Alvaro Rocha · Hojjat Adeli ·
Gintautas Dzemyda · Fernando Moreira ·
Valentina Colla
Editors

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Lisbon, Cávado, Portugal

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Columbus, OH, USA

Gintautas Dzemyda
Institute of Data Science and Digital Technologies
Vilnius University
Vilnius, Lithuania

Fernando Moreira
DCT
Universidade Portucalense
Porto, Portugal

Valentina Colla
TeCIP Institute
Scuola Superiore Sant'Anna
Pisa, Italy

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Preface

This book contains a selection of papers accepted for presentation and discussion at the 2023 World Conference on Information Systems and Technologies (WorldCIST'23). This conference had the scientific support of the Sant'Anna School of Advanced Studies, Pisa, University of Calabria, Information and Technology Management Association (ITMA), IEEE Systems, Man, and Cybernetics Society (IEEE SMC), Iberian Association for Information Systems and Technologies (AISTI), and Global Institute for IT Management (GIIM). It took place in Pisa city, Italy, 4–6 April 2023.

The World Conference on Information Systems and Technologies (WorldCIST) is a global forum for researchers and practitioners to present and discuss recent results and innovations, current trends, professional experiences and challenges of modern Information Systems and Technologies research, technological development, and applications. One of its main aims is to strengthen the drive toward a holistic symbiosis between academy, society, and industry. WorldCIST'23 was built on the successes of: WorldCIST'13 held at Olhão, Algarve, Portugal; WorldCIST'14 held at Funchal, Madeira, Portugal; WorldCIST'15 held at São Miguel, Azores, Portugal; WorldCIST'16 held at Recife, Pernambuco, Brazil; WorldCIST'17 held at Porto Santo, Madeira, Portugal; WorldCIST'18 held at Naples, Italy; WorldCIST'19 held at La Toja, Spain; WorldCIST'20 held at Budva, Montenegro; WorldCIST'21 held at Terceira Island, Portugal; and WorldCIST'22, which took place online at Budva, Montenegro.

The Program Committee of WorldCIST'23 was composed of a multidisciplinary group of 339 experts and those who are intimately concerned with Information Systems and Technologies. They have had the responsibility for evaluating, in a 'blind review' process, and the papers received for each of the main themes proposed for the Conference were: A) Information and Knowledge Management; B) Organizational Models and Information Systems; C) Software and Systems Modeling; D) Software Systems, Architectures, Applications, and Tools; E) Multimedia Systems and Applications; F) Computer Networks, Mobility, and Pervasive Systems; G) Intelligent and Decision Support Systems; H) Big Data Analytics and Applications; I) Human-Computer Interaction; J) Ethics, Computers & Security; K) Health Informatics; L) Information Technologies in Education; M) Information Technologies in Radiocommunications; and N) Technologies for Biomedical Applications.

The conference also included workshop sessions taking place in parallel with the conference ones. Workshop sessions covered themes such as: Novel Computational Paradigms, Methods, and Approaches in Bioinformatics; Artificial Intelligence for Technology Transfer; Blockchain and Distributed Ledger Technology (DLT) in Business; Enabling Software Engineering Practices Via Latest Development's Trends; Information Systems and Technologies for the Steel Sector; Information Systems and Technologies for Digital Cultural Heritage and Tourism; Recent Advances in Deep Learning Methods and Evolutionary Computing for Health Care; Data Mining and Machine Learning in Smart Cities; Digital Marketing and Communication, Technologies, and Applications;

Digital Transformation and Artificial Intelligence; and Open Learning and Inclusive Education Through Information and Communication Technology.

WorldCIST'23 and its workshops received about 400 contributions from 53 countries around the world. The papers accepted for oral presentation and discussion at the conference are published by Springer (this book) in four volumes and will be submitted for indexing by WoS, Scopus, EI-Compendex, DBLP, and/or Google Scholar, among others. Extended versions of selected best papers will be published in special or regular issues of leading and relevant journals, mainly JCR/SCI/SSCI and Scopus/EI-Compendex indexed journals.

