

FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO

**New Business Models in the Digital
Economy Applied to the Smart Tourism
Sector – The Case of U.Porto's Digital
Museum App**

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Master's in Innovation and Technological Entrepreneurship

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Resumo

O sector do turismo é provavelmente um dos sectores mais importantes em Portugal, portanto, a inovação de modelo de negócio é de grande valor para a indústria. Considerando que as aplicações móveis são uma tendência em todo o mundo, nomeadamente no setor do turismo, há espaço para inovar e oportunidade para a entrada de novos players no mercado.

Com esta perspectiva, o Museu Digital da Universidade do Porto traz um novo horizonte ao cenário turístico da cidade e posiciona a Universidade como um parceiro de referência nesta matéria.

O presente trabalho pretende avaliar a oportunidade de valorizar uma aplicação desenvolvida no contexto académico avaliando cenários de implementação no mercado, oferecendo valor real aos clientes e ganhando espaço em um mercado tão dinâmico.

Esta aplicação também se constitui como uma importante ferramenta para a preservação do património cultural da Universidade e da cidade que é, literalmente, um museu a céu aberto.

O estudo explora conceitos chaves para a compreensão deste sector e apresenta um estudo de caso, onde analisa questões referentes à Propriedade Intelectual envolvendo a relação entre a Universidade do Porto e a empresa Weblevel, instituições parceiras no desenvolvimento da aplicação Museu Digital da Universidade do Porto. Além disso, apresenta um estudo de Benchmarking realizado nas plataformas Google Play e AngelList, que teve como objetivo a identificação de boas práticas e uma melhor compreensão do universo das aplicações móveis direcionadas ao sector do turismo.

Abstract

The tourism sector is probably one of the most important sectors in Portugal, so business model innovation is of great value to the industry. Considering that mobile applications are a trend worldwide, particularly in the tourism sector, there is room for innovation and opportunity for new players to enter the market.

From this perspective, the University of Porto Digital Museum brings a new horizon to the city's tourist scene and positions the University as a reference partner in this field.

This paper aims to evaluate the opportunity to value an application developed in the academic context by evaluating implementation scenarios in the market, offering real value to customers and gaining space in such a dynamic market.

This application is also an important tool for preserving the cultural heritage of the University and the city which is literally an open air museum.

The study explores key concepts for the understanding of this sector and presents a case study, which analyzes issues related to Intellectual Property involving the relationship between the University of Porto and the company Weblevel, partner institutions in the development of the University of Porto Digital Museum application. In addition, it presents a Benchmarking study conducted on Google Play and AngelList platforms, which aimed to identify good practices and a better understanding of the universe of mobile applications aimed at the tourism sector..

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Chapter 1

Introduction

The role IT plays in the tourism industry, developed over time from a wired network base connected on the Internet to a wireless network base through the use of mobile devices in the late 1990s (Byun et al. 2016). From 2007, with release of iPhone driving the adoption of the smartphone and the deployment of Long Term Evolution (LTE) and Wi-Fi mobile networks (Byun et al, 2016), mobile technology became an essential determinant of quality of life and the direction of an industry (Duxbury & Smart, 2011).

Therefore, it is a fact that many areas have been facing huge transformations and impacts, as those technologies become more accessible and usable. Since the 1970s, tourism has been fused with IT to achieve development, revolutionizing tourism products and services (Koo C. et al as cited in Byun et al. 2016). Almost 50 years later, a lot has happened in this industry and totally new business models were created after this digital revolution. Mobile applications and social networks are changing the way human beings interact with each other and enabled the emergence of a totally new entrepreneur behavior and opportunities.

Palumbo (2015) states that, despite the global economic crisis, the mobile Internet devices sector is among the few which experiences continuous and fast growth. This highlights how strong and fast the mobile application industry is evolving. The research company eMarketer forecasts that smartphone penetration will jump from 5% of the global population in 2009, to 25% in 2014. And by the end of 2017, more than one-third of all people around the globe will be smartphone users (eMarketer as cited in Palumbo, 2015).

Also, Palumbo (2015) says that, “a new model of ‘Smart Tourism’ should emerge as an innovative view of tourism supported by the new digital technologies, oriented towards improving and simplifying the tourist experience. The spreading of smart technologies has great potential for the tourism industry and mobile technologies play a key role (among digital technologies) on account of their simplicity, widespread availability, pleasure of use, and usefulness. With the pervasive adoption of smartphones and tablets, mobile services and applications have gained mainstream popularity”.

Also, Mobile technologies enables a new way of travelling as ‘digital tourists,’ for whom the travelling experience is empowered by the information and entertainment coming from (though not exclusively) their new ‘travel buddy’: the mobile technology device (Palumbo, 2015). Mobile apps have the potential to personalize the tourist experience, through more

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“technological” features, such as augmented reality and integrating tourist offerings into a much broader range of use-case scenarios, states Palumbo et al (as cited in Palumbo, 2015), but also, through more organic manners, being co-creation one that brings great value in the form of personalized, unique experiences for the customer (value-in-use) and ongoing revenue, learning and enhance market performance drivers Rampen states (as cited by Lee et al. 2017). and will be one of the subjects focused in this work.

Therefore, the present study has the objective of understand how mobile applications are interacting with the tourism industry and how new business models are emerging as new technologies reach the market. At the end of this research, the intention is to propose a reference business model for a mobile application within the tourism sector.

1.1 Motivation

When deciding to enroll as a student at University of Porto master program in Innovation and Technological Entrepreneurship, it was my personal desire to combine personal interests and to be involved in a project that could have a practical use after completed.

Therefore, the immersion opportunity this master has offered in terms of concepts related with innovation and entrepreneurship, combined with the necessity of a business model innovation study, regarding a product developed by the University, were strong contributors when deciding to engage in this task.

As a musician, I’ve been professionally involved with the cultural and arts sector for at least 10 years and it has always been my personal desire to contribute with this market. Also, being tourism one of the main economic activities in Portugal, in this case, exemplified by the city of Porto, it became evident the relevance of this study.

Also, this project has as its case study, the application Digital Museum, developed in partnership with University of Porto and the company Weblevel, which demonstrates the practical of the research previously mentioned.

1.2 Objective

To propose a reference Business Model for the development of a digital tourism platform, created through a partnership between University of Porto and the company Weblevel. The platform offers the possibility for different entities to create tours within Porto’s limits and enable users to consume other user’s tours. Currently, the University develops content and Weblevel is developing the platform, therefore, the present study aims to bring knowledge towards the implementation of a sustainable Business Model.

1.3 Research Design and Methodology

As stated by Hevner et al. (2004), the design process is a sequence of expert activities that produces an innovative product (i.e., the design artifact). Having the intention to achieve the best possible results, this research will adopt a Mixed-Method Design, combining the Systematic Review methodology with an analytic design evaluation method and a Case Study Design (Hevner, 2004)

The Systematic Review and analytic design evaluation methods will have as its source of work, the selected articles from which its respective data will be analyzed in order to build the argument and to gather a deeper knowledge of the concepts necessary to perform the present research. By doing this, new business models may also be found. Besides that, a map of applications within the tourism sector will be created through web, Google Play research.

The Case Study Method will use University of Porto's "Digital Museum" application as its material of study. A mobile application developed by University of Porto in partnership with the company Weblevel.

1.4 Research Question

The present study uses the case of the Digital Museum mobile application as its material of study and for which the research intends to contribute in terms of business model development.

- How to implement co-creation strategies in the BM for a tourism digital platform?
- Which are the key components of the reference business model to explore mobile applications in the tourism sector?

1.5 Methodology

In order to achieve the research's goal, some tasks will necessarily be performed:

- Literature review on the topics (business model; Business model for digital platforms; co creation & digital co-creation);
- Benchmarking (Business model & Co-creation strategies) Map the existent mobile applications already in the market and develop a data base that will serve as input for developing the application's Business Model;
- Development of a model of Business Model Design for co-creation digital platforms within the touristic sector (With this information gathered, indicate the key elements a mobile application within the tourist sector should have).
- Case Study – Apply Model.

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Chapter 2

Literature Review

The literature review performed in this research was done in a systematic way. By doing this, it can be easily replicated by other researchers. The following steps were followed to have the best results.

1. The article “Pucihar, A., Lenart, G., Borštnar, M. K., & Marolt, M. (2015). Business model design for a platform for the collaborative innovation of tourism services. Paper presented at the IDIMT 2015: Information Technology and Society - Interaction and Interdependence - 23rd Interdisciplinary Information Management Talks, 467-474. Retrieved from www.scopus.com” was chosen to help the proper keywords choice that were used later for Scopus query.
2. A list of keywords and keywords combinations was created.
3. Each combination was then used in Scopus search engine. They were all marked to inspect title, abstract and keywords and the period considering the last 10 years was delimited. With the queries results, the following steps were taken:
 - a. All the results were exported into csv files with all the citations, abstracts and keywords information;
 - b. A visual selection was performed through Scopus website to identify and select the articles related with the topic, taking in consideration: title, abstract and keywords. After this task, csv files were exported again for each query.
4. Inspection of all csv files and statistics generation regarding the number of publications in all of them.
5. All csv files with the selected publications were combined, generating a big unified list. Duplicated articles were removed and controlled by Scopus EID, a unique academic work identifier assigned in Scopus Database.

With the applied methodology, the results were:

Literature Review

I. Keywords and Combinations

Mobile application, Tourism, Business Model, Innovation, Mobile Application, Smart Tourism, App, Mobile Technology, Mobile, Co-Creation

II. Queries

Table 1 - Queries

Keyword Combination	Total	Selected
business model and innovation and tourism	67	17
business model and mobile application	142	12
business model and smart tourism	7	5
innovation and smart tourism	40	6
mobile and app and tourism	152	22
mobile application and tourism	282	16
mobile technology and innovation and tourism	10	6
mobile technology and smart tourism	7	5
mobile technology and tourism	121	20
smart tourism and app	14	2
smart tourism and mobile application	19	3
Co-creation and tourism and application	18	6
TOTAL	879	120
Repeated		21
FINAL LIST		99

III. Selection Period

Table 2 – Selection Period

Year	Selected
2009	2
2010	4
2011	2
2012	3
2013	3
2014	8
2015	18
2016	13
2017	14
2018	28
2019	4

2.1 Key Concepts

2.1.1 Smart Tourism

Different definitions can be found on the literature about smart tourism. According to Gretzel et al. (2015), smart tourism is tourism that collects and consolidates data on destinations, provides rich onsite experiences to users with the support of mobile technology, and creates value from a business perspective. From the perspective of information services Li et al (2017) states that, smart tourism is an information service and support system for tourists traveling alone.

