

## Article

# Intelligent Digital Platform for Community-Based Rural Tourism—A Novel Concept Development in Peru

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**Abstract:** The COVID-19 pandemic has driven the rapid evolution and digitization of different tourism sectors through Industry 4.0. However, Community-based Rural Tourism (CRT) has not experienced the same technological advancement. Thus, considering tourism as a powerful socio-economic driver, this research is based on the relevance of the CRT for the development of rural areas through job creation, preservation of historical-cultural and architectural heritage, and appreciation of the local market. Therefore, the objective of this paper is to present a concept development model of an intelligent digital platform (IDP), where tourism products and services are visualized, articulated, and integrated with the different actors of the CRT, offering a personalized tourist experience. The concept was developed based on Business Process Management and Business Model Canvas (BMC). Thus, through meetings and interviews, it was possible to extract essential information to obtain the necessary know-how for the development of the concept. It was concluded that the COVID-19 pandemic has established a new business scenario, intensifying and accelerating the use of digital tools and ICTs in several sectors, including tourism. However, the use of ICTs in CRT is still incipient. As Peru is a country where rural tourism has a strong tradition, but there are no specific platforms for CRT, which makes the broad dissemination of rural experiences difficult, a BMC template has been developed to integrate the expected objectives, and the application of the proposed framework serves as a guide for other platforms with different niches markets in the tourism sector.

**Keywords:** community-based rural tourism; business model canvas; intelligent digital platform; business process management; industry 4.0



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## 1. Introduction

Tourism has undergone an intense transformation in recent decades [1]. The accelerated growth associated with the indispensable link with other sectors of the economy contributed to this industry becoming one of the largest in the world [2,3]. Currently, tourism is considered a powerful social, economic, and environmental driver, contributing directly to the development of cities and countries [4]. However, the closing of borders in an effort to contain the COVID-19 pandemic has seriously impacted the sector, reducing the number of travelers around the world by 60–80% [1,5]. As a result, individuals and organizations faced the challenge of reinventing and optimizing their operations, seeking new strategies to adapt to a temporarily collapsing market [1,6]. In this context, as international borders remained closed and the desire to travel increased after months of social distancing, rural destinations became an attractive option, especially for domestic tourists [7,8]. In fact, even before the pandemic, the demand for leisure options that offered genuine contact with nature and with the history and culture of non-urbanized communities was already

expanding [6,9–12]. Therewith, the possibility of enjoying vacations in a quiet environment and away from large urban centers, admittedly areas with a greater probability of virus transmission, effectively boosted rural tourism during the pandemic [5,8,13–17].

The quick ascension of this model, however, has highlighted some of its main weaknesses. Rural tourism strongly depends on the local community's commitment to offer personalized service and attract the attention of potential tourists looking for authentic experiences [18,19]. As a result, the dissemination of rural destinations is traditionally carried out in an informal and unstructured way, where an individual transmits experiences directly to the other, intuitively stimulating the latter's desire to experience the same feelings [20]. During the pandemic, this kind of communication has been hampered, as social distancing has drastically reduced opportunities for a physical encounter. In this context, the habits of potential rural travelers have changed, as emotional decisions have been replaced by detailed online surveys, increasing customer choices and knowledge about the destinations [20–22]. More than ever, rural entrepreneurs needed to adapt, especially those farthest from urban centers, in order to increase their visibility in the digital environment, providing accurate information to their visitors, adding value to their experience [23], and increasing their competitiveness [20,24–26].

However, searching for reliable information and planning a personalized trip on the web is not a trivial task. Most of the information is scattered, incomplete, out of date, or simply does not exist. Rural tourism enterprises face difficulties in implementing more responsive technologies, and end up investing in traditional tools, such as their websites [27]. In addition, different players in the tourism industry use distinct technological platforms to offer traditional travel products, but these platforms are not specialized and do not articulate the several actors in tourism. This model, therefore, does not contribute to tourists' comfort, which needs to use different services, whose operations depend on many stakeholders at multiple levels [7,28,29], such as air or road tickets, accommodation, car rental, tour packages, restaurants, and route planning [30]. Thus, planning a trip can become a tiring marathon, requiring the investment of a considerable amount of time from the user to find the best options. The creation of a new strategic model that can assist in the development of rural destinations as an integrated system is fundamental [31], and innovation is a key element in this process [5].

Technologies for smart tourism greatly impact the satisfaction of support for travel decisions, especially about the quality of the information, the credibility of the source of the information, interactivity, and accessibility [32]. In this sense, an Intelligent Digital Platform (IDP) which articulates the innovation propellers, such as the state, the academy, private companies, and the community, becomes a necessity to be a point of interaction between the different actors to provide specialized information, enhance the visibility of tourist resources and attractions, absorb travel experiences in the tourist destinations offered on the platform, articulate the actors of the rural tourism, and promote and market tourism products. In the literature, different definitions and types of digital platforms are found. According to Cenamor et al. [33], the digital platform is a digital information technology that supports information exchange activities and allows companies to homogenize, edit, and share data. On the other hand, Wang et al. [34] emphasized electronic interconnection and online collaboration with partners, while Karhu et al. [35] defined a digital platform as an extensible digital core that is equipped with plugins for third parties.

Marketing by the platform would be available to a larger volume of people at a fair cost, facilitating direct communication between travelers and local initiatives, minimizing intermediation so that the greatest benefits are for local communities. On the other hand, tourists will be able to plan their personalized trip through operations research techniques and artificial intelligence. Finally, the information that is left on the platform would serve the academy in carrying out Research, Development, and Innovation (R + D + I), work in data science, tourism intelligence, and artificial intelligence, allowing the continuous improvement of the platform and the processes directly involved with the rural tourism.

