



THE STUDY OF EXPERIENCE ECONOMY AND SERVICE DESIGN FOR
SUSTAINABLE DEVELOPMENT : CASE STUDY IN DUNHUANG AREA



By
Mrs. Ping QIN

A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy Culture - Based Design Arts
Silpakorn University
Academic Year 2025
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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต

สาขาวิชาศิลปะการออกแบบเชิงวัฒนธรรม แบบ 1.1

มหาวิทยาลัยศิลปากร

ปีการศึกษา 2568

ลิขสิทธิ์ของมหาวิทยาลัยศิลปากร

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IN DUNHUANG AREA
By Mrs. Ping QIN
Field of Study Culture - Based Design Arts
Advisor Assistant Professor Phuvanart Rattanaungsikul, Ph.D.

Faculty of Decorative Arts, Silpakorn University in Partial Fulfillment of the
Requirements for the Doctor of Philosophy

..... Dean of Faculty of
(Associate Professor Arwin Intrungsi) Decorative Arts

Approved by

..... Chair person
(Assistant Professor Apisak Sindhuphak, Ph.D.)

..... Advisor
(Assistant Professor Phuvanart Rattanaungsikul, Ph.D.)

..... Committee
(Professor Police Captian Anucha Pangkesorn, Ph.D.)

..... Committee
(Assistant Professor Sarawuth Pintong, Ph.D.)

..... Committee
(Assistant Professor Atithep Chaetnalao, Ph.D.)

640430037 : Major Culture - Based Design Arts

Keyword : Dunhuang, Mogao caves, experience economy, design arts, inspirations, modern design, sustainable travel, culture development

Mrs. Ping QIN : THE STUDY OF EXPERIENCE ECONOMY AND SERVICE DESIGN FOR SUSTAINABLE DEVELOPMENT : CASE STUDY IN DUNHUANG AREA Thesis advisor : Assistant Professor Phuvanart Rattananarungsikul, Ph.D.

This study investigates how the experience economy and service design can jointly promote sustainable tourism development in Dunhuang. The research addresses three key challenges: peak-season crowding with limited dispersal mechanisms, insufficient participatory experiences beyond major heritage sites, and persistent language and information barriers that affect visitor experience and local inclusion.

The objectives are to translate core theoretical concepts into collaborative practices with local stakeholders; to analyze tourism assets and develop richer, experience-oriented options that enhance community participation; and to design a practical model that improves trip quality within sustainability constraints.

A mixed-methods grounded theory approach is employed, progressing from literature review and contextual analysis to a pilot phase involving on-site observation, focus groups, and semi-structured interviews, followed by extended field immersion with participatory observation and stakeholder dialogues, and culminating in structured stakeholder surveys. The sample includes visitors, residents, tour guides, small service providers, community organizations, and public-sector actors.

Iterative service-design methods—such as co-creation, journey mapping, seasonal curation, and post-trip reflection—produce two process models (WTE and WTOCI) and ultimately lead to the Dunhuang Experience Sustainable Model (DESM), supported by a bilingual travel handbook. DESM operationalizes a people-centered, season-based, experience-oriented orchestration framework that aligns visitor interests with seasonal highlights, coordinates local resources into executable itineraries, and completes a feedback loop through sharing and iteration.

The model effectively disperses tourist demand, deepens cultural understanding, reduces dependence on ad hoc interpretation, and establishes stable entry points for community participation. The study concludes that integrating experience-economy value creation with service-design implementation provides a replicable framework for Dunhuang and similar heritage destinations, offering both practical outcomes and potential social impact.

ACKNOWLEDGEMENTS

First of all, I would like to thank the professors of the project team for giving me unlimited help in my learning process. Especially Professor Polcapt Auncha Pangkesorn was the director of the program, and my advisor Dr. Phuvanart Rattanarungsikul, gave me a lot of guidance in research and writing. These are very important for me to understand the process and methods of research and to solve many practical problems I have encountered in my research. At the same time, I would like to thank Dr. Pintong Sarawuth of the program team for his patience and time, encouragement and support during my confusion and stagnation. Especially in the first two years of study, his guidance has always inspired me and laid the foundation for my research. As an international student, Dr. Pipu Boosabok helped me better adapt to the learning style under different academic systems, helped me better understand the research methods of the thesis, and effectively promoted my research. They made me a better person.

Finally, I would like to thank my family for giving me unconditional support and encouragement during my study process, so that I have no worries during the study process, take the initiative and focus on research.

Ping QIN

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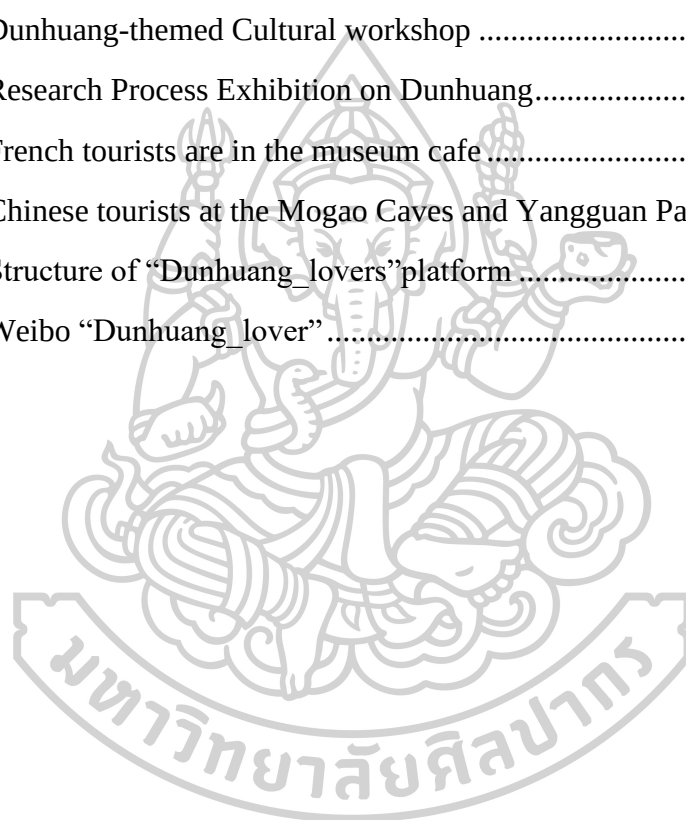


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Chapter 1

Introduction

In 1987, the Mogao Caves were designated as a World Cultural Heritage Site, significantly enhancing global awareness of this cultural treasure. Therefore, people have paid high attention to its surrounding areas, especially Dunhuang. Historically, Dunhuang was an important stop on the ancient Silk Road in China and a significant passage connecting China with the Western world. It thrives as an international center, characterized by a diverse economic landscape and rich local and foreign cultural influences. However, as time went by, with the changes of history, the alternation of dynasties and the gradual decline of the Silk Road, Dunhuang gradually faded from people's sight. After the founding of the People's Republic of China, although economic reform and development measures were mainly concentrated in the eastern region, Dunhuang was located in the western hinterland, surrounded by arid landscapes such as the Gobi Desert, and was somewhat marginalized in the rapid development of science and technology and economic progress. However, the thousand-year-old cultural history and artistic relics of the Dunhuang area have laid a solid foundation for the development of tourism in this region. In Dunhuang, which is surrounded by deserts on all sides, tourism has gradually become the main industry there. The tourism industry that began to thrive around the Mogao Caves, including hotels, catering services, cultural relics and accommodation, has become the main economic lifeline of the local area.

However, the Mogao Caves are confronted with numerous natural threats, with oxidation and shedding occurring frequently. The Mogao Caves are gradually dying out. In addition, the distinct four seasons of the climate make most tourists prefer to travel in summer. The severe imbalance between the peak and off-peak seasons of tourists has led to an imbalance in the pressure on local tourism resources. Besides tourist attractions, there are few more participatory activities to disperse the number of tourists during the peak season, which also puts pressure on local natural resources and cultural relics. In addition, as a major tourist attraction in Dunhuang, the Mogao Caves possess extremely high archaeological and artistic value. Moreover, they are

entirely managed by the government, making it difficult for local people to come into contact with the cultural value of the Mogao Caves and to participate in their tourism products and activities. Gradually, the local people have become less and less aware of the culture and value of the Mogao Caves. If it is foreign tourists, due to their even less common language, they find it even more difficult to understand its meaning. Then, if the Mogao Caves, which are the basis for the local economy's survival, really disappear one day, it will also have an impact on the sustainable development of the local economy. Therefore, in the face of the practical predicaments such as the imbalance between the peak and off-peak tourist seasons in Dunhuang, the single product range, and the insufficient language coordination, how to enable local residents to closely cooperate, bring more experience value to tourists, and balance the tourism reception pressure brought by the peak and off-peak seasons is a problem worth studying.

