisable f or the journalistic ethics and professional integrity. The low representation of more sources of information on the Catholic web portal is partly due to the facts that the texts with prayers and spiritual contents were also analysed.

Table 4. The type of headlines

	ANSWERS	PERCENTAGE
Difficult to determine	3	1.1%
Motivating	3	1.1%
Neutral	43	15.1%
Critical	1	0.4%
Sensational	24	8.5%
Informative	210	73.9%
Total	284	100.0%

While the previous tables show the number of the source of information in the articles, this table shows the total percentage of the types of headlines. It is obvious that the most articles are with informative headlines (73.9%), followed by neutral (15.1 %) and sensational (8.5 %). In order to elaborate more about the percentage of sensationalism in web portal headlines, it is necessary to study the representation of these headlines on each portal type, as shown in table 5.

Table 5. The type of headlines on web portals

TYPE OF HEADLINES		Secular	Religious	Total
Informative	Number of articles	12	198	210
	Percentage	50.0%	76.2%	73.9%
Sensationalistic	Number of articles	10	14	24
	Percentage	41.7%	5.4%	8.5%
Critical	Number of articles	1	0	1
	Percentage	4.2%	0.0%	0.4%
Neutral	Number of articles	1	42	43
	Percentage	4.2%	16.2%	15.1%
Motivating	Number of articles	0	3	3
	Percentage	0.0%	1.2%	1.1%
Difficult to determine	Number of articles	0	3	3
	Percentage	0.0%	1.2%	1.1%
Total	Number of articles	24	260	284
	Percentage	8.5%	91.5%	100.0%

The segmented data by the web portal types shown in Table 5 represent that cumulative high percentage of informative (73.9%) and low percentage of sensational headlines (8.5%) are differently placed on the secular and Catholic web portals. Indeed, there are only half of the informative headlines among the secular portals (50%), followed by not even 10 % less of sensational headlines (41.7%). Among the religious portals the percentage of informative headlines is slightly more than ¾ (76.2 %) and only 5.4 % of the sensational headlines. Having considered the fact that the analysed secular web portals are most-read portals in general and exceed the religious web portals by far, as shown in

Pictures 1 and 2, it is easier to get the readers' distinct impression that the sensational headlines are predominant among the web portals.

Hereafter, in Table 6., there are shown the types of headlines of the analysed articles on the specified web portals.

Table 6. The type of headlines shown by specified web portals

HEADLINES		Index.hr	24sata.hr	Jutarnji.hr	Bitno.net	Medjugorje-info.com	Hkm.hr	Total
Informative	Number of articles	5	4	3	64	48	86	210
	Percentage	50.0%	57.1%	42.9%	75.3%	71.6%	79.6%	73.9%
Sensational	Number of articles	5	2	3	6	7	1	24
	Percentage	50.0%	28.6%	42.9%	7.1%	10.4%	0.9%	8.5%
Critical	Number of articles	0	1	0	0	0	0	1
	Percentage	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.4%
Neutral	Number of articles	0	0	1	12	11	19	43
	Percentage	0.0%	0.0%	14.3%	14.1%	16.4%	17.6%	15.1%
Motivating	Number of articles	0	0	0	1	1	1	3
	Percentage	0.0%	0.0%	0.0%	1.2%	1.5%	0.9%	1.1%
Difficult to determine	Number of articles	0	0	0	2	0	1	3
	Percentage	0.0%	0.0%	0.0%	2.4%	0.0%	0.9%	1.1%
Total	Number of articles	10	7	7	85	67	108	284
	Percentage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

As can be observed from Table 6, the results show that most informative headlines among secular web portals are posted on 24sata.hr (57.1 %), followed by Index.hr (50.0 %) and Jutarnji.hr (42.9 %), whereas among the religious web portals have greater percentage of informative headlines: Hkm.hr 79.6 %, Bitno.net 75.3% and Medjugorje-info.com 71.6 %.

Among the secular web portals most sensationalistic headlines are posted on Index. Hr (50.0 %), while among the religious web portals most sensational headlines are posted on Medjugorje-info.com (10.4%). It is important to stress that neutral headlines were not posted on Index.hr and 24sata.hr, although they are presented by other portals (around 15 %).