We acknowledge all of those that contributed to the staging of WorldCIST'23 (authors, committees, workshop organizers, and sponsors). We deeply appreciate their involvement and support that was crucial for the success of WorldCIST'23.

April 2023

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Contents

Digital technologies in marketing: the case of University Tunas

Vitor Gonçalves[1][0000-0002-0645-6776] and Bruno F. Gonçalves[2][0000-0002-7541-3673]

[1] CIEB, Instituto Politécnico de Bragança, Portugal
[2] CIEB, Instituto Politécnico de Bragança, Portugal
vg@ipb.pt

Abstract. Digital technologies are currently present in all economic sectors of society and higher education as one of the basic sectors of contemporary society is no exception. Whether in the teaching-learning process, in other administrative and technical-pedagogical services, or in the student groups that make up the academic communities, technologies seem to play an important role in the development and operationalization of the various types of activities and processes that make up the different sectors of higher education institutions. It is in this context that the present research arises, which, in general, aims to identify the technologies adopted for the advertising and dissemination of the Tuna's brand and image, but also to understand how the team responsible for this area uses these technologies in this area of digital marketing. To carry out the study, the case study methodology is adopted, whose focus will be on the "RaussTuna - Tuna Mista de Bragança", Polytechnic Institute of Bragança (Portugal). The results suggest that this particular Tuna uses a set of digital technologies that help to operationalize its activity in the area of digital marketing. The results also show that each of the technologies has its own complexities, so the members who use them recognize having difficulties in using some of these tools. In this sense, it seems important to invest not only in the training of members in the area to acquire more digital skills, but also to invest in updating the various tools, platforms and software of the Tuna.

Keywords: Academia, Digital Technologies, Higher Education, Marketing, Tunas Universities.

1 Introduction

The use of digital technologies in higher education is already part of the day-to-day academic life of institutions in its various dimensions: implementation of the teaching-learning process, posting of grades, signing of documents, research and development, dematerialization and document management, management of libraries and scientific repositories, administrative, financial and academic services, can-didactic applications to the various study cycles, registration, exam registrations, document requests, payment of tuition and other fees, booking of meals in canteens, promotion and dissemination of the brand and image of the institutions, among many others. Obviously, it

wasn't only higher education institutions and their services that needed to adopt technologies to be digitally modernized, but also the teachers, employees, and students themselves had to adapt to the digital operation of higher education. As technologies are like a snowball, so too have the bodies based in these institutions (research centers, business incubation centers, academic and student associations, student centers and university Tunas) felt the need to accompany this change and invest in their digital modernization to adapt to reality, becoming more current and better prepared to meet future challenges.

The present research focuses precisely on the study of how one of these associations, in this case, an associative group of students - the "RaussTuna - Tuna Mista de Bragança (TMB)" - uses the technologies for the promotion and dissemination of its image in the exercise of its activity.

2 Digital technologies & digital marketing

Technologies, as mentioned in the previous section, are already part of the daily life of higher education institutions. They are, in fact, an indispensable tool for carrying out the other activities promoted by these institutions, from teaching, research, services, to the other associative groups that integrate these institutions. Technologies are even a useful and absolutely necessary pillar for the functioning of the other processes, activities and operation of the other organisms.

The technologies in digital marketing, especially with regard to editing and production of multimedia content (text, images, videos, animations, among others), but also to its advertising and dissemination on networks and other platforms are vital tools in a contemporary society. They are vital because organizations, companies, institutions, and associations need to promote their products and services so that the target audience acquires them, and through this, organizations can make a profit, attract even more customers, and gain value for themselves.