Gretzel et al. (2015) and Li et al (2017) as cited in Dongwook and Ungbum (2017) are considered a comprehensive approach. They call for researchers and practical managers to firmly establish the conceptualization of smart tourism and to accumulate theoretical and practical cases. Gretzel et al. (2015) and Li et al. (2017) definitions are as follows:

“Ubiquitous tour information service which is combined, cooperated with, optimized and improved upon during the tour activities in the form of ubiquitous processes, space and time, media, direction, terminals, and organizations to the individual tourists”. (Li et al. 2017)

“Tourism supported by integrated efforts at a destination to collect and aggregate/harness data derived from physical infrastructure, social connections, government/organizational sources and human bodies/minds in combination with the use of advanced technologies to transform that data into on-site experiences and business value-propositions with a clear focus on efficiency, sustainability and experience enrichment”. (Gretzel et al. 2015)

2.1.2 Business Model

The term “business model” came into increased usage at the end of the 1990s (Osterwalder et al. 2005) and several definitions can be found in the literature. This concept gained popularity during the dotcom boom with a vibrant and diverse research activity more recently (Zott et al., 2011).

Bowman et al. (2008) presents a broad definition of business models. They are defined as:

[...] a blueprint for a service or product to be delivered, the service or product definition and the intended value for a target group of consumers, the sources of revenue, and an enterprise architecture for service or product delivery, including processes, resources (capabilities and assets) required and the financial arrangements between the involved business actors, including a description of their roles and the division of costs and revenues [...] (Bowman et al. 2008).

2.1.3 Business Model Innovation

According to the Oslo Manual (2018), an innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).

Regarding business model innovation, Geissdoerfer et al. (2018) says that it as a stream in the work on business models, and some authors of the latter assume it to be an implicit part of their conceptualization. Souto (2015), defines business model innovation as a new configuration of what is done in the company and how it is done, in order to provide a new value proposition to customers. Therefore, the capability for frequent and successful business model innovation can increase an organization’s resilience to changes in its environment and constitute a sustainable competitive advantage (Mitchell and Coles, 2004).

2.1.4 Digital Transformation

Digital transformation blurs the line between our lives and technology. The way technology has become part of our day – to - day lives has readjusted the role of Information Technology (IT). IT has gone from being a mere enabler of value generation that is somewhat agnostic towards the customer to becoming a universal value facilitator that involves the customer in a value (co-) creation process. It affects business architecture in all areas: strategy, business model, organization, processes, solution portfolio, technology, competencies (Blaschke et al. 2017).

2.1.5 Digital Economy

According to the Commission of Experts for Research and Innovation – EFI's Report on Research, Innovation and Technological Performance in Germany (2016), the Digital Economy is divided in two categories, the internet economy and the 'classic' information and communication technology industry. In this economy, business model innovation occurs through software and internet-based technologies, such as cloud computing or big data. Still according to the report, the core of the digital economy is divided in three areas:

1. Internet service access, which involves all mobile and stationary data services for internet access, internet exchange services and domain allocation.

2. Applications and services, which includes IT outsourcing, hosting, cloud computing, internet presentations creation, online marketing, software applications for web applications including e-learning, digital print prepress and web-to-print applications.

3. End-user interaction: this field comprises all end users, companies and consumers, i.e. all B2B (business-to-business) e-commerce, online banking, B2C (business-to-consumer) e-commerce with goods and online services (e.g. dating agencies, tickets, travel and tourism, etc.), as well as original web content (e.g. online publishing, media downloads, mobile apps, etc.).

The Federal Ministry for Economic Affairs and Energy, stated by BMWi (as cited in EFI, 2016) says that, the digital economy includes both the Information and Communication - ICT sector and service providers – and the internet economy. For the German Digital Economy Association - BVDW (as cited in EFI, 2016), in contrast to the BMWi definition, it does not include ICT-based infrastructure or consumer electronics in the digital economy.

2.1.6 Co-Creation

The literature presents different definitions about co-creation. According to (Galvano & Dalli, 2014), co-creation is the joint, collaborative, concurrent, peer-like process of producing new value, both materially and symbolically. Vargo & Lusch states (as cited by Galvano & Dalli 2014), brings a broader definition gathering all the specific theoretical and empirical occurrences that companies and customers interact in a value creation manner.

For this research, the perspective brought by Von Hippel and Chesbrough (as cited by Galvano & Dalli, 2014), which focus on collaborative and open access involving companies and users.

Milbrath S. (2016) defines it as the process where brands and consumer work together to create better innovation ideas, products and services.

2.2 Synthesis

Peric et al (2016) argues that, despite the growing level of quality research in the field of business models, there seems to be a remarkable gap in the topic of tourism. Which demonstrates how the tourism industry could benefit from researches regarding business model innovation. Also, according to the same article, in today's complex business environment, creating and delivering value to the customer, as the goal of business models, implies continuous research of elements and relationships within the business model. Therefore, there is a research gap related with the exploration of features within business model contexts regarding the tourism industry.

Besides the traditional tourism industry, technology advancements have brought new ways to interact and the possibility of new business models to emerge, especially through mobile technology. According to Kim (2016), because mobile technology has become an indispensable commodity in daily life, its relationships with tourism, along its role, are key topics to be addressed in this field.

Pucihar et al (2015), gives an example of an initiative towards business model innovation in the tourism sector in Slovenia that, through the CentraLab Project, using a living lab approach and co-design process with stakeholders and end users, focused on creating innovative regional development. The goal of this initiative was to promote a collaborative relationship between tourism service providers as well as to explore opportunities related with tourists' engagement in the co-creation process of new and innovative tourism services (Pucihar et al 2015)

The above-mentioned initiative had as its result, the development of a web-based platform, which enabled the collaboration between tourism service providers, sharing of their current offers, and information about trip experiences, as stated by Pucihar et al. (as cited in Pucihar et al 2015). After a successful pilot launch of the platform and the demonstrated interest of stakeholders to continue cooperating after the projects ended, a proper business model was designed which enabled the platform's sustainable operation.

In terms of infrastructure, Byun et al. (2016), studied how to facilitate market access to Internet of Things (IoT) for the purpose of providing IoT service related required to implement advanced smart tourism in the tourism industry, which is very influenced by the Internet but also by information and communication technology (ICT) in the era of fourth generation (4G) long term evolution (LTE) networks.

The study concluded that, as IT migrated from wired networks to wireless networks, it enabled the tourism industry to provide new products and related services on the strength of the advanced network environment. The article also mentions how the Korean government is planning to develop smart tourism as a core policy related to the growth of the creative industry.

However, the market is about to experience another big breakthrough, as 5G becomes closer to reality. Rockman (2019) says that, 5G will enhance mobile broadband, massive machine type

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communications and ultra-reliable low-latency communication. The expectation is that by 2020, telecom providers will reach 3Gbps (Rockman 2019).

This all comes together when Palumbo (2015) says that, the spread of digital technologies offers great potential for both the creative industries in general and for the tourism industry. His argument that, 'Smart Tourism' is about to have a new model that will emerge as an innovative view of tourism based on new digital technologies, oriented towards improving and simplifying the tourist experience totally fits this discussion. The simplicity, widespread availability, pleasure of use, and usefulness of mobile technologies put them at a key position within the tourism industry.

Therefore, it is a matter of time for the emergence of new and innovative business model to reach the market within the tourism industry. Souto J.E (2015) demonstrated the influence of business model innovation and business concept innovation on successful incremental and radical innovations. In this sense, new opportunities start to be opened regarding the application, generation, and exploitation of technology and knowledge, enabling access to profits unthinkable in old business models (Souto E.J, 2015).

However, innovation is more than technological and scientific progress, it is related with firm's business new ideas, rethinking firm's business idea, and discovering new and unexplored ways of how to run a business (Souto J. E., 2015)

Moreover, just by looking around it is possible to confirm the fact that mobile technology, especially those related with smartphone use are getting more accessible every day. Dickson et al (2014) says that, based on its advanced computing capabilities and ubiquity, the smartphone has rapidly been adopted as a tourism travel tool. Hence, with a growing number of users and a wide variety of applications emerging, the smartphone is fundamentally altering our current use and understanding of the transport network and tourism travel (Dickson et al. 2014).

Going deeper into digital business model innovation Blaschke et al (2017), performs a systematic approach to business model innovations, treating technical and business aspects in an integrated way, which obtained an integrated methodology for the systematic development of digital business models. According to the study, two instruments are crucial for a successful business model innovation: an expressive business model representation and a suitable methodology.

The conclusion of the above mentioned research was that, regarding digital economy, it is necessary more than just tools to systematically develop digital technology; the necessity passes through a methodology for systematically Digital Business Modeling based on a language that is common to business and technology experts to understand (Blaschke et al. 2017).

Lee et al 2017 aims to identify and analyse tourists' co-creation experiences on the implementation of interactive multimedia features on mobile travel application. The study was done through tourists interview after a touristic application prototype test. The interview questionnaires were designed based on System Usability Scale (SUS); validity of interactive

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multimedia features; and the attractiveness of the prototype interface design (Lee et al, 2017). During this process, the findings showed that 85% of those interviewed do prefer to download mobile travel applications to seek information.

The results also identified that characteristics such as ease-of-use, speed and overall satisfaction were crucial to consider the studied application as effective, efficient and satisfactory. The author attributes this to familiarity and simplicity display locality/authenticity aesthetic concept design. The application was considered user-friendly due to its layout which confined to ethnicity graphic related usage as main menu navigation while kept the application loading information with good speed. User experiences defined that multimedia features such as Augmented Reality, Virtual Reality and 3D model were recognized as useful and convenient to augment the visual understanding of a specific place and information (Leet et al 2017).

Galvano & Dalli (2014), states that co-creation has been developing as a new paradigm in the management literature, allowing companies and customers to create value through mutual interaction. From this perspective, suppliers and customers are working on the same side for the development of new business opportunities.

This research deals with the increase of the literature regarding co-creation, most of those new writing comes from the fields of service management, innovation management, marketing and consumer research, all of them brings their own contribution to the subject (Galvano & Dalli 2014).

