Article

Strengthening the Resilience and Perseverance of Rural Accommodation Enterprises in the Iberian Depopulated Areas through Enterprise Architecture

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Abstract: The research objective of this work is to develop and evaluate an enterprise architecture for rural accommodation in the Iberian Peninsula that responds to the demand of the remote labor market. Through an extensive literature review and the application of *ArchiMate* modeling, this study focuses on providing an enterprise architecture that promotes business resilience and environmental sustainability and boosts the local economy. The proposed enterprise architecture is remotely evaluated by experts, highlighting potential benefits, challenges, and areas for improvement. The results show that the proposed enterprise architecture has the potential to improve the long-term success of rural lodging businesses, enhance the customer experience, promote sustainability, and contribute to economic growth in rural areas through value exchange among stakeholders. The *ArchiMate* model provides a holistic perspective on stakeholder interactions and interoperability across all functional business areas: Customer Service, Product Management, Omnichannel Commerce, Human Resources, Business Strategy, Marketing, and Sustainability Management. The idea is to empower rural lodging businesses to create a better customer experience, achieve energy and environmental efficiency, contribute to local development, respond quickly to regulatory changes and compliance, and develop new revenue streams. The main goal is to improve offers, mitigate seasonal effects, and reverse the continuous cycle of decline in areas with low population density. Therefore, this *ArchiMate* modeling can be the initial basis for the digitization or expansion of the rural lodging industry in other geographies.

Keywords: enterprise architecture; accommodations; depopulated areas; sustainability; archimate; modeling; business resilience

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1. Introduction

Rural villages, faced with a world in constant development and digital transformation, with the attraction of metropolises and the hope of success and prosperity, are becoming increasingly deserted and caught in a cycle of economic decline [1]. However, the aftermath of the pandemic felt worldwide, especially the moments of dejection, has confirmed that remote work is possible, shifted the focus away from sustainability, and brought the world's citizens back closer to nature [2]. Therefore, in the context of the evolving digital transformation and the changing behavior of tourists [3], especially in areas with low population density [4], the adaptation of small and medium enterprises (SMEs) in the tourism sector, especially accommodation businesses, is crucial [5]. This requires a focus on digital experiences, quality assurance, and sustainability measures, including certifications [6] and leveraging the potential of smart tourism to serve a new type of digitally savvy tourist [7–9] while addressing challenges related to energy sustainability [10], telecommunication, and remote work opportunities [2].

In this sense, being aware that sustainable development is made up of various forms of the three-part or -theme "social, economic, environmental" model and the linked human-ecosystem well-being model [11], knowing the importance of understanding sustainable rural tourism from the customer perspective, emphasizing the necessity of winning tourists' loyalty for a destination to achieve sustainability, including in environmental, social, and economic dimensions, as well as aspects related to customer loyalty and characteristics in the context of sustainable rural tourism [12], and that the creative industries play a crucial role in promoting sustainable and circular activities, minimizing the environmental footprint and helping to accelerate sustainable consumption and production patterns while promoting sustainable regional development [13], this study seeks, in the first instance, to understand, through a systematic review of the literature, what the needs of this sector are in order to understand what proposals can actually be implemented.

Barriers to digitalization in rural areas are mainly due to socio-cultural factors such as aging and low population density. Traditional values can lead to negative sentiments such as distrust of external institutions and fear of technological dependency and hidden costs, which are exacerbated by technology complexity, regulatory issues, and lack of ICT skills. Connectivity issues are a critical technological barrier that isolates these areas and hinders the adoption of connected technologies such as cloud-based sensor networks and IoT platforms. Economic barriers include the high cost of technology adoption and the inability of small rural businesses to benefit from economies of scale in technology infrastructure.

The literature suggests that these are likely the reasons why data modeling of this reality in enterprise architecture has yet to be developed. To address these challenges, a solution is proposed using ArchiMate to develop an enterprise architecture incorporating dimensions such as energy efficiency, quality certifications, CSR, online presence, and remote work capabilities. The TOGAF framework, specifically ADM, will guide the architecture development process and focus on different phases to address the specific needs of rural lodging in low-density areas. We know that, outside the Iberian Peninsula, there are studies that have opted to apply enterprise architecture to a hotel reality [14,15], but designing enterprise architecture for rural accommodation with a special focus on sustainability is a novelty.

In this way, this study aims in the second instance to explore the potential of an innovative enterprise architecture to promote sustainable development, with particular attention to small- and medium-sized rural enterprises (SMREs) in sparsely populated regions. The proposed architecture is aligned with the main objectives of Sustainable Development Goals (SDGs) 8, 9, and 11 and aims to promote job creation, entrepreneurship, and the growth of small- and medium-sized enterprises, especially in the context of sustainable tourism. It also focuses on developing resilient infrastructure, promoting clean technologies for industry, and supporting inclusive and sustainable urbanization. Stakeholder feedback emphasizes the importance of sustainability, usability, data security, and community involvement. Recommendations include integrating real-time sustainability features into the platform, standardizing reporting for rural accommodation, and improving usability through a customer-facing app with internal social networking features. Overall, the initiative is in line with global sustainability goals and has the potential to significantly improve the living conditions of rural communities through continuous improvements and collaboration with stakeholders.

Therefore, this work focuses on standardization, improved customer experience, strategic support, local economic support, technology integration, and policy and governance insights while highlighting the challenges and potential impacts of its implementation. Future research areas are suggested to explore technical aspects further, such as data personalization, environmental sustainability, user experience, policy influence, business models, and community engagement in the context of rural tourism. This study's findings will interest scholars, practitioners, and policymakers concerned with sustainable tourism development and economic growth in depopulated areas.

2. Methodology, Framework, and Tools

2.1. Design Science Research

The research applies the methodology of Design Science Research (DSR) by following the six steps proposed by [16]. Design Science Research (DSR) is a highly effective methodology in medical and information systems research that provides a structured approach with six key steps: Problem Identification, Goal Definition, Design and Development, Demonstration, Evaluation, and Communication. As shown in Figure 1, DSR involves the creation of information technology artifacts, including constructs, models, methods, and instantiations that aim for utility, not just truth [16].

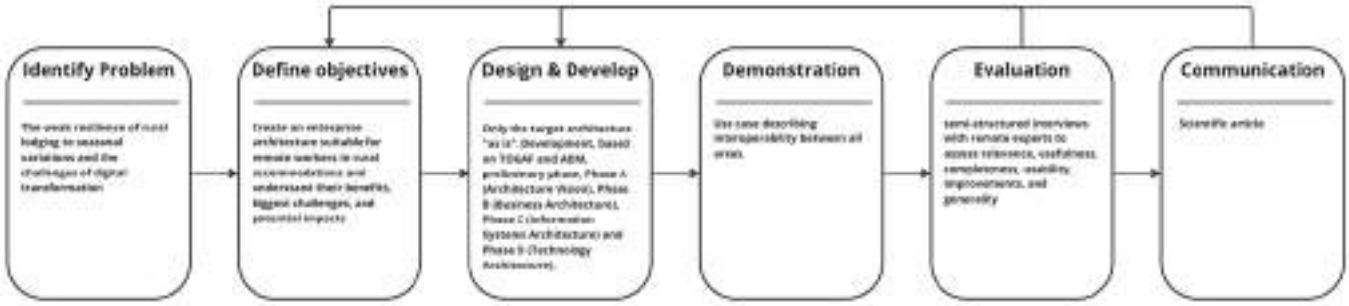

Figure 1. Process model DSRM (Adapted from [16]).

DSR is distinguished by its three research project cycles: the relevance cycle, which incorporates contextual requirements and field testing; the rigor cycle, which integrates background theories and knowledge; and the core design cycle, which emphasizes the construction and evaluation of artifacts to achieve a synergy between relevance and rigor in research [17].

In the first step, the problem is identified, focusing on the weak resilience of rural lodging to seasonal variations and the challenges of digital transformation in depopulated regions of the Iberian Peninsula. The second step is to define the objectives derived from the identified problem, which include the creation of an enterprise architecture suitable for remote workers in rural accommodations and understanding their benefits, biggest challenges, and potential impacts. The subsequent phase is the design and development phase, in which the desired functionality and architecture of the enterprise architecture is defined and created. Finally, evaluation is completed through ex post and naturalistic methods, including semi-structured interviews with remote experts to assess relevance, usefulness, completeness, usability, improvements, and generality.

2.2. Enterprise Architecture: TOGAF, ADM, and ArchiMate

Enterprise architecture, as defined by Marc M. Lankhorst, comprises a coherent set of principles, methods, and models used in the design and implementation of an organization's structure, business processes, information systems, and infrastructure. It is both a process and a product that guides the alignment of an organization's strategies, goals, and operations while providing the flexibility to adapt to changing external and internal circumstances. A well-designed enterprise architecture helps manage the complexity of an organization and provides a holistic perspective to ensure effective communication, regulatory compliance, and successful adaptation to a rapidly changing technological and business environment [18].

TOGAF (The Open Group Architecture Framework) is used around the world, including in higher education [19] and the public sector [20], to implement EA. TOGAF has evolved from a framework for technical architectures to a framework and methodology for enterprise architectures, providing tools and detailed methodologies for enterprise architecture development. At the heart of TOGAF is the Architecture Development Methodology (ADM), which follows a cyclical approach and includes phases for defining scope; developing business, information systems, and technology architectures; planning implementation;

and managing architecture changes. This provides organizations with a roadmap for managing complexity and aligning their operations with strategic goals [18].

ArchiMate is an open and widely used enterprise architecture modeling language that provides a standardized and structured approach to enterprise architecture design and documentation [21]. It provides a comprehensive set of multi-level modeling and deep visualization of concepts and notations that enable architects and stakeholders to visually represent and analyze various aspects of an enterprise, including strategy, business processes, information systems, and technology infrastructure [22]. We used the ArchiMate modeling language to represent all the enterprise architecture processes and components. This is the tool that will be used in the design and development phase of the DSR methodology.

2.3. Semi-Structured Interview Design

The design of semi-structured interviews, as recommended by scholars such as [23–25], follows a structured process:

- Transcription: interview data are transcribed into a written format to facilitate reading and analysis.
- Categorization: the transcribed data are categorized based on predefined themes that correspond to the analysis vectors. These themes include aspects such as remote work requirements, workplace characteristics, safety, support, convenience, tourism services, marketing, online booking platforms, and social media interactions.
- Thematic analysis: the categorized data will be subjected to thematic analysis to identify emerging themes and capture respondents' opinions on the proposed lodging data architecture.
- Report writing: the analyzed data will be summarized in a report that will include research findings, conclusions, and recommendations to improve the proposed lodging data architecture.
- Storage: the collected data will be securely stored for later retrieval.

3. Literature Review

Several literature reviews are concerned with rural housing and sustainability [26] and entrepreneurship in hospitality and rural tourism [27]. This systematic literature review investigates the relationship between rural accommodation, seasonal variation, and information systems in the Iberian Peninsula. This responds to the urgent need for research in this area due to the growing tourism industry and its importance for economic stability in regions with low population density. Therefore, our literature review aims to fill the gap in research on rural lodging establishments in low-density areas in the Iberian Peninsula, focusing on the effects of seasonality of tourism and information systems. The objectives of the study include the following:

- Summarizing relevant studies;
- Understanding the impact of tourism seasonality on lodging occupancy;
- Conducting a content analysis;
- Examining the existence of business and data models.