Table 7. The contexts of the Catholic Church topics broken down by portals

CONTEXT		Index.hr	24sata.hr	Jutarnji.hr	Bitno.net	Medjugorje-info.com	Hkm.hr	Total
Religious	Number of articles	1	0	1	62	55	82	201
	Percentage	10.0%	0.0%	14.3%	72.9%	83.3%	75.9%	71.0%
Political	Number of articles	1	0	0	1	0	0	2
	Percentage	10.0%	0.0%	0.0%	1.2%	0.0%	0.0%	0.7%
Social	Number of articles	3	4	3	12	4	7	33
	Percentage	30.0%	57.1%	42.9%	14.1%	6.1%	6.5%	11.7%
Economic	Number of articles	0	0	0	0	0	1	1
	Percentage	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.4%
Humanitarian	Number of articles	3	1	1	5	4	15	29
	Percentage	30.0%	14.3%	14.3%	5.9%	6.1%	13.9%	10.2%
Cultural	Number of articles	0	0	0	0	0	2	2
	Percentage	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.7%
Neutral	Number of articles	0	0	1	3	3	1	8
	Percentage	0.0%	0.0%	14.3%	3.5%	4.5%	0.9%	2.8%
Other	Number of articles	2	2	1	2	0	0	7
	Percentage	20.0%	28.6%	14.3%	2.4%	0.0%	0.0%	2.5%
Total	Number of articles	10	7	7	85	67	108	284
	Percentage	100.0%	100.0%	100.0%	100.0%	100.0%	100.%	100.0%

The context of the Catholic Church topic among the analysed articles is shown in Table 7. Among secular web portals, the Catholic Church is mostly mentioned in social and somewhat humanitarian context, i.e., secular web portals primarily perceive the Catholic Church as a social organisation (24sata.hr by 57.1. %, Jutarnji.hr by 42.9 % and Index.hr by 30% of articles) and not as a religious one. The following are the articles with the topic about the Catholic Church in a humanitarian context: Index.hr by 30 %, both Jutarnji.hr and 24sata.hr by 14.3 % articles each. Among the secular web portals, the Catholic Church is presented in a religious context on Jutarnji.hr (14.3%) and Index.hr (10.0 % of articles), whereas there are no such articles posted on 24sata.hr. Just as expected, most articles posted on the catholic web portals represent the Catholic Church in religious context, on Medjugorje-info.com at most (83.3 %), followed by Hkm.hr (75.9 %) and Bitno.net (72.9 %). After religious context, the majority of the religious web portal articles represent the catholic Church in a neutral context: both Medjugorje-info.com and Bitno.net (37.5 % each) and Hkm.hr (12,5 %).

Table 8. The value orientation of the articles

	ANSWERS	PERCENTAGE
Difficult to determine	1	0.4%
Neutral (generally descriptive)	19	6.7%
Both positive and negative attitude equally represented	2	0.7%
Negative	8	2.8%
Positive	254	89.4%
Total	284	100.0%

The general value orientation of articles is presented in the Table 8 and it is obvious that the positive value orientation is highly dominant (89.4 %) and followed by the neutral (6.7 %) and negative with only 2.8 %. Furthermore, these data are rather different between secular and religious web portals, as seen in Table 9.

Table 9. The value orientation of the articles broken down by the types of web portals

VALUE ORIENTATION		Secular	Religious	Total
Positive	Number of articles	10	244	254
	Percentage	41.7%	93.8%	89.4%
Negative	Number of articles	6	2	8
	Percentage	25.0%	0.8%	2.8%
Both positive and negative attitude equally represented	Number of articles	2	0	2
	Percentage	8.3%	0.0%	0.7%
Neutral (generally descriptive)	Number of articles	5	14	19
	Percentage	20.8%	5.4%	6.7%
Difficult to determine	Number of articles	1	0	1
	Percentage	4.2%	0.0%	0.4%
Total	Number of articles	24	260	284
	Percentage	100.0%	100.0%	100.0%
	Total	8.5%	91.5%	100.0%

As shown in Table 9., the analysis of the value orientation of the web portal articles about the Catholic Church displays that the most contain positive value orientation: secular web portals by 41,7 % and religious web portals by full 93.8 %. However, the percentage of the negative value orientated in relation to total shown in the Table 8 is only 2.8 %. Furthermore, secular web portals published far more negative orientated articles, up to ¼ (25 %), neutral articles, based on general description, around 1/5 (20.8 %), and the articles with equally represented both positive and negative attitude (only 8.3 %).

Among the religious web portals, the vast majority of articles about the Catholic Church is positively orientated (93.8 %). There are less than 1 % negatively orientated articles and only 5,4 % of neutral articles. From the foregoing facts it is easy to conclude that the majority of the media articles about the Catholic Church have positive value orientation, but in secular web portal there are 25 % articles with negative value orientation. Some web portals have higher percentage of negative value orientated articles, as shown on The Table 10.