Through co-citation analysis of 51 selected articles from a universe of 421 articles published on management and business journals, the paper identified:

1. two objects of analysis: products vs services;
2. two levels of analysis: company-centered vs customer experience-centered;
3. three main theoretical perspectives: service science, innovation and technology management, and marketing and consumer research;
4. six common themes: co-creating value through customer experience and competence, SDL, service innovation, the development of service science, online and digital customer involvement, as well as individual consumers and communities collaborating with companies; and
5. several recent developments, research trends, and gaps regarding the theoretical state-of-the-art of the co-creation theory and its possible developments.

Literature Review

Table 3 - Literature Review

Pucihar, A., Lenart, G., Borštnar, M.K., Marolt, M. (2015)
<p>Keywords: <i>Business model, tourism services, collaborative innovation.</i></p> <p>Concepts Covered: This study presents a case of the development of a business model for a platform for collaborative innovation of tourism services that has been developed in CentraLab project. The proposed business model is based on the CANVAS business model methodology.</p>
Perić, M., Vitezić, V., Mekinc, J. (2016)
<p>Keywords: <i>business models, environment, safety and security, sport tourism, tourist experience.</i></p> <p>Concepts Covered: The aim of this paper is to propose a conceptual business model for sport tourism that will consider some critical issues that challenge the industry.</p> <p>Future Research: must focus on overcome limitations regarding divergent literature; explore other features within business model context related with the tourism industry.</p>
Kim, D., Kim, S. (2016)
<p>Keywords: <i>Content analysis, Mobile technology, Smart tourismSustainability.</i> Concepts Covered: The purpose of this research is to identify the status and role of mobile technology in achieving sustainable and smart tourism, and to suggest future research and strategy directions for academia and managers in practice. This research utilized multiple sources, such as patents, academic articles, and news, and selected methodologies optimized for the purpose of each study.</p> <p>Future Research: Patent analysis based on CPC in study 1. To perform a manual analysis of the text is required to interpret specific keywords/clusters with multiple meanings. Observe that the number of reviews is not as vast as conventional text data and that the reviews of two apps do not meet the assumption of having homogeneity of variance. future studies must ensure that big data are collected and that a dictionary including words related to evaluation and emotion is used.</p>
Lu, C., & Liu, S. (2016)
<p><i>Business Model, Cultural, Innovation Strategy, O2O, Tourism.</i></p> <p>Concepts Covered: This paper focuses on exploration of O2O business model innovation by analyzing the main types, evolution and driving factors of Chinese Internet business model,</p>

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<p>taking Ctrip as the example. From the social prospective, O2O business model improves value and feeling of the customer experience as well as the operational efficiency of the enterprise value chain and utilization efficiency of social resources. This paper has also put forward what Ctrip can enlighten the development of tourism enterprises.</p>
<p>Byun, J.; Kim, B.W.; Ko, C.Y.; Byun, J.W (2016)</p>
<p>Keywords: <i>Smart tourism. 4G LTE network . Internet of things (IoT). Mobile virtual network operator (MVNO) . Wholesale pricing.</i></p> <p>Concepts Covered: The aim of this study is to facilitate market access by Internet of things (IoT) mobile virtual network operators (MVNOs) ('M2V' hereinafter) for the purpose of providing the IoT services required to implement more advanced smart tourism in the tourism sector, which is heavily influenced not only by the Internet but also by information and communications technology (ICT) in the era of fourth generation (4G) long term evolution (LTE) networks.</p> <p>Future Research: The study suggested various models that can realize inter-linkages between network and system through access to the 4G LTE network, but it is necessary to verify how these models can be actually implemented in the field for the tourism industry. It also seems necessary to conduct in-depth analyses through the use of IoT service-based M2V operators' actual data in order to verify the feasibility of a method of calculation of wholesale prices, as suggested in the study. It is expected that these limitations can be rectified through additional empirical research on business operators desiring to provide innovative tourism services based on IoT.</p>
<p>Palumbo F. (2015)</p>
<p>Keywords: <i>Analytic Hierarchy Process; Kano model; New service development; Smart Tourism; Tourist experience evaluation -</i> Concepts Covered: The overall goal of this research is to evaluate the impact of mobile technology in augmenting and streamlining the tourist experience.</p> <p>Future Research: Testing and assessing both tourists' acquaintance with and acceptance of mobile technology (with a particular focus on NFC technology and mobile wallets) and the interest (or lack thereof) of local authorities and travel, leisure, and hospitality companies in developing a range of new services based on NFC and mobile wallets.</p>
<p>Souto J.E. (2015)</p>
<p>Keywords: <i>Business concept innovation; Business model innovation; Hotel innovation; Innovation strategy; Non-technological innovation; Technological innovation; Tourism innovation –</i> Concepts Covered: This study, which is based on interviews with 115 senior</p>

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managers, seeks to show how tourism and hotel firms innovate, and how the achievement of successful innovations is possible. A model for business innovation is proposed, which takes full advantage of internal and external sources of innovation for the generation of sustainable competitive advantages. The findings show the effects of business model innovation and business concept innovation. The adoption of new models and concepts that support innovation are shown to be important. Specifically, the keys to successful incremental and radical innovations lies in adopting a new contextual and conceptual framework through which innovations can occur and customer needs can be met, thereby giving rise to new competitive advantages.

Dickinson, J.E., Ghali, K., Cherrett, T., Speed, C., Davies, N., Norgate, S. (2014)

Keywords: *smartphone; app; internet of things; transport; mobile media; sustainable travel* –
Concepts Covered: Based on a review of smartphone apps, this paper evaluates the current functionalities used in the domestic tourism travel domain and highlights where the next major developments lie. Then, at a more conceptual level, the paper analyses how the smartphone mediates tourism travel and the role it might play in more collaborative and dynamic travel decisions to facilitate sustainable travel.

Future Research: Necessity to understand how smartphones are altering the spatial and temporal presence of people, objects, vehicles and information in order to feed new tourism transport models. Since technology is rapidly evolving, the paper might be quickly out of date as the analysis is focused on a particular point in time. Travel behavior change is seen as core policy to address the climate change impacts of both utility and tourism related travel.

Blaschke, Michael & Cigaina, Marco & Riss, Uwe & Shoshan, Itzhak. (2017)

Concepts Covered: Digital technologies are increasingly shifting the boundaries between everybody's lives and information technology urging companies worldwide to address this vital topic. This requires a systematic approach to business model innovations, treating technical and business aspects in an integrated way. Currently one of the difficulties of such an approach is the lack of a common conceptualization to be used by both business and technology experts. The current chapter attempts to remedy this based on the interconnection of nine components of business model representation and five 'Digital Key Elements'. The elements of the resulting matrix are called 'Digital Value Drivers'; these describe the effect each digital key element has upon the various business model components. This matrix is transformed into a graphical representation and used in SAP Business Model Development and Implementation (BMDI) method to be then applied in Design Thinking workshops. BMDI is an iterative multi-step method aimed at designing innovative business models. Examples illustrate how the conceptualization is applied and how it enables to proceed from a digital business model design to an implementation in terms of 'Service Design'; this includes persona

Literature Review

development, customer journey map and service blueprint. Through this procedure we have obtained an integrated methodology for the systematic development of digital business models.

Future Research: In response to the challenges of the digital economy it is necessary more than just tools to systematically develop digital technology; what we need is a methodology for systematic Digital Business Modelling based on a language both business and technology experts equally understand. The structured approach presented is a step in this direction but it still needs more research and practice.

L. S., Lee, S. S., Shaharuddin, G. W., Ng and S. F., Wan-Busrah (2017)

Keywords: *Authenticity Design; Mobile Application; Multimedia Features; Tourism Experience; Usability.* **Concepts Covered:** The aim of this paper is to explore the use of interactive multimedia features on mobile travel services to improve touristic experiences. This study delivered a workable prototype with visiting Sarawak as a case study by integrating locality/authenticity design and interactive multimedia features content. User-testing was carried out to identify whether the mobile application usability can improve visitor experiences. A total of 40 visitors (18 male and 22 female) were recruited to participate in the user-testing study. The results indicated a positive SUS score 81 out of 100 and that multimedia interactivity on mobile travel application could enrich tourist's co-creation experiences compared to just static navigation and limited interaction. The outcome also significantly enhanced tourism experiences through authenticity design attractions such as iconicity and heritage elements value of a destination region. Overall, the findings provide perception of how tourists perceived usability of interactive mobile travel application and the impact of interface motif. Implications and suggestion are further discussed in this paper.

Future Research: The recommendations for future research is to enable tourism organisations to understand how and where technology-enhanced needs to be implemented before, during and after the tourists arrive at a destination. Additional add-on features of interactive such as AR museum and shopping opportunities would garner more virtual information and personal hobbies. Similarly, suggestion of integrating currency calculation and language translator features are among some other favourable information to be considered in the next travel application enhancement.

Marco Galvagno & Daniele Dalli

Keywords: *Value, Co-creation, Service science, Co-citation analysis, Customer participation, Service dominant logic* **Concepts Covered:** The purpose of this paper is to summarize and classify extant research and to better understand the past, present, and future state of the theory of value co-creation. Its main objectives are: to identify the different theoretical perspectives and research streams that characterize and define the co-creation

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literature, and to highlight the connections between them; to look for emerging trends and gaps in the literature by comparing the most recent papers with those representing the field's core.

Future Research: To use bibliometric coupling (Vogel and Gu'ttel, 2013) to uncover the common theoretical roots of the co-creation theory (e.g. Ramirez, 1999); replicate this study to detect changes in the structure and positioning of theoretical perspectives and research streams (Nerur et al., 2008); and to survey leading co-creation authors and journal editors to obtain their opinions on the bibliometric analysis results (Reader and Watkins, 2006, Rowlands, (1999).

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Chapter 3

Case Study: Digital Museum

As stated by (Starman, 2013), case studies have been largely used in the social sciences and have been found to be especially valuable in practice – oriented fields, even though it has not received too much attention among several other methodologies within the same social science research field.

Mills et al. (2010) says that are only a few texts dealing directly with case studies as a central subject and no encyclopedic reference provides throughout overview of the design and methods in case study research as a guidance for students, researchers and professionals who are trying to incorporate case studies into a rigorous research project or program.

As defined by Simon (as cited by Starman, 2013), a case study refers to an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in real life.

Therefore, the present study aims to use this qualitative research type, as stated by Starman (2013) to investigate the experience of University of Porto in developing a heritage preservation mobile application through a partnership with the private company Weblevel.

