

Professional paper

SPORT, MEDIA AND DIGITALIZATION

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Abstract: Digitalization covers all areas of the society, especially sport. This paper presents the results of digital media research and analysis, with a particular emphasis on the diversity of their implementation (analysis, sports event broadcasting, promotion...). Digital media have significantly improved sport, primarily by broadcasting sports and media events, as well as via training preparation and realization. However, these are two-way processes: sport and its needs require research and improvement of the contemporary image and sound broadcasting systems to be able to deliver a unique experience to viewers. The fact that sport and its needs represent the core of the widest audience makes sport a special medium. A great number of sports events are broadcast daily throughout the world. If a broadcast is not technologically superior (digitally – due to the sharpness of the image, pausing an action, VAR technology...), sports events would be outshined by other attractions. In addition to training and sports events broadcasting, digital media are also used to monitor safety in sports venues (video surveillance), which then reinforces the competitiveness of the broadcasting systems and the media, as well as their need to create their own digital platforms.

Keywords: *digital media; sports-digital marketing, digital broadcasting of a sports event; digitalization of sports training monitoring, social networks*

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INTRODUCTION

The media in sport and digital marketing represent one of the fields of specialty in sports management (Dugalić & Lazarević, 2015, p. 339), without which modern society would be inconceivable. Numerous authors explain the symbiosis of sport, media and mass culture, including: Rowe (2003), Hall & Nichols (2007), Boyle & Haynes (2009). The acknowledgement of the media as a mass social phenomenon, apart from informing, is characteristic for sport. According to Koković (2004), sport polarizes the widest audience: with national sentiments on one, and global attributes on the other side. The massive scale if interest into sport, especially globally, requires a strategic approach to communications in sport (Pedersen, Laucella, Kian, & Geurin, 2016), which are inconceivable without developed digital broadcasting systems. The digitalization of sport is an area that opens numerous research approaches: implementation modalities, legal framework, business skills development, functional areas of its implementation, advantages and disadvantages of sports digitalization, controversies of such processes, the perspectives of further development of digital platforms, etc.

Knowledge of new business skills is significant for the survival of sports manager as a profession in modern-day market (Dugalić & Lazarević, 2016b, p. 58). Therefore, there are multiple benefits of researching media digitalization in sport, and one of the mutual characteristics of sport and digital media that needs to be researched is massiveness as a sociological concept. Sport unites people in common: ideas, places, organizations and values. These bonds become very strong, which calls for communication and the synchronization of all activities within and outside the system of sport. The communication spectrum thus acquires more modern mechanisms of information transfer, whereby communication itself undergoes significant transformation. There are controversies regarding the understanding of the notions of communication and promotions, and they are perhaps the most notable in sport. While in journalism as an economic activity transfer of information holds great importance (as a final product), in sport the widest audience is indirectly and attractively presented other information, which is the essence of promotion. From the point of view of communicology, such approach is justified but not economically sustainable, because the cost price contains a so-called “unwanted information”. Sports journalism starts from the fact that no information coming from sport is undesired, which is true, but the problem arises with broadcasters who seek to connect all information to sport at all costs. These controversies are studied within two separate fields of sports management specialty, such as sports journalism and sports marketing, and what they have in common is the use of digital media to accomplish their mission. The consequence of these processes is that they turn sport into a medium per se, which uses the available digital resources, as is indicated by the results of this paper’s research. The end results include the commercialization of sociological phenomena, for which it was

almost unthinkable until recently (or even contrary to ethical and legal norms). Athletes are always under pressure, before and after competitions, in case of defeat or win, so along with other negative phenomena (doping affairs, sports sanctions, etc.), due to the popularity and power vested in them by the media, they contribute to the formation of generally accepted social norms. Even when the media do not stimulate deviations and abuse in sport, they have the power to shape the attitudes of individuals and the social milieu in which the limits of ability and morality are constantly pushed (Lazarević, Dugalić, Milojević, Koropanovski, & Stanić, 2014, p. 155).