Table 10. The value orientation broken down by web portals

VALUE ORIENTATION		Index.hr	24sata.hr	Jutarnji.hr	Bitno.net	Medjugorje-info.com	Hkm.hr	Total
Positive	Number of articles	3	3	4	71	65	108	254
	Percentage	30.0%	42.9%	57.1%	83.5%	97.0%	100.0%	89.4%
Negative	Number of articles	3	1	2	1	1	0	8
	Percentage	30.0%	14.3%	28.6%	1.2%	1.5%	0.0%	2.8%
Both positive and negative attitude equally represented	Number of articles	1	1	0	0	0	0	2
	Percentage	10.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.7%
Neutral (generally descriptive)	Number of articles	3	1	1	13	1	0	19
	Percentage	30.0%	14.3%	14.3%	15.3%	1.5%	0.0%	6.7%
Difficult to determine	Number of articles	0	1	0	0	0	0	1
	Percentage	0.0%	14.3%	0.0%	0.0%	0.0%	0.0%	0.4%
Total	Number of articles	10	7	7	85	67	108	284
	Percentage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The analysis of the value orientation of articles about the Catholic Church broken down by web portals, as shown in the Table 10, displays that the majority of the published articles on the web portals have positive value orientation. However, among the secular web portals only Jutarnji.hr has the majority of positive orientated articles (57.1 %). Other two web portals have less percentages: 23sata.hr by 42.9 % and Index.hr by 30.0 %. Among the religious web portals, the highest percentage of the positive orientated articles has Hkm.hr with the highest 100.0 %, followed by Medjugorje-info.com (97.0 %) and Bitno.

net (83.5 %). The most articles with the negative value orientation among the secular web portals were published on Index.hr (30.0 %), followed by Jutarnji.hr (28.6 %) and 24sata.hr (14.3 %). Overall, the articles with both positive and negative attitude equally represented were published only on secular web portals 24sata.hr (14.3 %) and Index.hr (10.0 %). The articles with neutral value orientation were also published on secular web portals: Index.hr (30.0 %), 24sata.hr (14.3 %) and Jutarnji.hr (14.3 %).

6. Conclusion

The conducted research was focused on the articles about the Catholic Church. i.e., the Catholic Church was the dominant topic of the articles published on the most-read secular and religious web portals and shared on the official *Facebook* pages during January 2021. Among these articles, the majority are those with no or one provided source of information, whereas two or more source of information were provided in less than 1/5 of articles. When these provided sources of information were broken down by portals, it is obvious that the most of articles without any provided source of information were published on Index.hr (20.0 %) and Medjugorje-info.com (32.8 %) of religious portals. Having regard to the fact that the articles with two or more provided sources of information are more relevant. This result implied that the vast majority of secular portals rarely provide sources of information in their articles, as well as some religious portals, especially Medjugorje-info.com.

The conducted research results have shown that of all articles, the most were informative headlined (73.9 %), followed by neutral (15.1 %) and sensational (8.5 %). When the sensational headlines were broken down by both types of portals, it was clear that these headlines made 41,7 % of secular and only 5.4 % of Catholic religious' web portals. This confirmed the H_4 hypothesis – *The articles about the Catholic Church on the Catholic web portals do not have sensational headlines.* Furthermore, the most sensationalistic headlined articles were published on Index.hr (50.0 %) and Jutranji.hr (42.9 %). This partially confirmed the H_3 hypothesis – *The articles about the Catholic Church on the secular web portals are frequently sensationalistic headlined.*

Among the religious web portals, the majority of sensational headlines were published on Medjugorje-info.com (10.4 %) and Bitno.net (7.1 %). There is a difference between the web portals- on secular web portals the sensational headlines were negatively connotated (e.g., *'Priest Mirko from Slavonia Once Again in Love with his Wench on the Wrong Grange').* On the contrary, on the religious web portals the sensational headlines were positively connotated emphasising the evangelisation based on personal experiences (e.g., 'At *Križevac Hill I Was in Tears Praying for my Son, and Then God Asked Me a Question').*

The context of the topics about the Catholic Church was mostly social, somewhat humanitarian on the secular web portals and least religious. Among the Catholic portals the prevailing context was mostly religious, as expected.

The most common value orientation of articles was the positive one (89.4 %), followed by neutral (6.7 %) and negative (barely 2.8 %). Among the secular web portals, 41.7 % articles were positively orientated with 25.0 % negative, whereas among the religious web portals the ratio was greater: 93.8 % positive with only 0.8 % negative, as expected.

The aforementioned means the articles about the Catholic Church were mostly positively orientated. However, the negative article published on the secular web portal had bigger media impact, so it gave wrong impression that the Catholic Church was mainly represented by articles with negative value orientation. This means the H_1 hypothesis – *Most of the articles about the Catholic Church on the secular web portals have negative value orientation* – was disproved, as the H_2 hypothesis – *The articles about the Catholic Church on the Catholic web portals have mostly positive value orientation* – was completely confirmed.

After all, it is necessary to be prudent with general conclusion about the representation of the Catholic Church by secular web portals. Therefore, in the continuation of this research the articles would be further analysed, particularly the value orientation criteria are to be applied to more categories, such as the article type and length. Total number of articles with either positive or negative value orientation is not the only relevant criteria to evaluate the certain media attitudes towards a certain topic, likewise the Catholic Church thematic.