The study addresses research questions related to the status of lodging studies, the impact of seasonality, the topics addressed by the authors, and the existence of business and data models in this context. It seeks to summarize relevant studies published between January 2018 and December 2022, analyze their content, and investigate whether business and data modeling already exist in this context.

To carry out the systematic literature review, the protocol illustrated by Figure 2 was followed.

Figure 2. Literature review diagram.

3.1. Rural Accommodation: Survival, Seasonality, Sustainability, and Digitalization

3.1.1. Context

Rural areas in the European Union, including the Iberian Peninsula, have experienced a significant population decline since 1960 [28]. A total of 44% of the EU territory is classified as rural [29], leading to economic changes characterized by vacant housing [30] but also offering opportunities for tourism and new services [2]. In 2019, tourism in Portugal was recognized as a crucial sector for national economic growth [31]. With a contribution of 19.1% to the Gross Domestic Product (GDP), it surpasses the percentage contribution of tourism to the Spanish GDP [32]. The rural hospitality industry has experienced significant growth [33], with rural accommodations recovering more quickly after the pandemic [34,35], while tourism in certain inland regions of the Iberian Peninsula has declined [33,34,36].

3.1.2. Survival

The UNWTO and other international organizations are advocating for a sustainable and innovative tourism development model that prioritizes investment, digital transformation, ethics, culture, and social responsibility and that responds to the changing needs of tourists [37]. This model integrates responsible cultural, landscape, and environmental management while promoting economic, social, and esthetic needs in underdeveloped regions [38].

In particular, the link between tourism and agriculture, especially in remote areas, can promote sustainable development. European rural economy initiatives such as LEADER, PRODER, and INTERREG aim to enhance local heritage, promote rural tourism, create SMEs, and support environmental protection [39].

However, there needs to be more research in this area, particularly concerning accommodation and the uptake of rural tourism [28,40,41]. Rural accommodation is an essential element of tourism products, and governments strategically promote rural tourism [39,42].

The increase in lodging establishments of different types in Portugal signifies the transition to a multifunctional rural paradigm [36]. The environmental context is crucial for the sustainable development of rural areas as a whole, with agritourism playing a vital role in the preservation of family heritage [42,43] traditional agriculture and viticulture, which is closely linked to wine tourism [44].

Agrotourism includes various activities such as producing local products, guest involvement, local cuisine, and environmental education [42]. The valorization of natural offers [43], such as river areas, can attract investments and improve the tourist offer [45].

To ensure sustainable development, tourism practices must protect the environment, local culture, and traditions, as ecotourism does [9,38]. However, ecotourism is not widespread in the protected area of Extremadura, Spain [46], although it could potentially offset depopulation and economic imbalance in rural areas [47].

Understand the consumer criteria for rural tourism products and apply sustainable development indicators such as ETIS, WTO, and Green Globe to Portuguese hospitality SMEs [3]. In addition, reducing energy consumption and introducing renewable energy

sources in the accommodation sector [48] that are aligned with customer preferences [49], including solar, wind, hydro, geothermal, and biomass, can help reduce CO_2 emissions [10].

3.1.3. Seasonality

The depopulation of rural areas in the Iberian Peninsula is a reality [28,29]. Remarkably, the Spanish region of Extremadura is a pressing problem characterized by an aging population and low occupancy rates [42,50]. Figures 3 and 4 show population density and aging in Iberia. Seasonal variations play an important role, with occupancy rates exceeding 50% during summer and on certain holidays [51]. While seasonality provides opportunities for economic expansion and tourism development [45], the mismatch between accommodation capacity and demand results in persistently low occupancy rates [50], leading to economic vulnerability and a high debt burden for small and medium enterprises in the sector [52]. Short-term measures reflect a need for long-term strategies and sustainability indicators [3].

Figure 3. Population density (inhab./Km^2), 2019. Source: Eurostat.

Figure 4. Population aged 65 and more (%), 2021. Source: Eurostat.

The Spanish government's Horizons 2020 tourism plan emphasizes the importance of cultural heritage in attracting tourists to combat seasonality by attracting visitors outside the high season [53]. However, this approach has been criticized for being overly ambitious and not addressing unresolved issues such as accessibility and seasonality [38]. To understand and address seasonality, key sustainability indicators include measuring monthly overnight stays, the percentage of seasonal employment, the seasonality rate, which monitors the instability of supply and demand during specific periods, and the percentage of venues

open year-round [3]. These indicators are critical for developing strategies to mitigate the effects of seasonality in rural areas.

3.1.4. Sustainability

The literature emphasizes the overarching theme of ensuring the survival of low-density areas, focusing on the Spanish region of Extremadura and its rural housing challenges. It is suggested that specific policies should promote tourism products that take advantage of the region's cultural and natural heritage [50], which aligns with heritage enhancement strategies [53]. In addition, Portuguese hospitality SMEs should consider this new strategic factor [3]. Promoting local gastronomic products, especially those with quality labels, can help promote a "culture of place" and create educational programs based on natural and cultural values [42].

Studies show that areas with natural mountain resources, moderate populations, and proximity to urban areas are more successful [35]. Reliable tourist mobility is critical to support local economies effectively, underscoring the need for robust transportation networks [3]. However, entrepreneurs face obstacles related to the fear of debt, risk of failure, or effects of seasonality [52,54]. European investment funds and cooperation in rural development and Iberian borders are essential for sustainable tourism development [3,39,42,55].

Future trends point to a convergence between different types of tourism that incorporate local populations and environmental protection into sustainable tourism practices [54,56]. Portuguese rural lodging managers express concern about adopting renewable energy innovations driven primarily by energy cost savings [10]. Specific targets for renewable energy adoption, government incentives, dissemination of quality information, and removal of regulatory barriers are needed to facilitate this transition [10]. Adopting CSR strategies [6] and sustainability certifications such as ISO 9001 and ISO 14001 positively impact the resilience of rural lodging businesses and strengthen their sustainability [5]. However, Portuguese rural accommodation businesses face several challenges in achieving energy sustainability, including the cost-benefit ratio, regulatory barriers, grid connection infrastructures, lack of information on technologies, tax benefits, and subsidies [10]

In addition, the concept of smart specialization proposed by Weidenfeld is highlighted for its potential to create knowledge and value in the development of innovative ideas [57]. This approach encourages promoting traditional activities alongside innovation, including design and new digital markets. It aims to create public spaces for commerce that are compatible with the overall goal of preserving low-density areas and promoting economic growth [58].

3.1.5. Digitalization

Digitalization is a crucial enabler for reducing CO_2 emissions in rural tourism, but it requires training and skills development for both employees and employers [8]. It includes developing expertise in energy efficiency and information and communication technologies (ICTs) in destinations [59]. It is also essential to communicate green values through quality labels on official accommodation websites [5]. Incorporating corporate social responsibility (CSR) can promote sustainable and inclusive growth, improve financial performance and competitiveness [60], and ultimately lead to greater customer loyalty [61] based on factors such as number of rooms, quality certification, and location [58]. In addition, fostering a strong sense of place and creating a satisfying tourism experience helps build a cognitive image of local identity, fostering consumer affection and loyalty to the destination [58,62].

In rural tourism, adapting to the changing behavior of tourists [3], especially in areas with low population density, is critical as the digital experience becomes increasingly important alongside the physical experience [4]. ICT-enabled tourism co-creation and digital competition are important aspects to consider [5]. The safety of accommodations should be effectively communicated through websites, especially in the context of the pandemic COVID-19 [7], which is crucial for customer satisfaction and positive post-purchase behavior [9].

Smart tourism is a growing trend in rural tourism that appeals to tourists who value quality, service, and digital marketing for small and medium niche markets [8,9]. The COVID-19 pandemic has accelerated the need for digitalization and sustainability in this business model.

Nonetheless, although no data or business modeling for this reality was found in the literature, the Internet and the digital transformation are opening opportunities for remote work and connectivity in rural areas, bridging the gap between remote populations and urban centers, and providing online solutions to various challenges [2].

3.2. Discussion

Rural accommodations play a critical role in rural development in the Iberian Peninsula, but different terminologies, typologies, and regulations across countries and regions hinder collaboration. The sustainable growth and resilience of these lodging businesses require not only a macro-level focus on landscape and heritage conservation but also a thoughtful approach that incorporates corporate social responsibility (CSR) and adapts to customers' changing needs. Seasonality remains a major challenge, affecting the regularity of revenues and making long-term financing strategies difficult. Therefore, it is essential to explore digital solutions and adapt business models to digital transformation and changing customer preferences, including the possibility of remote working.

This literature review provides a comprehensive overview of rural lodging establishments in the Iberian Peninsula. It highlights the need for further research, addresses the challenges of seasonality, and identifies key themes such as cultural heritage, sustainability, digitalization, and CSR. Despite the lack of business and data modeling in the existing literature, the literature review highlights the importance of developing an enterprise architecture to address rural lodging businesses' unique challenges and opportunities in this context. Although tourism has strengthened territorial cohesion and balance in inland regions with low population density, the great demand for tourism in the Iberian Peninsula is concentrated in coastal regions [63]. For this reason, there are also more studies related to these areas far inland [3,28,41]. On the other hand, rural hotel managers consider adopting technology and digitalizing tourism as a priority [7]. However, they acknowledge the poor access to technology and online connectivity [64]. The literature also notes the need for diagrams for rural areas [65].

4. Proposal

Barriers to digitization in rural areas are primarily due to socio-cultural factors, including demographic challenges related to aging and sparsely populated populations. Older people in these areas often need more technological skills, and the transfer of technological knowledge is hindered by rural communities' dispersed and sparsely populated nature [66].

Traditional values in these regions can lead to negative sentiments, including distrust of external entities such as funders, regulators, and ICT providers, as well as fear of technology dependency and hidden costs [3,66,67]. In addition, the inherent complexity of technology, regulatory issues, and lack of ICT skills exacerbate these challenges [54].

A critical technological barrier is the lack of connectivity, as it increases isolation and hinders the deployment of connected technologies such as cloud-based sensor networks and IoT platforms [68].

Finally, economic barriers include the high cost of technology adoption and the inability of small and fragmented rural enterprises to benefit from the economies of scale associated with technology infrastructure adoption [5,7,8,40,66].

As such, the literature suggests that this is why data modeling of this reality in an enterprise architecture has not yet been developed. In this sense, the proposed solution to address the identified challenges in rural lodging in low-population-density areas involves the development of an enterprise architecture (EA). This EA will be designed using ArchiMate, focusing on the holistic integration of multiple business dimensions, including

energy efficiency, quality certifications, CSR, online presence, and remote work capabilities. The TOGAF framework, specifically the ADM, will guide the architecture development process and focus on critical phases such as the architecture vision, business architecture, information system architecture, and technology architecture.

4.1. Preliminary Phase: Architecture and Business Principles

4.1.1. Architecture Principles

- Hybrid work environment: support remote work while enjoying the experience of rural lodging.
- Energy sustainability: reduce the carbon footprint of rural lodging.
- Sustainability certificates: enable sustainability certificates to be obtained and maintained.
- Website as sales platform: use a website as the primary sales platform.
- Improve post-purchase customer experience: improve post-purchase customer experience, personalization, and feedback management.
- ICT-enabled tourism: integrate ICT-based tourism services and experiences.
- Data security and privacy: ensure data protection and privacy in all aspects.
- Technology flexibility: support a variety of technology options to adapt to changing needs.
- Sustainable practices: prioritize sustainability in all aspects of the business, from energy consumption to waste reduction.

