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# INGUIA: AN INCENTIVE TO THE TOURISM DEVELOPMENT IN MANAUS WITH A DIGITAL PLATFORM SUPPORTS

**João Paulo Reis Marques*[1], Bruno Fabiano Silva Ribeiro[2] and Manoel Henrique Reis Nascimento[3]**

[1, 2, 3] University Paulista – UNIP. Manaus-Amazonas, Brazil.

[1] http://orcid.org/0000-0003-3842-8347, [2] http://orcid.org/0000-0003-3110-2504, [3] http://orcid.org/0000-0003-4688-6751

Email: *joaopaulo-rm@hotmail.com, brf147@gmail.com, hreys@bol.com.br

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**ABSTRACT**

Brazil offers to the national and international tourists a wide range of options, being the natural areas, the most popular tourist product, a combination of ecotourism with recreation, sun and beach tourism, adventure tourism, and historic cultural tourism. Creating richness and growing the consumption and production of the area. Tourism has great meaning to a city like Manaus, who still shows potential problems to your utilization, among them is mentioned the lack of disclosure, precarious infrastructure, security problems, and the missing of qualification guides to prest assistance to the city visitors. It is Presented the platform and previous results, (InGuia) who can contribute to the problem resolution on finding specialized professionals to prest guide service in the local tours and provides rich and trust information, all completed and updated about all the tourism richness of a place all of this in several languages, which is extremely important knowing how is the variety of nationalities that visit Brazil. Since Manaus Tourism has great potential, with a huge variety of places to visit, we present how Manaus loses all this potential with a bad experience given to the tourist caused by the missing of defined and actualized information. Besides that, it is also difficult for the ones who work directly with tourism, as in the case of the Guides, who suffer to create contact with the tourist. InGuia comes as a purpose to solve these problems, given to the tourist the opportunity to know better the place where he goes to visit, bringing precise information, easy to understand, and easy access. In addition to creating opportunities for Guides to reposition themselves in the market, allowing a better view of the service he proposes. In that way, InGuia helps both tourists who wish to have a better tourist experience, traveling with more convenience and practicality, now that they know they can easily find the information they need, as well as supporting the Guides, allowing the easy exposure of their services.



## I. INTRODUCTION

Brazil offers national and international tourists a wide range of options, with natural areas being the most popular tourist product, a combination of ecotourism with leisure and recreation, mainly sun and beach and adventure tourism, as well as historical and cultural. Which in turn generates wealth, increasing consumption, and production due to the new needs for products and services created by tourism [1].

Much of the problem of having more guides on the market is due to the difficulty of finding an agency to associate and provide their services, even though it is an autonomous profession, tourists feel more secure by hiring guides linked to regularized local tourism companies. Such guides must be prepared to offer good experience for those who buy their services, within this experience is the need to speak a common language for tourists.

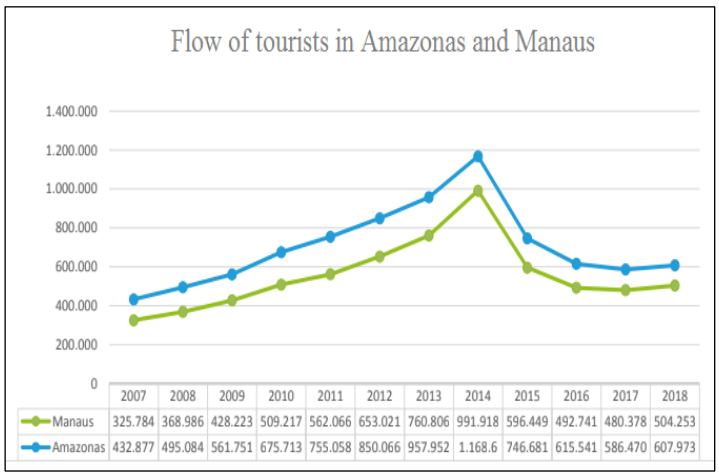
And an area with as much potential as Manaus presents specific problems for its use, among them are the lack of

dissemination, precarious infrastructure, security, and the lack of qualified guides to provide assistance to visitors to our city [2].

Between January and May of 2019, the capital of Amazonas received 285,304 tourists. According to data from the Amazonas State Tourism Company (AMAZONASTUR), the number is 3.32% higher than that recorded in 2018, when it reached 216,123 thousand. Of this total, the share of foreign tourists rose from 102,084 to 106,340 visitors this year - representing a growth of 4.16% [3].

Among national tourists, there was also an increase. While 2019 registered 164,150 Brazilians passing through Manaus, 2018 had 160,610. The number represents an increase of 2.14% [4].