The conducted research on the applied pattern could be used for further case studies, in order to shed more light on the topic of media attitudes about the Catholic Church. This paper gives methodological guidelines and analyses which could be used for further case studies and scientific verifications of this field of science. If statistically strengthened, these could also be used for broader and more profound conclusions about the representation of the Catholic Church on web portals and other media.

References

1. Alić, S. (2009). Masovno slobodi. *Filozofska istraživanja* 114 (2): 271:280.
2. Ančić, N. A. (1995). Biskupska služba. Između crkvenih problema i crkvene nauke. *Crkva u svijetu* 30 (4): 408-411.
3. Bogešić, R. (2019). Crkva i mediji – evangelizacija ili manipulacija. *Kairos: Evanđeoski teološki časopis 1*. 97-109.
4. Duvnjak, N. (2015). Načini prezentacije vjerskih zajednica u Hrvatskoj na internetu: analiza kvalitete mrežnih mjesta, *Crkva u svijetu*, 57–82.
5. Kovačić, S., Musa, I., Tomić, Z. (2019). Online mediji i novinarstvo na društvenim mrežama – istraživanje na primjeru društvene mreže Facebook, *Hum: časopis Filozofskog fakulteta Sveučilišta u Mostaru*, Vol. 14 No. 22.
6. Labaš, D., Vizler A. (2005). Odgovornost primatelja u svjetlu medijske etike. *Nova prisutnost: časopis za intelektualna i duhovna pitanja* 3 (2): 277-294.
7. Mikić, A., Novak, K. (2019). Katolička Crkva u hrvatskom nacionalnom i regionalnom tisku, Vjerska tematika u hrvatskom medijskom prostoru: *Zbornik radova znanstvenog simpozija i projekta na Hrvatskom katoličkom sveučilištu u Zagrebu*, Valković, Jerko (ur.), Zagreb: Hrvatsko katoličko sveučilište, 177-200.
8. Skoko, B., Bajs, D. (2007). Objavljivanje neistina i manipuliranje činjenicama u hrvatskim medijima i mogućnosti zaštite privatnosti, časti i ugleda, *Politička misao* 44,(2007)1,97.
9. Strujić, J. (2016). Društvene mreže, evangelizacija i kateheza. *Bogoslovska smotra*, 86 (2): 441 – 462.
10. Šola, I. (2017). Slika vjere i Crkve u hrvatskim medijima. *Crkva u svijetu 52*, (2017) 3. 459-474.
11. Tkalac Verčić A., Sinčić Ćorić D., Pološki Vokić N. (2014). *Priručnik za metodologiju istraživanju društvenim djelatnostima – II. izdanje,* M.E.P., Zagreb.
12. Valković, J. (2017). Crkva i mediji – izazov za teološko-pastoralno promišljanje i djelovanje. *Crkva u svijetu: Crkva u svijetu 3*. 417-433.
13. Vidak, I. (2014). Facebook, komunikacija 21.stoljeća. *Praktični menadžment*, Vol. V., br. 1., str. 48-52.

THE IMPACT OF DIGITIZATION OF ACCOUNTING ON THE ACTIVITIES OF ENTERPRISES IN BOSNIA AND HERZEGOVINA

***Mr.sc. Azira Osmanović, dipl.oec.*[1]**
***Prof.dr.sc Damir Šarić, dipl.oec.*[2]**

Abstract

Every day is a challenge that requires a lot of knowledge and time for the purpose of achieving planned sales, finding the best suppliers, achieving set business goals. Accounting is an integral part of any business, and it is important for the successful operation of any business. Accounting has changed and continues to change and expand from the moment it emerged. Accounting has undergone a special transformation with the information technology. Digitalization as one of the most important phenomena of the 21st century has affected all parts of society and business. Accounting software has become an integral part of the business of every enterprise, and without it would be almost unthinkable to track the company's business going from procurement, production to product sales. Business processes that involve accounting tasks should be designed, optimized and simplified for the purpose of ensuring time savings. Precisely due to the fact that time is money, and in order to save time, business is increasingly being transferred to digital form. The advantages and disadvantages of digital accounting were best seen during the COVID-19 pandemic. The purpose of this paper is reflected in demonstration of the impact of digitalization of accounting on the company's activities. The subject of research is to prove the positive and negative effects of digitalization of accounting on company's activities. Empirical studies will prove what kind of impact the use of digital accounting has on the company's business, and task set for accountants and management in the future.