3.1 Case Study Design

The present case study followed the methodology recommended by Yin (1994), as demonstrated bellow:

1. Design the case study protocol:
 - a. determine the required skills
 - b. develop and review the protocol
2. Conduct the case study:
 - a. prepare for data collection
 - b. distribute questionnaire
 - c. conduct interviews
3. Analyze case study evidence:
 - a. analytic strategy

4. Develop conclusions, recommendations, and implications based on the evidence

3.1.1 Case Study Protocol

As recommended by Yin (1994), this is the first stage for developing a case study. It is composed by two subheadings: Determine the Required Skills and Review the Protocol.

3.1.1.1 Required Skills

The researcher developed the present study as a requirement for obtaining the title in Technological and Innovation Entrepreneurship master's degree at University of Porto. The necessary skills to develop the case study were obtained during the course program and the study was directed by both the thesis advisor and co advisor, who guided the steps towards the best possible results. Also, the researcher has a management background and a personal interest for the tourism and heritage preservation areas.

An extensive literature review was performed in order to obtain the necessary overview of the industry and to summarize concepts necessary to a better understanding of the chosen topic.

3.1.1.2 Develop and Review Protocol

The researcher intends with the present case study to understand how to implement co-creation strategies in the Business Model for a tourism digital platform and what key business model components may be considered essential for a product like the one being studied (U.Porto Digital Museum).

Being the studied application a co-creation tool for tourists, students and the University of Porto in terms of cultural heritage preservation, this case study aims to answer the question regarding the best way to implement those business strategies.

This was done by interviewing other students involved in the project, more specifically in the creation of thematic tours that will be featured in the application. Also, interviewing the company responsible for the technical development of the application was performed. All interviews were done through open – ended form (Tellis, 1997).

In order to understand key business model components, a benchmarking study was performed by studying BMs from 60 similar applications, all chosen within Google Play Platform. All applications composed a data bank where the following information was collected and compared in order to help to develop the proper Business Model for U.Porto's Digital Museum Application. The data was categorized as follows:

- Application Name;

Case Study: Digital Museum

- Value Proposition;
- Customer Segment;
- Profit Model;
- Technology (Different technologies that might be used or features such as VR and AR);
- Business Model Patterns (Categorization according to St. Gallen's 55 business Model Patterns (Gassmann et al. 2014).

Regarding the interviews performed, the researcher seeks to answer the following questions:

- What values are perceived as being passed to customers?
- Are there any specific features of the application believed to deliver the greatest value?
- What management issues this business could bring?
- Considering the co-creation component within the use of this application, should users be rewarded for their contribution?
- How should users be rewarded for their contribution?
- How this application helps the preservation of Porto's cultural heritage?
- How this application should be promoted among students within University of Porto?
- Would people be willing to pay to use the application or for a specific feature?
- What improvements still needs to be done in the application?
- What are the University and Weblevel's expectations regarding the business exploration?

3.1.2 Conduct the Case Study, Preparation for Data Collection, Distribute Questionnaire and Conduct Interviews

Since the stages of this section are interrelated, they are presented together (Tellis, 1997). Therefore, in order to execute the designed plan, the data collection was performed according to Yin's (1994) guidelines and considering the six primary sources of evidence identified by him.

It is important to mention that, no single source has a complete advantage over the others; rather, they might be complementary and could be used in tandem. The six primary sources of evidence are as follows:

- documentation,
- archival records,
- interviews,
- direct observation,
- participant observation, and
- physical artifacts.

Each item has its own strengths and weaknesses, as demonstrated in table 3 and for the purpose of this study, it will be used the documentation, interviews (Open-ended) and direct observation.

Table 4 - Types of Evidence

Source of Evidence	Strengths	Weaknesses
Documentation	<ul style="list-style-type: none"> stable - repeated review unobtrusive - exist prior to case study exact – names, etc broad coverage – extended time span 	<ul style="list-style-type: none"> retrievability - difficult biased selectivity reporting bias - reflects author bias access - may be blocked
Archival Records	<ul style="list-style-type: none"> Same as above precise and quantitative 	<ul style="list-style-type: none"> Same as above privacy might inhibit access
Interviews	<ul style="list-style-type: none"> targeted - focuses on case study topic insightful - provides perceived causal inferences 	<ul style="list-style-type: none"> bias due to poor questions response bias incomplete recollection reflexivity - interviewee expresses what interviewer wants to hear
Direct Observation	<ul style="list-style-type: none"> reality - covers events in real time contextual - covers event context 	<ul style="list-style-type: none"> time-consuming selectivity - might miss facts reflexivity - observer's presence might cause change cost - observers need time
Participant Observation	<ul style="list-style-type: none"> Same as above insightful into interpersonal behavior 	<ul style="list-style-type: none"> Same as above bias due to investigator's actions
Physical Artifacts	<ul style="list-style-type: none"> insightful into cultural features insightful into technical operations 	<ul style="list-style-type: none"> selectivity availability

Source: Yin (1994)

3.1.3 Analyze Case Study Evidence, Analytic Strategy

Since the sample size for this study is relatively small – it was restricted to a few master students and the team working on the development of the application - the data analysis won't pass through any other software besides Microsoft Excel.

University of Porto's Intellectual Property Regulation was studied in order to understand and demonstrate how the partnership may be done as well as other documentation related to the Digital Museum Project, such as:

- **Master Thesis**
 - F. Vasconcelos. (2017). Universidade do Porto: contributos para um roteiro digital. Estágio Curricular no CIC.Digital Porto – Volume 1. Faculdade de Letras da Universidade do Porto.
 - Gonçalves, V. (2018). Imagens e Memórias em Reconstrução: Do Palácio de Cristal Portuense ao Pavilhão Rosa Mota Volume I. Faculdade de Letras da Universidade do Porto
- **Conference Papers**
 - PINTO, Maria Manuela, MEDINA, Susana, MATOS, Rodolfo, & FONTES, Paulo. (2016). U.OPENLab methodology: A Conceptual Model and Flowchart for the Dynamic Co-Production and (Re)use of Digital Contents. Paper presented at the ICERI2016 Conference 14th-16th, Seville, Spain
- **Blogs**
 - [24] C. Neves. (2018). A Weblevel e a Universidade do Porto. Available in:<
<https://blog.weblevel.pt/tag/museu-digital-da-universidade-do-porto/>>

As mentioned above, Microsoft Excel was the chosen software to organize information gathered on benchmark research, performed through Google Play and Angel List platforms. This data was used to evaluate business model components' frequency and to suggest components that could fit the Digital Museum App.

3.1.4 Develop Conclusions, Recommendations and Implications Based on the Evidence

The results of this case study are presented in the following sections of this Master thesis and includes a detailed description of procedures and the results obtained after data analysis. These results won't be limited to statistical analysis but will also be presented with explanations regarding each finding. Also, this thesis will present a suggestion of Business Model to be implemented as well as an analysis of Intellectual Property issues on the partnership agreement firmmed between the University and the company Weblevel.

Case Study: Digital Museum

Chapter 4

U.Porto Digital Museum Application

As stated by Vasconcelos (2017), the U.Porto's Digital Museum Project has as its main goal, the sustained and continuous valuation and dissemination of scientific knowledge from the University as well as from its exterior, through technology information and communication, reason why, while promoting academic interactions, it provides a digital site where museum collections and other U.Porto's collections are in constant enrichment, through information and meta-information creation and aggregation as well as new digital contents, products or services. It is a wide-range project, created to assure the promotion and proper management of the museum assets existent in the several University of Porto organic unities.

It's architecture involves a platform (concept, process and infrastructure) to support the continuous and innovative digital content production, associated with student's digital portfolio database, a repository of information and a digital portal (PINTO et al., 2016).

This project also counts with a native mobile application, developed in partnership with the company Weblevel. According to Neves (2018) and the article available in the company's blog, all inhabitants living in Porto may access a vast historical-cultural collection existent in the several organic unities within the University of Porto, totally digitalized. Besides that, tourists will have the opportunity to contact in a more direct way, the history, the culture and the city characters, through thematic tours provided within the App. As examples of the content already implemented in the App, there are:

- From "Palácio de Cristal" to "Univer-Cidade" – A crucial bonding between the old Palácio de Cristal (now called Rosa Mota Pavillion) and the University of Porto, is travelled throughout this tour. Places like the gardens of Palácio de Cristal, the Rosa Mota Pavillion, or Almeida Garret Library, are explored, with the objective of demonstrate the intense relation between the two institutions: sometimes through their buildings, city characters, sometimes through their events.

- Agostinho da Silva: The Utopia Constructor – An odd figure for the luso-brazilian culture. He was a humanist, thinker, philosopher and created bridges between the two nations: Portugal and Brazil, leaving a vast work to be discovered. Places like the Oswaldo Cruz Biology

Institute or the Fluminense Faculty of Philosophy of Rio de Janeiro are examples of what to be visited.

- José Rodrigues Foundation – Currently under development in partnership with José Rodrigues daughter, this tour relates with the sculptor's life.

- “Mar de Sophia” – Focusing on three of the most important places to Sophia de Mello Breyner: Praia da Granja, Algarve and Greece, which influenced in her work and life, this tour intends to escape from traditional literary tours and introduce Sophia from the perspective of her literary works.

There is also the possibility to create suggestions, and through this, actively contribute to the achievement of new knowledge, building narratives, representations and digital experiences around the scientific and cultural heritage, people and the University's knowledge construction.

This project also counts with the existence of partners institutions, universities aiming to implement a similar model to this one, currently available at University of Porto. Those universities are starting to collaborate with the project as well as other public and private institutions.

Chapter 5

Intellectual Property

Idris (2003), describes Intellectual Property (IP) as the term that describes the ideas, inventions, technologies, artworks, music and literature, that are intangible when first created, but become valuable in tangible form as products. Also, Intellectual property (IP) is a set of legally recognized rights when ideas or inventions are protected, Mohd Noo (as cited in Sukarmijan and Sapong, 2014).

Sukarmijan (2014) states that, Intellectual Property rights are the main motivation for inventors, it encourages commercialization, technology transfer, and promotes international trade.

However, even though playing an important role in inducing technological change and facilitating economic growth, IP right's protection is often not adequately appreciated and its potential for providing opportunities for future profit is widely underestimated by SMEs (Sukarmijan, 2014). Nevertheless, regarding large corporations, according to Idris (2003), IP generates more than 100 billion dollars a year in revenues from patent licensing alone, which demonstrates that a good patent portfolio can dramatically increase the enterprise valuation.

Therefore, if left unprotected, inventions and creations may be lost to larger corporations privileged with a better position to commercialize the product or service at a more affordable price, leaving the original inventor or creator to without the possibility to have any financial benefit or reward (Sukarmijan, 2014).

