Promoting active sports tourism through technology and evaluating its economic impact: Experiences from Cyprus

While the economic impact of major passive sport events is well documented the contribution of active sports events is scarcely examined. This reflective practice' paper contributes towards bridging the gap by examining, in a case study, the economic impact of one of the first big active sport events in Cyprus, organized using state-of-the-art technology. The paper presents the first commercial web platform and recommender system dedicated to active sports events, which provide all necessary services to customers and thus simplify, and ultimately increase participation in the event. We find strong evidence in support of the idea that active sport events have a strong positive impact on the local and countrywide economy, while technology can play a contributing factor and enable further promotion and better organisation of such events.

Keywords: active sports; sports tourism; economic impact; web platform; recommender systems

1. Introduction

Different forms of niche tourism, such as sports tourism, are becoming increasingly important and have the potential to help a tourist destination to differentiate from the norm. At the same time, related technologies aiming at supporting these events have emerged in an effort to facilitate efficient processes of enrolment and participation for interested athletes (Rosandich, 2008). As such, research and development of technology products and services into niche forms of tourism contribute towards tourism development and its associated social and economic benefits.

Ritchie & Adair (2002) state that: "Sport tourism includes travel to participate in a passive (e.g., sports events and sports museums) or active sport holiday (e.g., scuba diving, cycling, golf), and it may involve instances where either sport or tourism are the dominant activity or reason for travel". Moreover, Gammon and Robinson (2003) define a framework that categorizes "hard sport tourism" as travelling to a mega or major

sporting event where the tourists are in most cases passively involved in the event. They refer to “soft sport tourism” when sport activities are the main reasons for travel, e.g., hiking, canoeing or caving, and travellers are actively participating in the sporting activity. In the literature (Greenwell et. al., 2019), “soft sport tourism” is also referred to as “active sport tourism”, which is the definition adopted in this manuscript.

A fair amount of research on the economic impact of sport events is devoted to global Mega Sport Events (MSEs), most of which refer to passive sport events (Taks, 2013). Nevertheless, there are many more sport events that are organised around the globe, which refer to active sport events (i.e., non-mega sport events - NMSE). While the social impact of active sport events is widely examined in the literature (Kaplanidou & Gibson, 2010; Hallmann et. al., 2010; Taks, 2013), the economic impact of active sport events is barely investigated. Overall, the nature and evolution of active sport tourism and its research have evolved in a short amount of time (Gibson et. al., 2018), but still the economic impact of active sport events is not sufficiently examined and with little interconnection to the potential and influence that technology platforms can bring in terms of simplifying and increasing attendance to these events.

This paper contributes, from an empirical perspective, towards filling this gap via the analysis of the economic impact of active sport events on tourism and consequently the country’s economy. In particular, the paper addresses this gap, via a case study, by examining an international active sport event in Cyprus (OceanMan). The sport event was organized using a proprietary event management web platform (SportsTraveler76) and recommender system that were developed in this work, which provide all necessary services to customers and thus simplify and ultimately increase participation in the event. Central to our analysis is the notion that NMSE events can be further enabled, promoted and supported by technological platforms, in an attempt to help in the realization of their

associated economic benefits. To that end, we demonstrate how active sport events contribute to tourism and the local economy, and how technology can help to further promote and better organize such events.

In fact, by analysing the results from the participants' perspective captured from the answers to the defined evaluation instrument, we find strong evidence of significant direct economic contributions to the local economy, as well as long-lasting benefits by placing Cyprus on the map as an attractive destination for organising and participating in active sports tourism events.

The rest of the paper is organized as follows: In Section 2 we present an overview of active sport events and the associated technologies used in this type of events, focussing on the current availability of Information Communication Technologies (ICTs) and event management web platforms. The review also assesses the economic impact of these events and presents related literature. In Section 3, the SportsTraveler76 (ST76) event management web platform for Active Sport Tourism, and the Recommender System (RS) developed in this work are presented. Likewise, the OceanMan Cyprus active sports event, which was organised using the SportsTraveler76 (ST76) event management web platform is described. Section 4 presents the analysis of economic results from the event, while Section 5 concludes.

2. Related Work

This section presents a concise review of two interrelated strings of literature. First, we survey the socio-economic impact of sport events on tourism and the economy, and second, we review the Information Communication Technologies (ICTs) with a focus on event management web platforms that can play a significant role in the organisation and the implementation of active sport events.

2.1. Socio-Economic Impact of Active Sport Events

A theoretical perspective on the social impacts of sport events is presented in Taks (2013) who compares the social impacts and outcomes of MSEs and NMSEs, concluding that there is reason to believe that NMSEs are less relevant in creating durable benefits for the local communities hosting these events. In fact, NMSEs appear to provide a more positive social impact and outcome opportunities for local residents compared to the passive counterparts leading to more lasting benefits. This work calls for a broader research agenda focusing on the true value of small and medium sized sport events for local communities.

In the same line of research, Kaplanidou & Gibson (2010) focuses on the sport event images held by active and passive sports tourists at marathon races in Germany. The study outlines some differences in the perception of event images between active and passive sports tourists, as well as in the perception for different types of destinations. Specifically, for active sport tourists the clustering was closer in terms of emotional, physical and organisational image associations while the emotional theme is as valuable as the physical for active sports tourists. Overall, the results of the study suggest that the type of the destination also affects and elicits different event images among active and passive sport tourists.

Hallmann et. al., (2010) investigate the variables that influence the behaviours of active sport tourists within the context of recurring small-scale sport events. While acknowledging that small scale active sport events have not been widely observed and examined in the sport and tourism literature, the study assesses whether the participation of sport tourists in past events, the attitudes toward event participation, the participant's satisfaction with the sport event and the destination image are accurate predictors of intentions to participate in a sport event again. The study concluded that attitudes towards event participation are important since it looks to impact behavioural intentions directly,

while the sport tourist satisfaction with the event is critical as it formulates positive attitude and most importantly it acts as a direct predictor of behavioural intentions.

The idea of sport events as tourist attractions by destinations that seek to attract large numbers of tourists in their local area is set forward in Kaplanidou (2010). The paper follows the destination image measurement paradigm to investigate sport event image perceptions of active sport participants. The study requested, from a sample of N = 2,000 active tourists that travelled abroad for participating in the event, to give their opinion by indicating three words that came to mind following the completion of the event (i.e. post-trip phase). By classifying the acquired words (into six image themes – historical, emotional, organizational, physical, environmental, and social the study finds that active sport tourists' perception of the event image is associated with all six themes, but most predominantly with the emotional aspects of the event.