Most of the literature on the subject highlights the benefits, challenges, and relevance of rural tourism in sustainability, but few address the practical development of a business model that supports the sustainable and intelligent growth of this market. Thus, considering Peru as a country of ancestral traditions and with a strong vocation for rural tourism, but where digital technologies still face great resistance to be widely adopted, it is understood that the creation of platforms that can provide a stronger and easier link between the tourism industry and the final customer is extremely relevant. Therefore, the objective of this paper is to present the development of a concept of a new business co-creation model in an IDP for rural tourism in Peru, where artificial intelligence, operational research, and data analysis techniques were used. The concept presented for the development is based on a Business Model Canvas (BMC) in terms of its structure and operability, as a management tool, through an adequate flow of information between the different actors in the Peruvian tourism industry, to facilitate development between regions, for the management of tourism resources and activities.

## 2. Literature Review

### 2.1. Community-Based Rural Tourism (CRT)

The concept of rural tourism is not new, since it has been addressed in the literature for decades [36,37]. However, as there is still no consensus on a universal definition on the subject [38], the most basic meaning of this kind of tourism remains an activity that takes place in rural areas with a pastoral beauty [1,39] and with strong traditional folklore [40]. These are attributes that attract visitors to discover the rural way of life [4]. The idea is based on the essence of tourism, where people move temporarily “to discover new things and exchange cultures” [41]. Considering the rapid advance of urbanization and the corresponding exponential increase in the urban population around the world, there is a growing concern about the vitalization of rural space [42]. The state of attention, nonetheless, is not only due to the preservation of the natural environment but also to the resilience of communities that inhabit areas far from large urban centers. Taking into account the unstable nature of agricultural activity [43], rural tourism contributes to the social, environmental, and economic evolution of these communities, providing them with the possibility to develop in a sustainable way [7,29]. Indeed, the promotion of tourism in small rural villages can favor the creation of jobs [44], the preservation of the historical-cultural and architectural heritage [1], the alleviation of poverty [45], and the enhancement of the local market [46], among other benefits.

The practical implications of the rural tourism evolution, however, are complex, largely due to its dynamic and multifaceted nature [6,36]. Tourism activity, in essence, demands direct and indirect connections between different sectors of the economy [28], such as restaurants, construction, and artisanal productions [1]. This network involves several stakeholders representing the local community, the private sector, and local authorities [7]. Furthermore, rural destinations have some characteristics that differentiate them from other tourist destinations [26], especially regarding the relevance of small and medium-sized companies to the success of these ventures [1]. In rural tourism, a significant portion of the business is managed by the local population, whose lifestyle is an integral and fundamental part of the attraction. In this sense, healthy interaction between hosts and tourists is crucial for the development of this tourism model [26] and can be achieved through a collective effort of hosts [36,47]. That is, rural tourism is a business activity that must include elements of Community-Based Tourism (CBT) [7,48]. CBT focuses on interactions between local communities and tourists [49], strengthening community organizations [48], being “managed and owned by the community and for the community” [50].

The growing importance of rural tourism allowed it to define its own acronym, Community-based Rural Tourism (CRT). CRT is any tourist activity that takes place in a rural environment in a planned and sustainable way, under management models with active participation and leadership of local populations, represented by community-based organizations, which integrates harmoniously with the traditional local economy to contribute to

community development. The sustainable CRT mainly emphasizes social, environmental, economic, and cultural sustainability, empowering local communities in any aspect of tourism management [49,51–53]. Therefore, different studies have shown that the main trend of domestic tourism flows from cities to the countryside and the importance of the community in this process [54,55]. In this context, according to He et al. [39], “rural tourism is a new multi-modal tourism involving play, relaxation, vacation, creation, shopping, and learning”; hence, the difficulties of coordinating different systems managed by different stakeholders must be considered [56]. Thus, there is an urgency to develop an integrated system [7], which can only be operationalized through a digital transformation of the sector.

## 2.2. Digital Transformation for CRT

In recent years, the digital transformation of the tourism sector has changed demand and supply, offering increasing interaction in this industry, and the internet has become a crucial marketing tool, promoting the flow of information for business purposes [57]. Digitization has fundamentally changed organizational structures and processes, affecting the way people interact with each other. This phenomenon impacts organizational culture [58–61], promotes new business models [62], and redesigns relationships between companies and consumers [63,64]. Moreover, it composes platform-based alliances [65], networks between platform partners, and collaboration and competition between incumbents and participants through their digital platforms [66,67], as well as adding value to the challenges of service innovation [61].

There are already several technological solutions in the tourism sector, such as [TripAdvisor](#), [tripadvisor.com](#), [travelocity.com](#), [visiteurope.com](#), and [airbnb.com](#) (accessed on 24 April 2022), among others, which provide a direct channel between suppliers and consumers, reducing dependence on intermediaries [48,68]. These tools have gained popularity in recent years, showing the growing importance of e-tourism to meet tourism needs [69–71]. However, little to no attention has been paid to the digital transformation in Community-based Rural Tourism (CRT). In fact, according to Zhao et al. [30], e-commerce and e-tourism started late in rural destinations, either due to lack of internet access or digital illiteracy. Faced with this reality, CRT entrepreneurs are not oblivious to this and must be adapted to all areas of digital society, and to new information and communication technologies [72]. In this work, the Digital Platform (DP) for the CRT is defined as that it facilitates direct communication between tourists who want personalized experiences with local initiatives, exchanges information, giving visibility and promotion to potential tourism resources, shares data and experiences, promotes informal disintermediation, generates greater economic benefits for local entrepreneurs and satisfaction for tourists, and integrates digital technologies in the organizational context.

