Publication I

What We Know and What We Do Not Know About Digital Technologies in the Sports Industry

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Abstract

Recent advances in digital technologies (DTs) have transformed various aspects of how the sports industry operates and competes. Common applications of DTs on- and off-site the field of play include, for example, analytics solutions to improve players' performance, pricing predictions for ticket sales, or digital platforms to interact with fans. DTs further facilitate shared digital capabilities, thereby allowing for the integration of new stakeholders and thus giving rise to new digital ecosystems in the sports industry. However, Information Systems' (IS) research on DTs in the sports industry is still nascent. Hence, the role of DTs for the sports industry is not entirely understood. Therefore, we analyze how DTs shape the sports industry based on a concept-driven literature review. The analysis of 16 publications yields four groups of benefits that can be achieved by the usage of DTs for the stakeholders embedded in the digital ecosystem of the sports industry.

Keywords: digital ecosystem; digital technology; literature review; sports digitalization; sports industry

Introduction

In recent years, sports has evolved from an activity of game to an activity of organization that has been codified, strategized, professionalized, and commercialized (Davenport, 2014; Xiao et al., 2017). With an estimated total market value of over 500 billion dollars, ranking as one of the top business markets globally, the sports industry has a huge economic as well as social impact (PricewaterhouseCoopers [PwC], 2018). One major development shaping the sports industry is widespread digitalization. Digital technologies (DTs) such as cloud computing, electronic platforms, and artificial intelligence have transformed various aspects of how the sports industry operates and competes (Davenport, 2014; Xiao et al., 2017). Common applications of DTs on- and off-site the field of play include, for example, analytics solutions to improve players' performance (e.g., Cordes and Olfman (2016)), pricing predictions for ticket sales (e.g., Mignerat and Audebrand (2010)), or digital platforms to interact with sports consumers, so-called fans, more closely (e.g., Wulf et al. (2015)).

DTs enable the convergence of heterogeneous knowledge and information into new products and services (e.g., 3D printing, data analytics, or mobile computing) (Nambisan et al., 2017). DTs further facilitate shared digital capabilities that can either be independently customized for a company's own ecosystem or foster simultaneous use by multiple companies (Tan et al., 2017), thereby allowing for the integration of

new stakeholders and thus giving rise to new digital ecosystems that operate on shared DTs (Senyo et al., 2019). The partnership of the National Football League (NFL) and the Chinese Internet giant Alibaba is a prominent example of a digital ecosystem in the sports industry that is only made possible by the rise of DTs. More precisely, the NFL and Alibaba share their digital capabilities to broadcast NFL games, not only on traditional broadcasters in the U.S. but also live on a digital platform in Asia (Forbes, 2019). However, traditional stakeholders of the sports industry invest in DTs to continue digitalizing their digital ecosystems. These stakeholders face challenges such as large investments, entry barriers, and missing know-how due to high-levels of complexity, which are embedded in the sports industry (Davenport, 2014; Xiao et al., 2017). For instance, new actors, such as data providers and livestreaming services, are becoming critical constituents of a new digital ecosystem providing the sports industry with new resources, skills, and competences. Guidelines from the Information Systems (IS) research are scarce because researchers have not investigated how new DTs and the entrance of new actors change the ecosystem dynamics (Senyo et al., 2019; Xiao et al., 2017). Hence, IS research lacks an analysis of the role of DTs in the specific context of the sports industry. Therefore, we aim to answer the following research question (RQ):

RQ: *Which role do DTs play for the digitalization of the sports industry?*

To answer this question, we conduct a systematic concept-driven literature review that provides an overview of how IS researchers put DTs into perspective in the sports industry. We analyze DTs' role for the sports industry by identifying the benefits that stem from their usage. To provide explanations how DTs can be beneficially leveraged among the stakeholders of the sports industry to enable shared digital capabilities for researches and practitioners alike, we establish logical links from the various stakeholders embedded in the digital ecosystem to DTs' role.