Early efforts, as in Marsh, J. S. (1984) and Murphy, P. E., & Carmichael, B. A. (1991) aim at quantifying economic benefits from singular events, nevertheless with little context on sports-promoting tourism or technology. In related research, Swindell & Rosentaub (1998) fail to establish significant economic benefits for local communities hosting professional sport teams and facilities while Higham (1999) asserts that no benefits arise from hosting mega-events (i.e. the Olympics).

Daniels and Norman (2003) point out that smaller-scale events may be more beneficial for the local community because these do not require large-scale infrastructure, rather they operate within the established capacity of the community. If so, net economic benefits are easier to materialize as *"incremental spending above and beyond what would be expected in the region if the event was not held"* because the additional spending is not offset by capital expenditures. The study deviates from the single-event assessment by looking at seven regular sport events identifying economic drivers linked to tourism

event attendance and expenditure profiles as well as highlighting the need for complementary activities to maximize the benefits of sport initiatives.

Similarly, Drakais and Papadaskalopoulos (2014) assess the contribution to the local economy of four distinct events (golf, windsurfing, horse riding and scuba diving) all taking place in a single region in Messinia, Greece. By comparing the contributions of each of the four events the authors identify sports events as tourism propulsive activities exerting influence on the participants' decisions to visit again and propagating increased collaboration among various events and that lead to improved connectivity.

Hodeck and Hovemann (2016) examine active sport tourism in the German highland by taking into consideration seasonality effects. The authors found that from the participants' perspectives, the motivation to engage in sports' tourism is hardly affected by season. It is up to the organizing hosts to develop new all-season strategies in order to minimize seasonality effects and maximize the corresponding benefits. The finding is particularly relevant for Cyprus, where tourism is highly contingent on seasonality with several past efforts failing to address the problem. We argue that active sports events could and should be taken into consideration as an effective means of establishing an all-season touristic strategy.

Eiji and Higham (2020) provide a conceptual framework that maximizes sport tourism benefits by capturing the synergies between event sports and secondary tourism attractions. The framework identifies primary, secondary and tertiary non-sport attractions, as well as their interactions with the principle sport event. The case of Cyprus, with its rich history and numerous tourist attractions is also subject to this framework. Finally, Downward et al (2020), find that economic benefits of active sports (as well as their duration) depend on visiting attractions and hospitality. Thus, reinforcing further the idea that an interplay between sport-events and supplementary attractions/activities, as

well as an overall feeling of hospitality, aim to enhance the effectiveness of sport events as touristic products.

Overall, the above survey shows that the social impact of sport events is widely examined in several research studies, while at the same time, the economic impact of singular mega events is heavily investigated. Finally, activity-based sports tourism and events' impact to the economy is narrowly examined. Nevertheless, the economic impact of sport events in which professional athletes and amateurs actively participate, and at the same time engage in touristic activities during their stay at the destination requires further examination (Ritchie & Adair, 2002). In addition, in the above research works there has been little focus on technology, which can be a contributing factor to the attraction of larger participation, as shown from the economic analysis of the OceanMan event in this paper.

2.2 ICTs for Active Sport Events

Local Level

In the context of Cyprus, there are several information-based governmental and private websites[1] that promote the island of Cyprus as a tourism destination. The first and only dedicated information website for sports tourism[2] is the result of an effort of a sports fan trying to gather all the sport events in Cyprus, providing basic information about each sport event and with no registration and booking solutions. The most popular web platform for events[3] available in Cyprus has an explicit category related to sports, with basic information and instructions on how to register on the event's dedicated website. Finally, individual sport activities, such as three recurring marathons taking place in

[1] Cyprus Tourism Portals: http://www.visitcyprus.com, http://www.heartcyprus.com/
[2] Sports Tourism Website: www.runbis.com
[3] Cyprus Events Website: https://www.cyprusevents.net/

Cyprus, are promoted and added by the organizers in international websites or web platforms. These websites or platforms are dedicated to a specific type of active sport event, while at the same time offering only information and instructions on how to purchase tickets by using the organizers' payment methods.

International Level

There are several web platforms that promote Sport Event Tourism (i.e., "hard sport tourism"), which offer registration, tours and sports travel packages for sports fans that mainly travel to watch (passively) an event. For instance, SportsTraveler[4] features sporting events such as NBA matches, Wimbledon matches, etc. Worlds Marathons[5] is one of the first and major Active Sports Tourism web platforms that specializes only on marathon races. Moreover, sports activity tourism websites exist for specific events or sport types. For instance, Field Sports Travel[6] promotes and supports only fishing, shooting, and cricket activity sports. Moreover, there are technology providers[7] that sell event management software platforms to organisers of specific events or sport types.

Overall, no research has been identified on web platforms that offer electronic booking systems with a holistic approach towards hosting a set of features to support sport event organisation, management, and simplify and promote active sport tourism events. In this work, we strongly believe that Internet technologies (e.g., web platforms) can positively influence and increase participation in active sport events. In fact, previous research works have revealed that the use of Internet in the travelling process (before, during and after travelling) is defined as a key factor influencing the choice of a tourism destination (Bonn, Furr & Susskind, 1998; Heung, 2003; Kabassi, 2010). Furthermore,

[4] Sports Traveler: https://www.sportstraveler.net/
[5] Worlds Marathons: http://www.worldsmarathons.com/
[6] Field Sports Travel: http://www.fieldsportstravel.com/
[7] Active Network Software Solutions: https://www.activeendurance.com/

Luo et al. (2004) identified that tourists who use the Internet to book their holidays, actually spent more time at their travelling destinations in comparison to those that do not use the Internet.

More to the point, and in relation to this work, Valek and Axelsson (2012) investigated the use of the Internet among active and passive tourists from Slovenia. The authors have identified that active tourists are using the Internet more actively than passive tourists for their travel purpose (i.e. recommendation of tourism destinations). In fact, the data analysis revealed that more than 50% of active sport tourists (i.e. main motive for travelling is sport, culture or any other activity) use the Internet for travel purposes. On the other hand, the authors have identified that only 24.7% of passive tourists use the Internet for travel purposes, while the rest prefer to use agencies. The authors discovered differences between passive and active tourists who use Internet and online booking systems, which is the reason they propose the development of different booking systems and Internet pages for the tourism destination. In this sense, the authors are proposing the development of different booking systems for passive and different for active tourists. At the same time, the authors suggest different types of targeted web-communication. In this work, the key goal is to deliver such a platform that is fully tailored to the specific characteristics, preferences and needs of active sport tourists.