From its most basic design of displaying information to attract tourists to providing ongoing support to customers, and enabling real-time database updates [30], the advantages of joining digitalization outweigh the technical and cultural difficulties. However, with the advancement of technology, common websites began to enter a state of obsolescence, since recently, new terms emerged and are being massively used to solve industry 4.0 problems, such as additive manufacturing, artificial intelligence, big data, blockchain, cyber-physical, data analytics, Internet of Things, and machine learning [73]. In the tourism industry, some of them have also been used, which represent fundamental elements to provide personalized tourism experiences and achieve the digital transformation in the sector, towards more intelligent and competitive systems [74]. Data analytics is being used to support data-driven decisions and is an important source of knowledge for decision making based on user-generated content [75]. Several publications have highlighted the benefits of Big Data for tourism research, which are closely related to emerging technologies, new data processing skills, and new applications [76,77]. Cuomo et al. [78] presented how to apply “big social data” in the co-design of the tourist experience, providing greater value for visitors and a better decision-making approach, as visitors can better understand the places they want to see through digital visualization [30]. Internet of Things (IoT) is still incipient

in the tourism literature. In one of the few papers found, Pappas et al. [79] correlated the complexity of decision-making processes and IoT adoption. Blockchain research is also in a maturing phase. Luo and Zhou [77] implemented a blockchain-based platform for smart tourism, which can link the tourism company and visitors to improve the efficiency of the tourism industry.

In addition, various authors consider the capabilities of digital platforms as a value-creation factor [33,34]. Wang et al. [34] determine two types of digital platform capabilities aimed at two different markets (consumers and companies), i.e., the Digital Platform Capacity in Consumers (DPCC) and Digital Platform Capacity in Companies (DPCB). DPCC refers to the ability of a company's digital platform to help consumers learn and share information, experience, and knowledge. DPCB refers to the ability of a company's digital platform to conduct business with the company's customers and help them reach consumers. However, it has not been possible to verify, in the literature, a digital platform that simultaneously considers and benefits consumers and businesses (tourists, local businessmen, and direct actors). To obtain this mutual benefit and implement the platform, it is necessary to consider Artificial Intelligence. In this context, an IDP for the CRT, in addition to what has been explained, uses artificial intelligence techniques (heuristics and metaheuristics) to recommend personalized and optimized intelligent routes to tourists, as well as using data analysis to discover new needs of tourists (products and services) with the data stored in the platform. In this way, the platform will manage to increase the benefits for CRT entrepreneurs and offer the tourist (Traveler 2.0) a more intelligent and personalized travel experience.

The necessary digitization of local agents allows the establishment of collaboration models that explore natural skills (communicative, territorial, social, etc.) and the reliability of those who experience the tourist destination first-hand. This becomes a great source of value, encouraging the tourist to identify with the main characteristics of the place. The digitization of the rural tourism industry will provide access to information about the destination of these visitors [80], making their experience memorable, as long as the information is found on the internet. This free and easy access to information is extremely relevant, as younger tourists are increasingly dependent on digital applications [81], whether to book hotels and restaurants, assess the quality of services, or just share their travel stories on social media [82]. However, the literature is still incipient on technological platforms for the tourism sector, and a consistent model that articulates the actors of the CRT was not found. In this context, academia participation in the rural tourism innovation ecosystem can help to mitigate the risks of technological innovation for companies [20]. Therefore, this paper presents the concept of IDP development for CRT based on Business Model Canvas (BMC).

### *2.3. Rural Tourism in Peru*

Tourism encourages the emergence of new trends and travelers appear in search of new tourist segments to explore. CRT is promoted in Peru through a national program (Programa Nacional de Turismo Rural Comunitario) aimed at empowering communities and promoting sustainable development [83]. To implement this strategy, Peru has developed "Guidelines for the development of rural community tourism", which include a definition of the Peruvian model, conditions for the development of Rural Community Tourism, and models of entrepreneurship and management of Rural Community Tourism.

In 2019, the Peruvian Ministerial Resolution No. 402-2019, repeals the previous guidelines and approves the regulatory document called "Guidelines for the development of Community Tourism in Peru", where it is present 4 reasons to make the change of denomination from Rural Community Tourism to Community Tourism, and consider that the rural continues to be an intrinsic concept of Community Tourism. In this work the denomination of CRT will be maintained because the proposed platform is directly focused on the definition of CRT that was given previously.

According to Ypeij and Zorn [84], the beginnings of Rural Tourism in Peru originated in the southern highlands of the country, specifically on the island of Taquile, in 1976, when

backpacker tourists began to travel to South America in large numbers. Especially in those early days, the Taquileños managed to control the tourist trade and reaped its economic and social benefits. In addition to textiles, Taquile became known for its community development model that served as an example for development projects around the world. This initiative was initially successful with the help of a hitherto uninvestigated group of individual foreigners [85]. Since the Taquile experiential enterprise began in the mid-1980s, tourism remained controlled by the islanders themselves. The boats belonged to community partners, while accommodation and food were offered in houses that were managed collectively.