1.1 Significant of Problem

1. The excessive number of visitors and the imbalance between peak and off-peak seasons, along with the lack of additional experience activities, make it difficult to disperse the flow of visitors, and the protection of major scenic spots is hard, resulting in insufficient value for tourists' experiences.

2. The local tourism resources have not been fully utilized, and the collaboration of tourism resources is insufficient, making it difficult for local people to participate in the development of tourism in Dunhuang.

3. Language communication barriers and the way of traveling make it difficult for tourists to understand the culture and characteristics of Dunhuang, especially foreign tourists.

1.2 Research Objectives

1. To study the concepts of service design and experience economy, and collaborate with local people and resources to explore more products suitable for tourists' travel in Dunhuang.

2. To analyzing the local tourism resources of Dunhuang and integrating the theory of experience economy, more travel consumption plans can be developed, which can also enhance the local people's participation in the tourism industry.

3. To design a tourism industry model that can better enhance the travel quality and experience of tourists.

1.3 Hypothesis

Through the process of service design and in combination with the concept of experience economy, tourism in Dunhuang can be made more diverse, reducing the pressure on tourists in major scenic spots and providing tourists with more travel experience value and a sustainable development model for local tourism.

1.4 Scope and limitation of the study

1.4.1 Content Scopes

This research is limited to the study of service design and the theory of experience economy, and is applied to the development of tourism in Dunhuang to achieve the goal of sustainable development.

1.4.2 Population Scopes

People related to the Dunhuang area and tourism, including restaurant operators, hotel industry practitioners, tourism industry workers, and experts related to Dunhuang art.

1.4.3 Area Scopes

The Dunhuang area, The total area is 26,700 square kilometers is concentrated in the scenic spots and local communities of Dunhuang.

1.4.4 Time Scops

From the end of 2023 to the middle of 2025.

1.5 Research Framework

The study follows a sequential framework comprising background, methodology, design, validation, and conclusion, implemented across the period 2022 to 2025. In the background phase, a systematic literature review establishes the historical and cultural context of Dunhuang, traces regional economic and tourism development, and synthesizes the core theories of the experience economy, service design, and sustainable development, thereby defining the research problem and objectives.

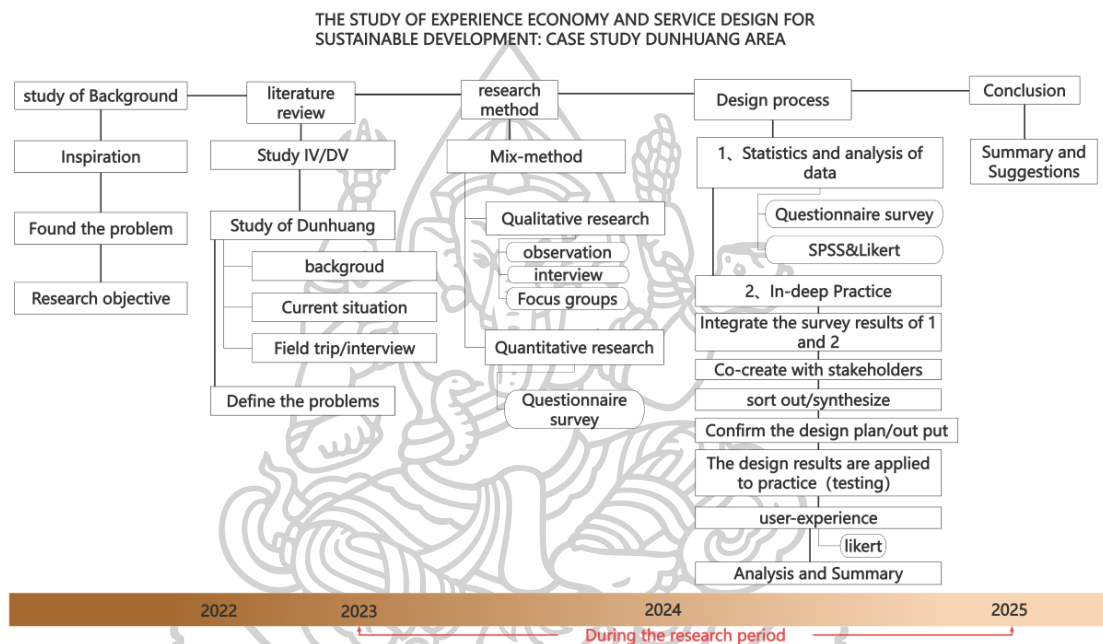


Figure 1 Research framework and time planning

1.6 Definition of Terms

1.6.1 Experience economy

Joseph Pine II and James H. Gilmore argue that Experience economy sells memorable experiences and transformations beyond services; firms stage events where memory is the product, shaping tourism and design.

1.6.2 Service design

Service design is a user-centered design approach. It is more conducive to solving complex design problems, especially those involving multiple stakeholders.

1.6.3 Touchpoint

According to Stickdorn and Schneider, a touchpoint in service design is any moment or channel—people, places, interfaces, communications, or policies—through which customers perceive or engage a brand, conveying information and value, shaping emotion, and forming basic units for evaluating experiences.

1.7 Concept Framework

By applying the methods of service design and integrating the concept of experience economy, innovative service models and experience strategies suitable for the tourism ecosystem can be developed to ensure the sustainable development of local tourism.

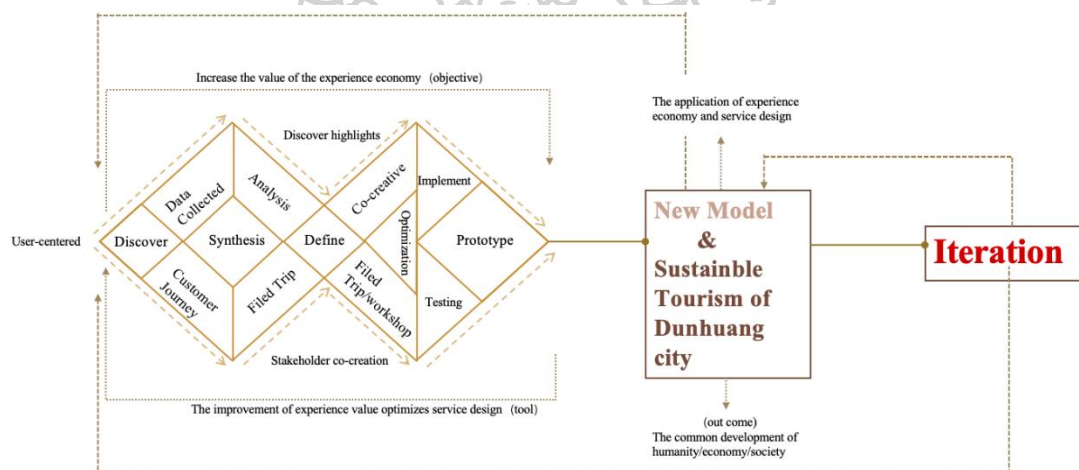
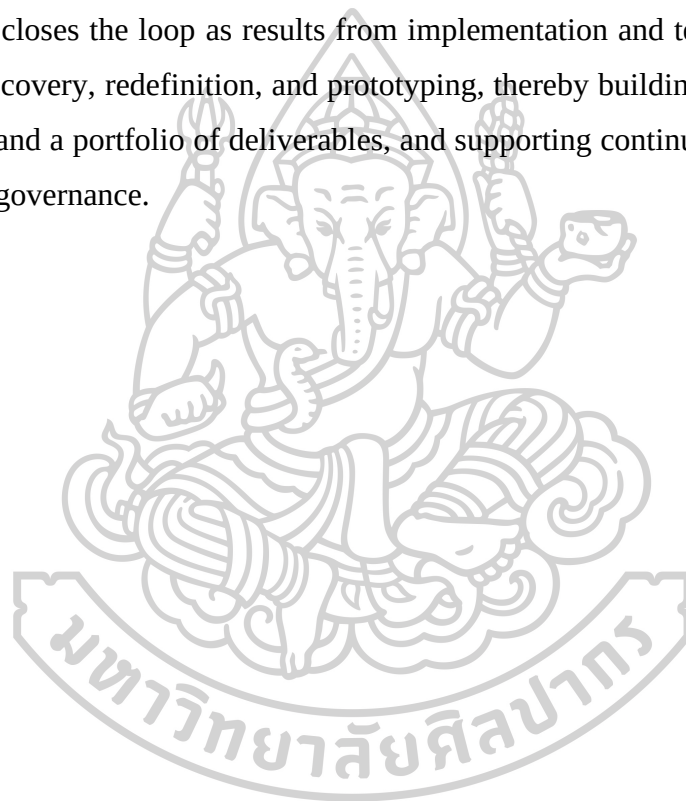


Figure 2 Concept framework

The research framework integrates theory and method within a user centred design and research cycle directed at sustainable tourism in Dunhuang. It follows the double diamond logic that moves from discovery and definition to co creation and realization. In the first phase the study conducts customer journey observation, field data collection, and systematic synthesis and analysis to surface pain points, identify destination highlights, and specify context sensitive problems. In the second phase stakeholder co creation and trip workshops convert these insights into actionable

service concepts that are then prototyped, implemented in situ, tested with real visitors, and refined through evidence based optimization. The framework operationalizes the experience economy by treating experience value both as the guiding objective and as the instrument for design calibration, while service design supplies the procedural toolkit that links diagnosis to intervention across touchpoints and actors. The central output is a context specific operating model for Dunhuang that coordinates local resources, elevates visitor value, and aligns environmental, social, and economic outcomes under the principles of sustainable development. A built in iteration mechanism closes the loop as results from implementation and testing feed back into renewed discovery, redefinition, and prototyping, thereby building a reusable body of knowledge and a portfolio of deliverables, and supporting continuous improvement in destination governance.