Legal framework

The abuse of the Internet is very present in today's sport; it leads to economic and social consequences, which is why it is subject to sanctioning (Dugalić, 2014, p. 115). Some of the paragraphs of Articles 35, 96, 98, 102-106 of the Sports Act require the publicity of informing in sports work, especially in Part III – General Interest in the Domain of Sport (Art. 112-138). Also, the Rulebook on Specific Conditions for Performing Sports Activities (2017), Section 5, Conditions concerning sports equipment), Article 9 prescribes that a sports organization must have: “a computer, a printer, an email, and an official Internet presentation that contains: basic info about the organization (name, headquarters, representative, governing bodies, brief history, membership in national and international associations, competition system, membership structure and number); information regarding the realization of programs funded from public revenues; information about sports results; a statute and general acts; information regarding the licenses issued to sports mediators and other sports professionals; sports rules or a link to the sports rules published by a competent national and international sports association”. In order to be able to exchange information, without which modern sport cannot function, all sports organizations (especially sports associations and international umbrella organizations) should be networked. This applies to the networking of other resources in the system of sport, such as: statistical data about athletes, sports results, sports venues, etc. (Dugalić, 2016, p. 589).

Another legal framework influences sports-digital media – the Law on Advertising (2016), which regulates the following domains:

- Advertising declaration, Art. 19;
- The responsibility of advertisement carriers, Art. 20;
- Special rules concerning the method of advertising – electronic media advertising, Art. 27;
- Product placement, Art. 28;
- Prohibited method of product placement in program, Art. 29;
- Information concerning product placement, Art. 30;
- Advertising and sales on television and radio, Art. 31;
- Recognizability, Art. 32;

- Broadcasting TV commercials and TV sales between or by interrupting TV programs, Art. 33;
- Broadcasting TV advertisement and TV sales without interrupting program, Art. 34;
- The duration of TV advertisements and TV sales, Art. 35;
- Content whose duration is not included in the total duration of TV advertising (sales), Art. 36;
- TV sales as an individual program, Art. 37; and
- Online advertising, Art. 45.

Serbia is a signatory of the Law on the Confirmation of the Convention on Cybercrime (2009), which specifies: the terms, support, remedies and methods of fight against abuses, including those in the domain of digital broadcasting systems.

Sports product and digitalization

This chapter explains how a sports product could benefit from media digitalization. Apart from athletes' celebrity endorsement by the widest audience, which is used for marketing purposes (to promote products and services), it is necessary to underline other aspects of digitalization, above all in the function of sport. Professional sport, globalization and the challenges offered by the international competitiveness of sport lead to the need for a long-term, strategic planning of efforts at the very stage of technical-tactical, psychological and other types of preparation of athletes. Considering that they offer excellent performance when it comes to the playback of video content for the purpose of strategic analysis (video sharpness, fast transition of sequences that follow the path of the props, slow motion of athletic action, etc.), digital radio broadcasting systems have been quickly embraced by sports professionals and professionals in sport.

Also, digital cameras are important in sport for multiple reasons, including correction which contributes to the improvement of sports performance through interactivity and personalization of digital sports-media records, as explained by Owens, Harris and Stennett (2003). This sophisticated technology uses various methods to classify video sequences into technical-tactical and strategic patterns in sport, which are subject of experiment. The given parameters such as (the lack of) structure in certain sports and tasks (for example, the classification of play sequences based on the identification of athlete's movements and the path of props) help analyze previous and simulate future strategically designed performances. An effective analysis of movement and activity during play, as crucial performances for the achievement of a sports result with the help of a solid strategic basis, requires sophisticated technology for the detection of monitoring player and prop movement, the analysis of their behavior and the play itself. The methodology employed by sports professionals for that purpose is the evaluation of videos obtained from networked cameras that cover the grounds. When synchronized cameras tail the path of the props,

the resulting images are instantly computer-processed by a 3D system (for example, *HawkEye*), in order to establish the positions of the ground contact and the bouncing of the props, etc. This system is reproduced through TV broadcasting, which requires automatic extraction of the most important sequences (out, goal, assistance...), and the video itself must enable more additional activities (slow motion, replay, zooming, precision...), which is also important for sports reporter. Action cameras and the *HawkEye* software are particularly important for ball sports, because computer processing is used to pause the path of the props (on one of 50+ sequences) precisely where needed on contact with ground, out or goal line (Varupa, 2013, pp. 6-8).