This paper is structured as follows: In the next section, we introduce sports digitalization as an academic discipline in IS research and provide an understanding of the digital ecosystem of the sports industry. We describe our research approach in Section 3. In Section 4, we present the findings covering the role of DTs for the sports industry. We then discuss our findings and avenues for future research as well as limitations of our study in Section 5. Finally, we conclude our paper in Section 6.

Theoretical Background and Related Work

Sports Digitalization as an Academic Discipline

There is no consensus on how sports should be defined in academia. A common definition typically entails characteristics of competitiveness, a 'non-hostility' nature, physicality (no matter to what extent), and also conformance of predefined rules (Wright, 2009). Following the work by Loy (1968), sports is also an organizing activity driven by institutional logics. We further define the sports industry as the market in which the products offered to its buyers are sports-related and may be activities, goods, services, people, places, or ideas (Pitts et al., 1994). While DTs in the sports industry are pervasive in practice, little academic research has been conducted on DTs in the sports industry in the IS discipline (Shah et al., 2015; Tan et al., 2017; Xiao et al., 2017). However, the massive transformation of the sports industry, triggered by digitalization, the growing public interest, and the large market potential associated with it, recently led to a surge in the level of scholarly interest in IS. Therefore, an IS community around sports has been established.

One of the most decisive articles for studying the sports industry in the IS discipline was published by Xiao et al. (2017). In their completed research article, Xiao et al. (2017) provide an understanding of "why and how should we study sports digitalization in the IS discipline?" (p. 3). We share the opinion of the authors that the sports industry, as a unique context with distinctive characteristics, calls for special attention rather than being treated as just another type of industry. The reasons for the uniqueness of the sports industry are manifold:

- the complexity embedded in the organizational activities – e.g., the structure of sports organizations as non-profit organizations and their competitive and secretive nature (Xiao et al., 2017);
- the heterogeneity of stakeholder groups – e.g., the different working methods and mindsets of traditional stakeholders, such as sports associations, and new stakeholders, such as data providers (Babiak & Wolfe, 2009; Tan et al., 2017);
- the nature of the product consumed – e.g., sports is a rather an intangible than a tangible product;
- the specific consumers – e.g., fans are mainly driven by emotions such as passion and social values rather than by rational evaluations (Babiak & Wolfe, 2009);

- and the enormous economic, political, and social impact – e.g., not only fans, sponsors, or investors spend their time and money in the sports industry, but governments also push into it to use the radiance of sports as a political instrument that demonstrates power and influence.

In sum, although the use of DTs is salient in the sports industry, IS research has not yet paid extensive attention to it. We argue that dismissing the sports industry as just another empirical context will translate to missed opportunities for comprehending an IT-driven phenomenon that might display interesting dynamics due to the uniqueness of the context at a theoretical level. This is in line with Chiasson and Davidson (2005), who call for the consideration of industries in IS research as institutional contexts by explaining how structures of certain industries, including schemas, rules, norms, and routines, become entrenched.

Digital Ecosystem of the Sports Industry

A digital ecosystem is a collaborative environment made up of different entities that co-create value through information and communication technologies. In a digital ecosystem, companies work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate innovations (Senyo et al., 2019). There is no well-founded and uniform description of the digital ecosystem of the sports industry described in literature (Holland, 2015; Xiao et al., 2017). Therefore, based on related work and prior studies on the business value of DTs, we developed a conceptual framework that helps to understand the composition of the digital ecosystem of the sports industry. The framework distinguishes between three types of stakeholders embedded in the sports industry, in accordance with Bower and Christensen's (1995) disruptive innovation theory: (1) traditional stakeholders who have been in the industry for a long time, (2) new stakeholders, such as innovators and disruptors (e.g., Information Technology (IT) stakeholders that provide the sports industry with new recourses, skills, and competences), and (3) repressed stakeholders that fear to be replaced by the new stakeholders entering the industry. This framework is depicted in Figure 1 and explained as follows.