Beyond State-of-the-Art

SportsTraveler76 (ST76) is the first commercial platform of choice for Active Sport Tourism for any type of sport event. It provides the full set of features and services (e.g., registration, hotel booking, event facilitation services) required to electronically manage active sport events. This enables organisers to effectively host, organise and manage active sport events, while at the same time participants can easily and effectively carry out all required tasks for attending the event from a single platform. Moreover, the

platform integrates a recommendation algorithm and system that were developed in order to enable the host organisation to receive recommendations on the top-N customers that are most likely to be interested in a new event hosted and managed by the platform. The event organiser can thus contact them directly via the platform, in an effort to retain and increase returning customers. The innovation and originality of ST76 comes from the fact that it differentiates from competitors in the following ways: (i) it offers the complete set of features and services required to manage active sports events of any type, and (ii) provides a recommender system that enables personalisation, thus increasing customer retention, and customer participation. These two ways aim to increase participation in the events, and at the same time increase the economic impact of active sport events.

The SportsTraveler76 web platform

Platform Overview

The ST76 web platform is the very first web platform, to the best of our knowledge, that offers the complete set of services and aims at personalisation to increase customer participation in active sport events. The ST76 platform provides the capability to promote worldwide NMSEs, which can assist in increased customer participation in active sport events. Thus, technology can act as a supporting factor that helps to further promote and better organize NMSEs. In fact, the ST76 platform enabled the worldwide participation of athletes in the OceanMan event as indicated in the analysis section.

Platform Capabilities

The web platform offers to the administrator the capability to manage sport events through the backend. Figure 1 shows on the left pane the entire set of features offered to the administrator of the platform, who apart from managing active sport events, is also able to manage users, manage newsletter clients, etc.

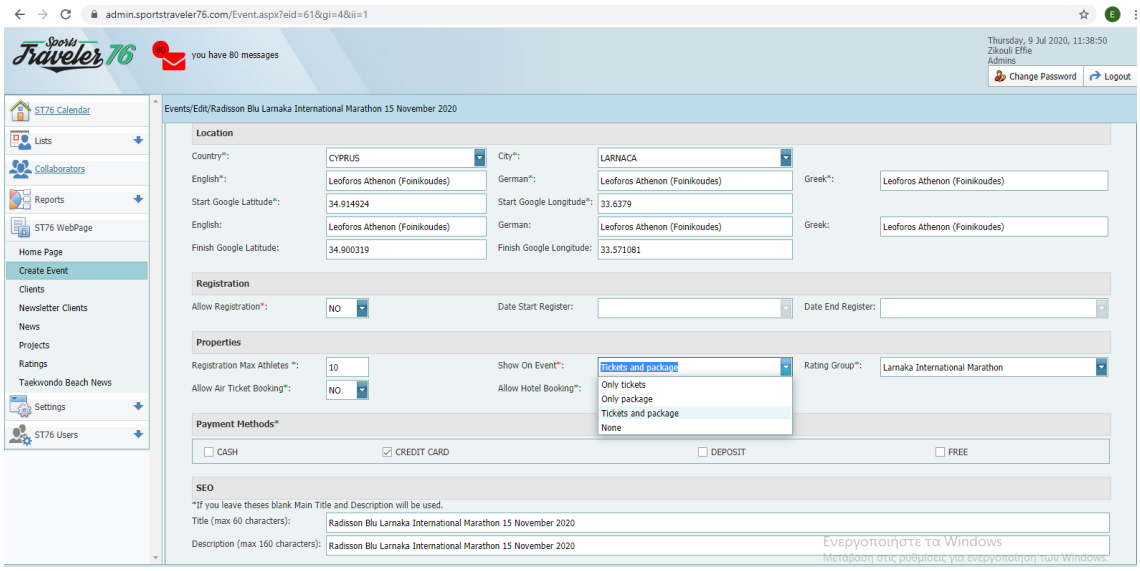

Figure 1: ST76 Web Platform – Backend: Create event

The administrator when creating an event is able to select one of the following event modes: 1) Only Tickets – customers are only able to purchase tickets for participating in the races of the event, 2) Only Package (hotel) – enables customer to book only hotels for a specific event and 3) Tickets and Package (hotel) – enables a customer to book a combined ticket and hotel package price. The first and third mode are the popular options when creating an event using the platform, whereas Figure 2 shows how to add tickets and prices to an "Only tickets" event and Figure 3 shows how to add packages and prices to a "Tickets and Package" event.