5.1 Types of Intellectual Property

In 1967, a convention established the World Intellectual Property Organization (WIPO) and stipulated that IP would include rights related to the following:

- Literary, artistic and scientific works
- Performances of performing artists, phonograms, and broadcasts
- Inventions in all fields of human endeavor
- Scientific discoveries
- Industrial designs
- Marks and commercial names and designations

Intellectual Property

- Protection against unfair competition
- All other rights resulting from intellectual activity in the industrial, scientific, literary, and artistic fields

Idris (2003) also demonstrates that, the most common forms of intellectual property are defined as:

- Patent (Invention) - A patent is an exclusive right granted for an invention (a product or a process that provides a new way of doing something or offers a new technical solution to a problem).
- Trademark - A trademark or " mark" is a distinctive name, logo or sign's identifying the source of goods or services.
- Copyright and Related Rights - A bundle of rights given to creators in their literary and artistic works. These creators, and their heirs, hold the exclusive rights to use or license others to use the work on agreed terms.

However, WIPO updated this list and currently, it is published on their website two other IP forms:

- Industrial Designs - An industrial design constitutes the ornamental or aesthetic aspect of an article. A design may consist of three-dimensional features, such as the shape or surface of an article, or of two-dimensional features, such as patterns, lines or color.
- Geographical Indications - Geographical indications and appellations of origin are signs used on goods that have a specific geographical origin and possess qualities, a reputation or characteristics that are essentially attributable to that place of origin.

5.2 U.Porto's Intellectual Property Regulation

Being the result of a partnership between U.Porto and the company Weblevel, some attention must be taken in consideration regarding Intellectual Property rights involving the Digital Museum Application. In this sense, in order to guarantee the best interests of the University, the IP right's protection follows the Intellectual Property Regulation, which was approved by the university's senate in November 16th, 2005 and considers the protection and valuation of R&D and other activities results in its interior, constitute an incentive to productivity and innovation, especially to all that perform activities within the university with strong connections to the business environment (Porto, 2005).

The document is divided in 3 Titles, each title divided into Parts containing a set of articles, in a total of 24 Articles, as demonstrated below:

Intellectual Property

Table 5 - Intellectual Property Regulation

Titles		
I - Of Industrial Property Rights	II - Copyrights and related rights	III - Final and transitory provisions
Part I - Subject and Scope of Application. Articles: 1 - Subjective and Scope of Application	Part I - Subject and Scope of Application Article: 14 - Subject and Scope of Application	
Part II - Copyrights and related rights. Articles: 2 - General Rule 3 - Use of University's Resources 4 - Career researchers 5 - Third Party Contracts 6 - Inventor's Moral Right	Part II - Ownership Articles: 15 General Rule 16 - Special Cases 17 - significant use of university media 18 - Contracts 19 - Bennefits	
Part III - Legal Protection. Article: 7 - Legal Protection		Articles: 21 - Interpretation and missing cases 22 - Implementation 23 - Revocatory Standards 24 - Review
Part IV - Rights Exploitation. Articles: 8 - Competency 9 - Bennefit Sharing 10 - Plurality of Beneficiaries	Part III - Organization	
Part V - Organization Article: 11 - University of Porto Competencies	Article: 20 - University of Porto Competencies	
Part VI - Procedures Articles: 12 - Duty of information and confidentiality 13 - Decision Process		

Also, inventors and researchers must follow some steps to guarantee the work is following the university's requirements. In the case of U.Porto's Digital Museum a set of documents are

available in the University's portal (<https://upin.up.pt/pt-pt/content/documentos-downloads>) and will be cited in this work.

- **U.Porto Invention Disclosure Form** - This form is to be completed and submitted to U.Porto Innovation by any member of U.Porto who believes to have developed a new invention.
- **Intellectual Property Regulation** – Document detailing the rules regarding IP protection and appreciation.
- **Model 1** – If participated in an invention related with the University of Porto and is a student of the university or belong to an external entity, besides the Invention Disclosure Form, this document must also be filled.

For the purpose of the present study, only the points related with the case of the partnership established between the university and the company Weblevel will be cited.

5.3 Industrial Property Rights

According to Porto (2005), Industrial Property Rights aims to legally protect creation on the industry, commerce and services domain, as well as brands and other distinctive signals of commerce. Therefore, this research considers that, regarding more technical development of this application, in which concerns the programming code and web platform, it is categorized under Industrial Property Rights articles.

5.3.1 Third Party Contracts

Going deeper on the regulation, the situation expressed on this study fits on the 5th article, which deals with third part entities contracts and attests that contracts and protocols celebrated between the university and other entities, of any nature, independent of how it is financed, must necessarily predict the regulation over Industrial Intellectual Property rights.

In this situation, the University of Porto may not be the right owner, therefore, in this case, other part may be chosen by the parts when celebrating the contract regarding the results obtained. This may be done by negotiation or by common agreement between the parts.

Also, the participation of any element, namely teachers, researchers, other hired personal, fellows and students, in contract execution, must be preceded of the celebration of a written agreement with the university, in which it is acknowledged that the Industrial Intellectual Property titularity over the results belongs to the University or the entity designated by the university.

Also, the contract may determine that participant elements sign a document in which they assume the confidentiality duty regarding the information and knowledge accessed during the contract execution (Porto, 2005).

5.3.2 Legal Protection

On the second paragraph, in the case of the University, regarding its power of management of its own Industrial Property Rights, it decides to give up the maintenance and consequent legal protection of a Industrial Property Right it must, previously to this desistance, to communicate this fact to the inventors, offering the opportunity to take over the full ownership of the subject matter (Porto, 2005).

The communication must be done with a minimum of 90 days in advance of any expiration date to maintain any rights already in force. In the case of inventors have the intention to own the right, an ownership transfer contract must be celebrated transferring the rights to the inventors (Porto, 2005).

5.3.3 Sharing Benefits

According to Porto (2005), the Net Financial benefits obtained through the economic exploration of the results will be object of allocation in the following proportions:

10% to University of Porto;

30% to the Organic Unity or other entity from the UP universe in which the activity that conducted to the result was performed;

60% to the inventor;

Those referred benefits regards the amount obtained after costs regarding legal protection of the results and other costs are deducted, eventually, incurred in the commercialization process of the protected results.

5.3.4 Plurality of Beneficiaries

The partnership between U.Porto and weblevel, also fits the 10th Article, which deals with multiple beneficiaries and states that, in all situations where there are multiple creators, the owned benefits, according with the benefits sharing rule, must be object of an equally division, excepting the cases where previous agreement exists stipulating the contrary and since the University is informed in advance of the existence of this agreement. The same logic applies to University's organic unities involved in the project (Porto, 2005).

5.3.5 University of Porto Competencies

According to Porto (2005), the University's competencies are as follow:

- To implement the University's Intellectual Property Agreement and other procedures necessary to its correct application;
- To decide and effect legal protection of investigation results, namely patent requests;
- To manage and explore Industrial Property Rights exclusive owned by itself or not;
- To celebrate contracts related to the exploration of Industrial Property Rights owned by itself.

5.4 Author and Related Rights

The University considers as creations susceptible to protection by author and related rights, intellectual creations in the literary, scientific and artistic domain, of any genre or expression, namely literary work, artwork, audiovisual, multimedia works and computer programs, therefore, and as mentioned previously, this is where the present study will focus its attention.

Also, the university recognizes and celebrates as a basic principle that, the ownership of rights related with conceived works and performed by teachers, investigators, other employees and students from any cycle, as the result of developed activities due to services performed at the university, belongs to the respective creator or author, save through written agreement explicating the opposite (Porto, 2005).

Therefore, considering the content published in the application, it fits under Author and Related Rights articles, as follows.

5.4.1 Especial Cases

According to Porto (2005), the university may assume author or related rights, through previous agreement, with the author or creator according to the following situations:

- The work results from the execution of contract between the University or other entity, in which it is expressly stipulated the author's right belongs to the university.
- The conclusion or achievement of the work implies a significantly use of the university's means or appropriations.

In any case, the work creator will keep the moral rights, provided by law, always being designated in this quality.

5.4.2 Significant Use of University's Means

As mentioned in the previous section, the Intellectual Property Agreement (Porto, 2005) deals with the situation when the University's means and appropriations are significantly used to develop and achieve project's objective, therefore, there is a matter to be solved regarding this specific issue, since the content creators for this app are students and all of them are performing their work within the university and under the university employees orientation.

5.4.3 Contracts

Contracts celebrated between the University and other entities, in which the main objective or accessory, direct or indirectly contemplates the creation of work, must mandatorily predict the regulation over ownership and exploration of the respective author rights or related rights (Porto, 2005).

This means that, all the work performed through the partnership between the university and Weblevel, must necessarily follow these guidelines.

5.4.4 Sharing of Benefits

According to Porto (2005), the Net Financial benefits obtained through the economic exploration of the results will be object of allocation in the following proportions:

- 10% to University of Porto;
- 30% to the Organic Unity or other entity from the UP universe in which the activity that conducted to the result was performed;
- 60% to the inventor;

In the case of existence of several creators, it will be attributed equal shares, excluding the cases where written agreement celebrated between these parts establish a different sharing form and if informed to the university.

Intellectual Property

Chapter 6

Benchmark Research

To fulfill its objective and gather relevant information regarding similar applications available in the market, specifically those related with cultural heritage preservation, this research performed a benchmarking on Google Play and AngelList.com.

According to Elmuti & Kathawala (1997), benchmark is the process of identifying the highest standards of excellence for products, services, or processes, and by making the necessary adjustments, to reach those standards, commonly called “best practices”.

Therefore, besides the previous knowledge gathered in terms of literature review, the benchmarking, that is much more than just a mean of gathering data on how well companies perform against others, it can be used by a variety of industries, from services to manufacture, and is also a method to identify new ideas and new ways of improving processes (Elmuti and Kathawala, 1997).

The benchmarking study was performed through analysis on Google Play Platform and AngelList.

6.1 Google Play Sample

On Google Play, a universe of 578 applications were identified, using the references *Travel and Locals* (82), *Digital Museum* (246) and *Heritage App* (250). Due to restriction limits in terms of time, the total of applications selected was 52.

With this selection, the goal was to obtain information regarding business model details and features used by applications similar to U.Porto Digital Museum and identify possible patterns, as well as gather insights regarding good practices to be replicated and avoid bad experiences.