Chapter 2

Literature Review

The economic development of Dunhuang largely depends on the influence of the Mogao Caves and its unique geographical features. Tourism has become one of the main pillar industries in the local area. The development of the tourism industry requires a more comprehensive service system to drive it, so as to provide tourists with a better travel experience. Therefore, in order to make better innovations in the later design of this study, this chapter of literature research will consist of three main parts. The first part is to collect and organize information on the background of Dunhuang and the current situation of its tourism industry based on grounded theory. The second part is to summarize the significant problems of Dunhuang's tourism industry and the theoretical learning related to this study. The third part is to collect suggestions from participants and local stakeholders through pilot research, combine literature research with data collection from field investigations, conduct further analysis of data information based on grounded theory, classify and encode the data for the research objective, and apply it to the later research advancement.

2.1 Study of Grounded Theory

In the qualitative methodology spectrum, Grounded Theory (GT) emphasizes a "bottom-up" theoretical generation logic. Its core lies in allowing concepts and categories to "grow out" from empirical materials through continuous comparison and theoretical sampling, rather than being imposed by prior assumptions (Glaser & Strauss, 1967). The subsequent differentiation led GT to form multiple paths: The classical orientation advocates postponing the framework presupposition as much as possible to maintain theoretical sensitivity, while the procedural orientation enhances operational transparency and reproducibility through the technical sequence of open-spindle - selective coding (Strauss & Corbin, 1998). The constructivist orientation further emphasizes the co-construction of meaning between researchers and respondents, and combines initial/focused/theoretical coding with reflexive writing and abductive (abduction) strategies to enhance explanatory power and contextual

relevance (Charmaz, 2014). The corresponding cycle of "memorizing - comparison - back to the field" provides a bridge from "code pile" to "theoretical integration". Theoretical saturation is defined as the point in time when new data no longer introduces new properties, dimensions or relationships of the category, and it is evidence of convergence and table stopping (Bryant & Charmaz, 2007; Strauss & Corbin, 1998). It is worth noting that GT is not an excuse to ignore literature, nor is it a simple listing of verbatim manuscripts or word frequency statistics. The essence of its methodology lies in traceable comparative logic, concept density and interpretive tests for negative examples (Suddaby, 2006).

For the Dunhuang tourism research characterized by the interweaving of "experience, service and sustainability", systematic study of GT can significantly enhance the theoretical sensitivity and mechanism abstraction of materials: It can not only materialize front-line narratives into testable propositions of "conditions, interactions/strategies, and results", but also make up for weak scenarios through theoretical sampling, ultimately forming contextualized middle-level theories that are both in line with local practices and can be connected with subsequent quantitative tests (such as structural equations) (Charmaz, 2014; Glaser & Strauss, 1967; Strauss & Corbin, 1998).

Therefore, in order to enable the materials learned and collected in the later stage to be analyzed and compared in an orderly manner, I will encode the information in the subsequent literature research, field investigations, interviews, etc. according to the grounded theory method to form open coding, so as to provide effective reference data for the subsequent coding. The encoding sequence will adopt the method of research content plus information extraction data. For example, the information from literature research will be encoded as literature A1 (LA1), the information extracted from interviews will be encoded as Interview A1 (IA1), and so on.

2.2 Experience Economy and Service Design in Sustainable Development

The theories involved in this research topic include the tourism development cycle, experience economy, service design, sustainable development theory, etc. The study of these theories can better support the researcher's next step of research and lay

a theoretical foundation for the researcher's research. Theoretical research on the experience economy can better understand the measurement standards of experiences from the perspective of tourists and find suitable manifestations of the experience economy for this research. The theory of sustainable development will support researchers in achieving their ultimate goal. The development of Dunhuang is not aimed at consuming existing accumulations to gain economic benefits, but rather considers how generations of Dunhuang people can continue to carry forward this culture a hundred years from now and continue to benefit future generations. This theory is very crucial in the research, providing clear standards for it. The research on service design is aimed at serving as a research process to ensure that this research can proceed in an orderly manner.

2.2.1 Principles of Service Design

Based on the characteristics of service design, there are five widely recognized principles of service design or service design thinking: user-centered, collaborative innovation, orderliness, materialization, and integrity.

User-centered

The User-centered (UCD) design concept has been widely applied in product design, interaction design and other fields. There is no exception in the scope of service design to implement this principle of user-centeredness. The participation of users enables the service system to form a closed loop. Centering on users, understanding their needs, and optimizing the overall service experience are among the important principles of service design.

Collaborative Innovation - Co-creative

In a service system, there are not only (visible) consumers (service users), but also multiple stakeholders such as service providers and managers. If the participation of all stakeholders in the service design process is fully mobilized, more comprehensive design concepts from multiple perspectives can be obtained. Therefore, in addition to design, service designers also need to have organizational skills to stimulate the creativity of various stakeholders and mobilize their enthusiasm for participation in the service design process.

Sequencing

A complete service system is composed of multiple service stages and multiple contact points, and must follow certain service processes. It is a dynamic process over a period of time. The timeline is very important to users, and the pace of service will largely affect users' emotions. Service design should take into ID the rhythm that each link brings to users, implement precise rhythm control, and connect every point of interaction between users and services.

Materialized Evidencing

In the service system, many services are carried out invisibly in the background. To a certain extent, it is necessary to materialize the intangible services, thereby enhancing users' perception of the services.

Holistic

Service design is about designing a system, not just the interaction at a certain touchpoint. The objects of service design are not only users (consumers), but also multiple stakeholders such as service providers and system administrators. Therefore, when doing service design, it is necessary to think globally and consider problems from an overall perspective.

Table 1 Key Information for Service Design

	服务设计文献/理论 (Service design literature/theory)
LA1	利益相关者分层（按与服务系统的紧密程度区分核心、直接、间接三类；用于界定谁参与、谁受影响） Stakeholder stratification (distinguishing core, direct and indirect categories based on the degree of closeness to the service system; used to define who participates and who is affected.)
LA2	Touchpoint（触点五分法） 触点是利益相关者与服务系统交互的载体，分为物理/数字/情感/隐形/融合 Touchpoint (Five-Point Touchpoint Method) Touchpoints are the carriers through which stakeholders interact with service systems, and they are classified as physical, digital, emotional, invisible, and integrated.

	服务设计文献/理论 (Service design literature/theory)
LA3	Processes (多触点的系统性、动态流) 服务对象不是单个触点，而是由多触点构成的系统性、动态流程；节奏、阶段划分与组织尤为关键 Processes (Multi-contact systems, dynamic flows) The service object is not a single touchpoint, but a systematic and dynamic process composed of multiple touchpoints. Rhythm, stage division and organization are particularly crucial.
LA4	Offering (服务供给物) 服务系统设计的核心是明确所提供的服务供给物 Offering (Service Supply) The core of service system design is to clarify the service providers to be offered.

2.2.2 Process of Service Design

In the field of design, the widely accepted and disseminated design processes include the five steps of design thinking: empathize, define, ideate, prototype, and test, as well as the double Diamond model proposed by the British Design Institute: discover, define, develop, deliver. Their common point is that they all start from discovery and definition. First, they ensure that the right thing is designed, and second, they need to go through a repeated iterative process of concept production and testing. Service design also follows the same design process.

Discover/Research

The main stages of development include: questioning the demand, listing the research subjects, choosing the research direction, and conducting the research. In service design, the discovery stage typically involves understanding the service background, the stakeholders in the existing service, and the problems in the existing service process, etc. Common methods include: field investigation and desk investigation. Common research methods include user interviews, focus groups, design probes, cognitive walkthroughs, etc.

Define/Synthesis

In the definition stage, the original research data obtained in the discovery stage is analyzed and sorted out to define the design goals, which includes the following steps: summarizing the original research data, cluster analysis, design insights, and redefining design requirements.

