An integral mobile application for pre-travel, on-site and post-travel stages

Una aplicación móvil integral para etapas previas al viaje, in situ y posteriores al viaje

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ABSTRACT. Today, more than 92% of travel information searches are carried out on the Internet. In fact, the use of Information and Communication Technologies is a constant in any area of the tourism industry. Nevertheless, the myriad of travel websites and mobile applications can also cause disorientation and slower decision making by tourists, as well as the need for installing an important number of mobile applications for different purposes. This paper proposes the design of a holistic, single mobile application able to integrate the relevant information on travel resources from pre-travel, on-site and post-travel stages. In the application it is taken into account the different actors who are included in the travel experience such as information searchers, content providers or local merchants, allowing real-time connections among them. Furthermore, the mobile application encourages the users' engagement and a better user experience through some gamification features.

RESUMEN. Actualmente más del 92% de las búsquedas de información de viajes se realizan a través de Internet. Sin embargo, el alto número de sitios web de viajes y aplicaciones móviles también puede causar una toma de decisiones más lenta por parte de los turistas, así como la necesidad de instalar un número importante de aplicaciones móviles para diferentes propósitos. En este artículo se propone el diseño de una aplicación móvil integral capaz de integrar la información pertinente sobre los recursos de viaje en las etapas previas, durante y posteriores a los viajes. En la aplicación se tienen en cuenta los diferentes actores que están incluidos en la experiencia de viaje, tales como buscadores de información, proveedores de contenido o comerciantes locales, permitiendo conexiones en tiempo real entre ellos. Además, la aplicación ofrece una mejor experiencia de usuario a través de algunas funciones de gamificación.

KEYWORDS: Travel, Mobile applications, Information integration, Gamification, User experience.

PALABRAS CLAVE: Viajes, Aplicaciones móviles, Integración de información, Gamificación, Experiencia de usuario.

1. Introduction

Tourism industry has become one of the major income source to most of the countries around the world. The numbers of digital travellers are increasing tremendously by the emerging technology that enhances the travel experience in all levels. Travellers are heavily relying on mobile communications hence it becomes an important channel for the tourism companies (Kim, Park & Morrison, 2008). Travellers are also highly connected to the online society. They are continually searching info that best fits to their interests or is personalised somehow, looking for the authentic experience and real time connections. These travellers have led to the competitiveness in the market by enhancing travel experience through various innovations. As the competitiveness increases, travellers intend to gain the greatest enjoyment with minimal expenses. Hence, the boost of digital travellers in this technology-based era is leading people to rely more on internet and mobile apps in all travel stages either be pre-travel, on-site travel or post-travel (Vigolo, 2017).

However, the market pool is full of travel apps where users have to download several mobile apps individually for different purposes for a single journey (Dickinson, Ghali, Cherrett, Speed, Davies & Norgate, 2014; Lu, Mao, Wang & Hu, 2015). For example, Expedia provides a variety of product offers but it is limited to the usage during the pre-travel stage for booking purposes. People need to rely on Tripadvisor for recommendations during the on-site travel stage; then, travellers need to search the available offers or best values in other apps or browsers for consumptions like the locals. Sharing experience and memories has to be performed in other different apps like Facebook, Instagram, Snapchat, etc. A survey conducted elsewhere (Tiongson, 2015) shows that 40% of the users will return if they received exclusive discount or bonus content through mobile applications, especially in the travel categories, but they would like to have all the coupons accessible through a unique point. As a final drawback of having different apps is that it drives to requiring more space of the device's storage unit.

As an alternative to solve the aforementioned problems, the objective of this paper is to optimise the tourism product resources to end users through a single travel mobile application as a holistic solution called "Voyage 360". The specific goals pursued by this app are given next:

1)   To optimise the benefits for both travellers and local merchants.
2)   To enhance on-site travel experience.
3)   To engage the tourists and the local merchants for the best available value offers and hence to maximise the average revenue through gamification.
4)   To provide the travellers an interactive travel guide that leads to discover the best local offer deals for the greatest enjoyment while travelling.