The graph in figure 1 shows the quantitative behavior of the number of tourist visitors in the city of Manaus and in the Amazon.




| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manaus | 325.784 | 368.986 | 428.223 | 509.217 | 562.066 | 653.021 | 760.806 | 991.918 | 596.449 | 492.741 | 480.378 | 504.253 |
| Amazonas | 432.877 | 495.084 | 561.751 | 675.713 | 755.058 | 850.066 | 957.952 | 1.168.6 | 746.681 | 615.541 | 586.470 | 607.973 |

Figure 1: Flow of tourists in Amazonas and Manaus.
Source: [4].

Among the concerns presented in the monthly report on the survey of the behavior of tourism in the metropolitan region of Manaus, carried out by the Fecomércio Institute for Business Research of Amazonas (IFPEAM) in March 2019, are the precariousness of the infrastructure and the poor disclosure of the city both in Brazil and abroad.

Tourism in Brazil is a growing and fundamental sector for the economy of several regions of the country. Brazil received 6 million foreign tourists in 2013 and about 6.62 million in 2018, being classified, in terms of international tourist arrivals, as the main destination in South America and the second in Latin America, after Mexico [5].

This article presents the development of a multiplatform tool (InGuia) that can contribute to the problem of finding specialized professionals to provide a guide service on local tours and also provide reliable, up-to-date and complete information on all the tourist wealth of a given location, making them available in several languages, with an auxiliary and interactive map that guides the tourist in his needs as a visitor, making available all varieties of routes, making a marketplace for establishments and everything the tourist needs to know for his safety.

Since applications have been the main development tools in various areas of the world, such as urban mobility, financial needs, language translation, and several other points, InGuia has been proposing a new way of accessing various tools that enable a tourist experience a pleasant place by means of geolocation maps, access to comments from other tourists about the places that are visited and a bank of qualified guides that can be chosen according to the needs that the user seeks to support.

## II. THEORETICAL REFERENCE

### II.1 TOURISM AND THE NEW WORLD TREND

Tourists use the Internet in all the processes of a trip for different reasons, namely: seeking knowledge about the place to be visited, ease, novelty, creativity, pleasure, and social activities [6].

Through studies carried out by [7], smartphones have changed the behavior and emotional state of tourists by providing and accessing various tourist information quickly and easily. In this sense, the instant information provided by these devices allows the tourist to be more effective in solving problems, sharing, and storing the tourist experience and memory.

It is important to highlight that accessing and sharing information via the Internet, through comments, videos, and photos, has been empowering tourist consumers, to the point that they have been making decisions in planning destinations and tourist activities, without the need for travel agencies [8]. Thus, satisfaction with this information induces different results, such as visiting the destination, quality experience, and high overall satisfaction. Therefore, the mediation mechanism in the context of tourism requires a deeper understanding of the relationship between information needs, information tools (ie the Internet and Smartphones), and the tourist experience itself.

Due to the growing demand for users of mobile applications, websites are adapting their content for this type of platform. These tools are used to strengthen communication with real and potential tourists through information from users capable of influencing decision making [7].

The use of smartphones during the trip is of great interest and relevance, as the human being's search for quick answers in the globalized world has led to the development of tools that make life easier and automate tasks and processes. In this context, the use of this device allows the satisfaction of the tourist's wishes to be immediately sought for an answer to their needs, looking for information, a restaurant, or an event.

In 2017, researchers [8] in their article "Mobile Applications and Tourism: A Quantitative Study Applying the Theory of Planned Behavior", claim that tourism is an area of constant transformation that easily adapts to changes in the market due to its wide capacity for interaction. The incorporation of applications that have destination information, transportation, food, and lodging services within the reach of its users is an aspect to be explored by enterprises and places that have the practice of tourism as a resource for social and economic development.

According to [9], the tourism sector is a major incorporator of technology in its various segments, and its growth always depends on the capacity for innovation and the use of technology to improve management, develop new products, improve communication, optimize travel experiences and personification of service.

#### II.1.1 REGIONAL TOURISM AND ITS ISSUES

With the main tourist reference to nature, attracting the most different visitors, the tourist activity gained other dimensions, with several branches or denominations, such as rural tourism, ecotourism, nature tourism, adventure tourism, scientific tourism, among other modalities. Among these, scientific tourism is one of the most recent, understood as "the type of tourism made up of people who move with the object of self-education or improve their personal horizon through participation in events or visits to environments of high tourist and cultural value [10].

But the lack of disclosure means that tourists arriving in the city, the tourist routes they take are very limited, leaving aside important aspects of Amazonian culture and history that would be very well seen by those who are attracted by the local beauties. Managers and other operators of the hotel chain in Manaus also made it difficult to attract tourists due to the absence of cultural and business events and the airport infrastructure [11].