Zorn and Farthing [85] conducted a long-term ethnographic evaluation of the development, management, and decline of community tourism in Taquile, focusing on the relationships between hosts and external agents/mediators (intermediaries). Relations with external tour operators and guides have generally been acrimonious due to competition for control of transport and the type of tourism that externals promote. The study points to the need for further investigation of the potential impact of this type of intermediary/broker, particularly in relation to public sector investment and development. To combat these challenges, it is essential that there is a participatory model that involves the community as a whole and that long-term capacity development programs are planned.

### 3. Materials and Methods

One of the tools used in strategic planning and that helps decision-making to chart the future trajectory of organizations is the SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) [86]. In this work, emphasis was placed on the strengths and opportunities, considering the different needs of the direct actors, the regulations, and tourism trends, with the purpose of presenting an electronic government model for the CRT.

From the knowledge of the strengths and opportunities in the CRT, the IDP conceptual development begins, as well as the identification of the platform functional requirements, in such a way that it satisfies the needs of the different direct actors. The processes were identified and modeled with Business Process Management, which is a set of methods, tools, and technologies used to design, represent, analyze, and control the operational processes of the business [87].

The main steps of this process are:

- Identify the processes: In this stage, an analysis of the existing processes was made for the different CRT actors, using various techniques such as on-site visits, interviews, and bibliographic review. Then, the processes desired by the different actors were identified.
- Identify process owners: People involved with the processes (owners of the processes) were identified, especially those in leadership positions.
- Maintain the relationship between the processes: It was assumed that the business processes are not isolated, but maintain a certain level of relationship between them, so emphasis was given when representing the processes.
- Keep record: All stages of process modeling were documented, recording the evidence so that the identified processes can be subsequently reviewed, analyzed, and validated. It is necessary to highlight that the documentation was not necessarily only physical documentation, but also digital.

According to the ISO 9241-210/2019 user experience (UX) is “the result of a person’s perceptions and responses to the use and anticipated use of a product, system or service”. To develop the platform concept and identify the functional requirements, visits were made to different experiences at national and international level, as well as to institutions, public, and private projects that work with this type of tourism. Through meetings and interviews (previous communication by telephone), it was possible to extract essential information to obtain the necessary know-how for the development of the concept. In addition, relevant information was obtained from related scientific articles, reports, official

websites, and official documents in general, as well as the recommendations of the possible users, were considered.

Validation and prioritization were carried out through the following steps:

- Requirements prioritization: after being identified, the list of requirements of the digital platform was prioritized.
- List of tasks that must be performed during a certain period of time.
- Analysis of the initial requirement: after obtaining the list of tasks, the class diagram of the selected requirements was made, for which the classes involved were identified and the relationships between them were analyzed.
- Elaboration of the platform structure: platform concept development design.
- Training: subsequently, training was provided on the usability of different platforms on the market for local entrepreneurs who would be tourist advisors, formed by members of indigenous and peasant communities, who were unaware of the existence of similar platforms and had never had access to their use. They were taught the use of certain platforms (booking, Airbnb, TripAdvisor, and the website of the community tourism program of Peru), and with this acquired knowledge, they were able to understand the development of the platform concept and eventually be part of the co-creation of it. New usability requirements were identified for local tour guides, among them, that the platform should have more information about tourist resources/attractions so that they can learn tourist information, and thus, better guide tourists.

This research adopts a methodological approach based on the Business Model Canvas (BMC) for the conceptual development of the proposed digital platform [88–90]. According to Osterwalder and Pigneur [87], a business model can be defined as “the way organizations create, deliver, and capture value”. In other words, the purpose of a business model is to support strategies so that companies in any sector can objectively demonstrate to their investors, customers, and the market their ability to generate value for their product or service [91,92]. Consequently, in the last ten years, the topic has gradually gained the attention of academia and the business sector [92,93]. Currently, considering the existing literature, the most used business model is the BMC [91,94]. Developed by Osterwalder and Pigneur [87], BMC is a flexible and easy-to-understand visual management tool that helps to identify the vital elements of a business, allowing new ideas and hypotheses to be analyzed before the business plan matures [91,95,96]. This interactive framework highlights the relationships between competencies and capabilities with external segments [92], helping organizations to structure their action plan and clearly communicate their business logic [97], enabling a better understanding of what should be delivered to the customer and how the process should be conducted [98].

The BMC is composed of nine categories or blocks [92,95,99]: Value proposition; Key partners; Key activities; Key resources; Customer relationships; Channels; Customer segments; Cost structure; and Revenue streams. These nine blocks can be divided into four main groups: Business core; Internal factors; External factors; and Financial factors (Figure 1).