The rest of the paper is structured as follows. Section 2 briefly revises related works in the area. Section 3 explains the main ideas on the development of Voyager 360. Section 4 reflects on the competitive advantages of this app. Section 5 discusses on the limitations of this proposal. Finally, Section 6 summarizes the main contributions and presents some future works.

2. Related Work

A significant change in the development of the tourism industry is evident. This change resides in a tourism model based on three aspects: innovation as the basis of new business models, intelligent management methods based on information and, last but not least, technology at the service of the traveller's consumption process, which shows a different way of relating to the destination (Ivars Baidal, Solsona Monzonís & Giner Sánchez, 2015).

According to this last point, the information about the destination becomes the main axis, which is why UNWTO (2015) speaks of four guiding principles: perception (the contents), encounter, understanding and the use travellers make of this information. To these four we could add one more, namely the method or device on which they obtain the information and allows travellers to interact with the destination itself, the active

generator of this information. The process of integration of these two areas, the traveller and the destination, is found in the fusion of digital trends and the arrival of smartphones, tablets, smartwatches and wearable technologies as supporting devices and Apps as tools for disseminating information. Thus, tourism has generated thousands of applications related to tourism products, services and experiences. In the case of Spain, the Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas (SEGITTUR, 2017) and the Spanish Chamber of Commerce have produced a Guide to Tourist Apps for 2017, in which it can be found Apps classified by type: Transport with a total of 35 applications such as BlaBlacar and Hailo; 33 accommodations such as Airbnb or TripAdvisor; Leisure and Catering ranging 22 applications such as CeliCiy; Active Tourism with 27 applications such as Golf plan; destination guide with a total of 38 applications such as the Guide to New York-mTrip or Mexico Travel Guido; and finally a typology that has been called Units, which consists of applications that help the tourist in the destination where some 38 applications appear, such as Google Maps, Instagram or My Travel Doctor. Without a doubt, the purpose of all these applications is related to the travel process itself, but it is still identified a lack of a holistic app that integrates all the actors (travellers, hosts, business managers) in a unique app.

Likewise, another type of classification can also be considered as in the case of Caro, Luque-Gil and Zayas-Fernández, B. (2014), which refer to applications for the cultural tourist: i) before the trip (anticipation phase), ii) during the trip (experiential phase) and iii) after (recreation phase). What is acquired (accommodation, information, leisure, etc.) and when it is acquired (before, during or after) must be integrated in a coherent way. In this work we follow this proposal to integrate all this information in the proposed app.

3. Development of Voyager 360 app

This section starts with a general description of the Voyager 360 app in section 3.1. Then, some detailed descriptions of the main processes and roles are given in section 3.2. Finally, some insights on the development of the app are given in section 3.3.

3.1. Product description

The idea of Voyage 360 consists in a platform to provide "on-the-go experience" throughout the travel cycle. On-the-go experience means to combine multiple dynamic elements to complete a full travel cycle within a single platform. Figure 1 shows the motives, the key roles and the channels at the different stages of a complete travel cycle.
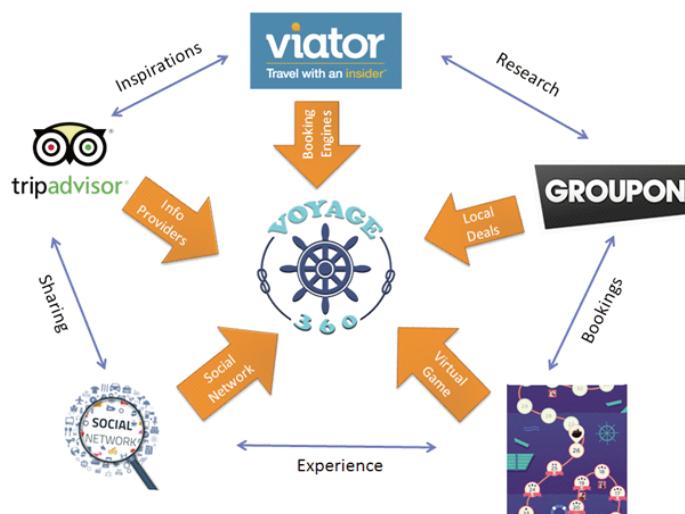

Figure 1. Voyager 360 main concepts and their relationships. Source: Self made.