In 2014 at the World Cup, Manaus had only 67 regularized tourist guides, according to the State Tourism Company (AMAZONASTUR). And it shows how the city is deficient in regularizing this class and in including these professionals in the job market. Although the profession is autonomous, according to Federal Law 8623/93, the professional must be registered with the Ministry of Tourism and carry the license issued by the Ministry of Tourism, through AMAZONASTUR. In 2020, with the new registration system for tourism providers, cadastur 3.0 implemented in 2018, surveys showed a total of 1,450 tourism service providers regularized at the Ministry of Tourism, an 8.53% increase in the volume of regularized providers if compared to the same period in 2019, which held 1,336 registered developments [12].

### II.2 API RESTFUL

API (Application Programming Interface) is a set of patterns that are established in a Z application, so that other applications can use the features provided by the Z Application, without having to access the details of implementation, but only to an interface with which you can interact with it.

In the 2000s, one of the main authors of the HTTP protocol, Roy Fielding, suggested the creation of new HTTP methods, in order to facilitate the semantics when HTTP requests were made. Making it possible, by reading the method, to get a sense of what that request will do, the most used methods are, GET, which means 'to get', that is, when you request data from the application, PUT, is used to update an existing data, POST, is used to create a new data and DELETE, is used to delete data.

REST (Representational State Transfer), is an abstraction of WEB architecture, consisting of a set of rules, and principles that allow the creation of a well-defined API using correctly the HTTP methods mentioned above. And finally a RESTFUL API, which is nothing more than an API that follows REST patterns, that is, when an application correctly uses the REST architecture, this application is considered RESTFUL [13].

### II.3 TYPESCRIPT

Typescript is an evolution of the already consolidated JavaScript programming language, basically Typescript is a ‘superset’ of JavaScript typing that is compiled for JavaScript itself. Developed by MICROSOFT, and led by Anders Hejlsberg, it first appeared on October 1, 2012, Typescript is completely Open-Source, allowing anyone to read and contribute to its source code.

The language shares the same basic types as JavaScript, such as String, Number, bool, with the addition of a few more, such as Turple, Void and Any. Its biggest difference and evolution in relation to JavaScript is giving the developer the ability to declare typing, making it easier to understand what types that parameter receives, and what type will be the return of a function, thus facilitating team work, and helping to avoid errors in the development environment [14].

### II.4 NESTJS

NestJS, is a Framework for developing efficient and scalable applications focused on the server-side with NodeJS. It uses progressive JavaScript, and is built with full support for TypeScript, (still allowing developers to use pure JavaScript) and combining elements of Object Oriented Programming, Functional Programming and Reactive Functional Programming.

Below the scenes, Nest uses a robust framework for servers like Express (standard) but can also be configured to use Fastfy. Nest provides a level of abstraction above the common Frameworks for NodeJS (Express/Fastify), as well as exposing its APIs directly to the developer. This allows the developer to have the freedom to use third-party modules that are available for the underlying platform [15].

### II.5 MYSQL

MySQL is a relational database management system, it is open source, and is used in most free applications to manage databases. This system uses SQL (Structure Query Language - Structured Query Language), which is the most used language for inserting, removing and managing content stored in a database [16].

### II.6 AI - CONTENT-BASED FILTERING

Recommendation engines have the function of recommending services or products to people. In a way, recommendation systems tend to limit people's choice by presenting them with suggestions for something they like or would buy. Many companies currently use a recommendation system to help the user discover new content, names like Youtube and Netflix, are already well established in the market in this regard [17].

The main goal of a recommendation system is to increase sales for a particular company. And to make this happen a recommendation system should only make available significant items to the user, [17], in his book on recommendation systems, summarizes the objectives of this system in four points, Relevance, Novelty, Chance and Diversity, is the union of these items that creates a good recommendation system.

After research, it was concluded that the best methodology for this project is Content Based Filtering [18]. This methodology is based on the similarity between the items, so it is based on the principle that the user tends to like an item that has shown interest previously. This type of filtering is very well applied in texts, since the content is described with keywords, that is, it analyzes similar terms already sought by the user to make a more assertive recommendation.

This approach has the advantage of not requiring other users to make recommendations, so a new user may already have personalized recommendations for him. It also facilitates the easy recommendation of new content, since when registering it, the keywords will already be clarified, and the new content can already be indicated to users, this methodology also facilitates the explanation for the user why he is receiving this particular recommendation , thus making it a better experience for it.

### II.7 REACT

React is a JavaScript library for creating user interfaces, React is based on 3 (three) central pillars, the first pillar being declaratively, React makes the creation of user interfaces an easy

task. By updating and rendering only the necessary components as the data changes, then declarative Views make the code more predictable and easier to debug.

The second pillar is componentization, allowing the developer to create encapsulated components that manage their own states, so with the combination of these components it is possible to create complex interfaces. And the last pillar, which serves more as a philosophy is, 'Learn once, use anywhere', React is a very flexible library, allowing its easy integration with any other existing technology, thus not limiting the developer with fixed Technologies [19].