4.1.2. Business Principles

- R-01: Achieve energy and environmental sustainability using sustainable practices, renewable energy sources, and energy-efficient technologies.
- R-02: Enable remote work and improve the customer experience through digital technologies, including high-speed Internet and user-friendly websites.
- R-03: Leverage emerging technologies such as IoT and AI to personalize the guest experience and optimize operations.
- R-04: Improve the post-purchase customer experience by offering personalized services and facilitating communication.
- R-05: Increase online presence and direct bookings by developing an attractive and user-friendly website as the main sales platform.
- R-06: Minimize environmental impact by implementing sustainable practices in waste management, energy conservation, and responsible procurement.
- R-07: Contribute to local community development by involving residents and creating employment opportunities.
- R-08: Act quickly to adapt to regulatory changes and ensure compliance while minimizing risks and complaints.

4.2. Phase A: Architecture Vision

4.2.1. Identification of the People Involved in the Architecture Development

- Business owners and managers: aligning the architecture with the business strategy.
- IT staff: ensuring that the architecture meets technical and security requirements.
- Customers: focus on customer satisfaction and quality services.
- Local community: promoting economic development and sustainability.
- Regulators and government agencies: ensure regulatory compliance.
- Suppliers and partners: maintain good business relationships.

4.2.2. Levels of Stakeholder Engagement

- Business owners and managers: focus key stakeholders on business strategy and risk management.
- IT staff: keep them happy and focused on technical architecture and security.
- Customers: keep customers happy by focusing on quality of service and ease of use.
- Local community: stay informed and pay attention to sustainability and engagement.

- Regulators and government agencies: key stakeholders who ensure compliance with regulations and permits.
- Suppliers and partners: stay informed and focus on service agreements and partnerships.

4.2.3. Issues and Solutions

- Dependence on seasonality: diversify revenue sources and customize the website for sales.
- Irregular tourist demand: promote year-round tourism with various activities.
- Lack of sustainable business management: implement sustainable practices.
- Lack of adaptation to digital transformation: embrace digitalization and take care of teleworkers.
- Lack of alignment between business strategy and IT infrastructure: develop an aligned IT roadmap.
- Inefficient IT systems: standardize and consolidate IT systems.
- Inability to meet customer needs and expectations: implement CRM systems.
- Non-compliance with regulations and policies: conduct regular compliance assessments.
- Limited financial resources: identify cost-saving options such as cloud solutions or outsourcing.

4.2.4. Confirmation of Preliminary Phase Principles

The analysis confirms that the business principles are consistent with the modeling of the motivational view, with clear parallels between the principles established in the preliminary phase and their application within the motivational view.

- Energy and environmental sustainability for rural lodging businesses:

Sustainable business practices, tourism frameworks, and environmental impact assessments are consistent with sustainability.

- Enabling remote working and improving the customer experience through digital technologies:

  High-speed Internet access equals a personalized customer experience.

- Leverage new technologies to enhance the guest experience and streamline business operations:

  Access to personalized lodging options is linked to online bookings and payments.

- Improve the post-purchase customer experience and increase customer satisfaction and loyalty:

  Digital marketing and customer experience are in line with customer acquisition.

- Increase your online presence and direct bookings by offering an attractive and user-friendly website as a sales platform:

  Diversification and revenue optimization are in line with a high-quality product offering.

- Minimize the impact of your activities on the environment:

Innovative solutions and social engagement are in line with environmental sustainability.

- Contribute to local community development:

  Create jobs and economic development.

- Respond quickly to change and comply with regulations:

  Regulatory compliance and reporting.
  Figure 5 illustrates the capability map viewpoint.

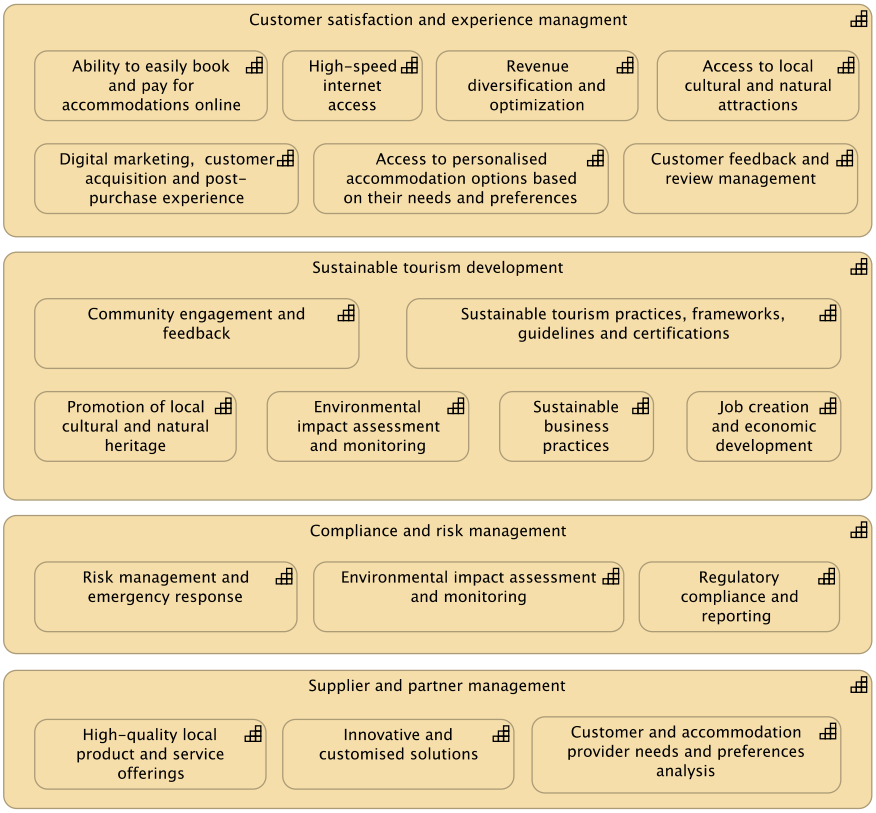

Figure 5. Capability map viewpoint.

4.3. Phase B—Business Architecture

Phase B of the ADM focuses on developing the target business architecture to align with business goals and strategic drivers while addressing stakeholder concerns. The gap analysis and Architecture Statement of Work are omitted because this is a novel architecture for which there is no prior baseline.

Architecture Definition

For this purpose we start by representing stakeholders' viewpoint, in Figure 6.

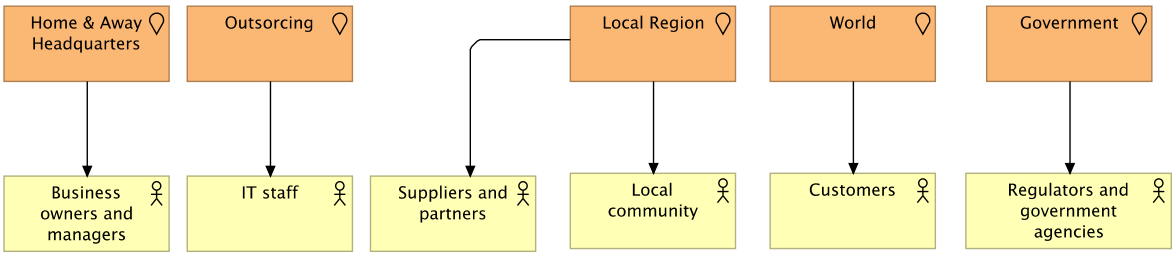

Figure 6. Stakeholders' viewpoint.

It is important to establish the relationship between the main stakeholders (customers, business owners and managers, and local community) and the major business functions. This is illustrated by Figure 7.

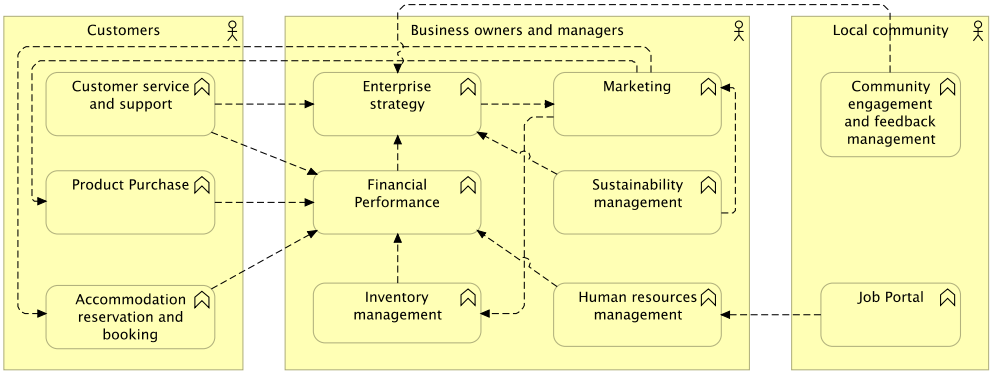

Figure 7. Main stakeholders and major business functions.

4.4. Phase C—Information Systems Architecture

Information systems architecture comprises application architecture as well as data architecture. It is represented in Figure 8.

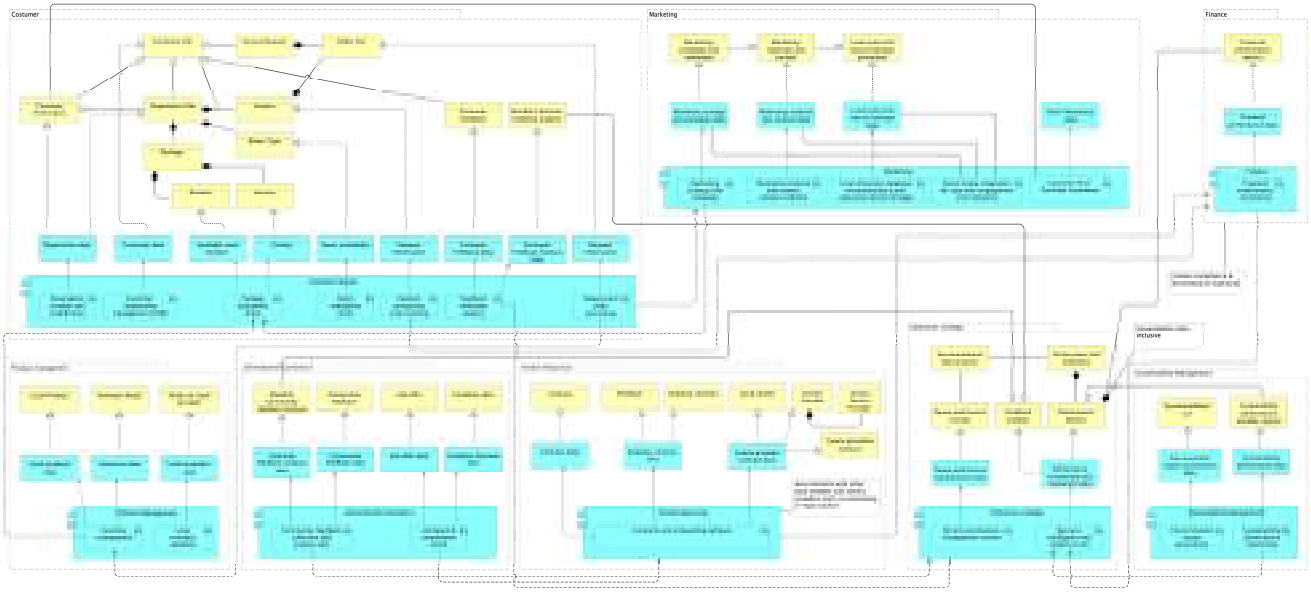

Figure 8. Data dissemination diagram.