Key words: *Accounting, Digitalization, Information Technology, Business.*

1 Mr. sc. Azira Osmanović, dipl. oec., Vitacare d.o.o. Sarajevo, azira.osmanovic1@gmail.com

2 Prof. dr. sc. Damir Šarić, dipl. oec., Zavod zdravstvenog osiguranja Tuzlanskog kantona, damir-saric@hotmail.com

1. Introduction

Information technology have progressive, intensive progress and development due to the enhanced technological progress. Every company strives to save time and money, and the goal is to get as much income as possible at minimal cost. It is precisely because of saving time and money that company have begun to introduce computerization into their business.

Computerization was introduced primarily in order to facilitate simpler and faster data input, data exchange, storage and processing of information. Using computerization, the final data is achieved faster and more efficiently, thanks to a better understanding and supervision of the business, and in this regard, it is much easier for management to make decisions, since business information is much more accessible. The biggest advantage is that the software can speed up certain processes, and certain data and information are available to end users faster than it was before, when there was no computerization of the business. Today, in Bosnia and Herzegovina, companies, in accordance with their needs, use computerization in business in various measures. Namely, as the company grows, the number of employees' increases, the number of branches increases, incomes or production increases, and all this leads to the purpose to introduce new software that will contribute to business development in a reporting form.

When we go back twenty years ago, the business we have today looks like a sci-fi movie. Namely, starting the production of a new product, which requires the purchase of raw materials from a new supplier, meant going to certain fairs, frequent visits to the supplier, until the deal was finally agreed. Today, this is being agreed within a few hours. Namely, in Internet search engines, we can quickly find suppliers of the desired raw materials, immediately contact them and look directly at the video link to the production of this raw material, and then receive proforma invoices, contracts and other documentation by mail. Work that previously could take months is now completed within one working day. If, for example, a loan from a bank is required for the purpose of purchasing this raw material, this previously meant visiting a bank with numerous papers that accountants manually prepared for days for the bank. Today, we receive analytical cards of customers, suppliers, balance sheets or other additional documentation based on accounting programs within a few minutes, send them to the bank and receive feedback on whether the bank can provide a loan. If the bank approves the loan, in the past the money was used to buy the raw material by going to the bank and filling out a payment order at the bank, while today with the help of electronic banking the money transfer is completed without going to the bank, and in a few minutes. In this simple example, which is every day in business, it is easy to see the savings in time and, consequently, money with the introduction of digitalization in business.

2. Theoretical basis of the research

2. 1. Digitalization of the business

There has been a significant simplification of the daily activities of the company with the development of information technology. Information technologies have contributed, first of all, to saving time, money, energy, as well as other important resources. The process of digitalizing of the business took a long time, and every day it undergoes new transformations. Digitalization of the business involves the creation of a digital version of paper documents, images, which are later used for further processing and analysis. Digital transformation implies the transformation of a business based on digital technologies. Digital transformation starts from changing the work of the company, the earlier business model, and with the use of different information technologies (Majdandžić, 2004). Digital transformation implies a change in the work of the company, which implies a high level of use of digital technologies (Javorović & Bilandžić, 2007). There are various definitions of business digitalization, the most commonly used are:

- Digital transformation is characterized as a fusion of advanced technologies and the integration of physical and digital systems, and predominantly affects the change of business departments, defining new processes and creating Smart products and services (European Commission, 2019).
- Digitalization is the transformation of analog data and processes into machine-readable, so that they become suitable for automatic processing (OECD, 2018).
- Digital transformation is the process by which companies intersect their business processes with new digital technologies, use omnipresent machine connectivity to achieve higher productivity of equipment and processes, gain a market or comparative advantage, change the size of businesses, services and operations, as well as business models, and increase productivity throughout the chain creating and delivering value to the end user (Ismail, Khater and Zaki, 2017).
- Digital transformation is the application of technologies to create new business models, processes, programs and systems that lead to increased revenue, comparative advantage and new business models (Schwenter, 2017).
- Digital transformation is the use of technology in a radically new way to radically increase productivity or achieve a new operating model of the company, where digital technologies provide more efficient processes, a higher level of talent attraction and new business models (Deloitte, 2018).
- Digital transformation requires that the organization better manage overall change, especially when changes are made to the core competencies and business processes, and that companies focus their customers and / or users, which implies agility at all levels (Bloomberg, 2018).

The introduction of business digitalization simplified the use of many business systems and there has been a change in the way employees work, and significant time savings have been noticed in jobs that were previously performed. The usual course of business has changed with the introduction of digitalization of the business.

Digitalization of the business contributes to the fact that it is possible to track business activities better and more successfully, that data can be constantly collected, processed, analyzed, that historical, achieved and future target values of data can be compared (Kasich, 2017). Easier and faster data availability also allows you to react faster to certain business events and make certain decisions more correctly.