### II.8 FLUTTER

Flutter is a set of user interfaces made by Google, for creating beautiful and natively compiled applications for, mobile, web and desktop, from a single source code. Flutter is based on Widgets, which are a huge variety of components that make up the user interface, with Widgets it is possible to develop everything within the application, user lists, animations, stylization, interaction with the user, among others [20].

Flutter is compiled directly into Arm Native, using the GPU, and being able to directly access the APIs of the platform and services, so the built application has an almost native performance, being very fast, and making the most of what the platform can offer, being mobile, web or desktop.

## III. METHODOLOGY

For the development of a multiplatform system, which aims to serve as an intermediary between tourist guides and tourists, we followed some necessary and recommended steps to have a good idea base.

A bank of guides was created based on the tourism guides registered first with the State Union of Tourist Guides of Amazonas, all of which are analyzed according to the legislation, **General Tourism Law 11.771/08, of September 17, 2008**, this means, the credentials, history, faculty, among other sieves were checked, together with the class regulating body, AMAZONASTUR, to decide which people will offer their services through the platform.

Three initial language alternatives were defined (English, Spanish and Portuguese) so that regardless of nationality, the user experience with the platform will be comfortable and understandable. Users will immediately see the language options that are available on the platform when opening the app, if you set it to English for example, all navigation elements and automatic messages that will appear within the app, regardless of their content, will be in English. An application with different languages is important for a platform that aims to win tourists around the world.

To support and validate the project, a research was conducted with the target audience, following the steps of raising hypotheses, creating a persona that represents our target audience, in order to develop a research that statistically proves that the idea meets the needs of national tourists and local guides. The survey was conducted through formalized questionnaires on google forms and received around 900 responses of great value to the project, which helped to prove the problems faced by tourists on their travels. Interviews were also conducted through phone calls and videoconferencing with the president of the State Union of Tourist Guides of Amazonas, Ananias Correia and with blogger Jô Viajou, Jordana Cavalcante, to talk about the problems faced by tourism guides and discuss how our platform can boost class and regional tourism. with this it is possible to better understand the functioning of this sector and with that the project will have a solid base for its development.

For the development of this project it was decided to use the RESTFUL API concept, that is, the project was divided into 3 (three) parts, the Backend, which will be responsible for the business rules, connection with the database , emailing, and authentication, this backend API will be 'consumed' by Frontend, which will be a Web application, where users interact with an application, and this API will also be used by APP Mobile, this type of architecture is extremely versatile and with better maintenance, since all applications are eliminated from each other, so in the following paragraphs it will be described as tools used in each application, starting with the Backend and moving to the Frontend and ending with Mobile.

The language chosen for use in the Backend was Typescript, as it brings more speed and facilitates team development. To make the execution of the language, the NodeJS platform will be used, which is an asynchronous JavaScript interpreter, to assist in this, the NestJS Framework, it allows the use of the most used architectural model currently, making the scale project in a reliable and organized manner.

The MySQL relational database will be used for data storage, a secure and very fast database management system. In order to connect the bank to NestJS, TypeORM will be used, this is responsible for allowing queries with Typescript, that is, it can translate Typescript to SQL, which is the language understood by most databases data, using the ORM concept, helps the developer to stay focused on a single language, in the Typescript case, as well as organize the source code of the application.

To give a better user experience, a Recommendation System will be used. The idea is that when registering, the user will answer some questions, giving indications of the tourism categories he is most interested in, so initially he can make some personalized recommendations for each user. However, depending on the use, the application will gather more data of the user based on their visits, research and viewing time in certain categories or subjects, so the more the user uses the platform, the more apt the Artificial Intelligence will be to make more assertive recommendations.

Going to Frontend, it was decided to use React, as it also allows the use of Typescript, thus allowing the reuse of knowledge, React is a library widely used in the market, being maintained by Facebook, and with a large community, having a vast amount of tools, it is a library that is constantly growing.

The Mobile application was built with the aid of Flutter, Flutter is a Framework developed by Google that allows the creation of apps for Android and IOS with only a programming language, because it is an interface kit it also facilitated the development of the design , animations among others, thus improving the user experience with the application. A Google Maps API will be used to create the interactive map for tourists, in addition to a payment processor, to allow the purchase of packages and the hiring of Guides.

We opted to centralize the entire project around a language, so that concepts could be reused, and also streamline the maintenance and updating of the code. And these are the main tools that make up ***InGuia.***

The idea is that, if the tourist opens the application and having already registered, have quick access to information regarding the tourist spots, hotels and establishments, the tourist will also have access to a catalog of guides, categorized by types of routes, or the languages that the guide masters.

The guide, on the other hand, would have the ability to make himself available and can be contacted by tourists who might be interested in his service, the application will provide through an API, the guide's ability to send and receive messages to the tourist, through the application itself.