Kotler et al. (2012) state that the definition of marketing is currently related to identifying and understanding the needs of human beings as social beings. Marketing can then be considered "a social process, in which individuals and groups get what they need and what they want, through the creation, offering and exchange of products and services of value with others" (Kotler et al., 2012, p. 5). It is a way of doing business, taking into account the customer's knowledge, to develop a product or service that benefits all the elements that interact in the exchange process (Gomes & Kury, 2013). It should be noted that the RaussTuna - Tuna Mista de Bragança (TMB) has no interest in doing business, only in promoting its music, activities, Tunas festivals in which it participates and events that it promotes annually of a social, cultural, musical and scientific nature. In general, the promotion of the Tuna has as main objective to make known the activities to the Tunas of the country, to the institutions of higher education, but also to the local inhabitants and the localities of the region of Bragança and North of Portu-gal. Obviously, the promotion of the Tuna has as main objective the attraction of new members for the association that can actively participate in the activities, play and sing in the other performances that are held throughout the country.

The human being, seen as a consumer agent is in constant evolution, building and deconstructing values, which makes the theories about consumer behavior a mandatory knowledge content of the marketing area (Glória, 2009). It is, obviously, fundamental to understand the consumer behavior of a given product or service so that it is possible to respond, in the most adequate way, to the needs, desires, and tastes of the current and potential public. According to Maçães (2017), is a complex process, as it is influenced by a multitude of factors, these being: psychological factors; personal factors; cultural factors; social factors. These factors are also taken into consideration in the production of the various contents that are published on the web.

The conception of a marketing plan supported by the company's strategy is also a vital instrument for the operation of the organization, as it ensures greater organization in the execution of other tasks, from the capture of content, to its production, to its publication on the web. As McDonald & Wilson (2013) emphasize, marketing planning is the planned application of resources to achieve marketing objectives. Planning "consists in making a set of explicit decisions in advance, as opposed to improvising, which consists in making decisions at short notice, usually without explaining them formally" (Lendrevie et al., 2015, p. 502). The case study of our research is concerned with making a marketing plan at the beginning of each year in order to organize its activities, but also to distribute them among the members of the digital technologies team. Still regarding the marketing plan, it is important to mention that over the years several models of plans have been proposed by different authors who study themes related to marketing (Cohen, 2005; Kotler & Armstrong, 2010; Kotler & Keller, 2006; Philip, 2002; Wood, 2007). It is, of course, up to each marketing team to elaborate its marketing plan taking into consideration its p's, thus defining its objectives, principles, target audience, among others that it eventually considers necessary.

3 Methodology

In this section we present the methodological framework and the study objectives, the data collection tools, as well as the data analysis.

3.1 Methodological framework and objectives of the study

For the development of the study, the methodology of single case study was adopted, namely, in RaussTuna - Tuna Mista de Bragança (TMB), Polytechnic Institute of Bragança (IPB), Portugal. Through this methodology, it will be possible to be inside the case, to know the dynamics of the association's activity and to know the members, namely, the dynamics of the digital technologies team of the Tuna. In addition to these advantages, with this methodology we intend to identify the technologies used, but also understand how the team members interact and use this set of technologies in the area of digital marketing, particularly, in the promotion and dissemination of Tuna in the academic community, local and Tunae.

With the development of this research, it is intended to achieve three objectives:

- Identify the functions of the digital technologies team;
- To identify the technologies used by the team;

- To understand for what purposes the technologies are used;
- To identify constraints on the use of these technologies.

These investigative objectives were achieved with the support of a qualitative approach, which is explained in the following section.

3.2 Data collection instruments

Two data collection tools were used for this research: participant observation and interview.

The participant observation allowed us to observe and understand how the digital technologies team, namely its members, use the panoply of technologies to carry out their activities. In this sense, it was possible to identify the technologies and understand for what purpose they are used in various areas.

The interview was also applied to the members of the Tuna technologies team who use the various technologies, but also to the person responsible for the administration of all technologies. The semi-structured interview type was adopted since it does not require a rigid script and allows a greater openness in the conversations held with the interviewees and, consequently, a greater extraction of data that, eventually, may be important for the investigative reflections of this research.

3.3 Data analysis

The analysis of the data from the two instruments was carried out in Microsoft Excel. Through participant observation, it was possible to identify the tools used by the team members and categorize and organize the various functions for which these tools were used. The semi-structured individual interview allowed not only to corroborate the conclusions drawn from the participant observation, but also to collect information about the skills of each team member, as well as to identify the constraints in the use of the various tools.