Voyage 360 is a mobile application that:

i. allows travellers to share their itinerary with budget spent on each travel product or service by seamlessly connecting to social networks or TripAdvisor;

ii. allows travellers to search the best match itinerary and download for vacation reference by connecting to booking engines;

iii. allows local merchants to offer their tourist privilege deals to the users as an advertising platform;

iv. incentives both travellers and local merchants to use the application through gamification techniques.

There are some motivations that engage users in gamification for tourism industry such as the challenge of competition and achievement, social interactions in the virtual world, seeking information and exploration, excitement and relaxation (Xu, Tien, Buhalis, Weber & Zhang, 2015). The location-based games encourage users to engage on-site experience in a more fun and informative manner. The gamification environment may then enhance the travel experience with co-creating personal experience and it could also give marketers an innovative alternative to enhance brand awareness. Next section explains the main processes and key roles in Voyager 360.

3.2. Voyager 360 process map

Figure 2 shows the process map of Voyage 360 mobile app structure for a better understanding of its operational procedure. The most relevant roles of this process map are explained next.
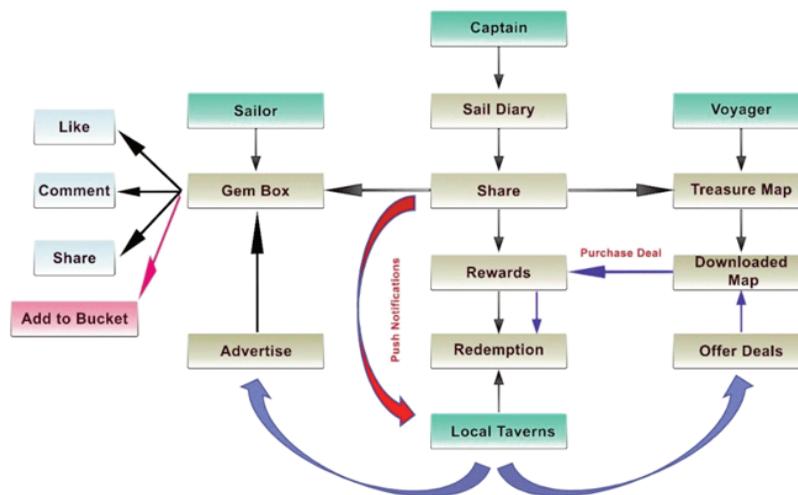

Figure 2. Voyager 360 process map. Source: Self made.

3.2.1. Travel Content Provider (referred as Captain)

"Captain" is the travel content provider in the Voyage 360 mobile app. The Captain will record their travel itineraries by sharing the pictures, videos, product information and budget spent related to the activities during their travel. The Captain has the choice to share a single activity to the social platform or a completed minimum three days two nights' itinerary to the guide platform.

The Captain will be rewarded with points for higher status achievement to encourage for their continuous travel content contribution. The collected points can be used to redeem products and services that are available at the redemption platform.

The first action for the Captain is to insert initial travel info in their "Sail Diary" such as travel length, destination, numbers of persons and currency used for the budget records follow by selecting the travel

products or services to update (see Figure 3(a) and Figure 3(b)). The Captain will continue to update the details of the selected product or service according to the info details required (see Figure 3(c)). Location fields are automatically filled by integrated Google Map information provided that the smartphone GPS is enabled. The uploading photos or video feature is integrated with Google Street View to allow photo shooting with 360-degree virtual view of a restaurant, for example. The total spent amount will be updated as the Captain continuously update their activities from day to day until the last day of the travel journey. This information will be summarized in the Captain's home screen of the app.