In everyday work, digitalization most often refers to one new and simpler approach to processing, sharing, analyzing and presenting data. The digitalization process allows better, faster and more efficient exchange of information and business data, which is of great importance for better business management. Business digitalization is an ongoing process that requires constant innovation, investment, and monitoring of needs, and in this regard, the needs of companies are adjusted.

Digitalization of the business implies, first of all, optimization based on digitalization of the existing business process, and innovations that imply continuous improvement of these processes.

2. 2. Digitalization of accounting

Today, it is almost impossible to imagine accounting that does not use information technology. Accounting uses various software, but primarily for data entry and archiving, as well as software for digitizing financial documentation, and this is the starting point for digital transformation. In order to achieve a complete digital transformation, it is necessary to change the previous approach that was applied in the business of the company.

Digitalization of the business entails digitalization of accounting business. Erasing of boundaries between markets, the sale and purchase of products from all over the world, brought a new approach to business, and digitalization and digital transformation of enterprises became necessary.

Information technology has long been a key carrier of accounting information. Accounting software is being improved and developed every day. The advantages of business digitalization are increasingly being used and applied in order to develop the business and in an effort to make the business even better, to make the business more competitive in the market in accounting, digital transformation has brought extremely big changes. Those changes do not only refer to software changes but they are necessary in the work, or in the way of posting, but there has been a so-called online-real-time mode of operation that results in increased business efficiency.

Accounting work primarily involves constant monitoring and accounting of business events. The work of accountants has been significantly improved and facilitated with the digitalization of accounting. The search for accounting information use to take a long time, because every piece of information required also finding of documents in binders, which were often placed in remote locations. Today, data is available in a matter of seconds thanks to the developed software solutions. In addition to the fact that data is available quickly, a particular advantage is that this data can be accessed at any time and no matter where you are anywhere in the world. The advantage of digitalization was especially noticeable during the pandemic caused by the COVID-19 virus, when work was carried out smooth from home as well.

Cloud accounting is increasingly being used, which actually provides access to any information, at any time and from any place.

Digitalization of accounting in Bosnia and Herzegovina has not yet been applied as in developed countries, because most accountants are still using, in addition to the software, paper documentation with the appropriate signature and seal. One of the biggest breakthroughs in the digital transformation of accounting has been made by banks with the introduction of electronic banking.

3. Methodological basis of the research

3. 1. Subject, purpose and hypotheses of the research

Empirical studies were aimed at proving the impact of digitalization of accounting about the company's activities.

The research also wanted to point out the positive and negative sides of the digitalization of accounting, and why digitalization of accounting is still not applied in Bosnia and Herzegovina as in developed countries. Target group of the research were people employed in the accounting sectors of the company. In this context, a survey was conducted on the impact of digitalization of accounting on the company's activities among 32 employees of the accounting sector, who duly completed questionnaires.

The time in which you have to constantly adapt to market needs requires a lot of knowledge and time on the one hand, and on the other hand, if you want to stay competitive in the market it is necessary to have information on time to achieve planned business goals. The development of science and technology has greatly facilitated doing business, and erased the boundaries between the markets of different countries. It has now become common practice to make deals and enter into contracts with customers and suppliers around the world. Information technology has changed business and changed the old ways of negotiating and doing business thanks to the speed of transmission and exchange of information and documents. Trips to remote countries of the world are no longer required to conclude a deal. Communication is carried out through video calls, document exchange by e-mail, which significantly affects both cost reduction and significant time savings as one of the most significant business resources.

Digitalization of the business, in addition to the numerous advantages also certain problems but without it would be difficult to remain competitive in the market today. First of all, we are talking about business security. There are more and more problems with the loss of certain data due to insufficient protection, and due to frequent cyber-attacks.

There is a certain fear in this regard, and digitalization of accounting is not accepted in Bosnia and Herzegovina as it is accepted all over the world. Accountants, in addition to recording data electronically are using various software, still widely use paper documentation.

The paper sets the task to research the effects of digitalization of business, both positive and negative, as well as the reason why there is still resistance of accountants towards the digitalization of business.

In accordance with all the above, the paper sets out the main and two auxiliary scientific research hypotheses:

H_1: Digitalization of accounting has a significant impact on the enterprise activities.

PH_1: The misuse of data as a result of cyber-attack creates resistance to the application of digitalization of accounting, which affects the activities of the company.

PH_2: Digitalization of accounting helps save time and increase business efficiency.

3. 2. Techniques and methods of research

The conducted research is based on the collection of primary data, a method of surveys through a highly structured questionnaire intended for employees in the accounting sector, who are also the most competent to provide answers to the research topic. 32 duly completed questionnaires were filled out of the total number of questionnaires sent to 48 e-mail addresses, which makes the response rate of 66.66% of the total sample in the monthly survey, from May to June 2022.