## IV. RESULTS, SCREENS AND FEATURES

Usability tests were carried out with 10 users, among them Tourism students, professionals in the field of tourism and tour guides, in addition to tourists who were visiting the city of Manaus.

The usability test is a qualitative test that shows how people interact with the application, during interactions users reported what they were thinking and asked questions about the tools presented on the platform.

Professionals in the sector highlighted that it is a necessary application for tourism and for the state, with emphasis on information and dissemination of tourist points, as they recognize that the system used by tourism agencies does not meet the needs of tourists and does not pay attention to disclosure. of its historical points for the residents of Manaus. In Figure 2-3 a user is observed using the platform in the usability test.

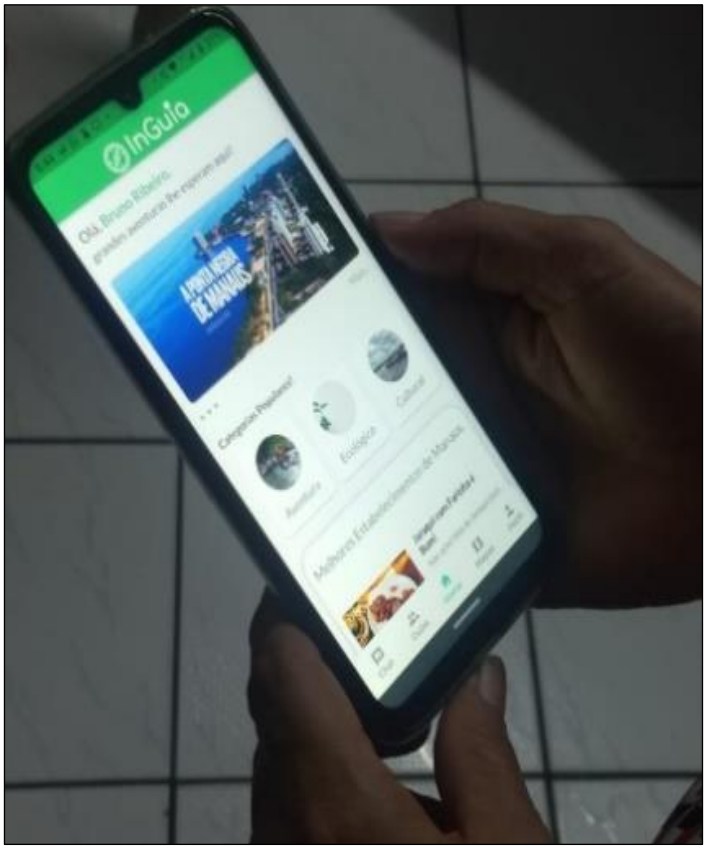



Figure 2: Usability test, home.
Source: Authors, (2020).

It also called attention to the inclusion and opportunities of qualified and regularized tour guides to be able to advertise and publicize their services, since the class suffers a certain neglect caused by the informality of some professionals and the lack of a platform to help in the professional's personal marketing , making an effort to promote itself through customer recommendations.

Tourists were asked to evaluate the interfaces and usability of the tools. the feedback was very positive, they evaluated the interfaces as clean and easy to understand and use even though they were the first contact with the tool.

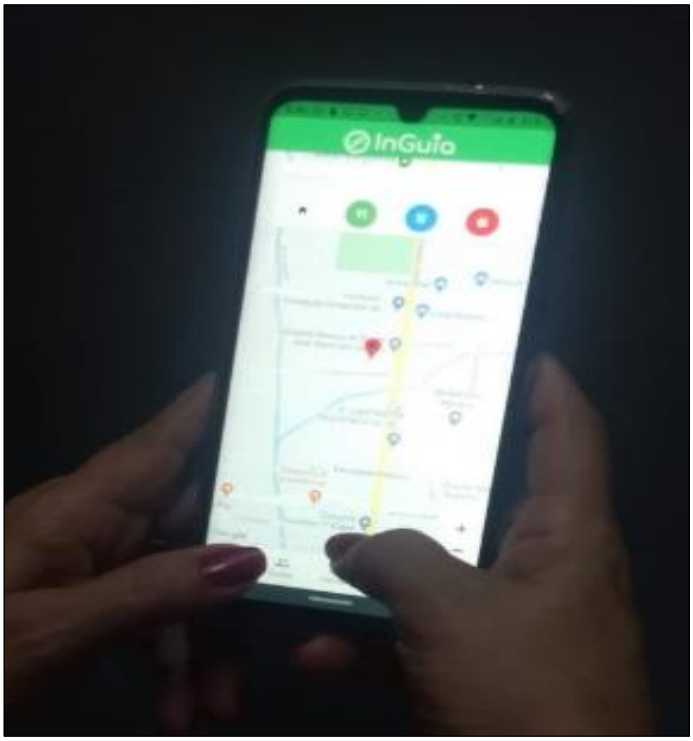



Figure 3: Usability test maps.
Source: Authors, (2020).