On the one hand, according to Davern and Kauffman (2000), the potential value of DTs can be observed at several levels of analysis, at which flows of DTs value become discernible for the investing firm (i.e., from micro to macro level). Examples of different levels of analysis where value can accrue (directly or as consumers of the output) include individual users, teams and work groups, business processes, firm level, and even

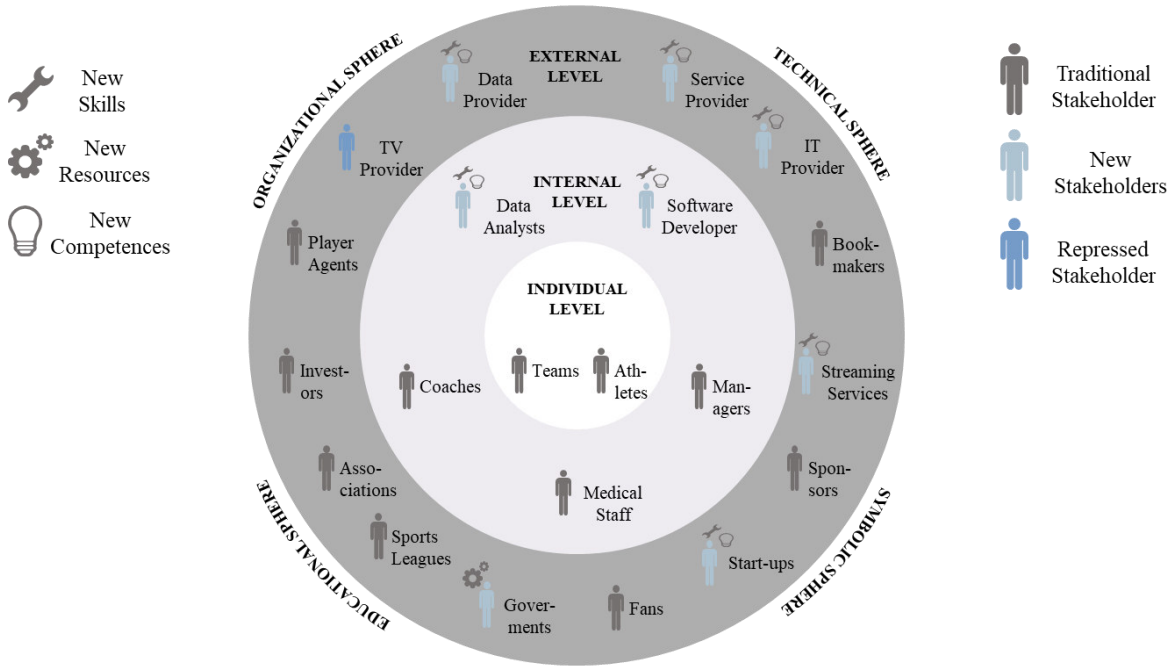
industry level. For the purpose of this study, we differentiate between three levels of analysis in the sports industry, based on the article by Caya and Bourdon (2016): (1) an individual level, (2) an internal level, and (3) an external level. At the individual level, we find athletes and teams who benefit from the application of DTs. The internal level of analysis consists of stakeholders within a sports organization. For instance, their management team, coaching staff, and other support staff, such as doctors and statisticians. External level stakeholders are people, groups, and entities that are not directly concerned with the transformation of potential value into realized value creation of a sports organization. Stakeholders at this level interact with stakeholders of the individual and internal level in the creation of shared value. External stakeholders are, for instance, professional sports leagues, sports federations, sports fans, technology vendors, media companies, player agents, sponsors, and investors.

On the other hand, the framework divides the digital ecosystem of the sports industry into four spheres with regard to the institutional activities of sports, which are described in Loy (1968): (1) the organizational sphere, (2) the technical sphere, (3) the symbolic sphere, and (4) the educational sphere. The organizational sphere describes the organizational aspects of the sports industry in terms of teams, sponsorship, and government. Activities in this sphere deal with the administration of sports and the pursuit of both business outcomes and sports outcomes. Therefore, organizational activities not only encompass activities in direct relation to sports production, but they also include business activities that ensure targeted outcomes (e.g., customer satisfaction and revenue). The technical sphere describes "the material equipment, physical skills, and body of knowledge which are necessary for the conduct of competition and potentially available for technical improvements in competition" (Loy, 1968, p. 8). Activities in this sphere, for example, include skills and knowledge possessed by coaches to enhance the technical equipment. The symbolic sphere of sports includes elements of secrecy, display, and ritual. Sports consumers are a major part of the symbolic sphere of sports, both as observers and as participants, depending on their roles and level of engagement. Finally, the educational sphere of sports deals with the activities of acquiring the above-mentioned skills and knowledge of the technical sphere, thus focusing on those activities related to the transmission of skills and knowledge.