The criteria to choose the applications took in consideration the similarities with U.Porto's Digital Museum, therefore, the applications should have as its main focus, the preservation of more than one museum patrimony, or to explore the surroundings of a museum or city, as well as having tours available. Applications strictly focused on showing a specific museum collection, without any tours were not selected.

6.2 AngelList Sample

AngelList database is huge, and from a universe of 5,285 companies listed on the platform and due to time restrictions, this research selected 26 to perform the benchmarking.

The objective on AngelList was to identify good ideas that could be adapted and bring more value to U.Porto's Digital Museum, therefore, the criteria to select the companies was based on ideas that could fit the Digital Museum Application.

6.3 Google Play Framework of Analysis

Research on the company's website is probably the best way to gather information regarding its business model, however, more strategic information may be left out of the general public's eyes. Yet, it is still a good way to extract elements, such as, customers segments, value proposition and revenue streams. Worth's to mention that, in some cases, the only information available was the one presented on Google Play Platform and, for the purpose of this research, only the ones showing enough information were considered.

6.4 AngelList Framework of Analysis

Some companies, even when present on the platform, while trying to access their websites, they were unavailable or offline, which for the purpose of this research were not considered and left out of the benchmarking.

The research focused on identifying companies value proposition, and once mapped, their core businesses were categorized as follows:

- SaaS
- Web Based Platform
- Mobile Application
- API
- Voice Menu

Benchmark Research

- VR Glasses
- Content Management System (CMS)
- Crowdfunding Platform

Finally, with this information mapped and having a better understanding of each company, 16 suggestions were created, then, each suggestion was linked to its proper building block, according to the Business Model Canvas (Osterwalder & Pigneur, 2010).

6.5 Angellist Benchmarking Results

As mentioned previously, the focus of the research on Angellist platform, was to gather insights of ideas U.Porto's Digital Museum could benefit from. Therefore, the results were as follows:

Table 6 - Angellist Benchmark

Company	Product/Service	Insights
Smartvel	Smartvel is a B2B SaaS tech company specialized in destination content solutions for the Travel Industry: Airlines, DMOs, Hotels, Travel Agencies, Car rentals, Maps, F&B, and other segments. We have developed a unique destination content technology based on Big Data and Machine Learning techniques, that is capable of gathering, classifying, translating and geolocating effectively everything there is to experience at any destination in the world.	U.Porto's Digital Museum could use this software to engage customers and improve experience.

Benchmark Research

Company	Product/Service	Insights
Wandering	Our vision is to create a world full of meaningful content, forming into experiences for users according to the place, time and context they're in. To enable that we need a lot of rich, tagged, location-based content, and a well defined user-base. So we created a Location Based Learning platform, with various applications in different contexts, enabling experiential, meaningful & authentic learning.	Use the Digital Museu App as an interface to engage users and community to interact with the city's heritage through games, teaching activities, tours and business promotions. (QR Codes, Augmented Reality, teachers create games)
LM Sport Tourism	LM Sport Tourism develops the Runnin'City app. Runnin'City allows users to discover over 100 cities around the world while running or walking. Runnin'City guides the users through the main points of interest of a city thanks to turn by turn vocal GPS instructions and reads a 30 seconds description of the points of interest when you run past.	To create different modalities of tours and categories. (joggers, bikers, food, bars, beaches)
Localixo	SmartEcoMap™ is a cognitive virtual assistant created specifically for tourist destinations. It gathers information from different tourism platforms and suggests them to users	To integrate Digital Museum with other platforms to increase offers
Uncovered	Hammamet Uncovered delivers best addresses right on your mobile.	To have App's "ambassadors", who would recommend exclusive and "locals only" contents, place or find interesting places that would be interested in compose the business offers within the App. They would be selected according to interactions within

Benchmark Research

Company	Product/Service	Insights
		the app and would get a percentage out the the percentage the App would get for transactions.
Culturebase	Culturebase is a gamified, AI-powered mobile hub that connects locals and travelers to the unique and authentic local culture. Culturebase drives demand for less-recognized local goods and experiences in a city, while enabling more creators to make more money doing what they love by growing their audience of locals who weren't previously in the know and introducing them to an audience of travelers they may have never had.	Involve arts and cultural promoters in general (SUBCULTURE). (painters, grafitti, music, performance, fashion, food etc) in the digital museum application. Have them offering less obvious content.
Petrous Media - Tappy Guide	Tappy Guide features: -Provide outdoor navigation for directions and discovery when exploring new surroundings. We help visually impaired people locate buildings, building entrances, cross paths and intersections, bus stops, etc.-Indoor navigation at government buildings, and participating businesses such as grocery stores, sporting/concert venues, museums, hotels, office buildings, hospitals, state parks, etc. -Help locate handicapped parking spaces, structures and handicapped	To implement handycap adapatations into the app

Benchmark Research

Company	Product/Service	Insights
	<p>accessible buildings that are wheelchair accessible. -Assist individuals who are hearing / speech impaired communicate with others.</p>	
<p align="center">Merge VR</p>	<p>Compatible with Android and iOS devices, Merge VR Goggles provide an immersive virtual reality experience powered by your smartphone.</p>	<p>To create a VR version of U.Porto's museums and AR features within the app.</p>
<p align="center">Cloudguide</p>	<p>CloudGuide is the only smartphone application bringing 100% official content from a single, beautifully designed interface. Our platform welcomes museums, monuments, parks and art galleries. A trusted, worldwide represented channel to get easier access to official content, interact, engage visitors, gather statistics, and much more.</p>	<p>To provide Venue's official content within the application (audio-guide)</p>

Benchmark Research

Company	Product/Service	Insights
Nexto	Nexto is reimagining the on-location visitor experience of travel and heritage destinations by transforming guided tours into gamified adventures with elements of augmented reality (AR). Using our online publishing platform (CMS), destination managers and Nexto partners can easily build interactive audio tours, treasure hunts, escape rooms and other engaging on-location experiences that are delivered to the visitor through a single mobile app (Android & iOS).	Create AR Games enabling interactions with the city's heritage
TravelStarter	TravelStarter is a global crowdfunding platform for innovative travel and business projects. It is an incubator for all the projects that are connected with local tourism and communities: accommodation facilities, restaurants, bakeries, coffee shops, bars, tourist shops, web sites, mobile apps, transportation.	A crowdfunding section where users can help local businesses related to tourism in exchange for touristic related rewards.
Helper	Helper is an application that allows any user to seek professional advice and any professional to earn money helping others.	A section for locals to offer touristic services
HiJames	Connect travelers with local experts for an authentic trip and assistance	Enable locals to be "concierges" and help tourists during their stays for a specific value

Benchmark Research

Company	Product/Service	Insights
Smart City App	Smart City App, enabling and agregating public services and information. Enhacement for tourism, local commerce, transportation, etc. The App can be used also to gather information from and to the citizens, crowd-populating information about traffic, crime, weather, shopping, etc. Make your own social network within township or local goverment context.	Daily city information provided in the app through users interaction (weather, crime, traffic).
ArrivalGuides	ArrivalGuides is the world’s largest network of destination information. We are the destination content supplier for more than 300 high profile actors in the travelling industry, such as China Eastern, Ryanair, Airberlin, Germanwings, ZUJI, Etihad Airways, Webjet, Qatar Airways, Brussels Airlines, Bravofly, etc. This means that ArrivalGuides control the destination information that is publishedd on all these partners (online, downloadable pdf-guides, pre-travel emails, Android / iPhone apps, SmartTV apps etc.).	To have a web platform related to the application with content about the city.

Finally, with this map, it is expected that the university and Weblevel may have inputs to improve user experience and offer a better solution when delivering this application to the market.

6.6 Google Play Benchmarking Results

When performing the Benchmarking research, the focus was to gather information regarding application's value proposition, customer segments, technology and business model. Considering the fact that, U.Porto's Digital Museum is an application designed to work for the preservation of the city's cultural heritage and that most of the similar application would be government financed, it was expected that, during the analysis, some of them would be available for free. So, considering this aspect, most of the applications did not have any revenue.

6.6.1 Value Proposition

In order to perceive each application's value proposition, the texts presented on their websites were considered approximations of it. Also, for applications with no website available, the ones with enough information showed on Google Play were considered and the opposite, discarded.

After this, core elements of each value proposition were extracted and classified under two categories related with the customer segment it is aimed to.

Benchmark Research

Table 7 - Core Value Delivered by Customer Segment

Customers	Frequency	Business	Frequency
Audio guides – Main delivered value focused on audio guides.	1 (1.92%)	Customer Acquisition – Main value delivered to business related with customer acquisition.	2 (3.85%)
Convenience – Main delivered value as convenience, such as, easiness to buy tickets, travel planner and general touristic information.	4 (4.69%)	Digital Technology Service – Value delivered as new technology research.	1 (1.92%)
Discounts – Discount applications	2 (3.85%)	Low Cost Advertise – Value delivered related with saving money in advertising.	3 (5.77%)
Culture – The main delivered value was information and to serve as backup for museums and collections.	35 (67.31%)	Low Cost Applications – White Label Applications offered for a lower price.	2 (3.85%)
Digital Walking Tours – Application focused on automated walking tour	1 (1.92%)	Low Cost Platform – White Label Platform offered for a lower price	1 (1.92%)
Experiences Search Engine – Airbnb like services offered mobile.	1 (1.92%)	Technology Solutions – Value related with facilitating businesses operation through multiple technology related solutions.	1 (1.92%)
Interactivity – Applications focusing on features like AR and VR	5 (9.62%)	-	
Map Search Engine – Main delivered value related with location, maps search.	3 (5.77%)		
Prizes – Main delivered value related with prizes offered to users	1 (1.92%)		

6.6.2 Customer Segments

For the purpose of this research, the customer segments were classified under two main categories. They were either “Final Users” or “Businesses”. The frequency for “Final Users”, considered applications segmented specifically for those customers, however, none of the applications was designed strictly to Businesses, in fact, all applications under the “Business” category are also classified under “Final Users”.

Table 8 - Customer Segments Categorization and Frequency

Final Users	Frequency	Businesses	Frequency
Museum Visitors – Inhabitants using services in their hometown or city.	39 (67.31%)	Lodging Businesses	13 (25%)
Tourists – Outsiders using services or visiting venues outside their hometown or city.		Touristic Attractions – Any attraction not being a museum itself	
Person with disabilities		Advertisers	
		Experience Suppliers	
		Cultural Spaces	

6.6.3 Technology

The applications were evaluated in terms of features or different technological components used.