The response rate is considered acceptable for this type of research given the short period of time in which the research was conducted. The results of the study would probably have been different if the initial sample number had been determined in a larger number. In this regard, the results of this study are not the rule, but they certainly provide a good guide for future research on the impact of digitalization of accounting on the business of the enterprise.

In the empirical part of the research, the methods were used for the purpose of forming and presenting results on the subject and the answers to the set goal and set hypotheses of this scientific research.

On the basis of analysis of the obtained results, an insight into the effects of digitalization of accounting on business in theoretical and practical terms is given, as well as an insight into the attitudes of the accounting profession on the effects of digitalization of accounting on company's activities.

4. Research results

In addition to the extremely great advantages brought by the digitalization of business it is important to mention that the digitalization of accounting can be abused. In the absence of sufficient data protection or irresponsible work of individuals, the company may face data loss.

This research of the impact of digitalization of accounting on business aimed to find out how accountants see the effects of digitalization, and why the digitalization of accounting is still not applied to the extent that it is applied in the world.

The research determined application of digitalization of accounting in the practice of companies in Bosnia and Herzegovina, as well as the impact of its application on the activities of companies.

On the basis of 32 duly completed questionnaires, we came to a new way of using digitalization of accounting in practice.

In the research, accountants have made an exceptional contribution to a better understanding of the topic under consideration.

Of the 32 respondents to the survey, 13 accounting managers gave answers to questions, while the remaining 19 respondents declared themselves as referents engaged in accounting.

All respondents agreed with the statement that digitization of accounting is present and applied in accounting practice. Thanks to this issue, there was a room for further study of the positive and negative effects of digitization of computer technology in practice.

The purpose of the study was to find out what impact the digitalization of accounting has on the activities of companies in Bosnia and Herzegovina.

In accordance with the previously mentioned, it was logical to conduct a research of positive and negative effects of digitalization of accounting that has on business.

In this regard, the following questions of the questionnaire focused on the negative side of the application of digitalization of accounting in order to verify, confirm or deny some theoretical interpretations and conduct a research.

When asked what are the negative effects of digitalization of accounting, the majority of respondents stated that it is data security (79%), a slightly smaller percentage of respondents said that it is a problem with learning and replacing the old way of working with computers or new programs (9%), a smaller number of respondents (5%) believe that these are additional operating costs, while a certain number of respondents (7%) do not know what would be the negative effects of digitalization.

From the previous question, a new question also arose concerning the security of accounting data. In particular, out of the total number of respondents, 37% stated that they were victims of a cyber-attack, and 63% stated that they were not victims of a cyber-attack. From this question, a new question arose concerning those who were victims of the cyber-attack, and concerned of the loss of data. In particular, of the respondents who were victims of the cyber-attack, 18% of respondents stated that they experienced partial data loss, while 82% of respondents stated that no data loss occurred.

The second part of the questionnaire focused on the positive impact of digitalization of accounting on the business. When asked about the general application of digital accounting in practice, respondents said that the application of digitalization of accounting facilitates business, and 92% of respondents said they fully agree, while 8% of respondents said they are not sure whether digitalization of accounting makes business easier.

Of the total number of respondents, the largest number (84%) fully agreed that the digitalization of accounting contributes to saving time, 6% of respondents believe that the digitalization of accounting does not contribute to saving time, while 10% of respondents said they do not know whether digitalization of accounting contributes to saving time.

When asked that the digitalization of accounting contributes to the reduction of operating costs, the largest number of 56% agreed with the above, 43% of respondents did not agree with the above, and 1% of respondents do not know whether it contributes to reducing operating costs.

In the following question, out of the total number of respondents, the largest number of them, or 93%, fully agreed that the digitalization of accounting speeds up the exchange of information, 4% of respondents do not think that the digitalization of accounting speeds up the exchange of information, and 3% said that they do not know whether they would get a faster exchange of information with the digitalization of accounting.

Of the total number of respondents, the largest number, 56%, fully agreed that the digitalization of accounting makes it easier for managers to make decisions, 38% of respondents believe that digitalization of accounting does not make it easier for managers to make decisions, and 6% said they do not know whether digitalization make it easier for managers to make decisions.

4. 1. Confirmation of hypotheses

The use of multiple regression analysis in the study confirmed the assumption of a link between cyber-crime and the general use of digital accounting in the company's activities.

Table 1. Statistical overview of the connection between the general application of digital accounting and data misuse as a consequence of cyber-crime on business operations

Model	R	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin Watson
1	,636	,401	,60102	,454	19.101	*1*	*26*	,000	1.801

Source: Author's research

The correlation coefficient R (0.636) reveals a medium-strong correlation between the observed variables, data misuse as a result of digitalization of accounting and business operations. F (19,101) indicates that the results are statistically significant, and based on this, it is concluded that data abuse as a result of cyber-crime is a consequence of digitalization of accounting and is related to the activities of the company. The obtained data confirm hypothesis PH_1, which assumes that there is a statistically significant connection between data misuse due to cyber-crime and digital accounting and that this leaves room for impact on company's business.