4.5. Phase D—Technology Architecture

Technology architecture describes the logical and physical elements needed to support information systems architecture. It is illustrated in Figure 9.

4.6. Final Remarks

Due to the unique nature of this enterprise architecture project for rural lodging in low-density areas, specific steps typically involved in architectural development should have been included. Therefore, given the small scale and lack of data modeling of this reality in the literature, only a "target architecture" is developed, and risk assessments, communication plans, and architectural work descriptions are deemed unnecessary. The project focuses primarily on the target architecture. It bypasses the base architecture and gap analysis as it serves an academic purpose with no immediate implementation intent and, therefore, forgoes detailed architectural requirements, change descriptions, and KPIs.

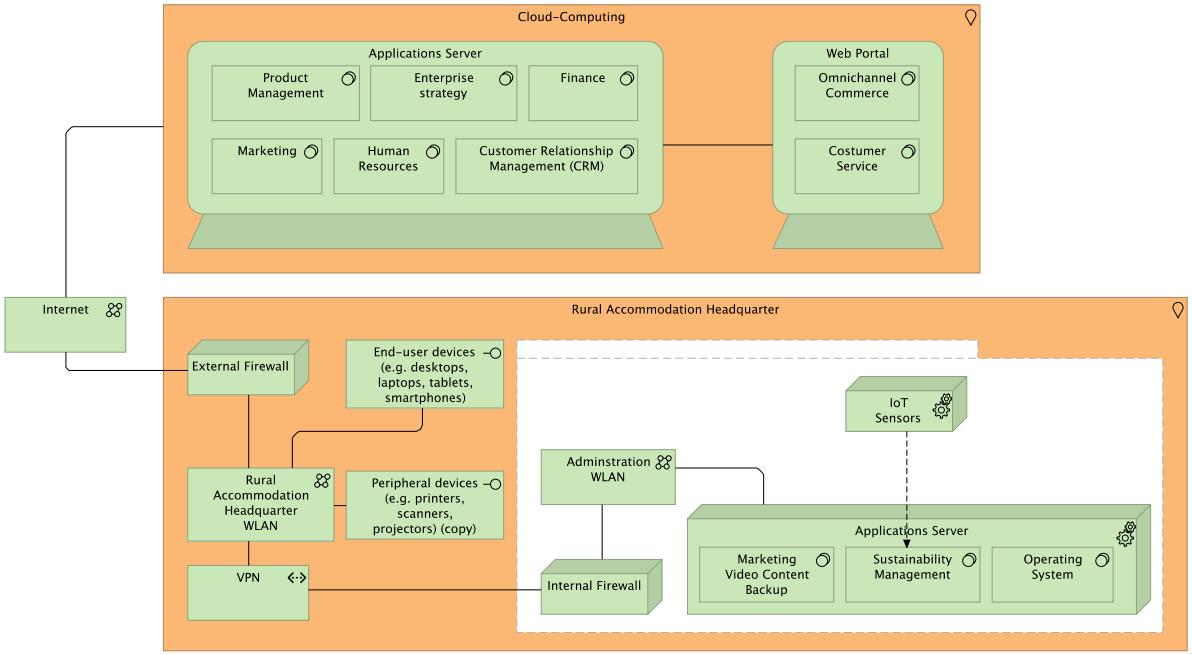

Figure 9. Technology architecture based on cloud computing.

5. Demonstration

5.1. Enterprise Goals and Background

Interior Side is a fictional company in rural Portugal that focuses on sustainable tourism and community support. They offer accommodations in a small village with comfortable rooms, access to a swimming pool, and platforms for relaxation and yoga. The company promotes sustainability and local engagement and offers exclusive packages for direct bookings, including the sale of organic products from local farmers and artisans, and provides bicycles for guests to explore the beautiful surroundings.

5.2. Use Case

Sarah, a remote worker, is looking for eco-friendly and affordable accommodation in inland Portugal for a month. She comes across Interior Side, a company that arranges rural lodges in sparsely populated areas. She decides on a charming lodge in a small village near a year-round bubbling fountain with a pool and meditation platforms. Impressed by Interior Side's sustainability goals, Sarah books an entire house to support the company's environmental commitment. Booking directly through the official website provides special offers with local attractions and organic produce. She customizes her stay, requests weekly organic fruit and vegetable deliveries, and rents three bikes for her family to explore the nature trails. Sarah also works with the community portal to make suggestions to promote sustainable tourism. This way, she and her family have a memorable and environmentally conscious stay and support the local community and environmental protection.

5.3. Business Domain

Considering the business domain, using the use case exposed above, we see that the customer has booked the accommodation, so the whole house, for one month. Thus, by making this choice, the customer triggered, in a first step, the business process "Accommodation reservation and Booking".

As shown in Figure 10, when the reservation is presented, the customer is asked if she wants to make a new reservation or adjust a reservation she has already made. Since this is a new customer, she is asked to enter a specific time to check the availability of rooms in the accommodation. On the website, anyone can see what discounts are available for

medium- and long-term stays, which are very attractive if the reservation is made monthly with full use of the accommodation.

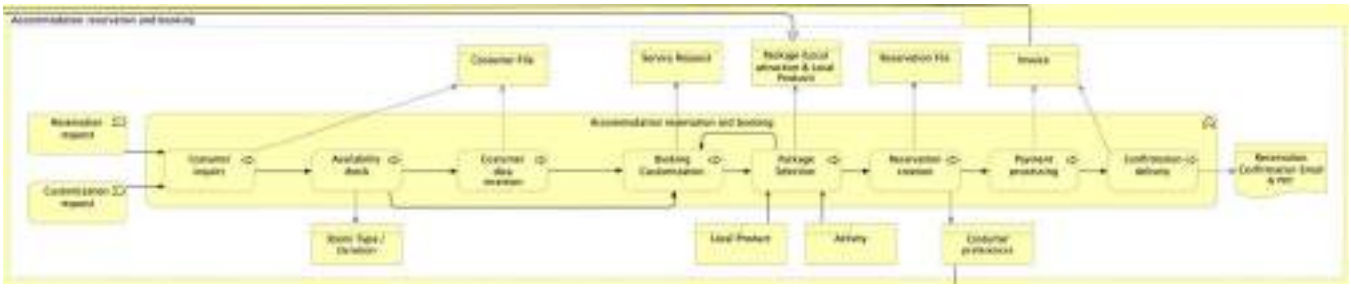

Figure 10. Business process accommodation reservation and booking.

In this use case, if the customer selects all four available rooms, she wants to book the entire accommodation in the previously specified period. The customer is asked to enter her personal information into an online form. This information is stored in the customer's file.

The customer can then review and adjust her reservation. For example, in one use case, the customer adds a weekly basket of high-quality organic produce for three people to the reservation (Package selection) and reserves three bicycles (Booking Customization), as shown in Figure 11. The price is adjusted and displayed accordingly.

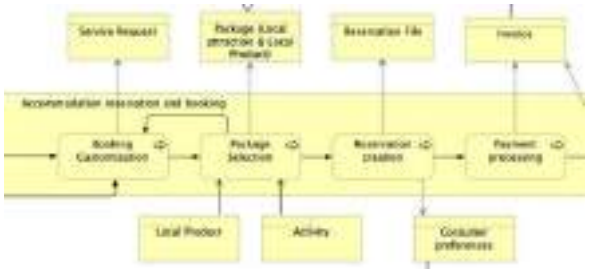

Figure 11. Booking section from the accommodation reservation and booking business function.

After the confirmation, the payment page is presented where the client can select the payment method and pay. Then the documents related to the booking confirmation as well as the payment invoice—business object "Invoice"—are sent to the client by email.

Considering this, it can be seen in this business function that there are some associations with other business functions. Namely, the business object "Costumer preferences" is directly associated with the business object "Costumer Post-purchase experience" because this information is essential for this business object (Figure 12). On the other hand, the "Invoice" business object is directly associated with the "Sales & contracts payment data" business event that will activate the "Financial management and budgeting" business function, which is necessary to produce the business object "financial performance metrics" (Figure 13).

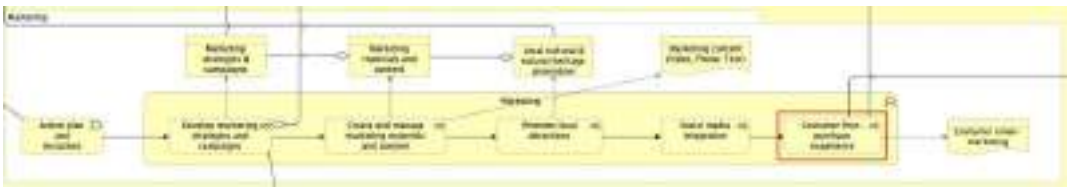

Figure 12. Marketing business function.

Figure 13. Financial management and budgeting business function.

This information is then associated with the business process "Analyze the external environment and internal capabilities" in the business function "Strategic planning and decision-making" (Figure 14).

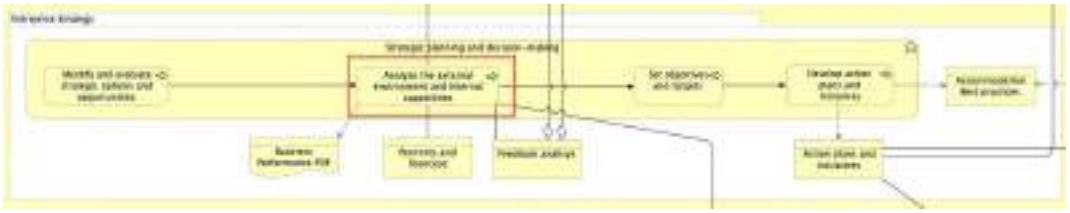

Figure 14. Strategic planning and decision-making business function.

Also, the promotional packages that the customer has chosen, defined by the business object "Package", are a specialization of the business object "Local cultural & Natural heritage promotion" produced by the business process "promote local attractions" in the business function "Marketing" (Figure 15).

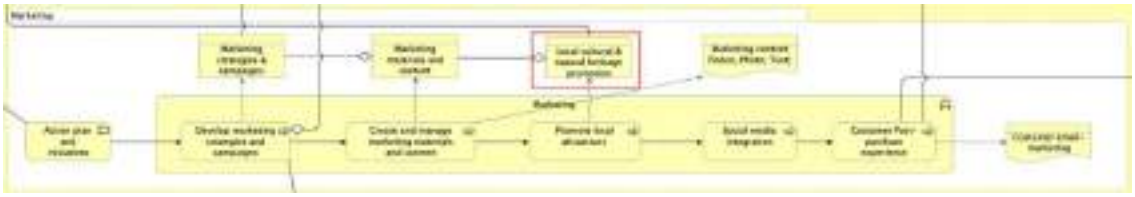

Figure 15. Marketing business function.