As the Captain will perform the last update for the last day of the travel journey, they will have the options to save the completed itinerary for their own record purpose or to publish the itinerary and share it with other users. The completed itinerary will be checked to have the minimum requirements before enabling the "publish" button in order to ensure the quality of the travel content such as below:

i) There are at least three products or services update each day during the travel journey.
ii) The Captain must complete the itinerary of each day of their travel journey as per initial recorded travel length at the sail diary.
iii) The Captain is able to rearrange the travel itinerary orders if they choose to update the products or services by the end of the day during the travel period.
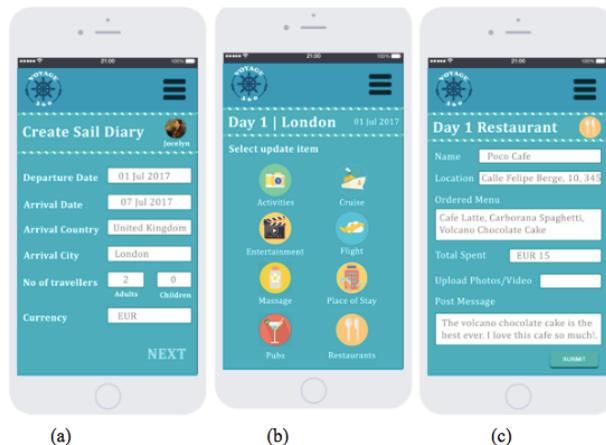

Figure 3. Several Captain's role app screenshots. Source: Self made.

3.2.2. Travel Info Searcher (referred as Voyager)

"Voyager" is the group of users who are planning for their next holidays. They are the users at the research stage whose goal is to gather information such as accommodation recommendations, places to visit, cultural or leisure activities to do, recommended restaurants and budget estimation. Travellers usually need to perform multiple research via different platforms for the best options. The Voyager now can refer to the dynamic itineraries contributed by other travellers and save the best preferred itineraries as the travel guide.

The Voyager is shown a list of available destinations with itineraries contributed by the Captains (see Figure 4(a)). The Voyager can choose the target destination by one touch on the picture of the destination. Moreover, a feature called "Treasure Maps" will show all the itineraries for the chosen destination with the length of travel, the total budget spent by the Captain, products and services consumed by the Captain and the Captain's reliability status (see Figure 4(b)). The Voyager can choose to view the itinerary or download it for future reference. The Voyager has available more details of the itinerary with pictures or videos and comments on the products and services consumed by the Captain.

Voyager 360 is able to update information in real time such as ongoing promotions while Voyager is

travelling. For example, the Voyager is presented a map for navigation with flaming icons showing the local merchants who are having promotions that encourage Voyager to check out for more info on those promotions (see Figure 4(c)).
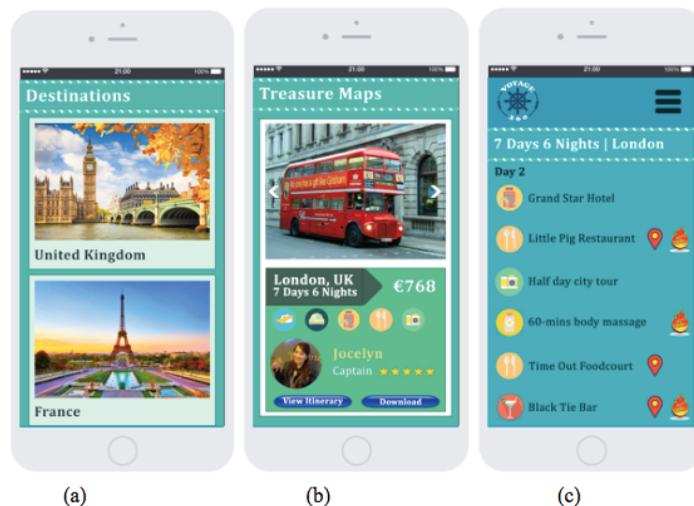

Figure 4. Several Voyager's role app screenshots. Source: Self made.

3.2.3. Social Networker (referred as Sailor)

"Sailor" is the group of potential travellers who are inspired by other travellers. They have not decided a travel plan or any destination yet but they have a high interest in travelling. They often watch the updated feeds shared by other travellers and they may response with minimal direct interaction or add the items to their bucket list for future reference. Sailor is also the representative of the local community who is willing to provide relevant local insight to the travellers at their social post.

The Sailor is able to view the published items and has access to give a like to the post, to comment or to share the post within their friends' circle (see Figure 5). In order to do this, the Sailor enters the "Gem Box" in the Voyager 360 app, namely the aggregator of social media platforms. It also serves as the research and planning platform to the travellers for their next vacation.