At this step, the original requirements will be redefined, laying the foundation for the subsequent divergence and output of design concepts. Some service design tools, such as user experience maps and stakeholder maps, serve as tools for thought organization and visual expression at this stage, helping to transform design research into insights. Raise the "how might we" question to redefine the specific design requirements in order to proceed to the subsequent creative design stage.

Develop/Ideation

The establishment stage is the process that designers are most familiar with, where creative divergence leads to the proposal of design concepts. It involves continuous refinement and improvement of the concepts. The main steps include: creative divergence, concept evaluation (iterative process), and design plan.

It should be noted that the design concept output of service design should not only take into ID the service users, but also the service providers. How to create a complete service process to provide a better experience for all stakeholders is the core. During the stage of concept divergence in design, if designers act as organizers and enablers, and bring various stakeholders into the creative design process by organizing collaborative design workshops, they will gain multiple times the rewards. Some service design tools, such as user experience maps and service blueprints, will help designers understand the background, think globally and think diversely at this stage.

Deliver/Implementation

This stage is the final production of the solution, including: creating a prototype, testing and analysis, and solution iteration.

After generating the service design plan, the plan can be tested and improved by quickly creating a service prototype. Establishing a service prototype can save the cost of trial and error, and problems can be identified and improved as early as possible. Even the implemented solutions need continuous testing, iteration and

improvement. A complete design process requires continuous iteration, from the establishment to the output stage, and the iteration of the discovery, output, and discovery processes, in order to gradually refine a good service system.

2.2.3 Summary

Service design is a user-centered design approach. It is more conducive to solving complex design problems, especially those involving multiple stakeholders. It enables researchers to clearly distinguish the core issues from the key stakeholders and also allows them to have a clearer understanding of the key points of the problem.

Table 2 Key Process Information for Service Design

	服务设计过程（流程范式） Service design process
LB1	目标与要素框定（Mission & IPO） 先明确使命/目标/战略，并清晰界定 Input–Processing–Output 要素 Objective and Element Framing (Mission & IPO) First, clarify the mission/goal/strategy, and clearly define the input-Processing-output elements.
LB2	内部能力约束（时间/成本/质量/效率） 服务过程需匹配组织内在能力，以提升质量与效率；关键涉及有效产出率、时间、成本、质量 Internal capability constraints (time/cost/quality/efficiency) The service process needs to match the organization's internal capabilities to enhance quality and efficiency. The key points involve effective output rate, time, cost and quality.
LB3	组织与文化环境适配 组织结构既含硬件/技术系统与专门技能，也含使命、职能特征、团队形态等“软件”，并强调软硬件有机整合 The organization is adapted to the cultural environment Organizational structure encompasses both hardware/technical systems and specialized skills, as well as "software" such as mission, functional characteristics, and team form, and emphasizes the organic integration of software and hardware.

LB4	技术可用性与投入 评估现有/可用技术能力；信息化从手工到电子化，显著提升运营效率；不足则需加大投入 Technology availability and investment. Evaluate the existing/available technical capabilities; The transformation of informatization from manual to electronic has significantly enhanced operational efficiency. If there is a shortage, more investment is needed.
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2.2.4 Study of the Experience Economy

An experience economy is the sale of memorable experiences to customers. The term was first used in a 1998 article by B. Joseph Pine II and James H. Gilmore describing the next economy following the agrarian economy, the industrial economy, and the most recent service economy. Joseph Pine II and James H. Gilmore argue that businesses must orchestrate memorable events for their customers, and that memory itself becomes the product: the "experience". More advanced experience businesses can begin charging for the value of the "transformation" that an experience offers, e.g. as education offerings might do if they were able to participate in the value that is created by the educated individual. This, they argue, is a natural progression in the value added by the business over and above its inputs. Tourists having the purchased experience of visiting the Temple of Apollo at Delphi. Although the concept of the experience economy was initially focused on business, observations and theories have crossed into tourism, and architecture. The experience economy can be quantified as the economic value of an experience, which is a psychological process people can go through. The experience economy is often consumed as product or service, or as pure experience product such as sports, and online dating. The experience economy is also considered the main underpinning for customer experience management.

(Zhu Heliang, 2002, pp16, How to Understand the Experience Economy). The experience economy can be defined as "an economic form that takes commodities as props, services as the stage, and providing experiences as the main economic offering." The reason for such a demarcation is that the proposition of empirical economy is viewed from the perspective of the evolution process of human

social economic offerings or economic values. From the perspective of the evolution process of economic supplies, they consider it as belonging to human society.

The development is based on the direction of providing agricultural and mineral products, industrial products, services and experience. Correspondingly, the economic development of human societies can be divided into four eras: agricultural economy, industrial economy, service economy, and the experience economy that is advancing.

Experience the content of the economy. All kinds of information indicate that the physical experience of the economy was initially produced from the entertainment industry. For this reason, nowadays, quite a few people regard physical experience scriptures as recreational scriptures. At the same time, many people regard the physical experience provided by enterprises as providing entertainment to customers, thus equating the physical experience industry with the entertainment industry. These are all very big misinterpretations. This kind of misinterpretation stems from the narrow rational understanding of the empirical experience. From the perspective of the actual situation, the various experiences that enterprises offer to customers are mainly not for entertainment but to attract customers to participate.

2.2.5 Theoretical Study on sustainable Development

The currently recognized concept of "sustainable development" in the world originated from the definition proposed by the World Commission on Environment and Development in 1987. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains two key concepts:

The broad definition of resource sustainability:

1. While enhancing and creating the present, we must not do so at the expense of well-being.

2. Based on the principle of making good use of the natural resources of all ecosystems, the basic environmental stock must not be reduced. When utilizing organisms and ecosystems. The long-term development model that merely pursues economic growth has led to environmental damage, and various environmental crises have emerged. People have come to realize that economic development is constrained

by the carrying capacity of the environment. Sustainable development originated from the "Green Movement" in the 1980s. In the 1960s, developed countries purchased large amounts of farmland in Africa and South America to grow coffee and sugarcane, and used the money to buy food to supply local residents. However, due to excessive land development and a lack of planning, the futures of coffee and sugar depreciated in a short period of time. The economies of South American countries suddenly collapsed. Coupled with soil erosion, the abuse of pesticides and the continuous expansion of excessive consumption, the land became infertile and even decertified, leading to famine. The concept of "need", especially the basic needs of the poor in the world, should be given the highest priority. And the limitations imposed by the state of technology and social organizations on the environment's ability to meet current and future needs. World Commission on Environment and Development, "Our Common Future" (October 1987). Sustainable development is not simply equated with colonialization or environmental protection. Generally, it is believed to consist of three aspects.

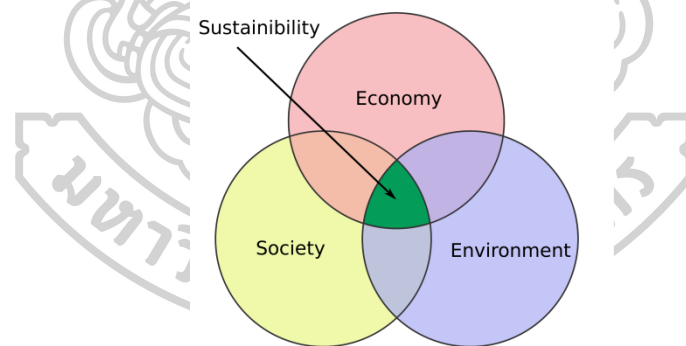


Figure 3 Sustainability Venn diagram

(Source : https://en.wikipedia.org/wiki/Sustainable_development#/media/File:Sustainability_venn_diagram.svg)

2.2.5.1 The three elements of sustainable development

Environmental aspect

According to the report of the World Commission on Environment and Development: Our Common Future, the capacity of the Earth's life support system contains biodiversity conservation, climate stability, clean air and water, soil health,

renewable utilization of resources and pollution reduction, etc. The core principle is to keep resource consumption, emissions and ecological damage within the regenerative and absorption capacity of the ecosystem. Promote reduction, reuse, recycling (3R) from the perspective of the life cycle, and achieve development within the environmental threshold through regulations (environmental impact assessment, pollutant discharge permits, nature reserves), market mechanisms (carbon pricing, green taxes and fees), and technological innovation (clean production, renewable energy, circular economy). This dimension directly responds to the Brundtland report's emphasis on "meeting contemporary needs without compromising the ability to meet the needs of future generations", as well as the "environment" defined in UN documents as an independent but inseparable pole of sustainable development.

Social aspect

Based on the Resolution adopted by the General Assembly, emphasizing human well-being and social equity contains poverty reduction and inclusion, decent work, education and health, gender equality, cultural diversity and community resilience, intergenerational and intergenerational equity, participatory governance and the rule of law, etc. The goal is to improve the quality of life and reduce inequality on the premise of respecting human rights, so that no one is left behind in the achievements of development. Governance tools include social security, public service supply, community participation and transparent accountability. Both the United Nations' 2030 Agenda and the 2005 World Summit documents have identified "social development/social dimension" as one of the pillars of sustainable development and require it to be advanced in a "balanced and integrated" manner with the economy and the environment.