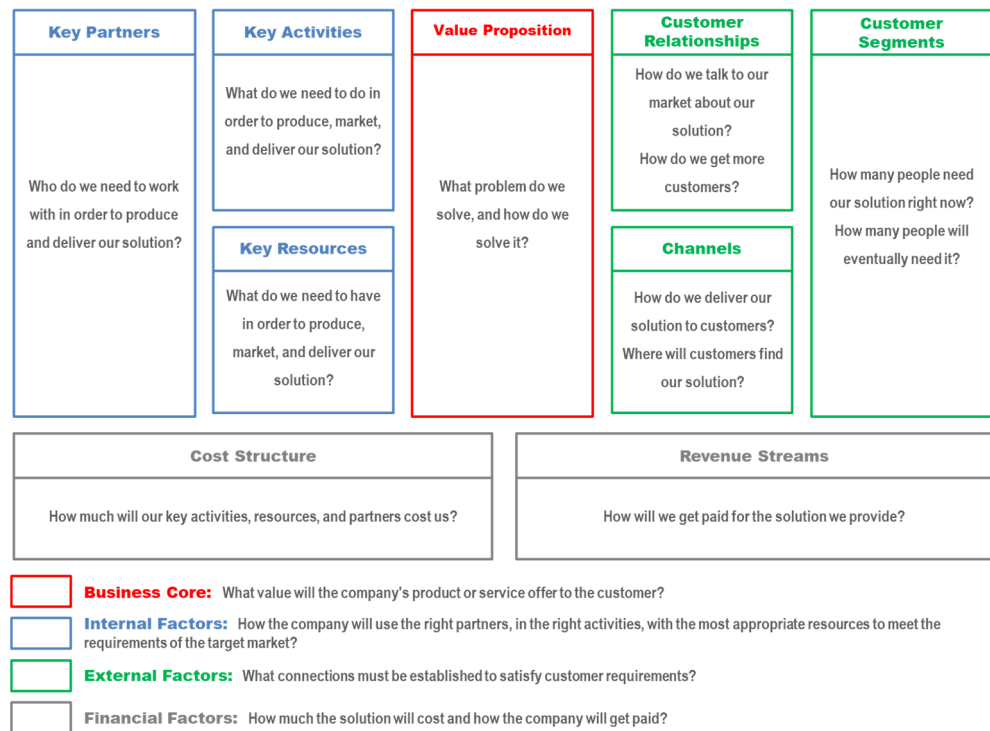


Figure 1. Business model canvas. Adapted from [97].

The development process model is characterized by being iterative and incremental. The project is divided into iterations or mini-projects that generate an increase in the system, following a four steps spiral scheme: Pre-feasibility study; Project formulation; Project execution; and Solution validation. In the Pre-feasibility study, the objective is to analyze the problem domain through a business model, in order to generate the responsibility establishment model describing the scope of the solution system. Regarding the Project formulation, the objective is to analyze the essential aspects of the implementation of the IDP in order to ensure its feasibility. In this phase, the reference architecture that supports the development of the platform is defined. In the Project execution step, the purpose is the implementation of the IDP in its corresponding versions. Finally, in the Solution validation step, the objective is to start the platform, detecting and correcting possible failures until customer satisfaction is achieved. As a result of the implementation, a set of representations of the solution system with different levels of abstraction is obtained, which are described in Figure 2.



Figure 2. Abstraction levels for the solution system. Source: the authors.

In this sense, this paper emphasizes the Pre-feasibility phase to present the concept of the business model developed for the CRT. The idea of creating a concept development model is based on several reasons, such as the demand and supply of the tourism market, the interaction between the players in the tourism sector, the development of IT tools for CRT, and the belief that the Business Model Canvas (BMC) fits as a useful management tool to present the developed concept of IDP. Table 1 presents the research methodological framework, that is, the sequence of phases and iterations performed to propose the BMC for the IDP.

**Table 1.** Methodological framework—Phases and iterations for the IDP.

Phase	Step	Activity
Initial Phase	Step 1	<ul style="list-style-type: none"> <li>• Literature review regarding electronic platforms and CRT business models;</li> <li>• Visits to experiences in CRT;</li> <li>• Process models;</li> <li>• Coordination with CRT actors and the demand;</li> <li>• Preparation of the information ranking;</li> <li>• Analysis of the CRT sector needs;</li> <li>• Identification of interests.</li> </ul>
	Step 2	<ul style="list-style-type: none"> <li>• Identification of the functional requirements;</li> <li>• Planning the development of the IDP in the first iteration;</li> <li>• Analysis of the requirements of the first iteration, obtaining the task list;</li> <li>• Development of the platform framework with an emphasis on scalability and ease of maintenance, using agile development technologies.</li> </ul>
Iterative Phase	Step 3	<ul style="list-style-type: none"> <li>• Identification of new functional requirements for platform usability and user experience;</li> <li>• Analysis of requirements, obtaining the task list;</li> <li>• Redesign of the platform’s website.</li> </ul>
	Step 4	<ul style="list-style-type: none"> <li>• Training on the usability of the platform for the actors involved in the offer;</li> <li>• Training on platform usability for demand actors;</li> <li>• Creation of acceptance tests;</li> <li>• Redesign of the platform’s website.</li> </ul>
Incremental Phase	Step 5	<ul style="list-style-type: none"> <li>• Adaptation of the BMC to the needs of the CRT;</li> <li>• Design of BMC for the e-platform in CRT;</li> <li>• Development of the IDP concept for the CRT.</li> </ul>

Source: the authors.

#### 4. Results and Discussion

The use of technological platforms, in times of COVID-19, brings many benefits to rural tourism service providers and tourists, in terms of information for the organization of their personalized trips. One of the main reasons we chose to develop the concept of a digital platform for rural community tourism through the BMC is because Peru is among the ten countries with the greatest biodiversity in the world, also known as “megadiverse countries”, for its variety of ecosystems, species, genetic resources, and indigenous cultures with valuable knowledge [100]. In this way, it meets the appropriate conditions to develop Community Rural Tourism in a sustainable way.