On the other hand, we see in the use case that, after two weeks of her stay, the customer decides to interact with the community and consider suggestions and possible ideas related to communication and sustainability. In this sense, by entering this message, the client activates the business function "Community engagement and feedback management" (Figure 16).

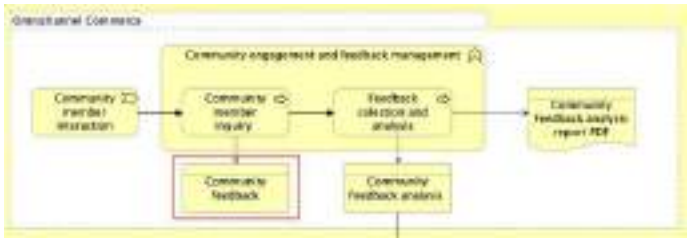

Figure 16. Community engagement and feedback management business function.

In this sense, by entering this message in a form with predefined fields and an area for free writing, the customer activates the business function "Community engagement and feedback management" (Figure 16). Her suggestion is written with a "Community Feedback" business object. The conclusion of this process triggers the business process

"Feedback collection and analysis," which will collect all the feedback and analyze it quantitatively. This information will be passed to the business object "Feedback analysis" in the business function "Strategic planning and decision-making" (Figure 14). This will instruct decision-making as this company is meant to be customer- and community-centric.

5.4. Data Domain

Because all instances use the most up-to-date data, centralized data management reduces the risk of data corruption and discrepancies. Considering this, data objects are available for modeling business data in a system at a high level of abstraction and allow data to be segregated by storing sensitive data in different tables or external systems, which improves security and compliance. Therefore, data objects provide a powerful tool for handling and modifying structured business data and support the integrity and effectiveness of the system.

In this sense, and by taking into consideration the use case above, in this sub-chapter, we will present the developed data domain in this enterprise architecture.

During her stay, Sarah decided to rent the entire accommodation, added a promotional package with regional products, and reserved three bicycles for the whole month for the family.

As shown in Figure 17, the room availability in the accommodation shown to the customer when entering the period is read from the data object "Room availability". The data that the customer enters is written in the "Customer data" data object because she is a new customer. In turn, the available local organic products are read from the "Available Local product" data object, and the activities—in this case, the rental bicycles—and other activities are read from the "Activity" data object.

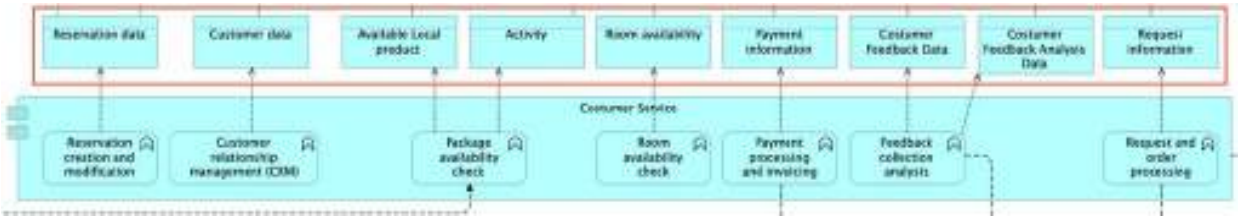

Figure 17. Data objects referring to the customer service application.

When the customer is satisfied with her selection, she completes the process by entering the payment data and finalizing the purchase. The payment data are written in the "Payment information" data object. If the customer does not want to pay immediately or only half the amount, all the information entered in the date object is written in the "Reservation Data" data object.

Based on this first interaction, several data objects provide data to or interoperate with other data objects. This is the case for data objects related to the availability of promotional packages (Figure 18).

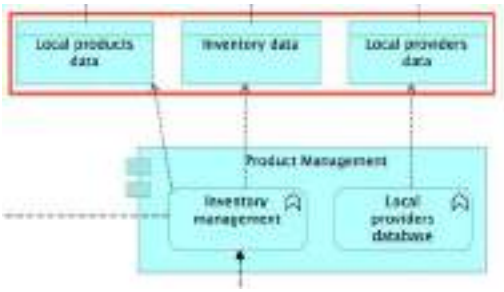

Figure 18. Data objects related to the product management application.

This means that the data involved in the "Local Products data" and "Inventory data" objects is directly related to the "Available Local product" object belonging to the "Costumer Service" application displayed in Figure 17. This inter-dependency is also present in the data object "Local providers". That is, in the absence of residual stock in the housing of long-term storage products (e.g., potatoes, onions, garlic, wine, and olive oil) other local providers contained in the "Local Providers data" data object are recommended (Figure 18). Also, all details regarding the payment will be contained in the "Payment information" data object (Figure 19).

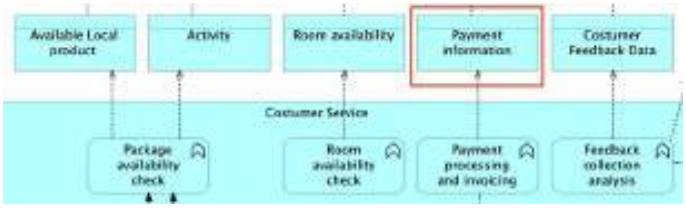

Figure 19. Payment information data object referring to the customer service application.

This payment data, and of course the respective cost and all fees for the hosting, will be read by the "Finance" application and is essential for writing the "Financial Performance data" object (Figure 20).

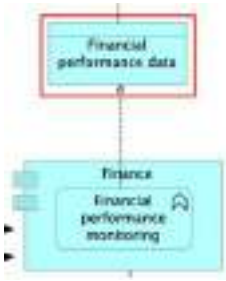

Figure 20. Financial performance data objects referring to the finance application.

All customer preferences, which relate directly to all these aspects and details described above, will be used in the personalized email-marketing data written and then read the "Email-Marketing data" object present in the Marketing application (Figure 21).

Figure 21. Email-marketing data object referring to the Marketing application.

We also know from the use case that the customer interacts with the community via the community portal on the company's website. This communication will be written into the object data "Community feedback data". On the other hand, the analysis of the data (feedback) provided by the community will be written in the "Community feedback analysis" object data (Figure 22). The red box in Figure 22 highlights these data objects.

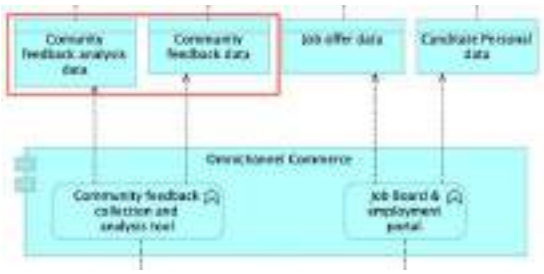

Figure 22. Community feedback data objects referring to the Omnichannel Commerce application.

The same happens as collecting customer feedback in the "Costumer Service" application. That is, the customer feedback is written to the "Costumer Feedback data" data object, and their analysis is written to the "Costumer Feedback Analysis data" data object (Figure 23).

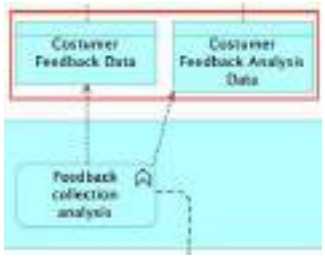

Figure 23. Customer feedback data objects referring to the Costumer Service application.

Additionally to this analysis, the data provided by the IoT sensors written into the "Environmental impact assessment data" data object also provides data that, after being correctly analyzed and transformed into performance metrics, will be written into the "Sustainability performance data" data object present in the "Sustainability Management" application (Figure 24).

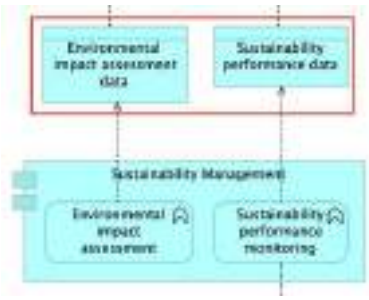

Figure 24. Environmental impact assessment and sustainability performance data objects referring to the Sustainability Management application.

With all this analysis of customer and consumer feedback, financial metrics, and sustainability performance-related metrics, it will be necessary to write the "Performance monitoring and evaluation" data object (Figure 25), highlighted by a red box.

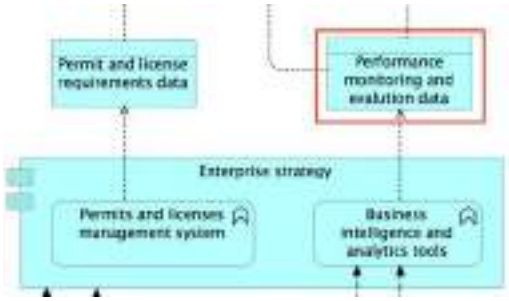

Figure 25. Performance monitoring and evaluation data object referring to the Enterprise Strategy application.

5.5. Application Domain

Application development focuses on usability, allowing users to focus on their tasks without understanding the underlying technology in detail. This approach encourages users to work in a unified information environment and minimizes the risk of improper system use. In this sense, developing applications that are shared across the enterprise is preferable to avoid duplicate and conflicting data, thereby reducing resource requirements. As a case in point, the standardization of data, information, and technology through defined interoperability standards is critical to ensure consistency, manageability, user satisfaction, and maximum return on investments. Considering this, we return to our use case to demonstrate the application domain produced for this architecture.

As already stated, the client rents the entire accommodation for one month, has ordered a promotional package with regional products, and has rented three bicycles for the whole family.

As shown in Figure 26, the customer's registration is completed by the application function "Customer Relationship Management", and the availability of the rooms is completed by the application function "Room availability check". If the customer wants to book the accommodation or, even afterward, change the reservation, this functionality will oversee the application function "Reservation creation and modification". In turn, the package selection (that is, what products and activities are available) will be the responsibility of the "Package availability check". Furthermore, the application function "Payment processing and invoicing" will provide the payment process and the corresponding invoice.

Figure 26. Costumer Service application.

Part of the data that is processed in the "Package availability check" application function in the "Costumer Service" application flows from two different sources: 1. data concerning available regional products is provided by the "Inventory management" application function in the "Product Management" application (Figure 27); 2. data concerning available activities—in this use case the rental of three bicycles—is provided by the "Marketing strategy and campaign" application function in the "Marketing" application (Figure 28). In both figures, the application function is highlighted by a red box.

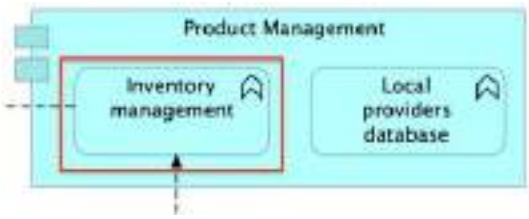

Figure 27. Product Management application.

Figure 28. Marketing strategy and campaign planning application function.

In turn, the data processed by the "Payment processing and invoicing" application function in the "Costumer Service" (Figure 26) application will flow into the "Finance" application to produce financial performance metrics about the accommodation (Figure 29).