Economic aspect

Focus on the vitality and efficiency of the economic system, according to the Resolution adopted by the General Assembly prioritize "the quality of growth" over quantity: guided by resource efficiency, structural upgrading, green technology and innovation-driven long-term resilient growth; Internalize externalities (such as carbon/pollution costs) to avoid irreversible depletion of natural capital; Guide capital towards activities that balance environmental and social values through green investment, sustainable procurement and responsible business practices. This

dimension and the other two dimensions mutually restrict and promote each other - this "interdependent and equally important" three-dimensional structure has been repeatedly confirmed in the United Nations General Assembly and the framework of sustainable development governance. The "triple bottom line" at the enterprise level (profit, society, and public domain/environment) has also become a common approach to implementing the three dimensions in business practices.

2.2.6 Summary

As a destination centered on World cultural Heritage, for Dunhuang to achieve high-quality development, it must simultaneously consider three aspects: "experience economy, service design, and sustainable development". In short: The experience economy tells us that we should take "unforgettable experiences" rather than merely "highlights" as the core value, and enhance tourists' feelings through narrative, immersion and education, thereby bringing higher satisfaction, repeat visits and word-of-mouth. Service design offers a way to "stably deliver" this value, emphasizing a user-centered approach, cross-departmental collaboration, and clear service processes. It integrates various touchpoints such as scenic spots, transportation, explanations, and night activities, reducing queues and information asymmetry, and enhancing the consistency of the overall experience. Sustainable development sets an unbreachable bottom line, requiring operations within the micro-environment and ecological carrying capacity of cultural relics, while also taking into ID community benefits and economic feasibility. The three aspects work in harmony: service design determines "how to bring the experience to every touchpoint", and sustainable development determines "within what boundaries and for whom to benefit". Based on this, Dunhuang can enhance the experience and efficiency while protecting its heritage through specific measures such as time-slot reservation and staggered peak hours, digital substitution/replication of exhibitions, Cardium-type routes and night economy, community co-creation and revenue distribution, and transform its cultural and ecological advantages into long-term competitiveness.

2.3 Overview of area and history

2.3.1 Introduce of Dunhuang

Dunhuang is located at the intersection of Gansu, Qinghai and Xinjiang provinces in China. With a population of more than 130,000, the city's economy is mainly based on agriculture, followed by tourism services, and there is no relatively strong industry. This is insignificant among counties and cities in the country. However, Dunhuang is famous all over the world because of its glory and profound cultural connotation. Dunhuang is flanked by the magnificent Qilian Mountains to the south, the vast Taklimakan Desert to the west, the rugged Beisai Mountain to the north, and the rocky Sanwei Mountain to the east. It covers an area of 31,200 square kilometers. It has a warm temperate climate. The annual rainfall is only 39.9 mm, while the evaporation is as high as 2400 mm. Full sunshine, long frost-free period. (CCTV.com, n.d.)

The area west of the Yellow River in China has been called “Hexi”, “since ancient times, because the area is sandwiched between the Qilian Mountains and the North Mountains, forming a narrow strip of about 1000 kilometers long, several kilometers wide to more than 100 kilometers, like a natural corridor, so it is also called “Hexi Corridor”.

Dunhuang is located in the west end of Hexi Corridor, and the present Dunhuang City is a county-level city in the westernmost part of Gansu Province, bordering Anxi County to the east, Subei Mongolian Autonomous County and Aksai Kazakh Autonomous County to the south, Ruoqiang County to the west, and Hami City to the north. In ancient times, the names of the surrounding areas of Dunhuang were uncertain, and the vast area in the west was generally called the Western Regions. Western travelers had to pass through Dunhuang to enter the Western regions and go to Central Asia, South Asia, West Asia, and even Europe and North Africa. Dunhuang was the only place for ancient diplomatic caravans to travel east and west and was the most important transportation hub on the Silk Road. The geographical environment inside Dunhuang region is Sanwei Mountain and Mingsha Mountain in the south, Gobi in the north, and a plain formed by alluvial downstream of Danghe River in the middle. Since ancient times, Dunhuang people have been

mainly active on this plain. Dunhuang is located in the interior of Asia, the local continental climate, dry, less rain, annual precipitation is less than 50 mm, far below the evaporation, but other water sources are more abundant, Dunhuang south of the Qilian Mountains, the mountains rich in snow water for it to bring vitality. At an altitude of more than 4,000 meters, Qilian Mountain is covered with snow all the year round, which is called “ice source reservoir”. Most of its glaciers are distributed on the north slope. In spring and summer, the snow melts and flows into the corridor to form three major water systems, Shiyang River, Heihe River and Shule River, and several oases are formed along the river. Dunhuang lies on an oasis in the Shule River basin. This oasis has a large area, fertile land, suitable for farming and grazing, and is a rare “land of life” surrounded by desert and Gobi. (Dunhuangtour.com, n.d.)



Figure 4 Location of Dunhuang

(Source: Piao et al, 2003)

By 2022, the resident population of Dunhuang is about 185,000 people, mainly Han, Hui, Tibetan and other ethnic groups. In 2022, the GDP of Dunhuang City was 8.769 billion yuan, an increase of 3.6%. Among them: the added value of the primary industry was 1.251 billion yuan, an increase of 5.4%; The added value of the secondary industry was 1.964 billion yuan, up 3% year-on-year, and that of the tertiary industry was 5.554 billion yuan, up 3.4% year-on-year. (Baidu Baike, 2022)

Among them, the primary industry is mainly based on agriculture and animal husbandry, the secondary industry is mainly based on industry and construction, and the tertiary industry is mainly based on tourism and service industry. Therefore, the tertiary industry is the top priority of the entire Dunhuang economic income. In 2017, the tertiary industry, with the cultural and tourism industry as the core, IDed for more than 60% of Dunhuang's GDP. (Chi Zijing, 2018)

2.3.2 History of Dunhuang

The earliest record of Dunhuang in historical records is found in the “Notes on Da Yuan Zhuan in Shi Ji” (S,145-90 BC) which quotes Zhang Qian's report as saying: “Shiyue family lived in Dunhuang and Qilian.” This is the first appearance of “Dunhuang”, and since then this place name has been passed down through the ages and used until now, but its etymology and original meaning could not be determined as early as the Eastern Han Dynasty, scholars then expressed their opinions and debated, and so far, no consensus has been reached. At present, the interpretation of Dunhuang can be broadly divided into two categories.

One is to interpret the literal meaning of Chinese, that “dun” means “big”, “Huang” means “sheng”. Ying Shao of the Eastern Han Dynasty said that it was further developed by Li Jifu in the Tang Dynasty, and later scholars were happy to use it as evidence to illustrate the important role of Dunhuang on the Silk Road in the ancient communication between China and the West. However, at that time, the character book did not have this intention, although there is a dialect between Chen and Zheng that interprets “Dun” as “big”, it can be far away from Dunhuang and may not be able to share the same language and custom. Moreover, according to this statement, “Dunhuang” was the Chinese name of the county when Emperor Wu of Han Dynasty established the county, and in fact, this place name is likely to have appeared before Emperor Wu of Han Dynasty set up Hexi four counties, and it was only used by later counties. Therefore, this is about an understanding of Dunhuang after it became an important town on the Silk Road, not necessarily its original meaning.

The other kind of interpretation is from the phonetic aspect, that “Dunhuang” is the translation of the minority language, or the Chinese pronunciation of the local

indigenous people's name. With the development of the historical research in our country, there is now a deeper understanding of this issue, and this view has won the recognition of most scholars, but there are many differences as to which ethnic language it originated from. The more common versions are: derived from the Tocharian language, it is a short translation of the family name “Tocharo”, which, like “Dun” in the “Classic of Mountains and Seas” is the Chinese counterpart of the first syllable of the word “Tocharo”; It is derived from the Rongdi language where it is located, belonging to the Turkic language family, meaning the mountains. After the Western Han Dynasty named the local counties for the mountains, “Dunhuang” changed from the mountain name to the place name. Originating from the Qiang language, it is the opposite sound of “Duhang”, meaning “chanting place” and so on. (Dunhuangtour.com, n.d.)

Dunhuang has a history of more than 2,000 years. Before the Xia, Shang and Zhou dynasties, Dunhuang belonged to the ancient Guazhou. Until the Han Dynasty, Dunhuang was one of the four Hexi counties established in the era of Emperor Wudi of Han Dynasty. It was also an important gathering place for Western foreign cultures to enter China, so Dunhuang was a city of great cultural and economic prosperity at that time. At the same time, because of the special geographical location of Dunhuang, Buddhism and Buddhist culture were introduced into China.