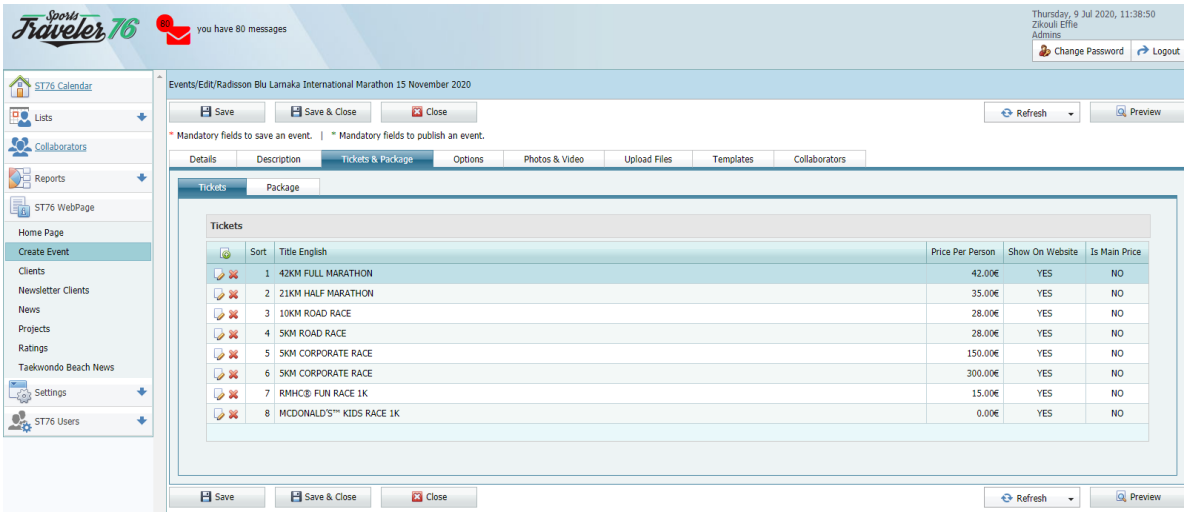

Figure 2: ST76 Web Platform – Backend: Add tickets to event

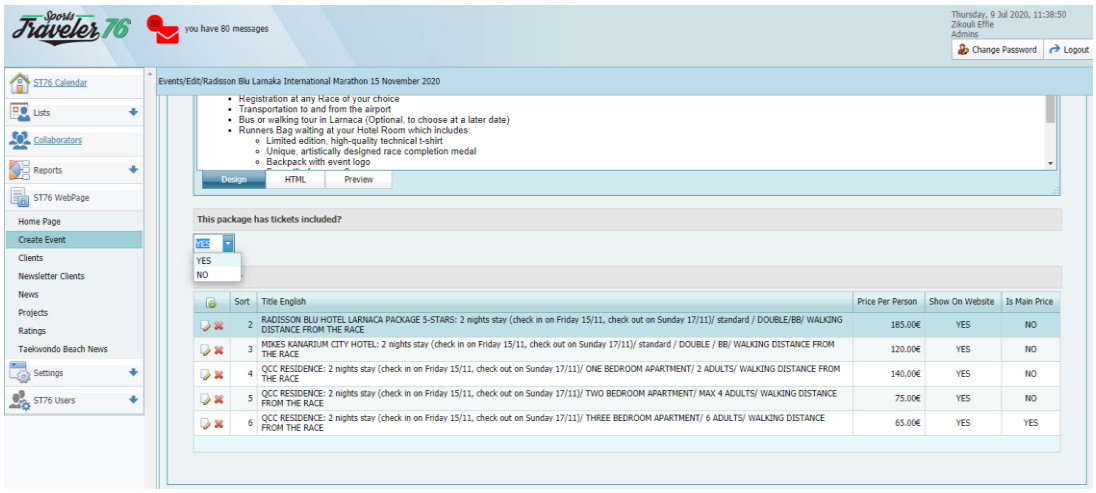

Figure 3: ST76 Web Platform – Backend: Add packages to event

Figure 4 illustrates the end-user view when an event is published, where the customer is able to purchase a ticket or a package based on the type of the active sport event. For instance, in the case the customer selects a package (ticket and hotel) then the user follows a page-by-page wizard where he/she needs to select the number of rooms, the number of athletes, enter each athlete details and finalise the purchase using Six Payment services. Finally, the platform allows creating an event where the hotel and flight ticket can be purchased by the company's external collaborators (e.g., travel agency) with the help of iFrames [W3C, 2020] that are integrated in the process flow of the customer registration and purchase wizard.

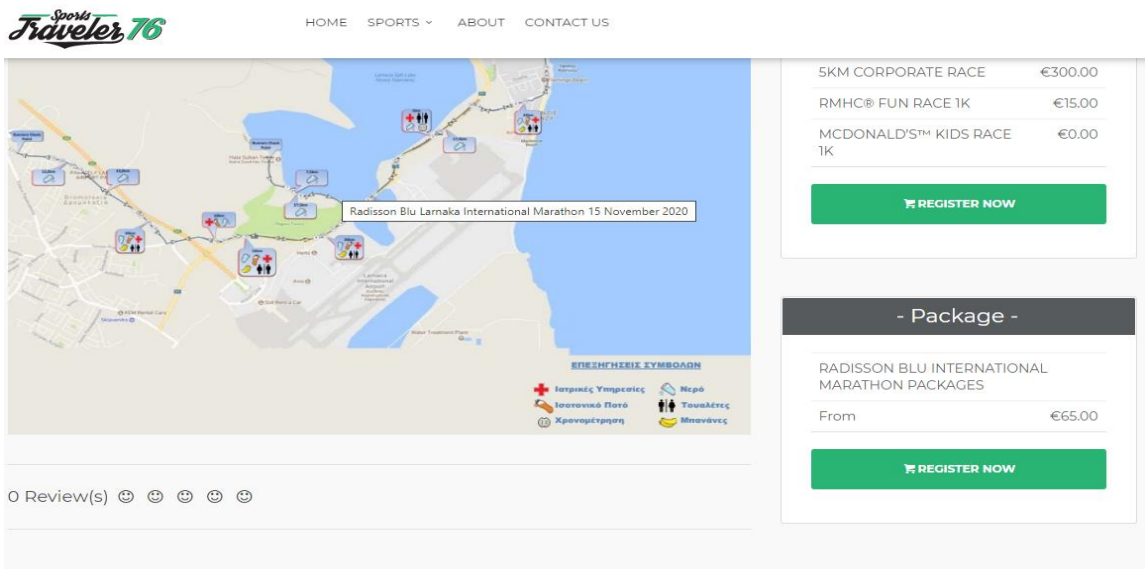

Figure 4: ST76 Web Platform – Frontend: End-User View

Platform Technologies and Architecture

Figure 5 shows the platform architecture that is realised on the ST76 cloud infrastructure with the following technologies and tools. The platform is implemented using HTML5 (HTML, CSS, JavaScript - client side) and the .NET programming framework (C# - server side) and hosted on the Internet Information Services (IIS) Web server. The Microsoft SQL Server is used as the platform's database and the data exchange between the client and server is performed using XML. Both the production and development server are deployed on a private cloud. On the basis of the above infrastructure the development and deployment of the new services was performed, which are offered by the platform (e.g., sport event facilitation services, recommender system), as well as integration with existing third-party services (e.g., hotel, flight, payment services) that will be offered based on the agreed and signed business partnerships.