Indeed, the stakeholder levels and institutional activity spheres are closely related to each other and sometimes overlap. These overlaps reflect the high levels of complexity contained in the digital ecosystem of the sports industry.

Figure 1

Stakeholders Within the Digital Ecosystem of the Sports Industry



Research Method

Literature Review

Research lacks a comprehensive overview that synthesizes the role DTs play in the context of the sports industry. Therefore, we performed a concept-driven literature review, relying on an adjusted five-phase identification and selection process that was originally derived by vom Brocke et al. (2009).

According to vom Brocke et al. (2009), journals are selected in the first phase. It is recommended to focus on articles published in scholarly journals or at renowned conferences as these articles are usually peer-reviewed before publication (Rowley & Slack, 2004; Webster & Watson, 2002). Due to those recommendations, only articles stemming from the Senior Scholars' Basket of Journals or articles published at one of the conferences organized by the Association for Information Systems (AIS) (i.e., AMCIS, ECIS, HICSS, ICIS, PACIS) are chosen for further analysis. In the second phase of the data collection process, we selected databases for examination. This study only includes databases related to the IS discipline: ACM Digital Library (ACM), AIS Electronic Library (AISeL), IEEEXplore, and ProQuest. The third phase requires the construction of a search query that includes search phrases and is executed on the databases chosen in the second phase. It is commonly recommended to use a set of

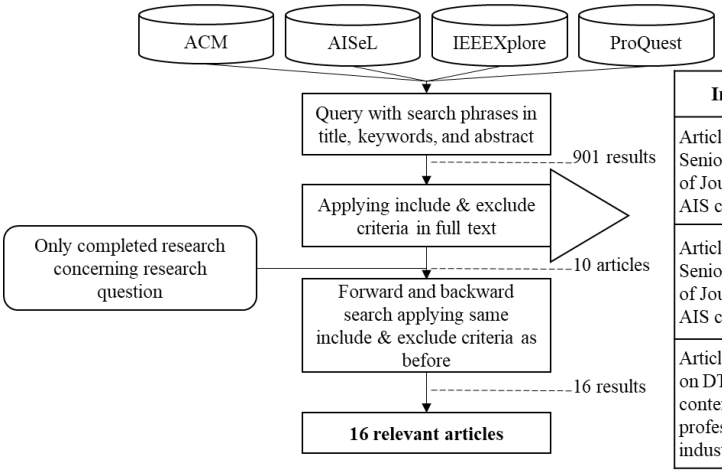
search phrases that are as precise as possible to exclude results covering topics or research questions that do not contribute to the research issue (Rowley & Slack, 2004). Thus, potentially relevant articles have to match the following search phrases for title, abstract, or keywords: (baseball; basketball; e-sport*; football; soccer; sport*) AND (analytics; digitalisation; digitalization; "information technology").

The first search phrase for the search query includes the combination of different expressions of sports, such as short form, singular and plural expressions as well as expressions for major sports disciplines. The sports disciplines are added because articles deemed to be relevant for this study are missing when using only expressions for sports. The second search phrase connected to the first search phrase by an AND operator contains expressions related to digitalization and IT. The combination of both search phrases ensures that relevant articles are found, and the application examines the role of DTs for the sports industry.