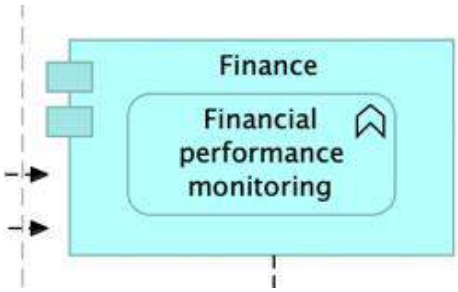

Figure 29. Finance application.

Also, the data produced by the "Financial performance monitoring and reporting" application function in the "Finance" (Figure 29) application regarding financial metrics, as well as the data produced by the "Sustainability performance monitoring" application function in the "Sustainability Management" application, will flow into the "Business intelligence and analytics tools" application function in the "Enterprise strategy" application (Figure 30).

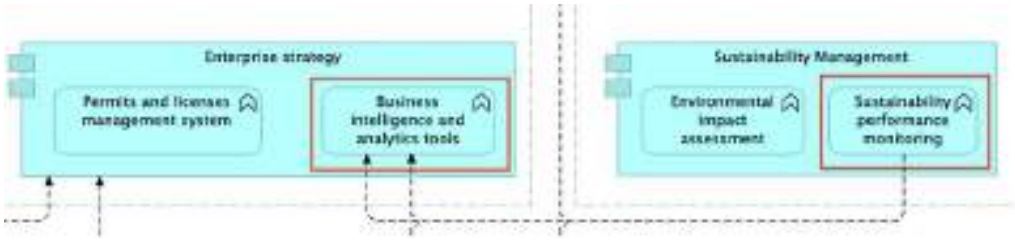

Figure 30. Enterprise strategy and Sustainability Management applications.

Furthermore, we know from our use case that the customer decides to interact with the community portal to give her suggestions regarding accommodation and possible sustainability measures. Therefore, the data processed by the "Community feedback collection and analysis tool" function in the "Omnichannel Commerce" application (Figure 31) will flow into the "Enterprise strategy" application (Figure 30) for future strategic decisions about the accommodation.

Figure 31. Omnichannel Commerce application.

5.6. Technology Domain

Technology architecture encompasses the infrastructure and technology used to support an organization's digital products, services, applications, and information. It could cover many technologies, including legacy systems, hybrid multi-cloud platforms, communications, integration, and IoT. Technology architecture focuses on achieving operational excellence and meeting non-functional requirements such as availability, reliability, and scalability. In contrast, the application architecture domain addresses the specific applications and software that generate and transform data into meaningful insights. The technology architecture domain defines the hardware and software requirements needed to operate the resources in the application and data architectures and optimize business processes. The aim is to minimize technical diversity and reduce the complexity and costs associated with building and maintaining different systems while ensuring seamless connectivity between different components.

In this sense, considering the small size of rural accommodations in areas of low population density, let us use an approach that is simple and easy to understand. So, once again, considering our use case, we know that the customer rented the accommodation for the whole month through the accommodation's official website. The purchase includes a promotional package that includes high-quality local organic products and an activity corresponding to the rental of three bicycles for the whole family.

Thus, the customer, when purchasing through the official website, accesses the "Customer Service" software system on the virtual "Web-Portal" device (Figure 32).

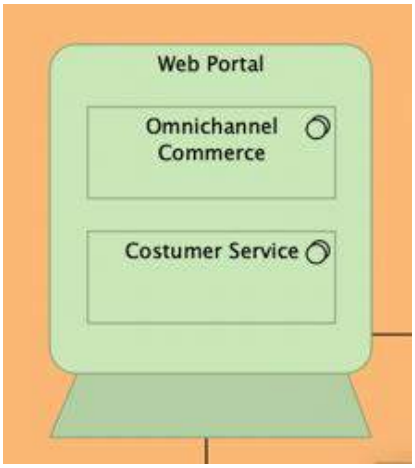

Figure 32. Web Portal Device.

This means that all data acquired through the portal will then be processed by the front office (Figure 33).

Figure 33. Front office application's server device.

That is, personal banking and purchase or reservation data are processed by the CRM. In turn, data generated relating to activities will be provided by the "Marketing" software system, and data generated relating to product availability will be provided by the "Product Management" software system (Figure 33). That is, this generated data will be displayed through the "Costumer Service" software system (Figure 32). Also, the customer purchase data will be provided to the "Finance" software system, and the customer feedback analysis data, generated in the "Costumer service" software system, will be provided to the "Enterprise strategy" software system in the "Back-Office Applications Server" device (Figure 34).

Figure 34. Back Office Applications Device.

We also know that the client, two weeks after the beginning of her stay, decided to interact with the community portal to expose some suggestions about sustainability. The insertion of this data will be completed through the "Omnichannel Commerce" software system in the "Web Portal" device (Figure 32). In turn, the analysis of this data will be provided to the "Enterprise Strategy" software system (Figure 34).

It is necessary to consider the physical and virtual barriers that are intended to ensure the integrity of all data and systems. That is, as shown in the figure, there is an external firewall on the direct connection to the Internet. Then, after the WLAN (Wireless Local Area Network) connection that serves all clients and simple peripherals, there are two branches: one for the back office and one for the front office because, by physically splitting the two realities, it is possible to create different paths and, therefore, different access premises and reduce any possible data loss—either by device failure or file contamination. In this sense, in addition to having different WLANs for each of the sectors and corresponding internal firewalls (one in each sector—front and back office), let us introduce a VPN (Virtual Personal Network) in the path destined for the back office, in order to limit the access to admin-only elements (Figure 35).

In contrast to the second architecture proposal, which—given the current times and the small size of the vast majority of rural accommodations in low population density areas—may be a viable option, this option is less expensive, and the updating of most of the software will be the responsibility of the service provider. Thus, it is intended that both the Web Portal and the Applications Server work in an integrated manner in a service provider of choice, in cloud computing (Figure 36).

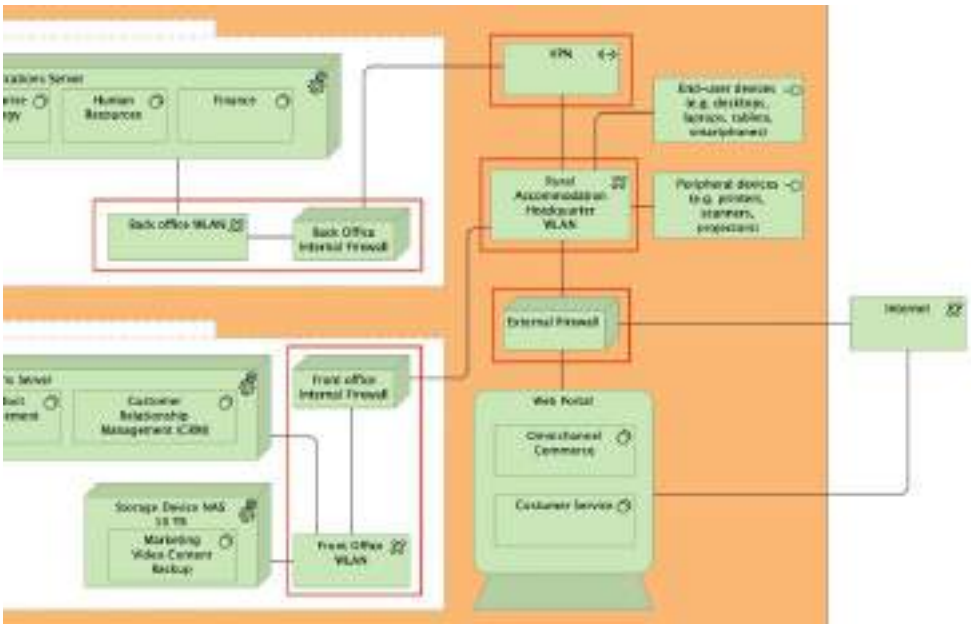

Figure 35. Technology architecture based on physical devices' security features.

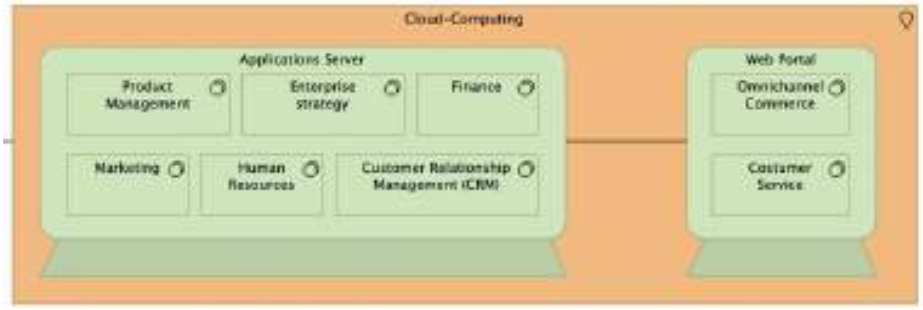

Figure 36. Virtual Applications Server and Web Portal in cloud computing.

Therefore, only the remaining "Marketing Video Content Backup" and "Sustainability Management" software systems—due to the data capture provided by the IoT sensors placed on the host—will remain on a local device. It is worth adding that the physical part of this architecture has been designed with the same security features, i.e., an external firewall connecting to the general WLAN of the host and, after a VPN, another internal firewall connecting to the WLAN of the admin site where it also connects the physical Server applications (Figure 37).

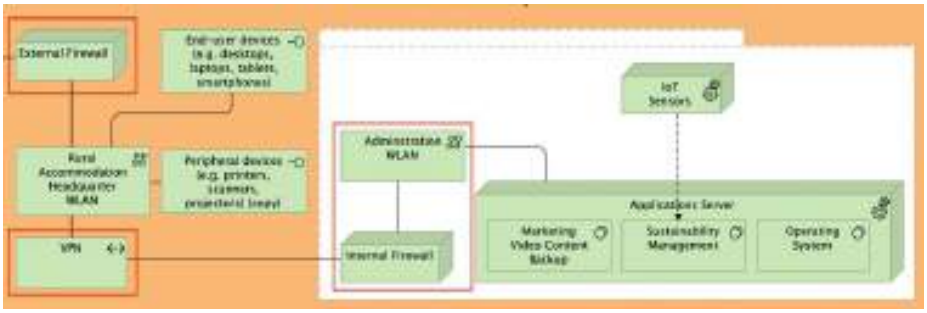

Figure 37. The simplified technology architecture of the physical devices and accommodation.

6. Evaluation

To find the perfect method for the evaluation, we follow the indications proposed in these articles [69] and answer the questions suggested by Venable, J., Pries-Heje, J., Baskerville, R. [70]:

1. What is being Evaluated?	Enterprise Architecture.
2. How is it evaluated?	Naturalistic.
3. When was it evaluated?	Ex Post.

Enterprise Architecture: This will be evaluated by considering the five dimensions proposed by Prat et. al. (2014) (Goal, Environment, Structure, Activity, Evolution) [71], namely, through the following vectors: Relevance; Utility; Completeness; Usability; Improvement; Global.

Naturalistic: The artifact will be evaluated by natural models, namely, through semi-structured interviews with experts in remote work.

Ex Post: The evaluation will be conducted after the artifact is produced.