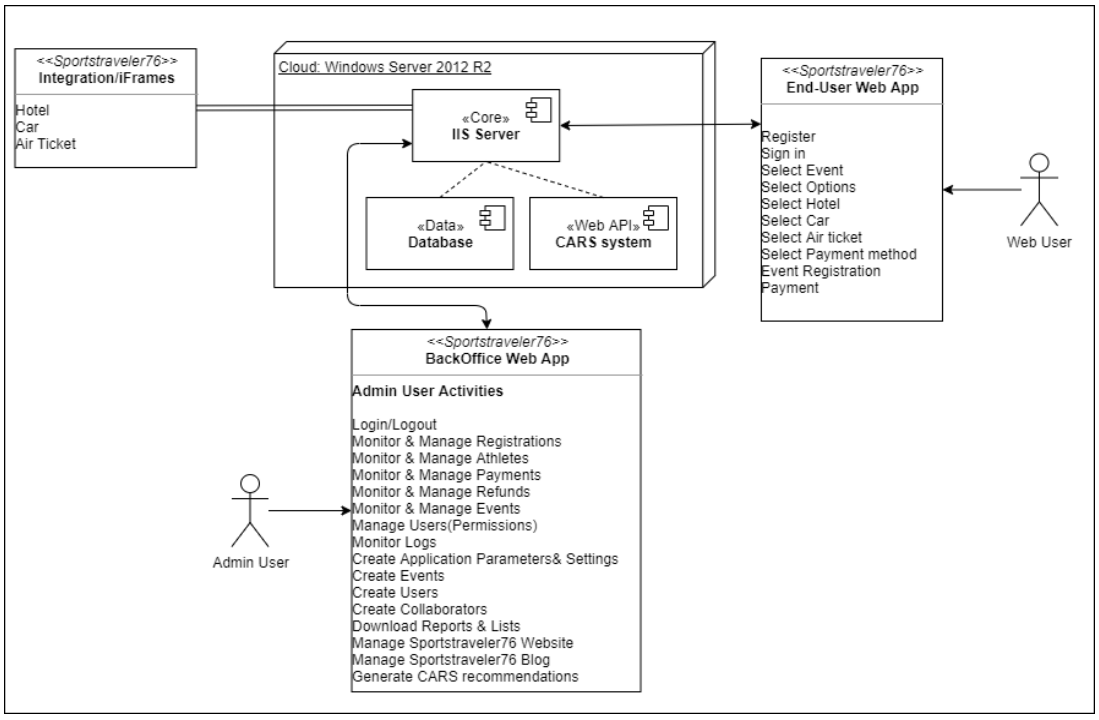

Figure 5: ST76 High Level Platform Architecture

The ST76 Recommender System

The proposed recommendation algorithm and system tackles the problem of providing recommendations to existing customers that are more likely to be interested to attend a new event created and published in the ST76 platform. In this work, a CARS system for active sport events has been designed and implemented as an independent software module. The frontend of the CARS system is implemented as HTML5 web forms, while the CARS system was implemented as a Web API with the help of the Python programming language. In fact, the Python CARS system exposes a Web API through which the functionality of the recommender system can be invoked. The above implementation approach provided straightforward integration with the ST76 web platform. More information, on the recommendation algorithm design and the CARS system implementation is provided in the following subsections.

The ST76 System Model

The ST76 recommender system (ST76_RS) is a domain specific solution that aims at providing recommendations of groups of users that are more likely to attend a specific type of event based on the similarity between users' contextual information and events' preferences. In particular, the ST76_RS is used as a Software as a Service (SaaS) to the ST76 web platform. The web service is hosted on a Windows Server and is developed leveraging the .Net Core Framework, which ensures scalability, reliability, and reusability. Additionally, the recommendation algorithm with the K-Means machine learning algorithm, is developed on top of the scikit-learn python library, which ensures correct operation and high performance; it is also hosted on the same server.

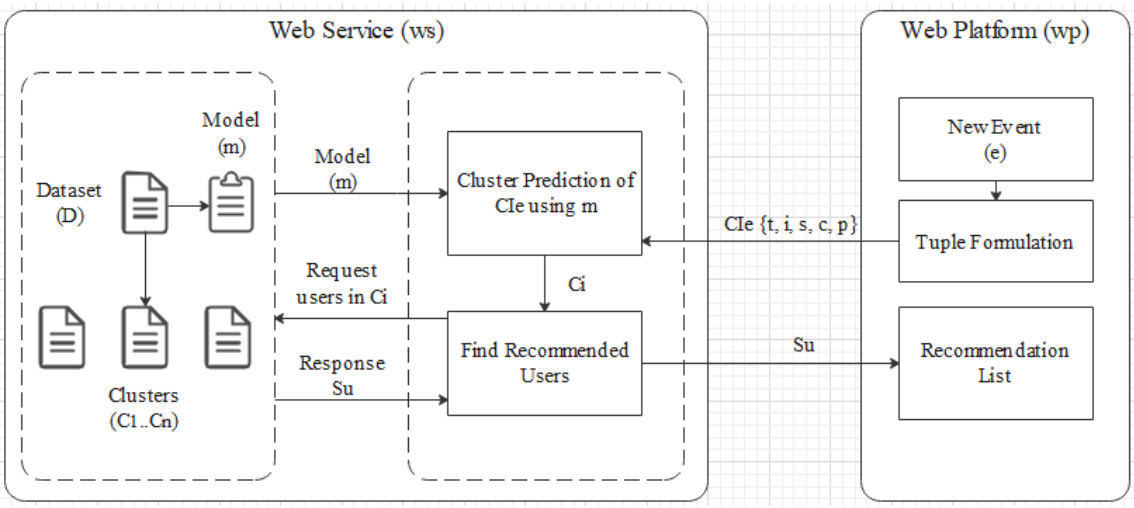

Figure 6: ST76 Recommender System Architecture

Figure 6 provides a visual description of the ST76_RS system architecture and operation: consider a web platform $\boldsymbol{wp}$ (i.e., the SportsTraveler76 web platform) and a web service $\boldsymbol{ws}$ located on server $\boldsymbol{S}$. Consider a dataset D that contains contextual information of several users clustered into $\boldsymbol{C1 \ldots Cn}$ clusters of users, where $\boldsymbol{Ci}$ is composed of users interested for similar events, using a K-means algorithm. Users contextual information include event type $\boldsymbol{t}$, event intensity $\boldsymbol{i}$, event season $\boldsymbol{s}$, user's companion $\boldsymbol{c}$ and participation's regional information $\boldsymbol{p}$ described by the tuple $\boldsymbol{CI}\{\boldsymbol{t,i,s,c,p}\}$. Additionally, consider a prediction model $\boldsymbol{m}$ stored on $\boldsymbol{S}$ that is able to predict which cluster of users $\boldsymbol{Ci}$ is more suitable to attend a new event $\boldsymbol{e}$, which is represented by the tuple $\boldsymbol{CIe}\{\boldsymbol{t,i,s,c,p}\}$. In this case, $\boldsymbol{wp}$ sends an HTTP Request to $\boldsymbol{ws}$ for a user recommendation based on $\boldsymbol{CIe}$ and $\boldsymbol{ws}$ responds back with a set of users $\boldsymbol{Su}$ that are most likely to attend event $\boldsymbol{e}$ based on their contextual information.