The above-mentioned search phrases are each transformed to the specific syntaxes of the literature databases. The search resulted in a total of 901 articles (the numbers are as of 21 September 2018). These articles' full texts are assessed with regard to the include and exclude criteria (see, Figure 2). After applying the include/exclude criteria, 10 relevant articles remained. In the fifth phase, the 10 remaining articles from the fourth phase are accumulated by identifying further relevant studies using the approach, as suggested by Webster and Watson (2002), of searching forward and backward. The Web of Science, as recommended by Webster and Watson (2002), is used to search forward. Additionally, Google Scholar is used, since researchers' experience showed that Google Scholar provides a more comprehensive impression on the actual number of citations. These articles are evaluated using the method described in the fourth phase and if identified as relevant, they are added to the pool of results. This search reveals another six relevant articles. The literature review process is finished after one-step of forward and backward search of the initially identified 10 articles. As a result, we identified 16 articles in total. Figure 2 summarizes the results of the literature review process. For further analysis, a concept matrix is used, which is explained in Section 4.

Figure 2

Overview of Literature Selection Process



Include Criteria	Exclude Criteria	Filtered Results
Article stems from Senior Scholars' Basket of Journals or one of the AIS conferences	Article is a duplicate	17
Article stems from Senior Scholars' Basket of Journals or one of the AIS conferences	Article does not stem from from Senior Scholars' Basket of Journals or one of the AIS conferences	872
Article has a clear focus on DTs used in the context of the professional sports industry	Article does not focus on DTs used in the context of the professional sports industry	2

Data Analysis

We aim to analyze DTs' role in the sports industry, which stakeholders benefit from the implementation of DTs, and how DTs can be beneficially leveraged among them to create shared digital capabilities. Therefore, to enable a comparison between the identified articles and to find patterns in the application of DTs, we analyzed our identified articles by five consecutive steps, which are described in the following.

First, we performed a qualitative content analysis of the articles and coded the context of the study including the DTs described, the type of sports (if mentioned), whether the article comprises empirical data, and the place of publication. Second, to identify practical applications of DTs in the sports industry only, we excluded the articles that have no empirical context from our sample for further analysis. As a result, the sample size was reduced to 12 articles. Third, in these 12 articles, we collected information about the mentioned stakeholder levels, the institutional activity spheres affected by the DTs, and whether the DTs have a supportive, enabling, or replacing role in the context of the article. Fourth, we developed a concept matrix that is based on the findings of the previous steps. This concept matrix is used to find patterns in the application of DTs to show which role DTs play in the context of the sports industry. The applied approach is to analyze DTs usage based on written case material. Specifically, we analyze which stakeholder levels have initiated the implementation of the DTs described in the article, the institutional activity spheres affected by the implementation, and DTs' role (as classified below). Following the logic of gradually decomposing complex concepts to make them more easily accessible, these impacts, altogether, form a cause-and-effect structure. By coding the impacts evident in the case material, the role of DTs is

investigated and structured to build logic links between the stakeholder levels and DTs' role via each institutional activity sphere. We then counted the occurrences of each logical link found in the concept matrix to identify patterns in the application of DTs. These patterns may help us gain an understanding of how DTs can be beneficially leveraged among stakeholders in the sports industry to gain shared digital capabilities. As a last step, we used the identified logical links and collected information about the mentioned benefits of the DT described in the articles and merged similar benefits into groups. The benefits were clustered into benefit groups if they were logically related to the same subject. We followed the theoretical approach of clustering proposed by Jankowicz (2003).

Results

Overview of Selected Articles

Table 1 provides an overview of the 16 articles identified. There is no article which stems from one of the journals included in the Senior Scholars' Basket of Journals. All identified articles stem from one of the AIS conferences, which underlines the high degree of topicality, as conferences have shorter review cycles than journals. 12 articles have an empirical context. The other four articles either develop conceptual frameworks for the usage of DTs (e.g., Wilkerson and Gupta (2016)) or provide an overview and a research agenda for sports digitalization (e.g., Xiao et al. (2017)). The remaining 12 articles rely on empirical evidence in their analyses, differ in context, and cover a broad variety of topics, although eight out of the 12 articles deal with data analytics solutions. In these articles, various applications of DTs in the sports industry are discussed. For example, ranging from algorithms to predict players' performance (e.g., Cordes and Olfman (2016)) through the development of a practice-based research network system to gain a better understanding of sports-related injuries (e.g., Lam et al. (2016)) to an analytics dashboard for improving decision-making in ocean race sailing (e.g., van Hillegersberg et al. (2017)).