According to Knight and Cotrell [83], the affirmation that CRT has led to poverty alleviation of the communities under consideration is a weak statement. However, CRT can lead to the simultaneous empowerment and disempowerment of individuals in communities, depending on particular expressions of power, such as dominance, agency, collectivity, or self-awareness. On the other hand, the pandemic has accelerated the digital transformation in the tourism sector [78,101–103]. The study conducted by Abbas et al. [103] determined that tourism companies and academics must consider and change the basic principles, the main assumptions, and the organizational situations related to the research and practice framework through the reconstruction and establishment of the tourism sector. The investment should not be for the increase in the number of visitors but for “better trips, more comfortable, personalized service, maintaining affordable prices”. In this sense, it

is necessary to make a fundamental change in organizational processes, new business models, relationships between supply and demand, alliances, network of partners, and collaboration. This could be achieved through a digital platform that has capacity for all the actors involved in the CRT. This model has not been verified in the literature, so the development of the IDP concept for CRT needs Artificial Intelligence tools so that all direct actors in the chain obtain benefits, mainly the active participation of the local community.

The local cultural wealth in most cases is not visible on the internet, since a large part of the rural population does not use Information and Communications Technology (ICT). Thus, the information is not automated, and there are digital gaps. The purpose of presenting the development model concept is that all indigenous or native peoples, as well as indigenous and peasant communities, are visited by responsible tourists. That way, social inclusion is carried out, digital gaps are closed, savings are generated, and the marketing of their products is fair and through the platform; in such a way that intermediation is minimized and the environment is preserved through ancestral knowledge, which is passed on for generations.

In this context, to define the main functionalities and usability of the platform, this research was carried out in conjunction with actors from the different drivers of the innovation model. Institutions that financed the implementation through research, as well as institutions linked to the tourism sector, provided representative information from the state. The academy was responsible for implementing the platform and was in charge of being the coordinating body of all the institutions in all the propellers of the Research, Development, and Innovation (R + D + I) model in the tourism sector. The company was represented by travel agencies. Finally, the community participated individually or through associations, such as tourism organizations.

Thus, the platform will be used by different actors, both in supply and demand. However, in terms of supply, it is the rural entrepreneurs who would use it to offer their services. To this end, a course-workshop called "Use of ICTs for CRT" was held, where entrepreneurs were taught the use of email, social networks, Google maps, platforms with tourist information, and the digital platform that is presented in this paper. Participants were trained on two different dates, for a total of 16 h. Fifty CRT entrepreneurs participated in the course, most of whom had never had contact with a computer. On the other hand, on the demand side, our digital platform was validated with tourists who went to tourist attractions, Systems Engineering students, representatives of NGOs (non-governmental organizations) that worked in CRT and representatives of Peruvian state institutions.

#### *4.1. Usability and Main Functionalities of the IDP*

The usability definition and the platform main functionalities identification were carried out through technical visits to public and private projects, which promote CRT-like experiences. The objective of the visits was to experiment, observe, and carry out interviews to obtain relevant information, evaluating the usefulness of its possible functionalities and difficulties that could exist. Thereby, the information was extracted to obtain the necessary requirements for the feasibility of the platform. Additionally, a literature review was conducted in reports, official websites, and official documents. The potential benefits of using the platform for tourists and CRT stakeholders were defined in their respective innovation aspects, ordered from the highest to the lowest degree of usability, concerning the information and the main functions of the IDP (Table 2).

**Table 2.** Usability and main functions of the IDP.

Innovation Aspects	Usability and Functions
Community	<ol style="list-style-type: none"> <li>1. CRT's business model.</li> <li>2. Visibility of your rural enterprises in the CRT;</li> <li>3. Marketing of tourist services;</li> <li>4. Management of your business information;</li> <li>5. Direct communication with the tourist.</li> </ol>
Use for tourists	<ol style="list-style-type: none"> <li>1. Centralized CRT information;</li> <li>2. Initial experience with CRT through the platform;</li> <li>3. Online payment of tourist services;</li> <li>4. Control of your travel experience;</li> <li>5. Direct communication with the rural entrepreneur;</li> <li>6. Reservation of services;</li> <li>7. Tourist or visitor opinion forum;</li> <li>8. Trip planner.</li> </ol>
Tourism companies	<ol style="list-style-type: none"> <li>1. Marketing of tour packages based on CRT;</li> <li>2. Alliances/synergies with communities;</li> <li>3. Diversification of the tourist product offered.</li> </ol>
State	<ol style="list-style-type: none"> <li>1. Visibility of tourist resources and services;</li> <li>2. Data to perform tourism intelligence.</li> </ol>

Source: the authors.

It is worth mentioning that the use of the IDP is similar for both tourists and travel agencies in terms of obtaining information. While tourists define their own personalized travel itinerary, the travel agency uses it to plan tour packages and offer them to its customers.

Community members identified four reasons to be part of the IDP: (i) visibility on the internet, promoting their products; (ii) information management that would be carried out by the administrators; (iii) payment for services would be made directly, without the need for intermediaries (international tour operator; national tour operator; travel agency; tour guide; and in some cases, local people); (iv) the use of other tools and services to gain visibility on the internet would be carried out by the platform administrators. For travel agencies, the main benefit is information for offering tourist packages with visits to tourist resources close to cities and communities, as well as possible alliances and synergies with communities. For academia, the main benefit is having data to identify the tourist profile, perform tourist intelligence, evaluate tourist destinations, and propose public policies based on R + D + I. For the state, the main benefit is closing gaps in social inclusion, digital literacy, territorial development, care for the environment, recovery of ancestral knowledge, and above all, proposing public policies based on R + D + I.

#### 4.2. Concept Development for Intelligent Digital Platforms in CRT

The business model proposal was developed using the Business Model Canvas (BMC) template, corresponding to the planning and design phase, which makes it easier to present the main components of the IDP and describe key areas, identify customers, mutual relationships, and channels to reach them. In the initial phase of the platform design, the BMC model allows the creation of several possibilities for its operation, as well as giving value to different activities that can be offered to tourists and other actors in the CRT production chain. The elements of the BMC method in this case study are explained below.