Figure 5. Sailor's role app screenshot. Source: Self made.

3.2.4. Local Merchants (referred as Local Taverns)

"Local Taverns" are the tourist product and service providers such as accommodation providers, tour operators, restaurants, shopping outlets, transportation companies and many more. They are the local

merchants who have interest in targeting on tourists to optimise their occupancy during low peak season or hours.

Local Taverns can choose to promote their business by offering discount deals or to enhance brand awareness to the tourists. Therefore, Voyage 360 becomes a new advertising platform for the local merchants to potentially increase their revenue into a new market.

Local Taverns can register to become the business partner with Voyage 360 with easy sign-up steps (see Figure 6(a)). Local taverns are required to complete mandatory company details before they are able to create any offer deals, advertising or sponsorship. They are required to provide accurate promotion info such as promotion validity date, promotion type, deal's description, attractive pictures or banners, terms and conditions in order to activate the promotion deals.

After a Local Tavern completes the details of the offer, Voyage 360 will generate a unique promo code for the specific offer deal. The purpose of this unique promo code is to allow users to redeem offers and as a tracking code for Voyage 360 and local tavern for invoice purpose without duplicating usage of promo code (see Figure 6(b)).

Customers (that is, Voyagers) who wish to redeem the offer deals will present their mobile voucher to the local tavern they are visiting. The customer will be shown with the time left for them to redeem the offers accordingly. The tavern's staff will swipe the promo code once the customer redeemed the offer as the record of completed deals.

Local Taverns also have the option with Cost per acquisition (CPA) advertising in Voyage 360 with different packages available. The Local Tavern dashboard will show the summary of the current balance and total view requests for the local tavern (see Figure 6(c)). It allows local taverns to have the overview of their CPA ads performance in order to decide the next action. In case of a local tavern who is yet to register as the business partner or has not enough credits for the CPA ads, the Sailor or Voyager are not able to see the supplier's details. The local tavern's name will appear once they become registered providers and have paid for the CPA ads.

The Local Taverns have the option to gain more exposure becoming the sponsor for exclusive marketing campaigns such as weekly contests. The marketing team of Voyage 360 will organise relevant marketing campaigns consistently with the availability of the sponsored items tactically. The Voyager 360 app allows Local Taverns to explore several relevant reports, thus serving as a tracking and monitoring tool for the providers to understand their performance.
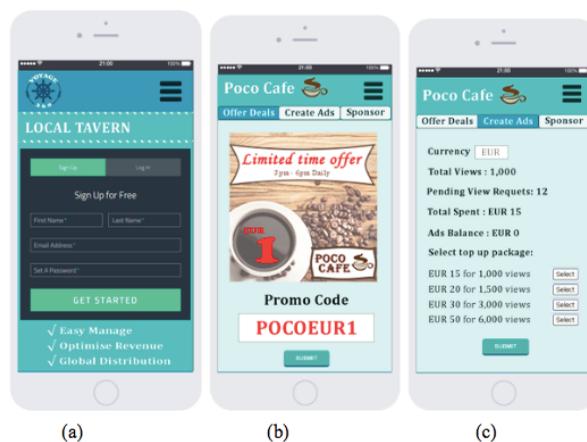

Figure 6. Several Local Tavern's role app screenshots. Source: Self made.

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3.3. Hybrid mobile app development

Voyage 360 is a functional travel platform fully-based on mobile, developed following a hybrid approach mobile app development. As shown in Figure 7, hybrid approach (IBM, 2012) combines the best and the worst of native and HTML5 app and requires skilful developers, however it has the benefits to have full device access such as app store and APIs. This approach has high level of functionality with reasonable development and maintenance cost. It has the most required features ability for the travel platform with GPS location, touchscreen and gestures, clean graphics and animation, offline connectivity, interactive user interface etc.