Table 1

Overview of Identified Articles

Article	Context of the Article	Empirical	Published
Caya and Bourdon (2016)	Development of a conceptual framework that identifies value creation from business intelligence use in competitive sports.	No	HICSS
Cordes and Olfman (2016)	Design science research approach to predict athletic performance with a genetic algorithm in football.	Yes	AMCIS
Fohrholz and Glaschke (2016)	Capacity and pricing predictions of coach vendors including a case study about the European Soccer Championship 2016.	Yes	HICSS
Hanisch and Hanisch (2007)	Development of a speech-enabled human-computer interface that ensures injury tracking in elite sporting clubs.	Yes	PACIS
Holland (2015)	Teaching case that investigates the impact of the Internet and social media on the sports market to develop a strategy for sports clubs.	Yes	ECIS
Lam et al. (2016)	Development of a practice-based research network system to gain a better understanding of sports-related injuries.	Yes	AMCIS
Loucopoulos and Kavakli (2016)	Research on enterprise capability modelling challenges to address dynamic requirements using a sports event as an example.	No	AMCIS
Mignerat and Audebrand (2010)	Investigation of the roles and actions of institutional entrepreneurs in the selection and implementation of IT for sporting events.	Yes	ICIS
Morgan and Ravindran (2017)	Teaching case that describes the use of business analytics to target baseball-free agents.	Yes	AMCIS
Shah et al. (2015)	Development of an analytics platform for professional sports teams (i.e., soccer) using a design science research methodology.	Yes	ICIS
Tan et al. (2017)	Case study to assess the differences between IT-enabled capabilities in sports (i.e., FC Bayern Munich) and traditional businesses.	Yes	AMCIS
van Hillegersberg et al. (2017)	Development of an analytics dashboard for improving decision-making in ocean race sailing.	Yes	AMCIS
Wilkerson and Gupta (2016)	Development of a framework that uses analytics to improve sports injuries prevention.	No	AMCIS
Wulf et al. (2015)	Teaching case that illustrates how value can be generated by social media using the example of a soccer club (i.e., FC Bayern Munich).	Yes	ECIS
Xiao et al. (2017)	Overview and research agenda of sports digitalization in the IS academic literature stream.	No	ICIS
Xu and Yu (2015)	Case study that uses sentiment analysis to detect players' pre-game moods (i.e., basketball) to predict their on-court performance.	Yes	HICSS

Linkage between Stakeholder Level, Institutional Activity Sphere, and Role of Digital Technology

To improve clarity about the role of DTs for the sports industry and to understand which benefits yield from the use of DTs, it is analyzed how DTs achieve their role via each stakeholder level and institutional activity sphere (see, Table 2). Therefore, we excluded the articles that have no empirical context from our sample. As a result, the sample size

is reduced to 12 articles at this stage. The articles are analyzed by searching for logical connections between the role of the DTs described in the article and the involved stakeholder levels via an institutional activity sphere. The role of DTs described in the articles is divided into an enabling, a supporting, and a replacing role. The enabling role describes DTs that create new organizational capabilities. The supporting role includes the DTs that support and simplify existing organizational capabilities. The replacing role is defined as DTs that replace existing capabilities such as the automation of manually performed activities.

While examining the connection between the involved stakeholder level, the affected institutional activity sphere, and the role of the DTs, the data gathered shows that the linkage between the internal stakeholder level, the technical activity sphere, and the enabling role of the DTs in use is one of four dominant linkages. Additionally, the internal stakeholder level, the organizational sphere, and the enabling role form another link. These connections are followed by the linkage between the internal level stakeholder, the symbolic activity sphere, and the enabling role. The last observed pattern is the linkage between the internal stakeholder level, the educational sphere, and the enabling role of DTs. The detailed results of the observed patterns are explained in the following subsections.