(a) Value proposition: This consists of the business core of any company. That is, how the company will differentiate itself from its competitors [104]. For this case study, the value proposition is based on offering a comprehensive CRT service in Peru, where ancestral knowledge is revalued, taking care of the environment, and respecting cultural diversity, among others. In addition, the value proposition focuses on offering different options for each client to customize their trip, so that they can choose accommodations, services, activities, and tours simply and practically, according to their needs and preferences. In

addition to the possibility of canceling the contracted services according to their budget. Thus, tourists will leave their fingerprints on the IDP, and this information can be used to carry out the continuous improvement of the tourist product.

(b) Key Partners: A network of reliable and efficient partners is crucial to minimize risks [104], especially in CRT. An extensive list of elements must be considered during the process of choosing strategic partners, such as linking to the value proposition, selection criteria, and developing a win-win relationship [105]. In this case study, the main network of members are rural entrepreneurs and other actors related to the CRT. It is precisely through this network of associates that customers learn about the services offered at the platform. Tourism agencies, tour operators, and different websites that people in the target segment visit regularly are highlighted.

(c) Key Activities: These can be defined as the activities that make the business a reality [104]. That is, actions that must be carried out continuously to create value for the product or service. This research considers actions related to the development, updating, and maintenance of the platform as key activities, as well as the creation of new products and continuous capture of potential customers.

(d) Key Resources: These are the elements needed to put the key activities into practice. In the proposed model, internet access, use of mobile apps, travel planners, and online payment tools can be considered the main resources, as well as the information that will be stored in the database, so that data analysis can be carried out later for strategic planning according to customer needs and preferences. This will allow recognizing the behavior patterns of new customers and suppliers to identify opportunities, improve services, identify existing gaps, and generate opportunities for continuous improvement.

(e) Customer Relationships: The relationship with customers can be considered the driving force of a company. As a community is established around its products and services, the company gets a wider reach for new releases. However, each segment has its own needs. The model proposed in this case study aims to retain consumers by providing a personalized experience since they are the ones who will promote and encourage the use of the platform. Relationships will also be fostered through IDP, social media, social networks, and the telephone.

(f) Channels: Elements that define how the product or service will reach the customer segment and convey the value propositions broadly and efficiently [104,105]. This research identified two main distribution channels for the case study, face-to-face and online. The first will be through the same entrepreneurs and CRT organizations. The second will be in the business-to-consumer (B2C) model, where commercialization is carried out between the company (the rural entrepreneur) and the customers. Thus, entrepreneurs can offer their customers the convenience of making purchases through the platform, in addition to attracting new customers.

(g) Customer Segments: The target customer segment is determined based on information obtained from studies of the tourist profile carried out by CRTs, based on demographic parameters, activities, social class, lifestyle, similar experiences, and interviews. CRT tourists, travel agencies, and companies that organize trips for their employees, as well as local actors that will integrate the platform were identified as potential customers. An effective BMC is a consequence of the correct identification of customers [105].

(h) Cost Structure: Describes the cost associated with the structure needed to offer the product or service. For this case study, the initial costs refer to the effective development of the digital platform. Once the service is up and running, the costs of maintaining the site, basic services, supplies, and staff salaries, among others, are added up. For the IDP, they are associated with the development process and servers and updating the customer record and the monitoring system. The cost of maintaining the tool and the website is also considered.

(i) Revenue Stream: Describes the strategy used to monetize each customer segment [105]. The billing method is to make a reservation and then pay in person. However, with a payment gateway, payments can be made via credit card or another method. In

connection with the platform, income will be derived from the services offered and training to use the tool, as well as advertisements that may appear on the platform. Prices vary according to the number of services contracted by customers.

The identification of modules was developed under the incremental and iterative model of software development. In this sense, the analysis of the research results allowed the proposal of a concept for the development of the IDP for CRT and a business model (Figure 3).