The hybrid mobile development also takes future into consideration with flexible development. The cost of development is reasonable and the web languages can be shared among different mobile platforms without spending more time to write new web language for each mobile platform.
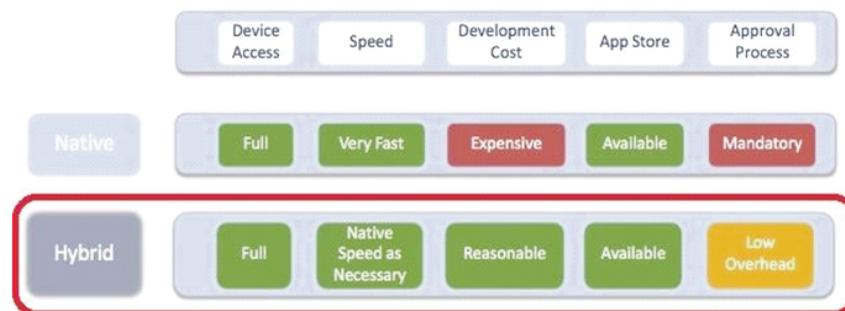

Figure 7. Comparison of native and hybrid mobile app development. Source: (IBM, 2012).

4. Voyager 360 competitive advantages

This section discusses the competitive advantages of the holistic approach of Voyager 360 in the three travel stages, namely pre-travel stage, on-site travel stage and post-travel stage.

4.1. Pre-travel stage

The travel contents of Voyage 360 are the contributions from worldwide travellers instead of standard information provided by commercial companies. Furthermore, some important content information from personal contributors could be integrated with info from these companies. Travel itineraries in Voyage 360 are personalised itineraries based on individuals' travel experiences, thus offering different alternatives to the regular itineraries offered by travel agencies.

Voyage 360 does not provide a booking engine but it will direct the travellers to local merchants booking engine to reduce the cost of payment gateway and bank charges. Promotion deal offers can be redeemed directly with the local merchants depending on the offers mechanics. The contributors will indicate the minimum consumption price for the specific product or service when they share the itinerary or travel items, providing the info searcher with a more accurate budget estimation. Unlike TripAdvisor, where the symbolic price range might be misleading with respect to the expecting price, Voyager 360 will show a more realistic (near real-time) product or service costs.

Finally, Voyage 360 allows users to upload and view pictures or videos in 360 degrees, therefore providing more accurate environment insights than false imaginative expectation from static photos.

4.2. On-site travel stage

Users can organise their booked itinerary in the Voyage 360 app with the integrated reservation system from the designated suppliers. They do not need to check the confirmation details booked from different suppliers but they will be able to view all details in a glance. Travellers will save the itinerary or the interesting items in their bucket list and they will use it for travel reference. This will help users to organise their trip in a

simple and easy manner.

Travellers usually search the nearby POIs as displays on the map but it is hard to decide which one to go and reading reviews often requires a long time. The geo-location results will only display the participating local merchants with on-going promotion deals that aim to direct customers towards the venue. Alternatively, users could enable the push notifications feature to receive suggestions when they are within the radius of the nearby promotional offers place.

4.3. Post-travel stage

Voyage 360 allows travellers to share post feeds like comments in social media and completed travel itinerary instead of writing reviews. There are mandatory fields that are required to fulfil for sharing a post feed to ensure the information provided is as complete as possible. Unlike TripAdvisor, which is review-based and focused on users discussing relevant topics via forum, Voyager 360 suggests user to post their experiences or completed itinerary in an automatic manner for different social media.

TripAdvisor rewards virtual badges to content contributors to promote identity status of traveller's reliability for writing reviews. On the other hand, Voyage 360 will reward content contributors with points and the achievement of different levels of identity status. Contributors could also change the collected points to redeem for products or services offered by participating merchants or entitle for exclusive member's discounts.

5. Discussion and limitations

There are two major challenges encountered during the research of Voyage 360 conceptual proposal which are the system integration limitation and market entry barriers against the industry giants. The current aggregate websites only focusing one product such as Skyscanner for flights, Booking.com for hotels, Viator for tours and transfers requires high connection times to catch the content feed from multiple sources. Adding for search elements within the same platform could easily multiply data fetch timing to display results. This is especially critical to perform highly accurate display result via multiple sources which might speaking different system languages.