The ST76 Recommendation Algorithm

The ST76_RS algorithmic part is composed of two phases:

- In the **offline or clustering phase**, the dataset is clustered using the K-Means machine learning algorithm (Forgy, 1965). Each cluster consists of user-

related entries that include users' contextual information, which refers to specific type of events; Thus, each cluster represents one or more events along with the users that are most likely to attend or have attended the corresponding event(s) based on their contextual information. Hence, a prediction model representing the clusters of users and their contextual information is generated and stored on a central server using the Joblib python library. [8]

- In the **online or recommendation phase**, the prediction model of the previous phase (i) is used to predict the cluster with users that their preferences and contextual information matches the profile of a new event.

Dataset

In order to provide accurate user recommendations to specific events a suitable dataset is needed. In the absence of any existing suitable dataset, we generated our own ST76 dataset by collecting domain specific data from users' contextual information. In particular, the dataset formulated is a result of 68 users answering the questionnaire [9], formulated in a way to obtain users' contextual information. The resulted dataset is composed of more than one thousand entries each providing contextual information of a user to a specific event style. Contextual information includes information regarding:

(1) the type of event (t) $(Official, Leisure, Domestic, Charity)$,

(2) the intensity of the event (i) $(Scale\ 1-5)$,

(3) the season event is scheduled (s) $(Autumn, Winter, Spring, Summer)$,

[8] Joblib Python Library: https://joblib.readthedocs.io/

[9] ST76_RS Questionnaire: https://forms.gle/d8Ah7VbeJLuQA3689 (EN version + 19 offline responses), https://forms.gle/6NTYjk8FXuDbBDxcA (GR version)

(4) the user's companion (c) $(Solo, +1, Family, Team/Friends)$, and

(5) the event's locality (p) $(National, European, International)$.

Note that each user may have multiple entries in the dataset and each entry describes contextual information about a specific event attended, which presents a different user's profile perspective.

Evaluation

For the evaluation of the clustering recommendation system a cosine similarity metric was used in order to measure the similarity between and within clusters. The cosine similarity is defined as follows:

$$sim(A, B) = \frac{A \cdot B}{\| A \| \times \| B \|}$$

where $\boldsymbol{A}, \boldsymbol{B}$ are two multi-dimensional vectors representing the attribute values of an item. In particular, the similarity between clusters is defined by the cosine similarity between the cluster centres vectors, where low similarity describes the dissimilarity between clusters.

Additionally, the similarity within clusters is the average similarity between all vectors included in a cluster compared to cluster centre vector, and can be defined as follows:

$$IntraSim(C_i) = \frac{\sum_{n=1}^{m} \mathrm{sim}(C_{\mathrm{n}}^{i}, \mathrm{V_{c_i}})}{\mathrm{m}}$$

where $\boldsymbol{C_i}$ is the corresponding cluster, $\boldsymbol{C_{\mathrm{n}}^{i}}$ represents each vector in $\boldsymbol{C_i}$, $\mathbf{V_{c_i}}$ is the vector representing the cluster centre, and m is the number of vectors included in the cluster.

As part of the evaluation, two experimental studies have been performed in order to examine the recommendation accuracy. In particular, the first experimental study is focused on the evaluation of high similarity within clusters to evaluate the existence of highly similar items within each cluster. In particular, Figure 7 presents the similarity within each cluster with each cluster similarity above 0.9. Thus, the high score indicates that the items within a particular cluster are highly similar.

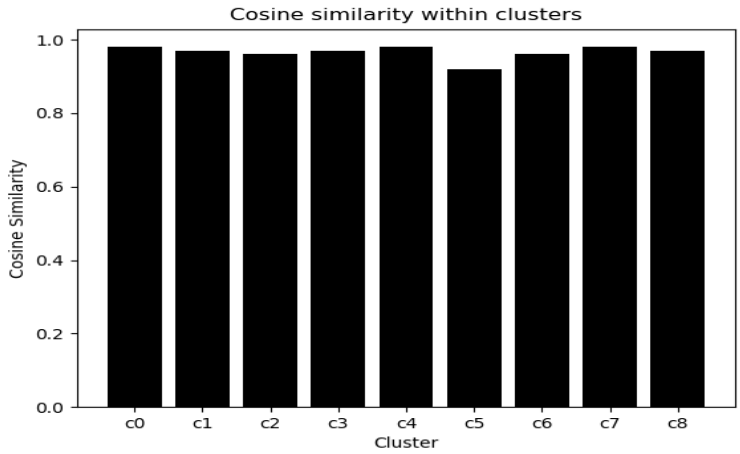

Figure 7: Cosine Similarity within Clusters

During the second experimental study, the low or high dissimilarity between cluster centres was evaluated in order to ensure that the clustering process was done properly. In particular, Table 1 presents the cosine similarities between all clusters' centres. The results show an acceptable level of discrimination between the clusters.

Table 1. Similarity between clusters

	C0	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**
C0	1	0.78	0.76	0.76	0.77	0.73	0.78	0.78	0.81
C1	0.78	1	0.71	0.83	0.71	0.79	0.71	0.69	0.77
C2	0.76	0.71	1	0.7	0.67	0.77	0.73	0.75	0.75
C3	0.76	0.83	0.7	1	0.76	0.69	0.68	0.76	0.68
C4	0.77	0.71	0.67	0.76	1	0.73	0.69	0.72	0.73
C5	0.73	0.79	0.77	0.69	0.73	1	0.81	0.69	0.66

C6	0.78	0.71	0.73	0.68	0.69	0.81	1	0.76	0.73
C7	0.78	0.69	0.75	0.76	0.72	0.69	0.76	1	0.75
C8	0.81	0.77	0.75	0.68	0.73	0.66	0.73	0.75	1

Lessons Learned

In this section, the survey's methodology is defined, the population of the study is presented and finally the analysis of the results is demonstrated for the different dimensions considered in the study, in order to illustrate the economic impact that active sports events have for the tourism economy.