At the beginning of the establishment of Dunhuang's capital county, the Han Dynasty took a series of military measures to establish granaries, cities and military camps in Dunhuang to prevent the invasion of Xiongnu. In the second year of Yonghe, Pei Cen, the governor of Dunhuang, led 3,000 county soldiers to attack Xiongnu in the west, killing King Huyan (Wang, 2020) and ensuring the security of the Western regions and Hexi in the Two Jin Dynasties. Therefore, since then, Dunhuang has been a strategic place that can be attacked and retreated and defended militarily.

At the same time, in order to secure the border and store materials to resist foreign enemies, the Han Dynasty also paid special attention to the agricultural development of Dunhuang, building canals, promoting water conservancy, and clearing land for production. At the same time, specialized personnel were sent to teach the common people effective methods of farming and agricultural production. In

particular, the emperor of The Three Kingdoms period, Emperor Fulong promoted plowing aquifers, “more than half of the province, the valley plus five” (Chen, 1962) food constants greatly improved.

With the development of agricultural production, it brought the development of feudal economy and the prosperity of feudal culture. There were many literati in Dunhuang during the Han and Jin dynasties. Zhang Zhi and Suo Jing were famous calligraphers and litterateurs in Dunhuang. Especially at the end of the Western Jin Dynasty, many literati and scholars with “high talent and practical learning” and “extensive classics and history” avoided Liangzhou, so the culture of the Central Plains along the Hexi Corridor developed vigorously. A large number of documents and murals found in the tombs of the Wei and Jin dynasties in Jiuquan, Dunhuang and Tupan are the cultural relics of that time and the basis for the development of Buddhist art (Duan, 2017, p. 1) .

After the establishment of Dunhuang County, the exchanges between China and the West became more frequent. After Zhang Qian led a huge delegation of 300 people to the Western regions, there were more than ten Chinese envoys each year, and envoys met each other. As a result of frequent exchanges, Chinese culture, especially silk, continued to spread to the West. At the same time, Western culture was also introduced to China with the envoys. But from here and there, they will pass through Dunhuang, so Dunhuang has become an important hub connecting Chinese and Western cultures.

Tang Dynasty can be called the heyday of China's feudal society, and it is also the history and culture of Dunhuang In its heyday. In the early Tang Dynasty, the rulers carried out large-scale water conservancy construction in Dunhuang area The project formed a relatively perfect oasis irrigation system, which greatly promoted the agriculture of Dunhuang Development. After more than 100 years of operation, the Tang Dynasty Tianbao period became the most registered Dunhuang The historical period. Because Li worshipped Laozi in the Tang Dynasty, he strongly advocated Taoism and matched it.

Should, Dunhuang area also set up Taoist, Taoist temples, preaching the scriptures, Taoism flourishing. Also, quite a few Buddhist monks from the Central Plains came to Dunhuang to preach Buddhism, and many Buddhist scriptures from

Chang 'an and Luoyang were also flowing the continuous influx of Dunhuang made Dunhuang once again accept the influence of the Central Plains Buddhist culture. And Don The eminent monks who came to Hong Road and went west to find their way back through Dunhuang made Dunhuang constantly absorb the Western regions, The nourishment of the Buddhist culture. The religious grotto art of Dunhuang thus entered its heyday. And in 755, the Anshi Rebellion broke out. In 781, the Tubo occupied Dunhuang. Its rule As a Buddhist, religion is an important tool for maintaining political situation. They gave money to the temple Things, fields, dependent populations, etc., also improve the status of monks, some senior monks can even Participate in political activities. Under the advocacy of the rulers, the number of folk believers in Buddhism is also increasing.

The influence of Buddhism expanded rapidly, with the number of monasteries increasing to 17 (out of the original 13) and the number of monks increasing to nearly 1,000 People (original more than 300 people). Tang Dazhong two years (848). Led by Zhang Yichao (from Dunhuang) Shazhou Han uprising. They drove out the Tubo rulers, took control of the Sha and Gua prefectures, and repatriated their envoys Following the Tang Dynasty. In 851, the Tang Dynasty did not return to the Rebellion army in Shazhou. Zhang Yichao was appointed governor. in Under the protection of the Guiyi Army, the Buddhist forces in Dunhuang developed further.

The year is A.D. 16. The Western Xia captured Gua and Sha. The rulers of the Western Xia believed in polytheism including Buddhism, so they supported the development of Dunhuang, a Buddhist holy site, and vigorously built temples and grottoes. In the third year of Song Baoqing (1227), the Mongols occupied Dunhuang. Although the caravans of Western countries still traveled to and from China and Central Asia through Dunhuang, the status of Dunhuang at this time could not be compared with that of the Han and Tang Dynasties, coupled with the large territory of the Mongolian Empire and the Han and Tang Dynasties, Dunhuang gradually lost its role as a strategic place to operate the Western regions, and only became a supply station on the river channel. However, the Yuan rulers also supported the development of Buddhism because of their policy of attaching equal importance to Confucianism, Buddhism and Taoism. The Six-character True Green Tablets in the Mogao Grottoes, in Mongolian, Han, Tibetan, Vatican, Western Xia and Bhasaba,

were carved in 1348 by Suililun, King of Xining and his concubine, prince, princess and emperor's son-in-law, who was in charge of Shazhou. In the fifth year of Hongwu (1372), the Ming Dynasty captured Hexi and Shazhou belonged to the Ming Dynasty. At that time, the maritime Silk Road opened up since the Song and Yuan Dynasties had become the main channel of communication between China and the West, while the status of the land route through Hexi Dunhuang had declined. The frontier defense of the Ming Dynasty focused on the east, and for the west, it only took the Jiayuguan Pass in the west of Suzhou as the gateway, and Dunhuang lost the important position of shielding Hexi and the Silk Road transit station. In 1539, the 18th year of Jiajing, the Jiayuguan Pass was completely closed, the Ming Dynasty almost cut off contact with the Western regions, and Dunhuang was left unadministered. More seriously, during this period, Dunhuang was once occupied by the Islamic Turpan, the Buddhist culture of Dunhuang was severely damaged, and the Mogao Grottoes were desolate. It was not until the third year of Yongzheng in the Qing Dynasty (1725) that Dunhuang County was re-established, and Dunhuang was revived after the settlement of immigrants. During the years of Jiaqing and Daoguang, Dunhuang Buddhists renovated the Mogao Grottoes and opened new Grottoes 11 and 228. However, at that time, the Buddhist power in the mainland had declined. Many residents of Xinjiang believe in Islam, so the Buddhist culture of Dunhuang has become a tree without roots and water without a source. In the year of Tongzhi, the Hui uprising broke out in Shaanxi, Gansu, Xinjiang and other places, and the Qing army drove the Hui rebel army led by Bai Yanhu to Dunhuang, and the rebel army destroyed all the corridors connecting the Mogao Grottoes to the upper and lower grottoes.

At the end of the 19th century, a Taoist priest named Wang Yuanzhuan settled down in the Dien Gao Grottoes. He used the money given by the believers to rebuild the Mogao Grottoes according to his own understanding of Taoism. The first thing he did was to remove the sand at the bottom of the grottoes. On May 26, the 26th lunar calendar year of Guangxu (1900), the people he hired were clearing the passage of Cave 16 when they accidentally discovered the cave. However, it did not attract the attention of the authorities, resulting in a large number of relics were “lured” by explorers from Britain, France, Japan, Russia, the United States and other countries, and dispersed to all over the world. Only the remainder of the loot was transported to

the Beijing Academy. The loss of Dunhuang relics caused incalculable losses to Chinese culture, but objectively attracted scholars from all over the world to sort out and study them from various angles, so that in the 20th century, a world-renowned study was formed - Dunhuang Study (An, 2009).