6.1. Profile of Interviewees

Due to the specificity of the enterprise architecture in question and its construction around remote working, it is seen as essential to focus the evaluation of this enterprise architecture proposal on remote work experts. Of the approximately 400 people contacted through various channels, only 6 agreed to participate in the interviews, primarily because of the time constraints associated with the intensive experiences that remote workers want to have in their temporary jobs. These six interviewees, representing diverse professional backgrounds and experiences, offer various perspectives on remote work and its associated requirements. The full details of those interviewees are represented in Table 1. Their motivations for remote work range from lifestyle choices to pandemic-related factors, and they emphasize specific key characteristics in seeking accommodations. These characteristics are listed in Table 2.

Table 1. Profile of interviewees.

Profile	#
Interviewees	6
Gender	50% Female—50% male
Age	30–45 years old
Remote work experience	1, 5–7 years
Professional areas	Remote work Tourism; Business Automation; Product Management; Software Engineering; Telecommunications; Humanities
What motivated remote working?	50% Flexibility—50% COVID-19 pandemic

Table 2. Essential characteristics of an accommodation.

Characteristics	#
Good internet connection	4
Workspace separate from living space (e.g., kitchen to cook or comfortable private areas for decompressing/networking)	4
Work conditions—comfortable place to work (desk and chair)	3
Clean, quiet, comfortable, and pleasant environment	2
Accessibility to activities and community and leisure offerings in the surrounding area	2

6.2. Report (The Distribution of Respondents' Answers to the Questions Examined Can Be Found in Appendix A)

6.2.1. First Thoughts on the Proposed EA

Overall, respondents showed interest and enthusiasm for the proposed enterprise architecture (EA). They appreciated the detailed abstraction, clear diagrams, and holistic approach it offers to housing, remote work, and sustainability in low-density areas. Although they can envision its practical application, some concerns and issues were raised that deserve attention.

6.2.2. Relevance

All interviewees emphasize the importance of building sustainable and robust infrastructure in rural lodging for long-term success. They believe standardized tools like the proposed enterprise architecture (EA) can streamline data collection, reporting, and sustainability efforts. In addition, providing customer-facing websites and online services is critical to improving the customer experience and building trust. Partnering with local service providers and establishing co-working spaces can contribute to the overall growth and vitality of rural areas. Reliable infrastructure, especially in terms of internet connectivity and transportation links, is essential to attract visitors and support rural businesses. Table 3 summarizes the opportunities and challenges.

Table 3. Main topics of relevance.

Opportunities	Challenges
Integrating sustainability into an existing business model is important and can lead to long-term success.	Implementing such a tool can require commitment, vision, skills, and resources from the business owner.
A standardized tool can help small business owners collect data and report on KPIs, streamlining reporting requirements.	Small businesses may struggle to meet reporting requirements and comply with standards without a standardized tool.
Mapping the entire business process, including user interactions and infrastructure, can identify areas for improvement and enable automation.	Existing third-party platforms and systems like HubSpot can serve similar purposes, so there is no need to build from scratch.
Digital tools and information can improve the customer experience and support business growth.	Access to reliable infrastructure, such as an internet connection, is critical for rural areas to attract visitors and support business success.
Upgrading with a validated EA can mitigate risk, meet certifications, and attract investment.	

6.2.3. Utility

Interviewees noted that more and more people are combining travel with remote work and are seeking out rural areas, which has led to a demand for platforms that bring accommodation owners and customers together. They envisioned an ideal platform that would provide owners with management tools and customers with a user-friendly app with information, community features, and additional services to enhance the overall experience of remote work and travel. The opportunities and challenges concerning this topic are summarized in Table 4.

Table 4. Utility main topics.

Opportunities	Challenges
Potential for a platform/app that serves as a bridge between professional and personal travel, offering services such as accommodation booking, activity recommendations, and local information.	Active management and engagement in the community space to encourage user participation.
Separate platform for owners to manage customer data, content, and engagement.	Building trust and acceptance among users for effective community interaction.
Aggregating data and developing partnerships with service providers can enhance the user experience.	Providing a user-friendly and efficient app interface to overcome the awkwardness often associated with websites.
Ability to create an internal social network where users can connect with each other, share information, and develop a sense of community.	Addressing the unique needs of field workers, such as access to local products and services in non-urban areas.
Integrating professional experiences and networking opportunities for teleworkers using the same accommodation.	Managing maintenance and updates for areas of the platform that require constant attention.
Facilitating interactions and improving the overall user experience through community engagement.	Building partnerships and maintaining relationships with service providers requires ongoing effort.

6.2.4. Completeness

Respondents' feedback on the enterprise architecture (EA) was largely positive. They emphasized clarity and comprehensive coverage of user experience scenarios. Suggestions included encouraging community connections, incorporating real-time sustainability data, and addressing data security concerns by implementing a centralized system. The full list of suggestions is represented in Table 5.

Table 5. Completeness: main suggestions.

Suggestions
Emphasize the importance of cultivating connections within the local community and creating networking opportunities.
Encourage community engagement and organize physical events to create meaningful connections.
Consider the choice of idiom and the possible need for intermediaries to communicate effectively with the local community.
Incorporate sustainability data to inform guests about the impact of their stay and provide real-time feedback and tips for sustainable practices.
Ensure technology and data security by ensuring compliance with local standards.
Consider a centralized system to address concerns and ensure compliance with standards.

6.2.5. Usability

The proposed enterprise architecture (EA) may appear simple on paper at first, but it proves complex in practice, with potential long-term benefits for strategic improvement. However, the challenges lie in providing practical, user-friendly solutions for small- and medium-sized businesses in the tourism industry, particularly in terms of seamless integration across systems and departments, making a cloud-based solution a viable option. Personal preferences may favor a physical brochure or app over a website for improved usability and engagement. Key takeaways from usability are listed in Table 6.

Table 6. Usability: key takeaways.

Key Takeaways
The EA appears simple on paper but could be complex in practice.
Short-term users may underutilize the tool, while longer stays or demonstrations provide deeper engagement.
The proposed EA can serve as a strategic improvement platform for future efforts.
Small- and medium-sized businesses in the tourism sector may struggle without a simplified digital support tool.
Building a seamless integration tool across different systems and departments is a major challenge.
A cloud-based solution is the most viable option for technical maintenance.
A physical brochure or app can improve the user experience compared to a robust website.
The tool should be designed for owners without technical expertise, provide data support and customization options, and influence decision-making and policy management.

6.2.6. Improvements

To improve the experience of property managers and owners, personalized client data collection and consolidation of services on a cloud-based platform are suggested, while remote workers can be offered a simplified tool to assess the suitability of destinations for remote work. Leveraging existing technology providers for efficient implementation, streamlining development, and reducing reliance on numerous IoT devices in accommodations is recommended. As shown in Table 7.

Table 7. Improvements: key takeaways.

Key Takeaways
Collect customer data to personalize interactions and marketing efforts.
Understand your customers' preferences and activities for tailored experiences and targeted recommendations.
Group customer trends to improve the overall experience and provide personalized recommendations.
Consolidate the bundled services on one cloud-based platform for easy access to information.
Provide enough information to check if a destination is suitable for remote work before booking.
Point out remote work conditions and amenities, such as reliable Internet access and facilities.
Leverage existing technology providers for robust and efficient implementation.
Work with established vendors and technologies to streamline the development process.
Focus on effective integration of existing resources.
Strive for a comprehensive and user-friendly solution.
Minimize the number of IoTs in accommodations to simplify technological connections and maintenance.

6.2.7. General

Respondents emphasize the importance of theoretical frameworks and guidelines for industry needs and advocate a focus on quality and community integration rather than price competition. They highlight the potential niche market of an accommodation search platform integrated with job listings for remote workers and emphasize the importance of sustainability, transparency, and trust in marketing. In addition, it is proposed to standardize reporting for rural lodging businesses through this enterprise architecture to measure sustainability impacts, with potential government support and funding for rural development. Finally, the concept of a white-label platform for wide adoption and the idea of a pilot project to test and adapt in practice are proposed. As shown in Table 8.

Table 8. Comments in general: key takeaways.

Key Takeaways
Theoretical frameworks and guidelines such as these EAs are important for finding solutions and reducing demand in various industries.
Economies of scale can benefit companies through a larger customer base and greater digitization. However, competing purely on price leads is a race to the bottom. Therefore, the focus should be on acquiring customers based on quality and volume.
Integration with the local community is critical to breaking down barriers and fostering sustainable and socially engaged experiences.
There is a potential niche market for a housing search app or website combined with job listings targeted to remote workers.
Sustainable practices are important and will eventually become the norm, but they should not be the only differentiator in housing choice.
Transparent marketing and credible websites are seen as sufficient to build trust.
Promoting environmental responsibility at work and on vacation, as suggested in this EA, is highly desirable and leads respondents to seek similar accommodations with the same environmentally friendly conditions and principles.
Standardizing the reporting of rural lodging establishments using the proposed EA would be beneficial for measuring the sustainability impacts of an individual region.
Government support and European funding for rural development could support and encourage such initiatives.
A white-label platform is proposed for the proposed EA that can be adopted by multiple communities.

6.2.8. Discussion: Use of Enterprise Architectures for Sustainable Development in Rural Tourism

This study explores the potential of innovative enterprise architectures to promote sustainable development, focusing on small- and medium-sized rural enterprises (SMREs) in sparsely populated regions. It specifically targets certain goals within the three Sustainable Development Goals (SDGs): Goal 8 (Decent Work and Economic Growth), Goal 9 (Industry, Innovation, and Infrastructure), and Goal 11 (Sustainable Cities and Communities).

The proposed enterprise architecture addresses Goal 8 by promoting development-oriented policies that support job creation, entrepreneurship, and the growth of SMEs. This includes the promotion of sustainable tourism that creates jobs, promotes local culture, and contributes to economic prosperity. In addition, the architecture aims to strengthen the capacity of domestic financial institutions to improve access to banking, insurance, and financial services for all.

In line with Goal 9, the enterprise architecture emphasizes the development of resilient and sustainable infrastructure to support economic growth. The focus is on providing affordable and equitable access for all, especially for small- and medium-sized enterprises in developing countries. Modernizing infrastructure and transitioning industry to sustainability through clean and environmentally friendly technologies and processes are also key objectives.

In addition, architecture is in line with Goal 11 by promoting inclusive and sustainable urbanization through integrated and sustainable settlement planning and management. It also aims to strengthen positive economic, social, and environmental links between urban, peri-urban, and rural areas by supporting national and regional development planning.

The study emphasizes the critical importance of integrating sustainability into the business model for long-term success. The proposed architecture emphasizes standardization, enhanced customer experience, strategic and local business support, technology integration, and policy and governance insights. It is expected that these elements, when implemented, will make a significant contribution to achieving the SDGs outlined.

Stakeholder feedback emphasizes the importance of sustainability within the proposed architecture. The integration of sustainability, usability, data security, and community involvement are recognized as critical factors. While stakeholders are overall enthusiastic about the initiative, they suggest that certain areas such as integrating sustainability into the

platform, ensuring user-friendly interfaces, and actively engaging the community should be considered.

To encourage guests to adopt eco-friendly practices, stakeholders advocate for the integration of sustainability features into the platform that provides real-time feedback and guidance. In addition, the standardization of reporting for rural accommodation establishments is praised as it has the potential to enable efficient and smooth reporting supported by government programs and rural development funds.

The study also recommends leveraging existing resources and making improvements to create a comprehensive and user-friendly solution. Suggestions include developing a customer-centric website or app that improves the overall customer experience through convenience, security, and trust. Emphasizing the user-friendliness of the platform gives an app preference over a website as it provides a more user-friendly interface. In addition, it is suggested that an internal social network be set up within the app to facilitate interaction and information sharing between users and foster a sense of community.