Survey Definition

Methodology

In this study the evaluation process focused on two dimensions: 1) athletes' profile and 2) economic impact. In specific, the goal was to identify if the participants of active sports events are also engaging in tourism during their stay, as well as the economic impact of such events. The evaluation was performed with the help of a custom instrument that was defined in a digital form (i.e., Google Forms questionnaire[10]) and was answered by the participants during the registration phase of the event. The following subsection presents the results of the survey.

Population

The research study presented in this paper was performed at the OceanMan international swimming event and involved 51 athletes out of a total of 512 (i.e., 10% of the participants answered the survey). The participants of the event were from 29 countries across the globe, while the gender ratio was 52.9% males and 47.1% females. It is important to note

[10] Survey - https://forms.gle/ef8vkyuSj91nPM7D7

that a large number of participants did not complete the evaluation questionnaire. Therefore, from the total of participants (i.e., 512), $N = 51$ are valid for analysis.

Survey Results

Participant Views

Figure 8 shows the most representative results of the survey, which refer to the views of the participants and other attendees of the event. In specific, it is clear that half of the international visitors are actually visiting Cyprus for the first time. Moreover, nearly 70% have booked accommodation for 2-4 nights or more than 4 nights, which is particularly important since this was a two-day event. These results are confirmed by the third pie chart, since 71.7% stated that they combined the event with holidays. This shows why nearly the same percentage has booked accommodation for more than 2 nights.

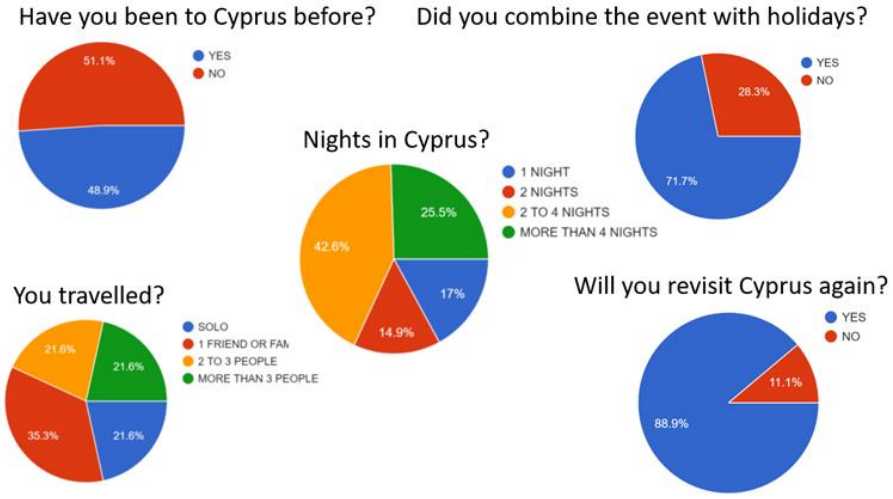

Figure 8: The main views of the event participants obtained from the survey.

Another important point is that only 21.6% of the participants travelled solo, whereas nearly 80% of the participants travelled with at least another visitor. Finally, the fifth pie chart clearly indicates that 9 out of 10 participants are planning to revisit Cyprus again. This showcases that new visitors were satisfied and will revisit for sport and tourism.

Economic Impact

This section assesses the economic impact of the event on the local economy, and by extension, on the country economy. OceanMan attracted 512 participants of which 433 participants were non-residents, arriving in Cyprus from 29 countries. The presence of "event-visitors" represents a source of incremental inflow to the economy as "new" spending is induced in the local community, and beyond. This is because without the visitors, the expenditure in the local economy would not have occurred.

Economic benefits are both direct as well as indirect and induced. Direct benefits arise from an increase in demand for goods and services which in turn increases the output and earnings of the end producers/providers. Moving down the supply chain, indirect effects arise from a corresponding increase in the output of the suppliers of the end producers. Finally, induced effects happen as the generated income is re-spent on the final goods and services.

To explicitly measure the direct benefits, we collect data regarding the expenditures of the visitors by means of the structured questionnaire mentioned above. To capture the indirect and induced benefits we classify the reported spending in Nomenclature of Economic Activities (NACE) categories and apply input-output (IO) analysis using country-specific multipliers (MOF NACE, 2008). IO analysis assesses the interdependence of different production sectors and quantifies, by means of a multiplier, how direct spending in a specific sector diffuses throughout the economy. In our survey, we identify three NACE sectors in which visitors commit their expenditures. We thereon obtain the corresponding multipliers from Giannakis and Mamuneas, 2018 (hence forth "GM18"). A final consideration in our analysis is how much of the economic benefits are retained in the local community. It is generally assumed that only a percentage, captured by the Regional Purchase Coefficient (RPC), remains in the local economy. A basic rule of thumb is to set the RPC equal to 65% as in Stynes (1997).

Table 2 below summarizes the information regarding the estimated direct spending of visitors and multiplier effects.

Table 2. Estimated Expenditure by International Visitors

PANEL A: Total Economic Benefits					
NACE Rev.2 (CY)	**Description**	**Per Person - Average**	**Direct Expenditure**	**CY I/O Multiplier (GM18)**	**Multiplied Effects on Total Benefit**
I	Accommodation & Food Services	€ 215.98	€ 202,621.79	1.66	€ 336,352.18
H	Transportation	€ 118.34	€ 111,025.64	1.79	€ 198,735.90
G	Trade (Wholesale and Retail)	€ 55.33	€ 51,904.49	1.35	€ 73,704.37
	TOTAL	**€ 389.64**	**€ 365,551.92**		**€ 608,792.45**
PANEL B: Regional Economic Benefits					
NACE Rev.2 (CY)	**Description**	**Direct Expenditure**	**Local Purchasing (65%)**	**CY I/O Multiplier (GM18)**	**Multiplied Effects on Local Benefit**
I	Accommodation & Food Services	€ 202,621.79	€ 131,704.00	1.66	€ 218,628.92
H	Transportation	€ 111,025.64	€ 72,167.00	1.79	€ 129,178.33
G	Trade (Wholesale and Retail)	€ 51,904.49	€ 33,738.00	1.35	€ 47,907.84
	TOTAL	**€ 365,551.92**	**€ 237,608.75**		**€ 395,715.09**

Panel A showcases the total economic benefits applied to the entire economy. Visitors' expenditures are directed in three sectors: Accommodation & Food Services, Transportation, and Trade. Transportation is driven mainly by excursions while Trade is limited to retail; i.e. shopping. To estimate the average accommodation cost we rely on rudimentary statistical analysis of questionnaire data. Because most of the questionnaire answers are given in intervals (i.e. the respondents state whether they have stayed in Limassol between 2 and 4 nights or whether they have spent a sum between €200-300, etc) we calculate per-person averages using the mean of grouped data formulated as:

$$Mean\ (Grouped\ Data) = \frac{\sum(Interval\ Midpoint\ x\ Frequency)}{\sum(Frequency)}$$

In the case of accommodation cost we calculate the average per-person number of nights spent in Limassol and obtain an average cost per night from 2 online travel agencies,

namely booking.com and budgetyourtrip.com. Based on these sources we set an average cost per night equal to €75. Finally, to estimate the economic impact of the entire event we apply the sample ($N = 39$) means of each spending category to the population of visitors ($N = 433$).