Apart from digital HD cameras, distributed all over the sports venue, microphones hold great importance, as they record high-quality digital sounds, in order to pair them with the video. That is how virtual scenes are generated, as well as “flying” reproduced footage in a 360⁰ -degree panoramic overview. In addition to networked cameras and sensors, the *Lucent Vision* system is also used to monitor player movement in real time and reconstruct the 3D path of the props based on synchronized static TV cameras. This path monitoring is based on digital image processing algorithms (movement segmentation, grayscale, and shape harmonization); 3D reconstruction based on stereo harmonization of procedures and speed assessment; and forcing more efficient research in the monitoring process.

There are numerous economical systems for the analysis and improvement of efficiency training in various sports (such as *Tennis Sense*, based on a network of IP cameras, which is used to record training sessions, competitions and similar activities). This infrastructure is amended by active and passive wireless sensors. *UbiSense* is an additional active space localization system that enables monitoring of a player’s 3D position based on the UWB (*Ultra Wide Band*) triangulation of small and light impulse radio tags. This assessment of 2D data regarding monitoring the path of props is amended by automatically synchronized 2D data with 2+ calibrated cameras, and the temporal 3D position of the props is estimated based on the triangulation of corresponding 2D positions. The interpolated path of props is then visualized in a virtual 3D graphic environment, and video data processing and background detection serve to assess athletes and monitor their position in individual sequences. Thus generated meta-data holds significance for indexation and efficient search of recorded footage in the sports-service process technology (for coaches, players and position commentators alike), and it is used in Android applications for individual monitoring of training. The *CyberSport* program (by Orad) enables inserting 3D graphics and animation into a live sports event broadcast. Regardless of the position of the camera, the inserted object shall maintain its position and appear as a constituent part of the grounds. A sports event broadcasting is improved by inserting 2D/3D graphics, animations and videos related to the sports grounds (such as the sponsor’s logo, audience reactions...). This data can be adjusted to certain sports and specific paths by means of mechanical sensors. That is how a digital image, ad, logo, video and

virtual screen can be inserted into a footage or live broadcast. Software for creating top, real-time 2D/3D graphics and animations, *3Designer*, is used to create patterns for all types of broadcasting, since every sport has a different approach and expectations (impact strength, tailing props, stats, projecting the radius for free kicks, offside line, simulating national emblems...). The most software programs are developed for the purpose of video sequence analysis and analytics in football (*Pro Zone3* for monitoring players; *Match Viewer* – subsequent analyses; *Match Insight* – performance analysis; *Trend* – team sports database, *Recruiter* for sale decisions...), (Owens, Harris, & Stennett, Hawk-eye tennis system, 2003). The NBA (National Basketball Association) league has developed its own software for training and play monitoring in order to enable the creation of superior strategies. During the 2018 FIFA World Cup in Russia, the latest VAR (Video Assistant Referees) technology was introduced to assist the referees monitor goals, penalties, red cards and wrong player identity.

According to Petrović and Milovanović (2012), the areas of implementation of digital video sequence analysis include: 1/ the analysis of the sports footage structure; 2/ the semantic analysis of sports events; 3/ the presentation of sports events; and 4/ detection, monitoring and 3D reconstructions. This leads to the need to implement computer applications and software programs into sport. Since user demands vary significantly, according to these authors, relevant information can be grouped into the following categories: 1/ the reproduction of specific event footage; 2/ tactical overview; and 3/ athletes' physical condition overview.

Sports-digital marketing

Research indicates that apart from information transmission, digital broadcasting systems are significantly turned to sport as a business that attracts mass media attention (Dugalić, Sretenka; Lazarević, Snežana, 2016a). Research results concerning the profession of celebrities that attract public attention (sport, fashion, culture, entertainment/media) conducted on a sample of 314 examinees in Serbia in 2016, indicated the average value for sport of 3.2 (based on the 5-degree Likert scale). However, this is not a compact market, because the research showed significant statistical differences ($\sigma \leq 0.05$) between the "gender" variables ($p=0.006$), which do not appear in the "age" and "employment status" variables. The analysis thereby included other sources: ISM – the Internet advertising market (Ipsos Strategic Marketing, 2015, p. 12), in order to specifically define the social values of sport and their impact on broadcasting systems. The analysis of the data related to the share of different types of media in the total advertising amount for 2014 indicates that television still leads with a share of 53% of the market (54% in 2013), followed by print media with 20% (21% in 2013), *Out-of-Home* with 12% (11 % in 2013), the Internet with 10 % (9 % in 2013) and radio with 4 % of the market (5 % in 2013). Numerous factors affect the growth of the Internet advertising market. According to the IAB (*Interactive Advertising Bureau*) 2014 report for Serbia,