Table 2. Statistical overview of the connection between the general application of digital accounting and time savings to increase the efficiency of the company's business.

Model	R	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin Watson
1	,685	,453	,60208	,473	22.422	1	26	,000	1.686

Source: Author's research

The correlation coefficient R (0.685) reveals a medium-strong correlation between the observed variables, saving time as a result of digitalization of accounting and increasing the efficiency of company's business. F (22,422) indicates that the results are statistically significant, and based on this, it is concluded that time savings as a result of digitization of accounting affect the efficiency of the company. The data obtained confirm the PH_2 hypothesis, which suggests that there is a statistically significant connection between digital accounting and time savings, and that this increases the efficiency of the company.

Taking auxiliary hypotheses, the main hypothesis H_1, with which it was assumed that there is a significant connection between the digitalization of accounting and the company's business is accepted as true.

5. Conclusion

Information technologies are an integral part of modern business today. The introduction of information technology into business has greatly facilitated business, and the introduction of digitalization of accounting has had a special effect. Information technologies contributed to the change in the basic mode of work of accountants, contributed to the fact that accountants compiled timely and accurate reports, and thus influenced the fact that accountants receive a new advisory role in the company due to time savings, since there is much more time left to analyze data. The results of the conducted research indicate that the digitization of accounting has a significant impact on the company's operations. However, despite the fact that information technologies and digitalization of accounting facilitate the work of accountants, in certain segments they also pose a problem for accountants in the form of increased responsibility and necessary competencies. Namely, tracking new trends in the development of information technology requires both certain adjustments and training of accountants. In addition, a special problem today is the frequent cyber-attacks, which are extremely difficult to deal with. This is one of the main reasons why digital accounting is not used in our country, as in the world. The protection that needs to be done requires certain investments, such as antivirus programs, new individual servers, etc., which represents additional costs for businesses that companies often do not want to accept. On the other hand, cloud accounting makes accountants suspect that, perhaps, someone will be able to abuse data and they have more trust in storing data on their servers, and printing documentation and storing it in their archives. However, de-

spite the fact that accountants still have some resistance, digitalization of accounting is a process that needs to be controlled, and without the use of which it would be unthinkable to conduct business in the future. It is concluded and indicated that there are positive and negative effects of digitization of business. Due to the short period of the research, the research sample is also small in this regard, so the recommendation for future research is to conduct research that would include a larger number of respondents, which would surely provide more detailed information about the effects of digitization on business.

References

1. Bloomberg, J. (2018). *Digitization, Digitalization, And Digital Transformation: Confuse Them At Your Peril*. https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/?sh=3b889d3c2f2c (10.05.2022.)
2. Deloitte. (2018). https://www2.deloitte.com/content/dam/Deloitte/mx/Documents/energy-resources/2018/Industry-4dot0-Paradox-KeyFindings.pdf (11.05.2022.)
3. Dokler, B. (2020). *Ako menadžment nije dovoljno postojan u realizaciji, digitalna transformacija teško će uspjeti*. https://www.poslovni.hr/sci-tech/ako-menadzment-nije-dovoljno-postojan-u-realizaciji-digitalna-transformacija-tesko-ce-uspjeti-4251208 (12.05.2022.)
4. European Commission. (2019). https://ec.europa.eu/growth/industry/strategy/advanced-technologies_hr (10.05.2022.)
5. ICV. (2019). https://www.whuon-controlling.com/en/latest-thinking/digitalization/ (10.05.2022.)
6. Ismail, M. H., Khater M., Zaki, M. (2017). *Digital Business Transformation and Strategy: What Do We Know So Far?*. http://v2.itweb.co.za/index.php?option=com_content&view=article&id=166391&Ite mid=3087 (12.05.2022.)
7. Javorović, B., Bilandžić, M. (2007). *Poslovne informacije i business intelligence*. Golden marketing – Tehnička knjiga, Zagreb
8. Majdandžić, N. (2004). *Izgradnja informacijskih sustava proizvodnih poduzeća*. Strojarski fakultet u Slavonskom Brodu, Slavonski Brod.
9. Microsoft. (2019). https://dionhinchcliffe.com/category/digital-transformation/ (08.05.2022.)
10. OECD. (2018). https://www.oecd.org/publications/measuring-the-digital-transformation-9789264311992-en.htm (12.05.2022.)
11. Rogers, D. G. (2020). *The digital transformation playbook*. Columbia Bussines Scholl, New Jersey.
12. Spremić, M. (2017). *Digitalna transformacija poslovanja*. Zagreb.