Thus, in general, we sought to perform a content analysis with the objective of identifying the various directions of response and, simultaneously, cross-referencing the data obtained from both data collection instruments, with the results presented in the following section.

4 Presentation of results

This section presents the results based on the objectives defined in the previous section: functions of the digital technologies team, identification and use of technologies, and constraints on the use of technologies.

4.1 Functions of the digital technologies team

The semi-structured interviews allowed us to understand the organization of the digital technologies team, but also to identify the responsibilities and roles assigned to the members of the team. These roles are identified below:

Team and technology manager:

- Leads and takes responsibility for the team;
- Manages, updates and maintains the official TMB website;
- Manages, updates and maintains the official website of the International Tunas Conference;
- Manages, updates and maintains the Information and Administrative Management System (SIGA);
- Manages the Massive Open Online Course (MOOC) - Tutorials Digital Space;
- Manages changes to the code and design of the Rauss Bar application;
- Manages all Tuna's digital platforms (Alexa, Tipeestream, Youtube, Spotify, DistroKid, Amen, Google apps, Udemy and Wordpress);
- Manages Tuna's social networks (Facebook and Instagram);
- Manages the social networks of the International Scientific Event of Tunas of the respective even-to (Facebook, Instagram and Youtube);
- Proposes investments in digital marketing for publicizing and disseminating the brand and image of the Tuna;
- Replaces the team members in their absence or impediment.

Content Producer:

- Video producer;
- Merchandising producer;
- Photo editor;
- Responsible for archiving and organizing digital content;
- Replaces team members in their absence or impediment;
- Performs any competence assigned by the Team Manager.

Social Media Manager:

- Posts on social media;
- Record videos;
- Coverage of events (photos and videos);
- Writes and corrects texts;
- Manages comments and messages;
- Replaces team members in their absence or impediment;
- Performs any competence assigned by the Team Manager.

Obviously, for each of these functions, there are various associated activities and tasks that are carried out by all the members of the digital technologies team. These tasks vary according to the type of activity that the Tunas promotes or participates in (concerts, festivals, release of singles or albums, tours, Tunas meetings, international meetings of Tunas, social causes, rehearsals, among other activities). Each of these activities has its own objectives and specificities that the digital technologies team studies carefully in order to produce the necessary content to transmit the message to the target audience.

4.2 Identification and use of technologies

Each of the tools identified above is used for very specific purposes that we will list below:

Content production tools

For each of the multimedia contents the Tuna recognizes that it uses several tools. Audio (Audacity); Image (Canva and Photoshop); Text (Microsoft Word and Google Docs); Video (Video Pad and Sony Vegas).

- Audacity: a tool for capturing and editing audio. For Tuna it is useful for recording voice over for promotional videos for social events and others, but also for recording lines of some musical instruments such as guitar, flutes, bass, accordion, among others. It should be noted that, after export, these sound clips are inserted into video tools to synchronize with other multimedia content, such as image and text;
- Canva: widely used for creating posters, invitations, banners and other content aimed at promoting a particular activity of the Tuna. This tool is widely used in the organization of the International Scientific Event of Tunas (scientific event held annually). It is also important to mention that the use of this tool has to do with the fact that it is very practical in the production of contents;
- Photoshop: it is a more complex tool, with a much higher level of detail, and is used by the team members to edit images that require a higher level of care and accuracy. It is a tool that members find difficult to use, both in terms of the wide range of options that the tool offers and the technical level. They also assume a lack of training in image editing and in the tool itself, and therefore recognize that they constantly resort to tutorials to acquire more skills in the area;
- Microsoft Word: is used to write texts for subsequent publication on websites and social networks. The use of Word has to do with the fact that writing, spelling and grammar corrections are more practical. Besides this aspect, it is possible to send the file to other colleagues in the team for verification and final revision of the text;
- Google Docs: this tool provides in general what Microsoft Word provides; however, it has the particularity of sharing directly with teammates, allowing simultaneous editing and collaboration. It also has the advantage that the work is stored in the Goo-gle's drive, which facilitates later access by team members;
- Video Pad: a tool used for editing and producing promotional and other types of videos. In addition to allowing the synchronization of various multimedia contents, it allows the addition of various types of effects, animations and transitions to all these contents. It is a very appealing tool for the user and technical skills are easily acquired in its use;
- Sony Vegas: like the previous one, Sony Vegas is a video editing program, however it is a bit more complex and requires greater digital dexterity in its use. It is a program that is used only by one member of the team in the production of videos that require greater care and a higher level of work and quality.