Table 2

Mapping of Stakeholder Level, Institutional Activity Sphere, and Role of Digital Technology

Article	Stakeholder Level			Institutional Activity Sphere				Role of DT		
	Individual	Internal	External	Organizational	Technical	Symbolic	Educational	Enabling	Supporting	Replacing
Cordes and Olfman (2016)		X			X			X		
Fohrholz and Glaschke (2016)			X	X					X	
Hanisch and Hanisch (2007)		X		X	X			X		
Holland (2015)		X		X		X		X		
Lam et al. (2016)		X		X	X			X		
Mignerat and Audebrand (2010)		X		X	X					X
Morgan and Ravindran (2017)		X			X				X	
Shah et al. (2015)	X	X			X		X	X		
Tan et al. (2017)		X	X	X	X	X	X	X	X	X
van Hillegersberg et al. (2017)		X			X		X	X		
Wulf et al. (2015)		X		X		X		X		
Xu and Yu (2015)		X			X			X		

Internal Stakeholder Level, Technical Activity Sphere, and Enabling Role of Digital Technology

Table 2 shows that seven articles build a linkage between the internal stakeholder level, the technical activity sphere, and the enabling role of the DTs described. The high number of occurrences emphasizes that many DTs described in the IS literature are implemented around the technical activity sphere in the sports industry. In general, while the technical sphere is closely related to the organizational sphere, DTs at this linkage enable an improved knowledge processing and in turn facilitate knowledge creation. For instance, some authors describe the development and implementation of injury tracking systems to gain a better understanding of sports-related injuries in professional sports (e.g., Hanisch and Hanisch (2007) or Lam et al. (2016)). Other authors develop algorithms to understand and predict players' performances (e.g., Cordes and Olfman (2016) or Xu and Yu (2015)).

Internal Stakeholder Level, Organizational Activity Sphere, and Enabling Role of Digital Technology

Additionally, five out of 12 articles establish a connection between the internal stakeholder level, the organizational activity sphere, and the enabling role of the DTs. In contrast to the linkage described in the aforementioned section, DTs at this linkage are used to ensure both sports outcomes and business outcomes (e.g., customer satisfaction or revenue). More specifically, DTs allow process automation, thereby supporting and replacing existing workflows and administrative processes. For example, Mignerat and Audebrand (2010) investigate the role of e-ticketing technologies, which replace paper-based tickets. Likewise, Morgan and Ravindran (2017) focus on business analytics to propose recommendations to target baseball players, which was a manually performed task in the past.

Internal Stakeholder Level, Symbolic Activity Sphere, and Enabling Role of Digital Technology

According to the analyzed articles, authors draw a linkage between the internal stakeholder level, the symbolic activity sphere, and the enabling role of the DTs in use. DTs at this linkage facilitate information exchange and digital interaction (Holland, 2015; Tan et al., 2017; Wulf et al., 2015). Information exchange and digital interaction are especially important in the sports industry, where many fans live outside the actual place of the venue, in remote areas. DTs close this distance gap and, for example, enable

sports organizations to transmit information as well as emotions digitally. As a result, the individual player, the team, and sports organizations can be brought closer to the fans (Tan et al., 2017). In consequence, DTs at this linkage foster a better fan accessibility and a closer relationship building. Three of the identified articles draw this linkage.

Internal Stakeholder Level, Educational Activity Sphere, and Enabling Role of Digital Technology

The analysis shows that three out of 12 articles denote a linkage between the internal stakeholder level, the educational activity sphere, and the enabling role of the DTs. At this linkage, the DTs described in the IS literature are data analytics solutions for tactical information, performance data, and physical actions that are turned into sports accomplishments on the field of play. For instance, DTs enable the collection of large amounts of performance data. This data is then analyzed in real-time by advanced data analytics techniques and displayed in dashboards or on platforms to gain valuable insights for coaches before and in real-time during the game (Shah et al., 2015; Tan et al., 2017). In sum, the benefits of DTs at this linkage ensure (real-time) performance monitoring and in turn performance improvements.