In total, foreign participants appeared to have spent approximately *€ 365,552*. The total amount is divided to: 1) 55.43% spending on Accommodation & Food Services, 2) 30.37% spending on Transportation and 3) 14.20% spending on Trade. By applying the IO multipliers, we extract a total economic benefit of *€ 608,792* distributed 55.25% on Accommodation & Food Services, 32.64% on Transportation and 12.11% on Trade.

Panel B gives the economic benefits retained to the local economy. By applying a RPC of 65% we find that visitors have exerted a total of *€ 237,608* in direct expenditures corresponding to *€ 395,715* after multipliers' effects. The distribution of the spending on the three sectors of the local economy is identical to that of the country economy.

International Visitors Expenditure Patterns

We sensitize our results (Breierova & Choudhari, 1996) with respect to two important assumptions in relation to our base case scenario. The first one is the average cost of accommodation per night, initially set to €75. Even though the figure is obtained from credible online travelling agencies, there are three reasons why the assumption deserves more attention: first, the estimate represents a snapshot of the demand for accommodation on a specific time of the year. In fact, demand for Limassol's' hotels is highly seasonal, picking during the summer period and dwindling over the winter. Second, the quoted price refers to individual bookings and does not take into consideration group travelling usually associated with discounts for full board or half board accommodations. Third, the estimate ignores alternative, decisively cheaper, means of accommodation which are not listed on the said websites, such as friend hospitality and/or youth/student hostels. The

second assumption refers to the percentage of expenditures retained in the local economy. While a Regional Purchasing Coefficient (RPC) of 65% is a popular rule of thumb, the small sizes of Cyprus and its population, the short distances between cities and other attractions, and the relatively good transportation network suggests that a strict distinction between regional and country-wide effects are harder to disentangle.

For each of the two sensitivity assumptions we replicate the calculation of regional economic benefits, after multiplier effects, by allowing both the average cost per night and the RPC to vary in corresponding ranges. Table 3 presents the results.

Table 3. Sensitivity Analysis

		Average Accommodation Cost Per Night/Person				
		€ 35	**€ 55**	**€ 75**	**€ 95**	**€ 115**
Regional Purchase Coefficient	***0.45***	€ 230,830	€ 252,393	€ 273,957	€ 295,520	€ 317,083
	0.55	€ 282,125	€ 308,481	€ 334,836	€ 361,191	€ 387,546
	0.65	€ 333,421	€ 364,568	**€ 395,715**	€ 426,862	€ 458,009
	0.75	€ 384,716	€ 420,655	€ 456,594	€ 492,533	€ 528,472
	0.85	€ 436,012	€ 476,743	€ 517,474	€ 558,204	€ 598,935

In Table 3 the minimum value of economic benefits represents an average accommodation cost per night equal to € 35 and a RPC equal to 45%. In contrast, the maximum value of economic benefits corresponds to an average accommodation cost per night equal to € 115 and a RPC equal to 85%. The shaded blocks reiterate the base case scenario with an average accommodation cost per night equal to € 75 and a RPC equal to 65%. *Sensitivity analysis reveals a range of total economic benefits between € 230,830 and € 598,935 with a base scenario of € 395,715.*

To contextualize the economic impact of international sports event on the Cyprus economy it is useful to consider the entire size of the Cyprus economy. With an

approximate annual GDP of €20 billion the organization of just 5 annual events every year for a period of 5 years is sufficient to increase the Cyprus GDP by a cumulative 0.05%. It is also important to note that such events promote Cyprus as a tourism destination with more than 71.7% of the visitors stating that they combined the event with holidays and 90% of the visitors expressing willingness to visit Cyprus again.

Finally, the following is explicitly stated in the Cyprus Tourism Market Report (KPMG, 2017): "In addition the Cyprus Sports Organisation and the Cyprus Tourism Organisation are aiming to promote and develop sports tourism that is estimated to generate revenue that exceeds €40 million, according to the two organisations." This showcases that both organisations consider sports tourism to be an increasing trend with a major economic impact, while this work demonstrates that a large footprint can be attributed specifically to active sport events.

Conclusions

Major sport events, commonly termed as passive sport events, are an established and proven source of sports tourism that contributes largely to the economy. Still, the economic impact of active sport events is scarcely recognized in the literature. Most research works on active sports events focus on the analysis and evaluation of the social impact of such events, while some works exist on the economic impact.

In this work, through a case study, it is shown that the visibility of an active sport event can be extended through the use of technology. Specifically, the web platform and recommender system developed in this work have provided the capability to promote and receive worldwide participation in the OceanMan event that took place in the small island of Cyprus. In fact, 512 athletes participated in the event, of which 433 participants were non-residents from 29 countries across the globe. Moreover, nearly 1500 people in total (i.e., athletes, family, friends) visited Cyprus due to the event.

The above statistics demonstrated that the use of SportTraveler76 platform for featuring the Oceanman event had a positive direct impact of promoting Cyprus as a touristic destination and contributed indirectly to enhance the Cyprus economy. In particular, the economic impact from the international visitors' expenditure for the swimming event *is calculated at a total effect of € 608,792.45*, while *multiplied effects on local benefit are estimated at € 395,715.09*.

Limitations of the above work are: (i) a single active sport event has been studied, and thus additional research work is required to further examine the economic impact that such events have to a country's economy and (ii) additional research work is required to examine different active sport events, supported and not supported by technology, in order to quantitatively and qualitatively assess how such platforms and booking systems can enhance participation and promote active sport events.

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