Content repository tools

In addition to the two websites that the Tuna has (Tuna's Website and Website of the International Scientific Event of Tunas) and the two social networks (Facebook and Instagram), the following content repository tools are used:

- Youtube: this tool is used since the Tuna was born and is very important for the dynamics of the dissemination of the brand and image of the Tuna around the world. The Tuna has a channel that has 76 videos, almost all of them of good quality. Some correspond to performances recorded in auditoriums and theaters by professional cameramen, others are promotional videos of events that the Tuna organizes, and others come from projects recorded in the studio such as singles, albums, among others. It is a central platform of the Tuna, which allows us to get closer to other Tunas, but also to the community of the Polytechnic Institute of Bragança;
- Spotify: platform that includes the albums and singles released and has an average of 133 listeners per month. It is very useful in disseminating the Tuna's music, particularly the original songs it produces. Since it is a tool widely used by younger age groups, the Tuna understands that it is a good bet for the dissemination of their music and their image.

Social networks - platforms for promotion and dissemination

Two social networks are used in the Tuna, namely Facebook and Insta-gram. Each of these networks serves two different purposes and, therefore, complement and articulate each other.

- Facebook (www.facebook.com/rausstunabraganca): is used because it aggregates an older public that goes back to the foundation of the Tuna and, therefore, it is very important to continue using it. This social network, among others, aggregates former students of the Polytechnic Institute of Bragança who joined the institution from the year 2007. Besides this aspect, it is through Facebook that the families of the members of Tuna follow the various activities from a distance, as well as former members or even entities, sponsors and some partners. We can say that it is a social network used to reach a very specific public and not so much the younger public and current students of the Polytechnic Institute of Bragança. The publications are not daily, but there is a regular update of what the Tuna is doing in their activities;
- Instagram (www.instagram.com/rausstuna.braganca): unlike Facebook, Instagram is adopted to reach students who have recently finished their studies or are currently attending the Polytechnic Institute of Bragança. It is a social network that allows us to complement Facebook and is oriented towards younger audiences and, therefore, we are concerned with keeping this social network updated on a daily basis, specifically through insta stories or even publications that are justified.

Website - promotion and dissemination platform

- WordPress (General Site of Tuna - www.rausstuna.pt): As a static space for information, the Tuna chose to build already in 2009 (foundation of the Tuna) a website in WordPress that allows to have updated information about the Tuna as, for example, social bodies, projects in development, bibliography, current

contacts, discography released, among many others. It is a site that has a lot of information available to the Internet user, so it is very useful for students of the Polytechnic Institute of Bragança (target audience) to search for credible information about Tuna;

- WordPress (Site International Scientific Event of Tunas - www.jornadastmb.ipb.pt): this site was created to promote and disseminate a scientific event, called International Scientific Event of Tunas. This event aims at the construction of knowledge through the presentation of communications from the Tunas and external personalities who are invited to contribute to the reflection and discussion of the themes of the event. It is intended to disseminate the best of what is done in the Tunas, aggregating the dimensions of associativism, traditions and values, music and higher education. Through this site you can find information about the event, but also download the abstract and poster templates, as well as consult dates and register for the event. It is important to mention that the page is in two languages: Portuguese and English. The target audience is clearly the Tunas, the academy in general of the Polytechnic Institute of Bragança, but also Tunas based in foreign higher education institutions.