Discussion, Future Research, and Limitations

To elucidate how DTs shape the digital ecosystem of the sports industry, we identified logical links that disclose the interrelation between the various stakeholder levels embedded in the digital ecosystem of the sports industry, the four institutional activity spheres of sports, and the different roles DTs can play. By investigating these links, four patterns emerged that yield to benefit groups. The major benefits are an improved knowledge processing and creation, an enhanced process automation, digital information exchange and a closer digital interaction, and (real-time) performance monitoring and in turn, performance improvements. However, the results of the analysis also show that the majority of the gained digital capabilities only benefit the stakeholders that have initiated to implement the DTs and are not shared with other stakeholders. As a result, potentials for the creation of shared digital capabilities are missed. Therefore, to truly unlock the innovative strengths of DTs in order to create shared digital capabilities – that is, capabilities that emerge from the collaboration and exchange of the acquired resources and gained digital capabilities – stakeholders of the sports industry need to cooperate more closely.

From an academic perspective, our work provides important insights into the applications of DTs in the emerging literature stream of sports digitalization in IS research. First, we proposed a conceptual framework that helps to understand the stakeholder composition and the digital ecosystem of the sports industry. Future research should focus on an identification of new stakeholders to investigate how these stakeholders further shape the digital ecosystem of the sports industry. Such research would extend our understanding of how the entrance of new stakeholders change the ecosystem dynamics. Second, we analyzed currently scarce IS research on DTs in the sports industry, linked our findings with the existing literature stream of institutional sports, and identified desired benefits in the use of DTs. As a result, we provided a unique contribution to an upcoming literature stream that will be highly relevant in the near future. More precisely, our applied mapping can be used in future research to classify and identify further benefits of DTs in the sports industry. Third, our research model comprises relevant constructs – stakeholder levels, the institutional activity spheres of sports, the roles that DTs can play, and logical links – that explain how DTs can beneficially be leveraged to constitute shared digital capabilities. In a next step, our research model can be applied in an empirical setting (such as a case study) to generate a more in-depth understanding of the role of digital technologies in the sports industry. Likewise, our research model can be extended by specific design and engineering requirements to establish an integrated framework for the implementation of DTs within the digital ecosystem of the sports industry. Lastly, given that our investigation has showed that there is no article published in the Senior Scholars' Basket of Journals, we call for more articles focusing on the sports industry in scholarly journals.

From a practical perspective, our research allows us to determine which DTs practitioners should focus on to achieve desired benefits. Hence, our results are especially relevant to executives who navigate their organizations between both sports outcomes and business outcomes. In addition, practitioners can use the results as a guide to design their own digital ecosystem within the overall digital ecosystem of the sports industry. In this sense, our results should also be seen as a wake-up call for the stakeholders of the sports industry, inspiring them to work closer together to create shared digital capabilities. For instance, designers can implement the identified DTs and seek for collaboration partners to produce higher-level products and services. Higher-level products and services can only be achieved by comprehensively exchanging the gained digital capabilities through DTs. For instance, real-time performance data collected by sports organizations can be shared with streaming services to enhance fans' television experiences.

This study is not free from limitations: First, we restricted our analysis to articles which stem from the Senior Scholars' Basket of Journals or articles that are published at one of the AIS conferences only. Second, it is noticeable that we only performed one-step of forward and backward search doing our literature review process. Third, the dataset consists of 16 articles only. Despite the small number of analyzed articles, our sample shows a high degree of topicality as 14 of the articles were published within the last four years (2015-2018). Fourth, it is fair to say that not all stakeholders of the digital ecosystem of the sports industry are mentioned in our investigations. Fifth, as this study aims to improve the comprehension of the role of DTs in the sports industry in the IS discipline, it is reasonable to assume that not every characteristic is covered, partly due to the novelty of the topic. Studies covering new aspects are likely to be conducted in the near future. Thus, an extension of this study's scope can become relevant.

Conclusion

Based on a concept-driven literature review, we investigated the role of DTs in the sports industry in IS research and identified patterns of logical links, which describe how DTs can achieve specific benefits. For research, the described conceptual framework and the identified logical links provide a theoretical explanation of how DTs facilitate desired shared digital capabilities. Future research should concentrate on how new DTs and new stakeholders shape the digital ecosystem of the sports industry. Implications for practitioners are guidelines which DTs they should concentrate on to achieve specific benefits that are relevant for their business and sports outcomes.

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