The part of the map and the divisions of types of tourism was highlighted by the majority as very interesting because it highlights the tourism segments present in the region and helps in the dissemination and arouses public interest.

As can be seen, the results of the tests carried out were positive and extremely important for the project, in addition to giving tips to complement the platform to better meet the needs of users.

To illustrate the screens, present in the mobile application, some wireframes of them were attached. Figure 4 shows the login screens and the registration screen in case there is no registration on the platform.

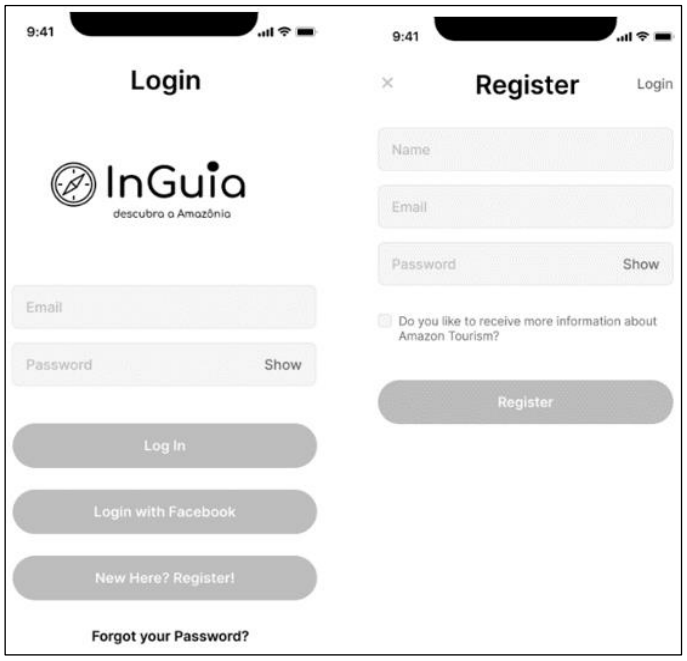



Figure 4: Login and Registration screens.
Source: Authors, (2020).

Figure 5-6 shows screens such as the home screen, where the highlights of the local tourism, the tours, the best-rated tourist spots and the services offered by tourism agencies and tour guides, the product screen with details and observations and the cart that is where the tourist will pay the requested products.

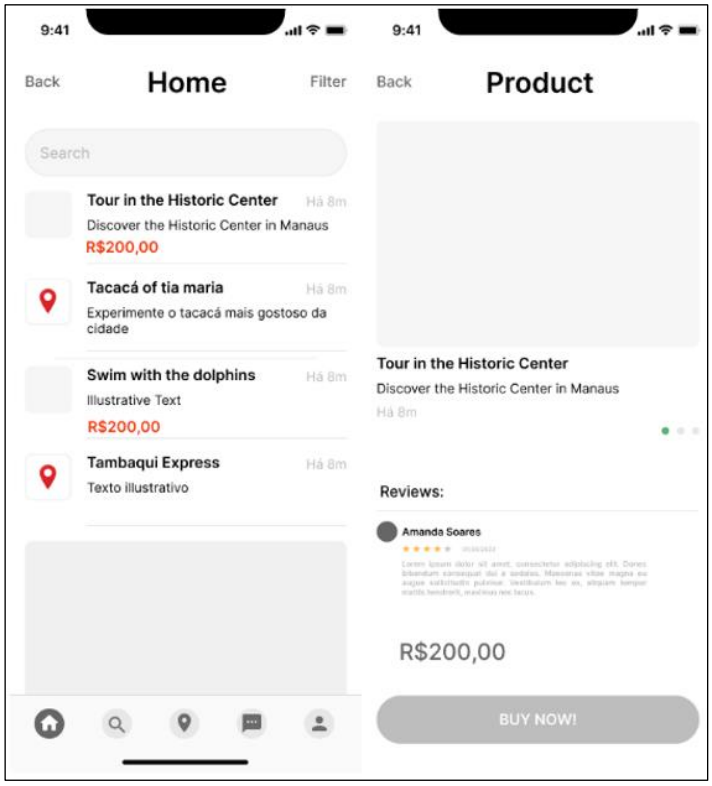



Figure 5: Home screens and product details and purchase.
Source: Authors, (2020).