the total value of digital and interactive advertising market is estimated to EUR18 million, which is 11.82% more than the year before. However, according to the same source (Ipsos Strategic Marketing, 2015, p. 17), a drop in the advertising market that began in 2008 is not compensable even by a boost in online advertising, regardless of the increasing Internet use by both users and advertisers. Considering that the research is dedicated to sports-digital media, it requires the analysis of audience's fields of interests in order to compare the results of the research of the professions of celebrities who attract the most attention of the auditorium. (Dugalić, 2015, p. 100). According to the ISM, the analysis of the most watched TV shows on the overall market and on the relevant markets in Serbia, as shown on Picture 1, indicates that out of 15 most watched shows in 2014, 13 was broadcast on RTS1, out of which 6 shows (46.15%) were major sports events broadcasts (Ipsos Strategic Marketing, 2015, p. 22). The 2015 data is almost identical. When only the public media services with the national frequency are analyzed, of the top 15 most watched shows in 2014, broadcast on RTS1, 8 shows (53.33%) were sports-related (in 2015, the share was at 46.67%), and only 2 (13.33%) were news-related (also, pp.24-25). Based on the data obtained by the Statistical Office of the Republic of Serbia (Serbia's Statistical Yearbook, 2016) and presented in Table 1, the situation concerning households' possession of computers is the following: 65.8 % of households own a computer, 64.7% own an Internet terminal, while 57.8% of households (68.5% in Belgrade) have a computer, an Internet terminal and a broadband Internet connection, which represents a continuous growth compared to previous years. The percentage of companies that use both computers and the Internet for their business, and which own a website is 80.8%, according to the same source (in Belgrade, the number amounts to 84 %).

Picture 1. *A share occupied by various TV channels based on the type of shows (Ipsos Strategic Marketing, 2015, p. 65); AMR – the % of persons aged 4+ who watch television; SHR – the % of all TVs in a household that are turned on during prime time.*

Sports shows

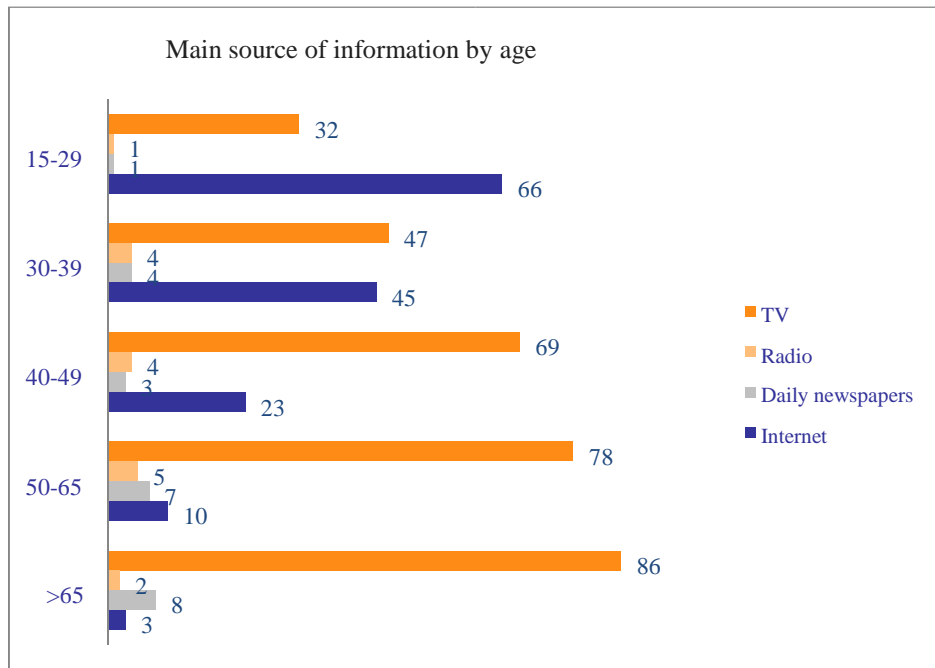
Typology	Channel	AMR	AMR %	SHR %
	RTS 1	383,917	5.62%	22.74%
	RTS 2	57,139	0.84%	4.16%
	PRVA	373,877	5.47%	14.75%
	PINK	204,466	2.99%	15.32%
	B92	204,345	2.99%	11.18%
	B92Info	2,745	0.04%	0.12%
	PINK 2	5,862	0.09%	0.78%
	Happy - Happy K	54,539	0.80%	1.97%
	RTV 1	12,053	0.18%	0.75%
	SK 1	12,902	0.19%	0.91%
	SK 2	4,501	0.07%	0.32%
	Fox	1,276	0.02%	0.25%
	Studio B	16,409	0.24%	0.80%