Table 9 - Technology Features and Frequency

Features	Frequency
Mobile Application – Application with no technological feature, just plain text or images.	36 (69.23%)
Mobile Application + Web Platform – Besides the mobile application, there is a web-based platform users could interact with.	2 (3.85%)
Mobile Application + API	2 (3.85%)
Mobile Application + QR Code	3 (5.77%)
Mobile Application + Booking Engine + Dashboard	1

Features	Frequency
	(1.92%)
Mobile Application + AR	2 (3.85%)
Mobile Application + AR + QR Code	1 (1.92%)
Mobile Application + Digital Membership Card	1 (1.92%)
Mobile Application + iBeacons	1 (1.92%)
Mobile Application + Modular Platform	1 (1.92%)
Mobile Application + Web Platform + API	1 (1.92%)
Mobile Application + VR + AR	1 (1.92%)

6.6.4 Business Model

All applications were categorized in terms of Business Model according to St. Gallen's Business Model Navigator (Gassmann et al. 2014). For each application, a Business Model Pattern was attributed.

The great majority of applications (39), were offered for free or didn't have any information that could be characterized as Business Model, for those applications, the term "None" was attributed regarding Business Model Information. Finally, there was one application government funded and the term "Government Funded" was used to specify its Business Model.

The Business Models identified in this research were:

Benchmark Research

Table 10 - Business Model Patterns and Frequency

Business Model Patterns	Frequency
Bidding	1 (1.92%)
Customer Loyalty	1 (1.92%)
Subscription	2 (3.85%)
White Label	2 (3.85%)
Peer to Peer	3 (5.77%)
Pay What You Want	1 (1.92%)
Leverage Custom Data	1 (1.92%)
Customer Loyalty	1 (1.92%)
Flat Rate	1 (1.92%)
None	39 (75%)

Chapter 7

Interviews

A series of interviews with stakeholders involved in the Digital Museum Application was also performed. However, due to restrictions in terms of time, it was not possible to interview everyone involved in this process, but the information obtained with the fraction interviewed was extremely valuable for the result of this research.

The interviews were performed through open questions sent by email, present meetings and Skype calls. The content discussed during the *in loco* meetings and skype served as inputs to compose the Business Model Canvas presented in the coming chapters, as well as the results of the questionnaires demonstrated bellow.

For the tables below, the open questions sent by e-mail served as inputs. Besides the students' answers, the tables will contemplate the answers given by the respondent from Fundação José Rodrigues, who is collaborating with the Digital Museum project and elaborating the José Rodrigues tour, which will be featured in the application.

Table 11 - Interviews

Students	Professors	Weblevel	Other Institutions
4	2	2	1

7.1 Students Interviews

The students were invited to answer a 10 questions questionnaire, and for each question, a main topic was approached, as follows:

1. Application's Delivered Value;
2. Functionality with the Greater Value;
3. Management Issues Identified;
4. Rewards Offered through Co-creation;
5. How to Reward Users;
6. Porto's Cultural Heritage Presevation;
7. App Promotion;

Interviews

8. Revenue Model;
9. Application's Improvements;
10. U.Porto and Weblevel Partnership.

7.1.1 Application's Delivered Value

With the answers given, a map of keywords was created in order to identify and simplify the elements that could later be used to compose business related matters.

In this section, the following keywords were mapped:

- **What values are perceived as being passed to customers?**

Table 12 - Delivered Value Keywords

Student 1	Culture
	Information
	Knowledge
	Education
Student 2	Promotion Network
	Tours
	Local Company Publicity
	Events Promotion
	Knowledge
	City's History
	City's Patrimony
	City's Characters
Student 3	Cultural Information
Student 4	Cultural Content
	Academic Standard
Student 5	Memory Preservation
	Porto Culture's Richness
	Immediate Information
	Immediate Content
	Simplified Information
	Simplified Content
	Promotion
	Preservation

Interviews

	Digital Content
--	-----------------

7.1.2 Greater Value Functionality

The following question was presented, and the results were as follows.

- **Are there any specific features of the application believed to deliver the greatest value?**

Table 13 - Greater Value Functionality

Student 1	No answer
Student 2	No answer
Student 3	To know in detail the person/event/object related to a touristic spot
Student 4	Content associated with physical spaces
Student 5	Fast information crossing and immediate access

7.1.3 Management Issues Identified

In this section, students had to answer the question bellow.

- **What management issues this business could bring?**

Interviews

Table 14 - Management Issues

Student 1	Don't see the application as a business, therefore, didn't have an opinion
Student 2	<ul style="list-style-type: none"> - At the information management level. - Different backgrounds of students developing content may cause writing, organization and point of view noises - Create standards for tours presentation
Student 3	<ul style="list-style-type: none"> - How to evaluate tours quality;
Student 4	<ul style="list-style-type: none"> - Different backgrounds of students developing content may cause writing, organization and point of view noises - To understand the right time to deliver a content into the platform
Student 5	<ul style="list-style-type: none"> - Small niche willing to pay for applications in this category - Don't believe in the viability of this business

7.1.4 Rewards Offered through Co-creation

In this section, it was asked if users should be rewarded by their participation.

- **Considering the co-creation component within the use of this application, should users be rewarded for their contribution?**

Table 15 - Rewards Offered Through Co-Creation

Student 1	None
Student 2	<ul style="list-style-type: none"> - While on academic level, to have the proper credits could be a type of reward for content creators - From a business perspective, yes, but the proper agreement between the involved parts still needs to be found
Student 3	Yes, through a gamification model
Student 4	<ul style="list-style-type: none"> - While on academic level, no. - From a business perspective, believes a closed team should be created to

Interviews

	exclusively deal with the application and be payed for that.
Student 5	- Yes

7.1.5 How to Reward Users

In this section, students were asked to suggest how users could be rewarded.

- **How should users be rewarded for their contribution?**

Table 16 - How should Users be Rewarded

Student 1	On academic level, considers a reward participating in this project
Student 2	<ul style="list-style-type: none"> - Students should be credited for their work - As a business, still needs to find a transparent and fair way to compensate every part involved.
Student 3	Through gamification elements: rankings, medals, badges, discounts at university's spaces
Student 4	<ul style="list-style-type: none"> - On academic level, no. - From a business perspective, believes a closed team should be created to exclusively deal with the application and be payed for that
Student 5	<ul style="list-style-type: none"> - On a student level, just to be part of the project and be credited for this is a reward; - On a business level, visualizations should be rewarded

Interviews

7.1.6 Porto's Cultural Heritage Preservation

The following question regarding the city's patrimony preservation was asked.

- **How this application helps the preservation of Porto's cultural heritage**

Table 17 - Cultural Heritage Preservation

Student 1	Promoting the city where the university has its roots, where it was born, where it developed itself, by promoting material and immaterial testimonies, projects a cultural capital projecting itself beyond borders through the web.
Student 2	<ul style="list-style-type: none"> - Through promoting city's places. - Tours may inspire the community to - know and preserve the city
Student 3	<ul style="list-style-type: none"> - Allowing people to meet unknown places, - By connecting people to the city's objects
Student 4	Believes the application helps only on promoting cultural heritage, not preserving it.
Student 5	Through Digital Memory

7.1.7 App's Promotion

Here, students needed to answer how they believe this application should be promoted for students.

- **How this application should be promoted among students within University of Porto?**

Table 18 - App's Promotion Among Students

Student 1	SIGARRA
Student 2	<ul style="list-style-type: none"> - At new students' welcome events - Flyers - Posters - Newsletter
Student 3	New students' welcome events
Student 4	- New students' welcome events

Interviews

	- Present it to courses directors and have them to spread the word
Student 5	- SIGARRA - Publicity in the Libraries - At University's bars - Ask students which university content they would like to be featured in the app.

7.1.8 Revenue Model

In this section, students were asked regarding the application's revenue model.

- **Would people be willing to pay to use the application or for a specific feature?**

Table 19 - Revenue Model

Student 1	At short term, no.
Student 2	Yes, if people identify advantages in using the app, like discounts or personalized offers
Student 3	No
Student 4	No
Student 5	Is skeptical about the idea of people paying to use the app

7.1.9 Application's Improvements

In this part, students should suggest improvements to be done in the application.

- **What improvements still needs to be done in the application?**

Table 20 - Application's Improvements

Student 1	- Tours currently available are not suited to be done by foot, therefore, to have shorter and walkable tours would be nice. - Define better the target market
Student 2	No opinion
Student 3	The design could be improved and updated according to google or apple standards
Student 4	- Develop ways to make the application more interactive and immersive.

Interviews

	- Enable other content formats (Video, AR, Sound)
Student 5	- Improve the way the content is delivered in the app

7.1.10 U.Porto and Weblevel Partnership

Students were also invited to comment their perceptions about the partnership between the university and Weblevel.

- **What are the University and Weblevel's expectations regarding the business exploration?**

Table 21 - U.Porto and Weblevel Partnership

Student 1	Doesn't have too much information regarding the partnership, however, believes that if students involved had access to those type of information, could deliver results more aligned with those expectations.
Student 2	<ul style="list-style-type: none"> - Considers it advantageous. The company has access to close to zero cost work force. - Allows students to have a professional experience.
Student 3	Believes that involving students in different process like design, programming, marketing and creating some type of incubator would be a good idea
Student 4	It could be better if there was more monitoring from both parts. At this moment, believes there is not enough interactions between the responsible for content creation and the technical team.
Student 5	Believes both institutions have a lot to win with the partnership.

Chapter 8

Business Model Representations

As stated by Blaschke (2017), business model representations must demonstrate key aspects of the company's business and the 'Business Network' it operates in. It must also, answer four questions:

- What value propositions are being offered?
- Who are the customers?
- How do operations have to work?
- • Why is the business model financially interesting?

In the present research, 2 representations will be used to guide the study. Osterwalder's Business Model Canvas (Osterwalder and Pigneur, 2010), J. Rodriguez' Business Model Canvas for Arts and Cultural Organizations (Rodriguez, 2016). For the purpose of this research, both Canvas will be presented, hoping to contribute with future business decisions regarding the Digital Museum Application.

8.1 Value Proposition and Business Model Canvas

In order to achieve the best possible result for this section, both Value Proposition Canvas and Business Model Canvas were created. All information gathered so far in this research, served as inspiration and inputs to attempt achieving stakeholders' expectations.

Considering the segmentation of customers, two categories were considered, "Business to Costumer" in green and "Business to Business" in blue.