As a case in point, the proposed enterprise architecture aligns with key sustainable development goals and emphasizes the integration of sustainability principles within its framework. The focus on environmental sustainability, community engagement, and economic growth makes this initiative a valuable contribution to promoting sustainable practices in rural tourism and economic development in depopulated areas. By incorporating stakeholder feedback and continuously seeking improvements, this initiative has the potential to significantly impact the achievement of global sustainability goals and the improvement of rural communities' livelihoods. Table 9 summarizes the opportunities and challenges of this topic.

Table 9. Main opportunities and challenges.

Opportunities	Challenges
Potential for a platform/app that serves as a bridge between professional and personal travel, offering services such as accommodation booking, activity recommendations, and local information.	Active management and engagement in the community space to encourage user participation.
Separate platform for owners to manage customer data, content, and engagement.	Building trust and acceptance among users for effective community interaction.
Aggregating data and developing partnerships with service providers can enhance the user experience.	Providing a user-friendly and efficient app interface to overcome the awkwardness often associated with websites.
Ability to create an internal social network where users can connect with each other, share information, and develop a sense of community.	Addressing the unique needs of field workers, such as access to local products and services in non-urban areas.
Integrating professional experiences and networking opportunities for teleworkers using the same accommodation.	Managing maintenance and updates for areas of the platform that require constant attention.
Facilitating interactions and improving the overall user experience through community engagement.	Building partnerships and maintaining relationships with service providers requires ongoing effort.

6.3. Technology Architecture Improvement Based on Cloud Computing

The remote experts (interviewees) made detailed suggestions for implementing and improving the accommodation as previously discussed. While some of these suggestions relate to later phases of the action beyond the phases presented in the enterprise architecture, the focus of the proposed enterprise architecture is to limit the technology domain to a centralized cloud computing model that ensures continuous updates and regulatory compliance. The outlined technology architecture is considered a basic framework with "room" for potential customization and inclusion of additional IoT devices for specific

amenities, such as real-time sustainability metrics, which should be documented prior to implementation based on individual shelter needs and owner ambitions (Figure 38).

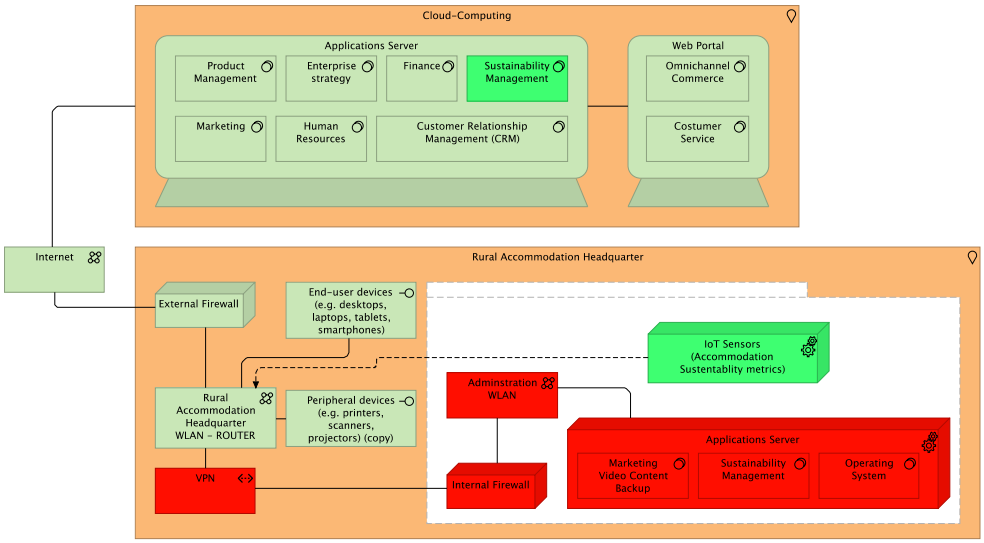

Figure 38. Cloud computing improvements.

7. Conclusions

7.1. Contributions

This article addresses the challenges and opportunities associated with rural exodus and housing resilience in sparsely populated areas. While the existing literature mainly focuses on tourism development and consumer behavior, this paper presents a novel business architecture tailored to small- and medium-sized rural accommodation businesses. The proposed approach aims to equip these businesses with information and business systems guided by the principles of sustainability and digitalization to rejuvenate sparsely populated regions and prepare for the evolving trends of teleworking.

The potential benefits of introducing this new enterprise architecture are manifold. First, it will focus on standardization by streamlining data collection and reporting processes, leading to greater efficiency and sustainability. In addition, the architecture aims to enhance the customer experience through customer-centric digital services, promoting greater convenience, security, trust, and community building. It also provides strategic support for risk mitigation, certifications, and investment/financing decisions and helps to support the local economy by creating partnerships and interactions within the community and mitigating seasonal effects. In addition, the architecture facilitates technological integration by ensuring reliable infrastructure and cloud-based solutions for seamless system integration. Finally, it offers insights into policy and governance by providing data-driven information to influence relevant sectors.

Despite these potential benefits, there are notable challenges in implementing the new enterprise architecture. First, it requires the commitment, vision, skills, and resources of business owners, which is challenging with insufficient investment and support. Integration and technical complexity are hurdles, especially when it comes to combining multiple systems with different functions, managing data, and ensuring security in a cloud-based solution. User acceptance and ease of use, especially for small tourism businesses, are crucial. Data privacy and security concerns are also important and require robust data security measures and compliance to manage the associated risks. Utilizing technology providers and working with incumbents to leverage existing resources and technology can be challenging and requires effective integration. Finally, sustainable practices and community engagement require significant effort and coordination.

The potential impact of implementing this enterprise architecture is far-reaching. From a business perspective, it aims to improve the long-term success of rural tourism SMEs,

optimize data collection and reporting for better management, identify areas for process improvement and automation, and mitigate the impact of seasonality on mid-length stays. In terms of customer experience and loyalty, the architecture aims to improve the customer experience through user-friendly digital platforms, personalize interactions and marketing based on customer data, simplify booking processes, consolidate services, facilitate professional exchanges and networking, and create a central platform for the employment of remote workers. The focus on environmental sustainability includes integrating sustainability data, providing real-time feedback to guests, and measuring and communicating sustainability impacts. In terms of technology and data security, the architecture aims to minimize data security issues and ensure compliance with standards through a centralized system for standards and data security. From a policy and management perspective, it aims to standardize reporting to enable informed decision-making and influence policy and management through validated information. From an economic perspective, it aims to attract remote workers and niche markets, create revenue opportunities through a single platform, promote economic growth in rural areas, and develop services that engage the local community.

The literature review on rural accommodation in the Iberian Peninsula offers an important contribution to researchers by providing insights into the dynamics, challenges, and opportunities of rural tourism. It addresses survival strategies, seasonal challenges, sustainability, heritage promotion, digitalization, CSR, and policy implications and provides a roadmap for further research. Similarly, the study on innovative business architectures for sustainable development in small- and medium-sized enterprises in rural areas contributes by aligning with the SDGs, taking a holistic approach, and emphasizing the integration of sustainability into business models, stakeholder engagement, integration of sustainable tourism technologies, user-friendliness, and recommendations for practical implementation. Together, these studies provide a comprehensive foundation for scholars interested in advancing research on resilient and sustainable rural accommodation and enterprise architectures in sparsely populated regions.

7.2. Limitations

However, the study also has its limitations. These include the need for a more focused literature review, expansion to other search engines, the potential development of additional use cases, and the limited availability of remote workers and digital nomads to evaluate the enterprise architecture, with only a small number of interviews conducted due to time constraints.

7.3. Future Work

Future research in this area could address the technical aspects of implementing the proposed enterprise architecture and integrating it with existing information systems. It could also explore methods for capturing customer data and personalizing interactions in the context of rural tourism, investigate how sustainability metrics and practices can be integrated to promote sustainability in rural tourism, and focus on automating and simplifying processes across multiple platforms to improve ease of use, especially for small businesses. It will also explore how business architecture can influence policy development and funding opportunities. In addition, viable revenue streams and funding opportunities to support research, implementation, adoption, and economic sustainability based on this business architecture will be explored, as well as strategies for local community participation and engagement, social entrepreneurship, and rural tourism to promote sustainable and socially engaged experiences.

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Appendix A

Table A1. Codebook.

Code	Entry
General comments	Avoid the side effects of scale economy.
	Doubts about the EA implementation.
	EA platform should and could be financed from European funds.
	Should think about Future EA implementations.
	Suggestion—platform as a website, app for users and a dedicated network portal.
	Sustainability is a good bonus, but there are other factors that play a big part in decision-making.
	Sustainability measures are important when choosing accommodation for remote workers.
	Local community involvement and local partnerships are critical to success.
	This EA could be a white label like Shopify.
	This theoretical work is relevant and interesting to the industry in general.
	Trust certificates are not important—better to have credible labeling.
	The nature of the company should be attractive for government funding.
	Suggestion—develop a pilot project only as a virtual simulation of the site.
	Avoid physical technologies to ensure quality control.
	Community platforms should function independently.
	Customers complain function is probably too complicated of a process for a single function.
	Direct sustainable feedback on user actions during the stay.
Completeness	EA rate—Good +.
	Holding physical events to raise awareness among the local community and encourage human and digital interactions.
	Well thought out and not missing key features.
	Understand how to communicate with the local community is key.
	Understand the customer journey data for owners is key to maintaining engagement.
	Provide fast customer service and excellent user experience.
	Improving the experience during the stay.
Improvements	Develop a simple version of this architecture.
	It is important to meet customer expectations regarding the specifications and work location for remote workers.
	Use as many existing providers as possible to facilitate the implementation.
Initial thoughts	Clarity in the diagrams.
	Could be great as a platform.
	The EA is complete.
	Is difficult to find places that combine all this.
	Very interesting.
	This EA could be implemented on a global platform and could be interesting for remote workers.

Table A1. *Cont.*

Code	Entry
Relevance	EA has many advantages for owners and managers. Doubts about the implementation. Disadvantages of rural locations: Good internet connections are necessary for everything to work. Good for SMEs and helps to mitigate the risks of implementation. Local resources are important to develop the local economy. Increases networking possibilities. EA is important to improve customer experience. Robust and sophisticated EA for data collection and performance. Rural is a pathway to new trends. Standardized way of data collection. The EA avoids complexity. Challenges in analyzing and entering data. A cloud-only implementation will facilitate all political and legal implications.
Usability	Design and UX are crucial to providing a good product. Improves a strategic way of working. Older systems are often clunky. Physical brochures in the traditional way are also good. The user interface should be designed with SME owners in mind. It provides a great overview of data processing. No challenges, but some functions only make sense if the customer stays longer. Easy to use on paper but probably difficult in real life. It should be considering the development of an App for customers. Doubts about the portal community: it should be normally active.
Utility	The development of new and strategic partnerships is essential. The EA facilitates all interactions. This structure is ideal for remote workers who want to stay longer. Buy local groceries through the website is a great idea. Probably develop a separate platform for owners and important for the local economy. Shared experiences in the community. Sustainability metrics are essential. Great to achieve work-life balance for customers and owners.

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