Table 1. *Devices in Serbian households (%), Serbia's Statistical Yearbook, (2016), since 2006, without data for AP Kosovo and Metohija.*

2006-	06	07	08	09	10	11	12	13	14	15	16
TV	95,7	97,8	98,4	98,6	98,7	98,9	98,2	98,2	99	99,3	97,8
Mobile phone	71,2	73,6	74,5	80,1	82	82,5	83,9	86,9	90,6	90,3	90,2
Personal computer	26,5	34	40,8	46,8	50,4	52,1	55,2	59,9	63,2	64,4	65,8
Cable TV	30,2	33,8	40,5	41,9	42,6	44,4	44,5	47,6	49,8	53,6	57,3
Lap top	1,5	3,8	5,8	9,3	11,2	15,5	21,4	31,6	38,7	39	39,2

An average Internet user, according to the ISM data, is aged 15-29, with higher education, belongs to the urban and wealthier part of the population, and is unmarried. What Picture 2 shows is that TV being still the most important medium for obtaining daily information (61.9 % in 2015), while the Internet follows it (with 30 %); however, the share occupied by television is dropping, while the Internet share is constantly growing (Ipsos Strategic Marketing, 2015, p. 37).

Picture 2. *Main source of information – General population, by age (Ipsos Strategic Marketing, 2015, p. 36).*



If we observe the assessment of the time of different media usage a year ago and now, the biggest change occurred in the use of the Internet. The Internet is a medium whose usage increased by 27.2%; this is related to younger population, aged 15-29 and 30-39, who spend significantly more time online (the same, p. 39). When it comes to the quality assessment of the contents of different types of media by almost 1/3 of Serbia's population, the IPS results indicate that the quality of online content has improved over the year, and that only 2% of the examinees find it worse, which confirms that the Internet is the fastest developing medium (the same, pp. 39-40). The analysis of programs and audience preferences shows that the most wanted types of program among TV viewers are news (40%), foreign movies (34%), and sports program (30%). A research by Dugalić & Ivić (2015) indicated that male population is significantly more interested into sports program, while the female part of the audience is more interested in music, foreign TV shows and *reality shows*. When asked to opt for the most important program for them, most viewers choose news (19%), sports program (17%), and then foreign movies (12%). According to both research results and based on gender, the most important field of interest for men is sport, while for women those are foreign TV shows and music programs.

The Olympic Games organization cannot function without digital broadcasting systems. During the Rio 2016 Olympics, the sports events broadcasting involved: 584 TV channels; over 270 dedicated digital platforms that enabled event coverage; 113,455 hours of TV broadcasting (13.5% more than for the London 2012 Olympics); more than 20% of coverage based on the average in relation to the previous games; and as much as 243,469 hours of digital broadcasting (or 198.6% more than for the London 2012 Olympics). Olympic Broadcasting Services produced 7.100 hours of live broadcast, using over 1,000 cameras distributed through the Super Slow Motion (SSM) and High Speed Slow Motion (HSSM) camera systems, and they also used drones for better footage of finishes in canoeing, rowing and triathlon. What was also used was Olympic Video Player (OVP), available in 56 areas, as a part of the Rights Holding Broadcasters' (RHBs) digital expansion strategy.