Business Model Representations

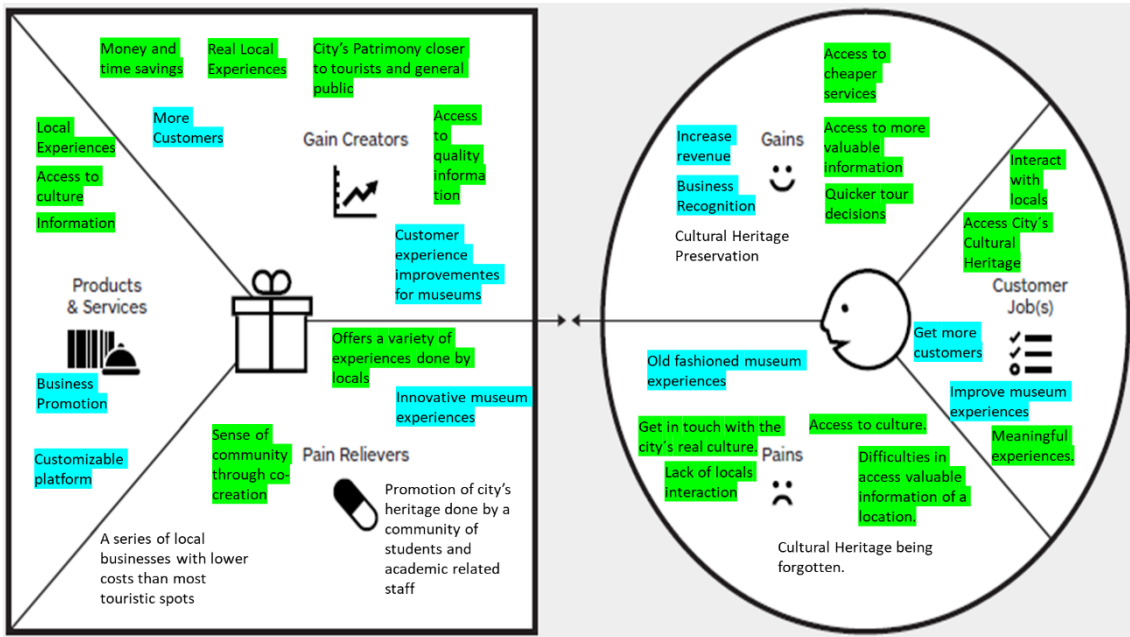


Figure 1. Value Proposition Canvas. Adapted from Strategyzer, Adapted in September 24, 2019, from <https://www.strategyzer.com/canvas/value-proposition-canvas>.

The Business Model Canvas is a strategic management and entrepreneurial tool. It enables the description, design, challenging, invention, innovation and pivoting of the business model. It is composed by nine building blocks that are organized in four segments (Osterwalder & Pigneur, 2010).

Business Model Representations

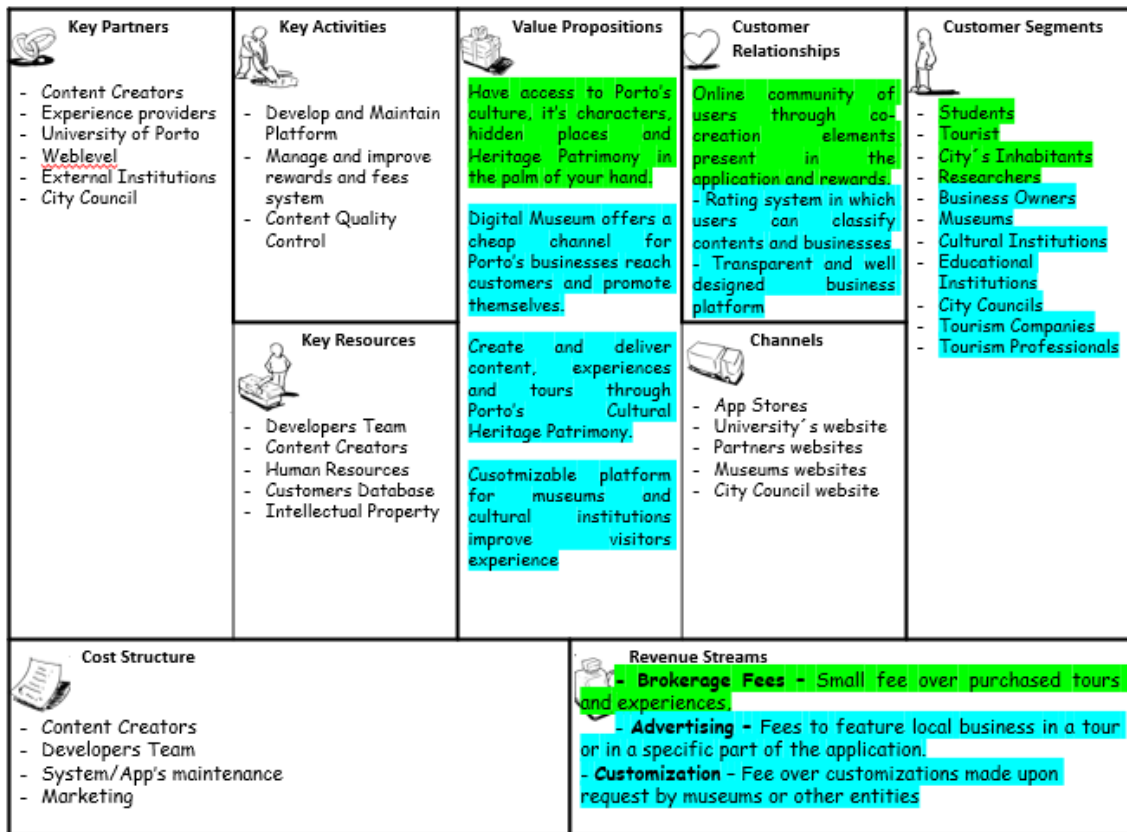


Figure 2 - Business Model Canvas, Adapted from Strategyzer, Adapted September 24, 2019, from <https://www.strategyzer.com/canvas/business-model-canvas>

Business Model Representations

Figure 3 - Business Model Canvas for Arts and Culture Organizations

Purpose/ Mission	WHY		WITH WHOM					WHAT			
	Desired Impact and Legacy	Success Metrics	Staff and Volunteers	Artists	Audiences	Funders and Donors	Other Stakeholders	Needs/Wants	Value Proposition	Channels	Key Activities and Value Chain
To help and promote Porto's cultural heritage conservancy.	Increase interest and knowledge to the city's patrimony, its history, characters, hidden places and culture.	Success will be measured by the number of downloads, access, experiences and tours consumption and increase of interest for the city's cultural heritage.	Students, University Faculty, Local businesses, Content providers and Weblevel	This is done with the goal of preserving and promoting the city of Porto heritage and increase interest for its museums, cultural spaces, historical spots and city characters.	Students Tourist City's Inhabitants Researchers Business Owners Museums Cultural Institutions Educational Institutions City Councils Tourism Companies Tourism Professionals	University support and good will of the company responsible for the development of the application. In the future, it is desirable to have public funding and commercial revenue streams.	University, City Council, Students, Tourists, city inhabitants, museums, business owners	Access to quality content, culture preservation, museum experience improvements, local businesses commercial benefits and promotion	Have access to Porto's culture, it's characters, hidden places and Heritage Patrimony in the palm of your hand. Digital Museum offers a cheap channel for Porto's businesses reach customers and promote themselves. Create and deliver content, experiences and tours through Porto's Cultural Heritage Patrimony. Cusotmizable platform for museums and cultural institutions improve visitors experience	App Stores University's website Partners websites Museums websites City Council website	Develop and Maintain Platform Manage and improve rewards and fees system Content Quality Control
HOW							Key resources and Cost Structure				
Income Streams: Earned Income			Income Streams: contributed Income				Key Resources: Developers Team Content Creators Human Resources Customers Database Intellectual Property Cost Structure: Content Creators Developers Team System/App's maintenance Marketing				
- Brokerage Fees – Small fee over purchased tours and experiences, - Advertising – Fees to feature local business to be feature in a tour or in a specific part of the application. - Customization – Fee over customizations made upon request by museums or other entities			Public Funding								

J. Rodriguez. 2016

Chapter 9

Conclusions

To understand how to innovate in terms of Business Model in such a dynamic industry like Tourism, was a great challenge. First, from this researcher personal experience, there was no previous experience with applications like the Digital Museum to have a starting point. Second, to go through all the huge amount of applications available online, most of them completely abandoned and considering the limited time, was a great learning.

Nevertheless, it is believed that the result will be able to help the future development of this project and that stakeholders involved with this application will have a good source of knowledge to proceed their works.

9.1 Achievements

The purpose of this research was to understand how an application, that has been developed under an academic perspective, could become a real product and reach the market. Two main questions served as a guide to this work and, at the end, were answered in a practical manner through a case study.

First, similar applications were mapped on Google Play and inserted in a data base that later could be used to gather insights regarding good practices as well as what not to do. In parallel, another data base was created with information gathered on AngelList with the same purpose.

From a total of 52 applications and 15 startups, it was possible to map different business model elements that could be later used and adapted in order to compose the Digital Museum Application proposed Business Model.

Conclusions

Moreover, the 4 interviews performed with the students involved in this project, 1 external collaborator from Fundação José Rodrigues, 2 professors and the company Weblevel, made possible to understand what the stakeholders' expectations are and deliver a work according to it.

9.2 Future Research

Future research could focus on increasing the data base developed for this research and, consequently, increase the universe of comparison with different applications and gather new idea that could be implemented. The world of applications is so fast and dynamic that, to have this work permanently done from a business perspective would be the ideal scenario.

Also, to dig deeper into Intellectual Property matters, involving more specialized students and researchers would be helpful to develop the ultimate agreement between the university and every other institution involved in this project.

Also, a more complex study regarding customer experience, would be of great help for the future of this project.

Appendix A

The presented questions have as objective to understand your perception regarding the Digital Museum application. This research deals with the management of this application, the questions are meant to focus on the business part of the application itself.

- What values are perceived as being passed to customers?
- Are there any specific features of the application believed to deliver the greatest value?
- What management issues this business could bring?
- Considering the co-creation component within the use of this application, should users be rewarded for their contribution?
- How should users be rewarded for their contribution?
- How this application helps the preservation of Porto's cultural heritage?
- How this application should be promoted among students within University of Porto?
- Would people be willing to pay to use the application or for a specific feature?
- What improvements still need to be done in the application?
- What are the University and Webelevel's expectations regarding the business exploration?

Conclusions

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