2.3.2 Economic situation of Dunhuang

Since the establishment of Dunhuang County in 111 BC in the Western Han Dynasty, the rise and fall of Dunhuang has been inseparable from three key words for more than 2,000 years: geography, economy and culture. Geographical location of Dunhuang. The Silk Road in the Han Dynasty started from Chang 'an, went through the Hexi Corridor to Dunhuang, left Yumenguan and Yangguan, and was divided into two roads, north and south. The southern route starts from Dunhuang, passes Loulan, crosses the onion Ridge to Benin, and reaches Daqin in the west. The northern route runs from Dunhuang to Dayuan via Gaochang, Qiuci and Yue Onion Mountains. Therefore, Dunhuang is the transit station between China and the West and the gateway to the Western regions, and it can also be said to be the three forks of the Silk Road. The superior geographical location has brought economic prosperity. By the Eastern Han and Wei and Jin Dynasties, Dunhuang had become a grain production base and commodity trading center on the Silk Road. Western jewelry spices, glassware into the Central plains of the Chong state silk lacquer tea is also constantly shipped to the West. The Book of the Later Han Dynasty calls Dunhuang “a metropolis handed over by Hua Rong”. In the Sui and Tang Dynasties, the country was prosperous, the Silk Road was smooth and the economy developed steadily. Trade prospered, “West of Iwu, east of Persia, tributes continued, business trips followed.” The Book of the Old Tang Dynasty records that during the Lantern Festival, Chang 'an was the first, Dunhuang the second, and Yangzhou the third. With economic prosperity comes cultural prosperity. The Central Plains Confucian culture took root and developed in Dunhuang from the Han Dynasty, and the Buddhist culture was introduced to Dunhuang from India during the Han Dynasty. Mogao Grottoes statue construction started from monks, nobles participated, and gradually flourished. In the flourishing Tang Dynasty, Dunhuang culture further consolidated the Han culture from the Central Plains, the cultures from India, West Asia, Central Asia, as

well as the national cultures of China's Western regions, Qinghai-Tibet, Mongolia and other places, forming a diversified and open culture led by the traditional culture of the Central Plains. Ji Xianlin said: There are only four cultural systems in the world with a long history, vast territory, self-contained system and far-reaching influence: China, India, Greece and Islam, and there is no fifth; There is only one place where these four cultural systems converge, and that is Dunhuang. At that time, Dunhuang was strong in geography, economy, and culture. (Chen, 2020, p. 19)

At the beginning of the Eastern Han Dynasty, Dunhuang's economy was still rich, but it gradually declined after Emperor Ming. In the early Eastern Han Dynasty, Hexi Dunhuang area continued to carry out the policy of recruiting people to secure the border and deploying fields for defense. For example, in the sixteenth year of Yongping, the Eastern Han government ordered the local officials of various counties to send some criminals to Shuofang and Dunhuang camps, and allowed their families to follow them, which increased part of the labor force in Dunhuang. However, in the Eastern Han Dynasty, the population of the counties in the north of China generally decreased, and Dunhuang was one of the counties with the least reduction in personnel, compared with the Western Han, it was still much worse than before. As early as the early Eastern Han Dynasty, due to the long-term conflict with the Xiongnu, the Eastern Han had immigrated some residents into the interior, and then fought with the Qiang people for years, and the court repeatedly discussed giving up Liangzhou, and the number of Dunhuang households decreased even more rapidly, far from the small number of immigrants can make up for it, to the Yonghe period of Shun Emperor (136-141 AD), there were only 7048 households and 29,170 people in Dunhuang (Dunhuangtour.com, n.d.)

The Western Jin Dynasty made some adjustments to Dunhuang county and county, renamed Mingan and Yuanquan as Yi 'an and Shenquan respectively, and transferred Ganqi County, which had been established in the Western Han Dynasty and originally belonged to Jiuquan County, to Dunhuang County, and also added Changpu County. In this way, the jurisdiction of Dunhuang County in the early Western Jin Dynasty generally included today's Dunhuang City, Anxi County, and the northern part of Subei Mongolian Autonomous County and the western part of Yumen City, which increased a little compared with the Han Dynasty.

After taking possession of Dunhuang in Hexi, the Western Jin government continued to follow the policies of Cao Wei, which enabled the prosperity of the Wei Dynasty to continue in this area. With the development of the Western Jin Dynasty's operation in the western regions, Dunhuang's economy and culture gained new development. After the Song Dynasty, with the rise of the maritime Silk Road, the land Silk Road gradually declined, and the geographical advantage of Dunhuang ceased to exist. After the Yuan Dynasty, Mogao Grottoes ceased to open and gradually abandoned. Ming Jiajing seven years closed Jiayuguan, Dunhuang became a frontier nomadic land. At this point, Dunhuang's economy was depressed and its culture was asleep. During this period, Dunhuang was weak in geography, economy and culture. In the third year of Yongzheng in Qing Dynasty, the court set up Shazhouwei, immigrated from Gansu states to Dunhuang, and changed Shazhouwei into Dunhuang County in the 25th year of Qianlong, and Dunhuang economy began to recover. In 1900, the cave was discovered, shocking the world. After the founding of New China, Dunhuang studies returned to China, and Dunhuang culture took the lead in recovery. But until the early 21st century, Dunhuang was still a remote northwestern town with a small economy based on agriculture and tourism. During this period, Dunhuang culture recovered, but its geography and economy remained weak.

In conclusion, due to its remote location, Dunhuang lags behind in economic development. However, the historical and cultural accumulation over a thousand years, as well as its unique desert scenery, have made it an attractive tourist destination. Therefore, tourism has become one of the main sources of income for Dunhuang at present, and has also attracted a large number of local people to join in the development of tourism.

2.3.3 Dunhuang art and culture

Dunhuang art culture is the crystallization of the long-term exchange and integration of various civilizations. As Dunhuang is located at the crossroads of the Silk Road, the long-term and continuous multi-cultural blend has absorbed the essence of civilizations from different regions and countries, giving birth to the Mogao Grottoes and the colorful Dunhuang culture, thus enriching the connotation of

Chinese culture. (Liu, 2023) The representative and prominent cultural types include grotto culture, Silk Road culture, border culture, religious culture, oasis culture, etc. At the same time, there are a large number of historical and cultural monuments corresponding to cultural characteristics.

2.3.3.1 Grotto culture

Dunhuang has a long history, profound cultural accumulation and diverse landforms. In terms of tourism resources showing high grade, variety and other advantages. Among them, Dunhuang Grottoes including Mogao Grottoes, West thousand Buddha Caves, Yulin Grottoes is one of the world's top ten grottoes, one of China's four grottoes, by the United Nations Science and Education Organization included in the “World Cultural Heritage” list, its monopoly is strong, high scarcity. The art of the Mogao Grottoes is extensive and profound, magnificent, blending architecture, murals and sculptures with extremely rich content, On the basis of inheriting the fine artistic traditions of the Han nationality in the Central Plains and the brothers in the Western regions, it absorbs and melts foreign methods of expression, and develops into a sacred place of grottoes art with local characteristics of Dunhuang in Chinese style.



Figure 5 Outside of Mogao Grottoes

(Source: <https://img.soundofhope.org/2021-01/1611376370760.jpg>)



Figure 6 Mogao Grottoes

(Source: Stephen, 2015)

2.3.3.2. Silk Road Culture

Dunhuang is a famous city on the ancient Silk Road. “Dun also Huang sheng also”, Dunhuang is the pronoun of “grand and brilliant”. Ji Xianlin, a famous scholar, once said, “The world has a long history, a vast area, and its own system of cultural systems only four China, India, Greece, Islam, and there is no fifth, and these four cultural systems converge in only one place, that is, Dunhuang and Xinjiang region of China, and there is no second.” As Dunhuang was an important link between the Central Plains and the Western regions, and a gateway for political, economic, military and cultural exchanges, it played an irreplaceable role on the Silk Road. Dunhuang's important position in transportation, has precipitated many cultures here. Some scholars from the Central Plains had to pass through Dunhuang to go to the Western Regions, and often some people could not walk here and became Dunhuang residents, and people from the west were the same, and even died here, so there was more cultural transmission. After the opening of the Silk Road, Chinese silk was continuously transported to the west, which became the fashionable clothing fabrics of the Roman Empire. At the same time, rare birds, foreign materials and religious thoughts, from western countries flowed into the Central Plains successively,

Dunhuang, which was located on the trunk line of the Silk Road, became the trade center and commodity transfer station between the East and the West. Under the background of great cultural integration, the extension of time and the expansion of space formed the Silk Road culture. The Silk Road culture is a miracle of world civilization that integrates the essence of the four major civilizations and the soul of Buddhism, Confucianism and Taoism, its contents cover murals, music, dance, architecture, sculpture, medicine, nationality, religion, politics, economy, and military. Dunhuang is a world cultural heritage site on the Silk Road, a world-famous art mecca, and a meeting place of four major civilizations. Dunhuang's splendid cultural heritage resources can be called a shining pearl on the Silk Road.



Figure 7 Silk Road Interactive Map

(Source: <https://en.unesco.org/silkroad/silkroad-interactive-map>)

2.3.3.3 Border culture

As an important city on the Silk Road and home to the Yumen Pass and Yangguan Pass, Dunhuang also boasts a border culture unmatched elsewhere. In the past, camel bells were jingling, people were shouting and horses were hounding, and caravans of envoys were coming and going. Now, standing at the sites of the two

Passes, looking out over the passes, the thousands of miles of Gobi and the vast earth, the desolate poems of the border jams reverberate in our ears, presenting the lives and vicissitudes of history of the garrison soldiers. The prosperity of trade and cultural exchanges along the Silk Road and the desolate vicissitudes of border defense together constitute Dunhuang's unique border culture. Prosperity and desolation coexist, which is the characteristic of Dunhuang Silk Road culture and border culture. Grand, harmonious and gorgeous, Dunhuang, deduces its culture with such a unique temperament.