A research into the sports market throughout the world has been intensively conducted since the mid-20th century, when sports management emerged as a specialized scientific discipline, at the same time as another specialist area – sports marketing (Dugalić, 2012, p. 59). According to Bauer (2015) and Krstić (2017), the research results for a significant basis for digital marketing research and its implementation in sport. The occurrence of sports management and sports marketing led to an intensive study of sports business and sports products using scientific methodology (Dugalić, 2013, p. 41). All this leads to the conclusion that digital broadcasting systems are necessary and widely used in sport. This explains why sports-digital marketing gained importance, however, its biggest transformation occurred in the domain of social networks.

Digitalization and social networks

Considering the inconsistency of sports products, which makes them complex to explain, and they also cover a very broad area of sport, as explained by its collective noun; sports marketing gets partialized in practice, which is why all the elements of the sports marketing mix are analyzed individually, with promotion featuring a particular expansion in sport. The end goal is to implement marketing management processes and quality management systems into sport, whereby the audience is observed as one of the active participants. In accordance, a strategic approach always encompasses all the social elements of sport, and the appearance of social networks has only supported and accelerated these processes. The appearance of digital broadcasting systems and their implementation in sport led to the need for communication between these participants to be able to share experiences, impressions, euphoria, disappointments... The need for two-way communication in sport is the reason why digital broadcasting systems saw major expansion. Whether those are clubs, athletes or sports events (the Olympics, World and European Championships), all the entities realized that the existing websites, platforms and networking of umbrella associations are not enough, because sport offers much more: the possibility to broadcast events live and communicate about the subjects the users find important, which reinforced the position of sport as an individual medium. That is why today all these entities use all the available social networks to reach the highest possible number of users (Mahan, 2011, p. 254).

The best sports example for this is the Barcelona sports club, which in addition to its own website, radio and TV channel – Barca TV (FC Barcelona, 2018), also has the most followers on social networks. They communicate with fans in 10 languages; the TV broadcast runs on two networks: Facebook and Twitter, and apart from them the club also communicates with its fans through Instagram, Viber and Google+. Since the Barcelona sports club has notable results in various sports (basketball, handball, futsal, roller hockey, numerous amateur sports, athletics, ice hockey, volleyball, rugby, field hockey, figure skating), despite the fact that some of them are not so popular, they still call for the same communication management as football. This leads to the need to form multiple webpages united on the same digital platform. Sports organizations that do not trigger mass interest mostly use other social networks, such as YouTube, Live Stream, etc. Famous clubs with well-networked communication and global orientation use digital broadcasting systems to comply with user demands and expectations (those of international sports associations - FIFA, UEFA; athletes, fans and sponsors). To illustrate this, the Barcelona sports club has the most followers on social networks: 27.8 million on Twitter, 5.1 million on Viber, and the most followers on Facebook, making a total of 226.2 million followers for all sports and social networks (FC Barcelona, 2018). Individually observed, C. Ronaldo (Real Madrid) has the most followers on social networks (309.48 million). Athletes with the most followers on social networks are tennis, football and basketball players (Dugalić, 2018). A league with the most social network followers is the English Premier League, whose members are all active on

Twitter (they were given the Sky Sports PL channel for live broadcasting, and users are able to tweet live, during a football match), (Sky Sports PL, 2018). Overseas, the Super Bowl and the NBA League trigger the most interest among social network followers.

CONCLUSION

The benefits of digital broadcasting systems for sport open up numerous questions regarding the field of implementation, legislation, ethics and the perspective of their future development. This paper analyzes some of these fields of implementation in sport (sports reporting, sports broadcasting, Android apps for individual training; structural analysis of a sports footage; sports-digital marketing, the semantic analysis of sports events...). Sports-digital marketing is based on the attention that sports trigger among the audience. That makes it a special medium for the conveyance of advertisers' and sponsors' promotional messages. Sport has greater need for global communication among participants (measured in billions when it comes to major sports events: the Olympics and World Championships) than other areas: fashion, culture, entertainment/media, which then leads to the need to establish viral services. It can be assumed that sports-related communication through mobile channels in real time will see higher growth in the future compared to the traditional broadcasting systems. At the same time, sports-digital media systems will bring doubts (technical-technological, a transfer of intellectual property rights, ethics, legal aspects and social values of sport), which must be answered by the scientific and professional public, so the goal of this paper's results is to stimulate new research in the domain of sports broadcasting.

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