Obviously, each of the tools has its own complexities and specificities, so it becomes a real challenge for the digital team members since most of the members have no training on these technologies. However, the members recognize that they are committed and willing to study the tools, to understand how they work to improve their skills and competencies in using them. Only in this way will it be possible to produce quality content, perceptible to the reader and that transmit to the target audience the correct, assertive and clear message that the student wishes to convey.

4.3 Constraints on the use of technologies

The use of technologies by the members of the Tuna has led to the emergence of a set of constraints that, in fact, were assumed throughout the development of this research and that we identify below:

- Difficulty in mastering different types of tools that have distinct purposes;
- Difficulty in keeping up, in a timely manner, with the latest technologies appropriate for publicizing and disseminating on the networks;
- Need to have training oriented to the acquisition of digital skills in the other tools;
- Need to have training oriented to the strategies to be adopted in digital marketing;
- Understand, in a timely manner, the aspirations, tastes and desires of the Tuna's target audience;
- Produce quality content (text, images, videos ...) that meet the expectations of the public;
- Update, in real time, the social networks and the website of Tuna;
- Lack of equipment (hardware) to capture quality images;
- Lack of software that allows quality editing of images and production of sound and video;

- More time to produce quality content;
- Get feedback from the public about the work done;
- Costs associated with the use of some platforms.

All the constraints or obstacles identified above can naturally be overcome with investment in the acquisition and updating of software, in the acquisition of equipment for image, video and sound capture, in the provision of training in other technologies, but also in digital marketing, specifically in the adoption of more appropriate strategies for the advertising and dissemination of the Tuna's brand. It should be noted that the members of this team are undergraduate students at the Polytechnic Institute of Bragança (Portugal), and only one element attends a course related to arts and design. This means that 80% of the team has no qualifications, skills or training in the area. The learning of these elements occurs through tutorials and the experience coming from the use of other technologies (social networks, websites, editing tools and production of multimedia content, applications, among many others). Effectively there are times when team members recognize that it is not easy to overcome the difficulties that arise, however, with the support of research, in the conversations and reflections that they have in group, in the suggestions for improvement that other members of the Tuna present and with the support of all, it becomes easier to overcome the various challenges that arise.

5 Conclusions

The research allowed us to identify the technologies used by the members of the Tuna, understand for what purposes they were used, and identify the constraints detected in the use of these technologies.

Functions of the digital technologies team

Through the instruments of data collection it was possible to see that the members of the digital technologies team are responsible for a wide range of functions that they perform on a daily basis and whenever there are activities that the students organize, but also participate in. Each of these functions includes specific activities and tasks ranging from team leadership, management of websites and social networks, to the production of other types of digital content that serve to transmit certain messages and information to the target audience of the Tuna.

Identification and use of technologies

Several tools have been identified as vital to the development of the team's work in the area of editing, production, promotion and dissemination of the Tuna's content on the networks. The team members recognized learning through the tutorials available on the Internet, but especially, through experience as they use the other technologies. They assume that the quality of their work increases as they interact with the various technologies, and they assume the search for similar technologies that allow them to improve their practice and acquire more digital dexterity. They also recognize the importance of inspiration and creativity in the production of digital content, as well as the creation of a dynamic, active and collaborative environment among all team members.

Also group reflections, small discussions and suggestions for improvement from outside the team are vital to improve the quality of the products.

Constraints on the use of technologies

As we approached the team members and analyzed the work produced, we could identify several constraints on the use of some technologies. Generally speaking these constraints have to do with the need for the Tuna to acquire new software that allows the production of contents with higher quality, but also the acquisition of equipment that allows the capture of sound, video and image. In addition, the members highlight the lack of training in the area of the tools they use, but also in the area of digital marketing, specifically in the most appropriate strategies to adopt in social networks, taking into account the constantly changing profile of the target audience, that is, the consumers. In this sense, it seems important to invest in the preparation of the Tuna members in general through training aimed at the acquisition and/or improvement of digital skills, as well as to invest in updating the various tools, platforms and software of the Tuna.

We cannot end without mentioning that although the results may not be clear, the truth is that the tuna's web presence has been favoring its promotion in the tunae context, as well as in the local and national or even international community.

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