5.1. System integration limitations

According to the research from the National Research Council Canada (Shen et al., 2010), the major challenge of system integration and collaboration technologies interoperability. This is referring to the ability to manage and communicate the product and project data smoothly looking at the complicated diverse software and hardware systems from different sources. The connection process involves the data interoperability and frameworks interoperability. In other simplified definition, does the sources speak the same languages that allows smooth data and framework mapping for an effective outcome as desired?

However, this challenge can be resolved with few application features enhancements according to the market preference. There is a similar concept trend currently available in China which identified as Travel Strategy App. The leading OTAs has similar concept which consist an additional feature that allows travelers to contribute itineraries, recommendations and travel journals. This includes TripAdvisor China who has a differ version than other regions in the world. Ctrip.com as the top leading OTA in China collectively utilized big data to increase their bookings. According to the i-Research company analysis report (iResearch, 2016), 64.2% of the users read the travel strategies, 59.7% will download itineraries, 55.5% purchase products, 52.7% users will contribute journals, 46.2% users participate in questions and answers and 43.6% users get to know new friends.

Since the launched of the travel strategy application in CTrip, there are 400,000 contributed travel contents covering 70,000 point of interests globally with 4 billion downloads.

5.2. Entry barriers

Voyage 360 is aholistic conceptual application for the online travel market, however, there are few entry barriers for a new brand into the industry. This includes huge development funds, content databased, technology limitation and time consumption.

We are well-aware there are billions of marketing cost spent to build up established brands such as Priceline Group or Expedia. In 2017, Expedia Inc. has spent $5.3 billion and Priceline Group has spent $4 billion on marketing (May, 2018). This has not included the amount to spend for skillful platform developers and maintenance cost. It is a long process from developing products, pilot tests, collecting content and users and building brand trust before earning revenue. It will be a huge challenge for a new brand to outstand from the industry giant crowds with limited capital.

Looking to the realistic of the market barriers and the production process, alternatively, it will be wiser to seek collaboration with one of the leading organization who owns ready database and technology experts. The interoperability risks will reduce dramatically with the support of the existing big data and technology available. China OTAs are the good examples to implement the holistic conceptual mobile application because the consumers' expectations are changing and requiring better functional platform. These generally center around authenticity, personalized experiences, removal of friction and on-demand functionality (Guy Langford, 2017). The new product extension line such as Voyage 360 is a high revenue generator given its sophisticated functions that could meet customer expectations in innovative way.

6. Conclusion and future work

Voyage 360 is designed as a holistic app that support all the travel stages from pre-travel, on-site travel to post-travel within a single platform. Travelers no longer need to download multiple apps and research through multiple website for destination information, travel guides or best offer deals. In addition, users enjoy better travel experiences with interactive gamification throughout the journey. The main goal of this innovative platform is to connect the universal travellers and the local communities for authentic travel experience. The local communities get the benefit to expand new market and enhance brand awareness globally with minimal cost. The tourists gain the experience to live like a local travel experience with minimal expenses. The stakeholders gain greater market share potentially with the market expansion globally by sharing economy business model.

There are multiple phases required while introducing the product to the market. Press release to the industry key medias is important to gain the attention of the local suppliers to register themselves as key partners from different regions. Voyage 360 will implement introduction reward system where points will be awarded to new registered users, user who refers new friends, extra bonus points rewards for first badge of content contributors. An affiliate program with the product suppliers will increase the users' growth by placing Voyage 360 logo at their outlets and rewards users accordingly. In case of the huge numbers of bloggers in America, Voyage 360 will have the feature that allows the bloggers to export and import their content without rewriting content in another platform. The genuine word of mouth is still a very powerful marketing tool that should not be underestimated by any company.

In conclusion, innovation has no end to keep enhance and improve the user experience, stay competitive in the market and sustain loyalty lifecycle within the emerging dynamic environment in the tourism industry. Voyage 360 has huge potential to become a world recognised travel mobile app with the consistency of the development and marketing plans.

Some future lines for Voyage 360 include the application of machine learning techniques to obtain insights from the users' behaviour. A survey on the utility and experience of use will be also carried out to assess the strengths and weakness of the application.

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