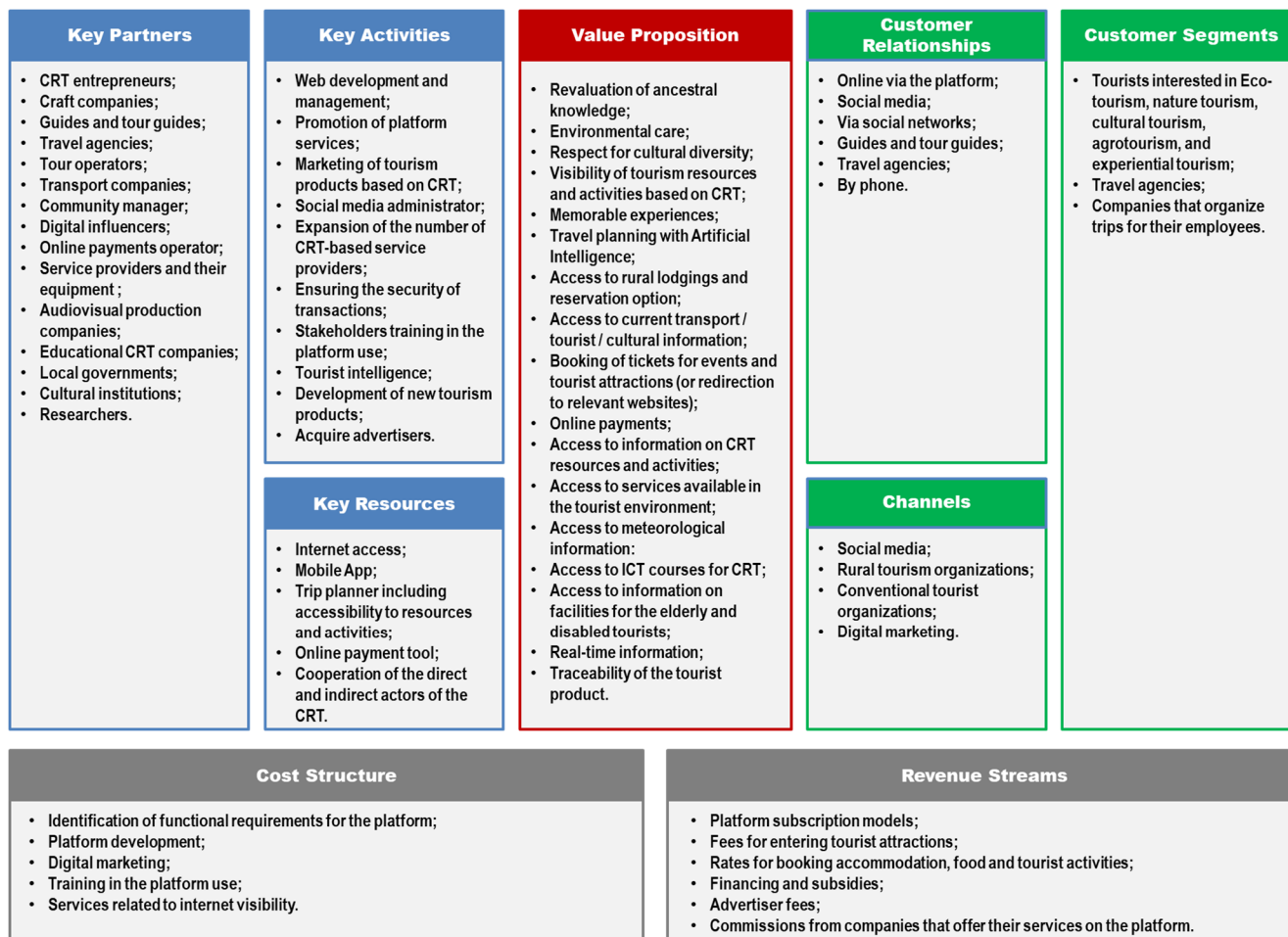


Figure 3. Business model canvas template in the planning phase. Source: the authors.

The BMC made it possible to quickly and accurately identify the different possibilities of its operation and the formulation of business ideas, not only for the platform but also adding value for the different stakeholders.

### 5. Conclusions

The COVID-19 pandemic has established a new business scenario, intensifying and accelerating the use of digital tools and ICTs in several sectors, as well as the use of Artificial Intelligence, Data Science, Operations Research, Big Data, and Blockchain. One of the most affected industries was tourism, forcing establishments to adapt to new health standards and protocols. The use of ICTs in community-based rural tourism is still incipient. The existing electronic platforms do not fully meet the expectations of rural tourists, as they do not present basic information in a single place. Data on services provided, local attractions, travel time, and distance, among others, are spread across the internet. Thus, complete information obtained in a single platform could contribute to the effective use of facilities, better management, and facilitate access to this tourism category for different social groups.

Peru is a country where rural tourism has a strong tradition. However, there are no specific platforms for CRT, which makes it difficult to disseminate experiences widely, as well as to promote activities with ancestral knowledge. Basic information, such as the provision of services around tourist resources by native people, indigenous communities, and peasants, is lacking. Considering that the authors are not aware of the existence of other publications that indicate practical actions for the development of strategies aimed at implementing Intelligent Digital Platforms in Peru, the novelty of this research is to use data collected from the local population to generate a concept of IDP. Hence, this paper presents the original concept of an IDP business model for the CRT using the Business Model Canvas tool. A BMC template has been developed to integrate and articulate the expected objectives. The application of the proposed framework serves as a guide for other platforms with different market niches in the tourism sector, as well as for the different actors of the state, academy, companies, and communities to implement the concept to develop the idea that combines the CRT with the tools of ICTs, Artificial Intelligence, Operations Research, and Data Science.

However, despite the direct benefits of using this kind of platform to improve the quality of services provided in CRT destinations and for local development, this research is subject to some limitations that must be considered, and some may serve as a stimulus for future work. First, although the platform itself consists of a generic model, which can be replicated in other scenarios, its scope must be customized to the local reality, taking into account the culture, heritage, and customs of the hosts. In this way, the community will feel included in the process, increasing the chances of success of the project. Second, regarding the Business Model Canvas, the tool provides an overview of the business but lacks depth in terms of data [98]. Therefore, further work should consider the use of hybrid business planning models. Finally, current research can be extended in several directions. We hope that the results of this work, which focused on the “Pre-feasibility Study” stage, will stimulate the development of studies that completes the implementation of an IDP for Peru, that is, the development of the stages of “Project Formulation”, “Project Execution”, and “Solution Validation”. Furthermore, among the future works that can be carried out are applications where the tourist performs self-check-in, minimizing the face-to-face form for validating identity documents, facial recognition by biometrics, and development of a practical implementation guide for small rural communities willing to start their own CRT intelligent platform. The validated guest data would be automatically sent to the different state bodies. Additionally, this study provides suggestions for recommendation systems based on the tourist information left on the platform.

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