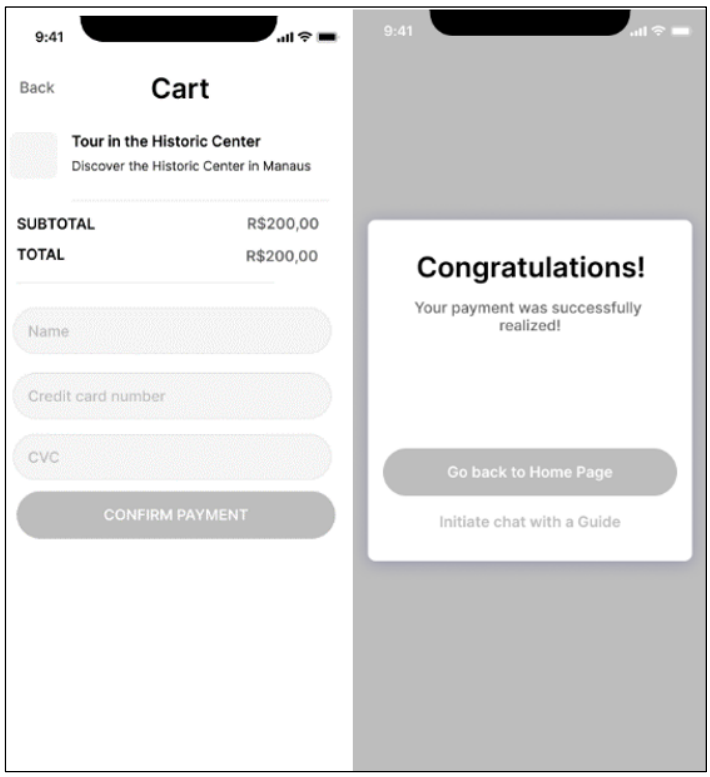



Figure 6: Home screens and product details and purchase completion.
Source: Authors, (2020).

Figure 7 shows the Map with information focused for a tourist, a cleaner map in order to assist the visitor when he is in the city. This map also includes the marketplace of partner establishments.

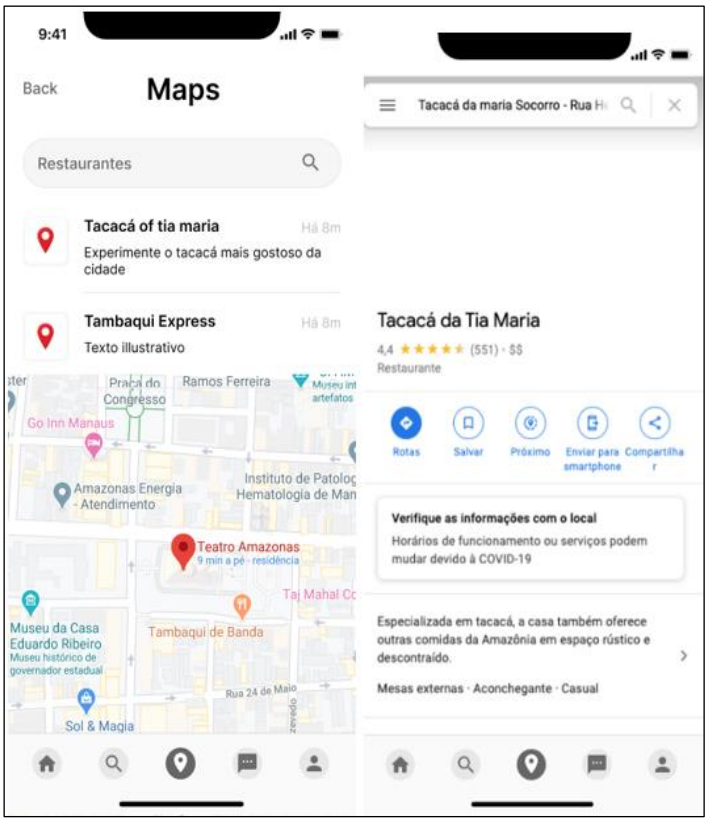



Figure 7: Map and Marketplace of tourist points.
Source: Authors, (2020).

Figure 8 depicts the screens containing the Cards of the guides with evaluations and details of his work, such as the tour specialties he offers and the 'chat' being made available by the application itself, to facilitate communication between tourist-guides. If the tourist has a preference for language or category of tour he can facilitate the search through filters that will be made available.

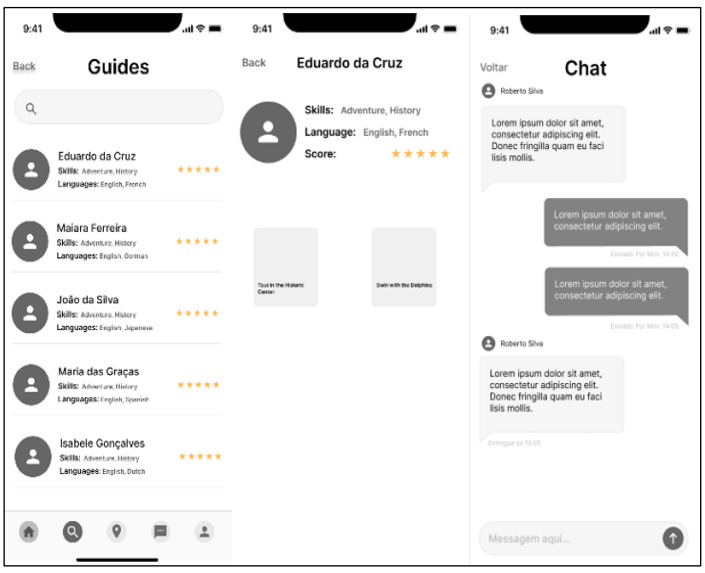



Figure 8: Search screens for tour guides, details and chat.
Source: Authors, (2020).

Figure 9 shows the screens where the guides will have access to the ads linked to them and have control over the comments and evaluations of their customers and view their finances within the platform. The guides registered their skills and the tours they will offer, within the APP, setting the price and offering additional services such as transportation, food, number of hours that will be dedicated to the tour and etc. each guide must report the languages he is fluent in, which type of tourism he is most qualified, such as historical tourism, gastronomic tourism, cultural tourism, adventure tourism, among others, to facilitate the service contract according to his expertise.

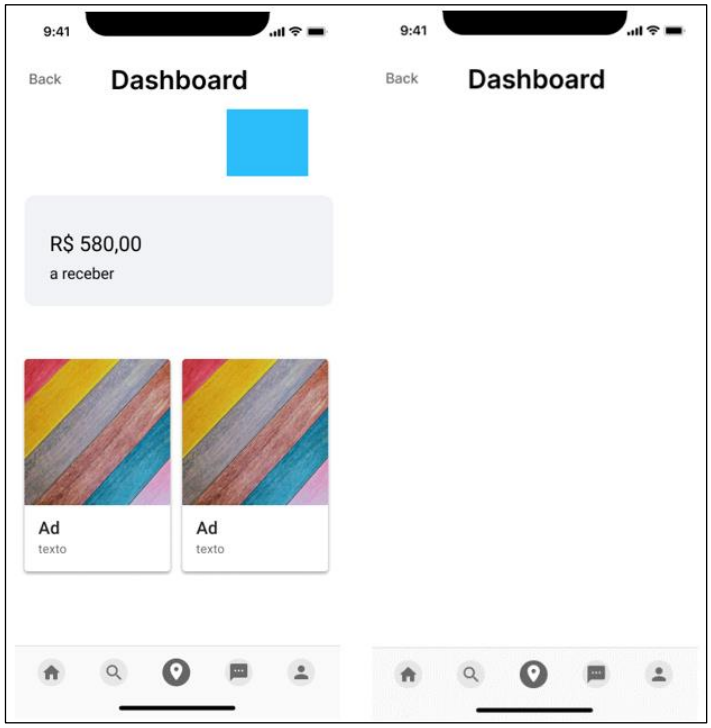



Figure 9: Login and Registration screens.
Source: Authors, (2020).

## V. CONCLUSIONS

In this article, the problem of tourism in Manaus is presented, with a huge potential for tourism, and with a huge variety of places to visit, it shows the bad experience given to the tourist due to the lack of well-defined and updated information. Other than that, there is also a difficulty for those who work directly related to tourism, as in the case of Guides who suffer to create contact with the tourist.

**InGuia** comes as a proposal to solve these problems, giving tourists the opportunity to get to know the city they are going to visit better, bringing accurate information, easy to understand, and easy access. In addition to creating opportunities for Guides to reposition themselves in the market, allowing a better view of the service he proposes.

So **InGuia**, helps both tourists who want to have a better tourist experience, traveling with more convenience and practicality, now that they know they can easily find the information they need, as well as supporting the Guides, allowing the easy exposure of their services.

As previously mentioned, an API REST approach was used, that is, the backend with business rules and database connection will be in an isolated application and the mobile platform will only consume the information from this backend. The next steps now are, finish the backend and deploy this application on AWS or Digital Ocean, which is a cloud service platform, he will be responsible for maintaining the application online so that the mobile platform can access it from anywhere. After that, the Wireframes presented above with Flutter will be improved, making the connection with the backend API, and finally making the platform available for download in the application stores, both for Android and for IOS.

## VI. AUTHOR'S CONTRIBUTION

**Conceptualization:** João Paulo Reis Marques and Bruno Fabiano Silva Ribeiro.
**Methodology:** João Paulo Reis Marques and Bruno Fabiano Silva Ribeiro.
**Discussion of results:** João Paulo Reis Marques, Bruno Fabiano Silva Ribeiro and Manoel Henrique Reis Nascimento.
**Writing – Original Draft:** João Paulo Reis Marques.
**Writing – Review and Editing:** João Paulo Reis Marques and Bruno Fabiano Silva Ribeiro.
**Resources:** Bruno Fabiano Silva Ribeiro.
**Supervision:** Manoel Henrique Reis Nascimento.
**Approval of the final text:** Manoel Henrique Reis Nascimento.

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