Figure 8 The Great Wall of Han Dynasty
(Source: Sohu, 2023)

2.3.3.4 Religious culture

An important carrier of Dunhuang culture is the religious culture of the grottoes led by the Mogao Grottoes. Since Lezuo saw the Buddha's light of the three Wei and dug the first grottoes, Dunhuang has gradually developed into a place where Buddhism must pass through to the east and a sacred place for Buddhism. What is valuable is Dunhuang records Buddhist culture and its historical evolution in the form of grottoes. The Dunhuang Grottoes are the world's largest and best-preserved treasure house of Buddhist art, the difficult Buddhism from India has been

transformed into a vivid artistic image here. From the evolution of the murals in Mogao Grottoes, we can clearly see the evolution process of Buddhist culture and Buddhist art gradually becoming Chinese. From the perspectives of painting, sculpture and architecture, the Dunhuang Grottoes fully demonstrate the grand Buddhist culture and the gorgeous and exquisite humanities and arts, making Jiaohuang a veritable holy land of Buddhist art.



Figure 9 Mogao Grottoes murals on Buddhist Themes
(Source: Li & Liu, 2018)

2.3.3.5 Oasis culture

There are two mains' rivers, the Shule River and the Danghe River that flow through Dunhuang. Danghe River is closely related to the development of Dunhuang, it originates between Tuolai South Mountain and Shulenan Mountain at the west end of Qilian Mountains, is the largest water source of Dunhuang and the main source of irrigation of Dunhuang oasis, is the lifeblood of the oasis. Due to the changes of Danghe River for many times and long-term weathering, most of the landforms in Dunhuang are undulating, especially in the eastern part. Trough depressions, overlapping depressions and Liang hills interweave together, forming a unique landscape, at the same time, forming a pattern of mountain, Gobi and desert

with a large area, rein area. The geographical context of Dunhuang makes Dunhuang not only possess world class art and culture, but also world-class landform wonders. Mingsha Mountain and Moon Spring “Coexistence of sand and spring, never drying up for a thousand years” is a wonder of the world located in the West Lake Nature Reserve in the west of Dunhuang City, isolated by the desert and the Gobi, the terrain is low and flat, lush aquatic grasses, rich in species resources. The plateau lake under the snowy mountains, Jiaowa Pond, the lake shingle, the green grass, is an ideal natural pasture and farming place where birds live and animals live. Looking far away are the dense layers of oasis, set off against the distant snow-capped mountains and peaks, is a natural scenic tourist destination. Dunhuang has both the beautiful and exquisite grottoes art, and the vigorous and vigorous Silk Road border culture. It has both the works of heaven and earth and the artistic treasure house of human wisdom. It is the meeting place of ancient human civilizations and the birthplace of modern international prominent Dunhuang studies. In addition, the desert, oasis, Gobi, snow mountains, hot springs, wetlands co-existence can also be called a miracle phenomenon at the same time in Dunhuang this magical land, people have to marvel at the magic of nature and the creator of Dunhuang's favor, nature in Dunhuang fully display their divine power, painted Dunhuang such a rare masterpiece of heaven and earth (Dong, 2007, p. 22).



Figure 10 Ming Sha Mountain and Oasis
(Source: Photographed by the researcher, 2022)

In the above aspects of culture, the art and culture value of Dunhuang is best represented by the Mogao Grottoes. In 2023, in Zhao Sheng liang's lecture "Dunhuang Cultural Value" Tian Z. K. (2023, December) talk about, the Dunhuang Grottoes group with Mogao Grottoes as the core is the core content of Dunhuang culture. In addition to the Mogao Grottoes, it also includes the surrounding West thousand Buddha Caves, Yulin Grottoes, East thousand Buddha Caves and five temple grottoes in Subei. Among them, Mogao Grottoes is the largest and most concentrated area. Mogao Grottoes was founded in AD 366, after a thousand years of continuous construction in the Northern Liang, Northern Wei, Western Wei, Northern Zhou, Sui, Tang, five dynasties, Song, Western Xia, Yuan and other dynasties, the existing 735 grottoes, is the world's largest, most rich content, containing extremely extensive cultural connotation of art and culture treasure. Secondly, the relics found in Dunhuang Sutra Cave constitute the second part of Dunhuang culture. The so-called "Cave for the Collection of Sutras", the 17th cave of the Mogao Grottoes, was discovered in 1900. It is one of the most important archaeological discoveries of the 20th century. More than 50,000 pieces of Buddhist sutras, social documents, embroidery, silk paintings and other cultural relics unearthed from the 4th to 11th centuries AD have been scattered all over the world, represented by Britain, France, Germany, Russia and China. Third, the cultural relics and ancient cultural relics found in the Dunhuang area are another important component of Dunhuang culture. Since the establishment of the county in the Western Han Dynasty, a large number of historical and cultural relics have been left in Dunhuang area in successive dynasties. For example, the number of Han slips found in Dunhuang alone is as many as 30,000. Gansu Province, based on a large number of wooden slips found in Gansu province, established Gansu Wooden Slips Museum, is the most concentrated collection and research unit of Han slips in China.

2.3.3.6 Architectural art

In addition, the formation of Dunhuang art is a process of continuous absorption of foreign culture, innovation, and development, and eventually become a Buddhist art system with Chinese characteristics. Its main artistic value can be

summarized from five aspects: architecture art, color sculpture art, painting art, music and dance art and calligraphy art.

Architecture is the main body of cave art, and each cave itself is the external expression of architecture. The types of Buddhist grottoes in Dunhuang Grottoes in the early period are mainly Zen grottoes and central pillar grottoes, which are derived from Indian monk chambers grottoes and gitti grottoes respectively. The central pillar grottoes, also known as the tower temple Grottoes, were relatively rare after the Sui and Tang Dynasties. In the history of Mogao Grottoes, a large number of cave eaves were built, and its spectacular scene was described by Tang people as “the long river in the front stream, waves reflecting the heavy pavilion”. Today, there are only five Tang-Song cave eaves on the cliff, which is a kind of ancient wooden architecture that is less preserved in our country. In addition to the buildings themselves, the Dunhuang Grottoes also retain a large number of ancient architectural images. The architectural entities in these images are depicted according to the buildings in real life, so they are of high research value. For example, the north wall of Cave 217 in Mogao Grottoes has been changed in an infinite number of views, and there are large and magnificent pavilions painted, which provide rich artistic materials for the study of the architectural style of the Tang Dynasty.

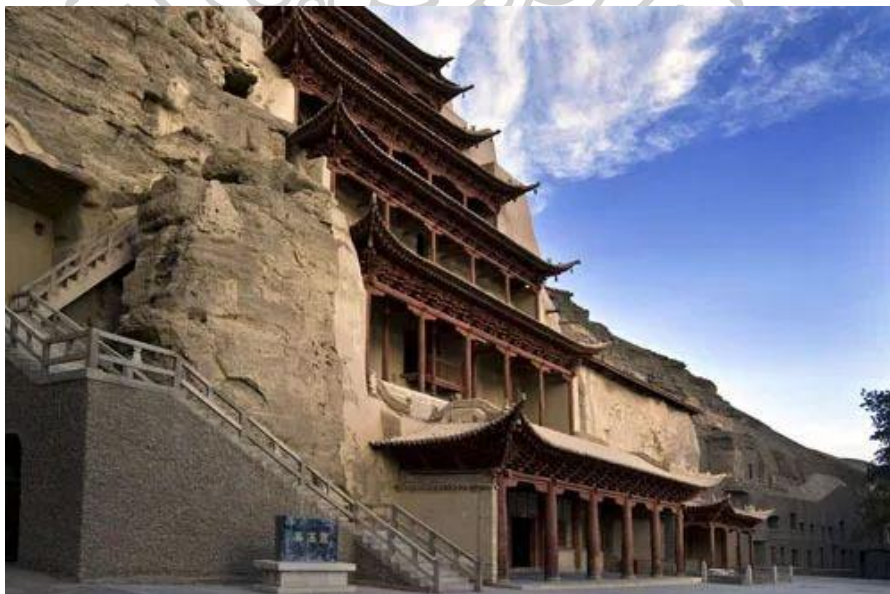


Figure 11 The main building of the Mogao Grottoes is nine floors

(Source: <https://bj.bjd.com.cn/images/201903/16/5c8ca4dde4b099b8f7a8f6db.jpeg>)

2.3.3.7 Sculptures art

The vast majority of ancient Chinese sculptures are religious sculptures. The existing ancient colored sculpture works in Dunhuang include Buddha, Bodhisattvas, Buddha disciples, heavenly Kings, strongmen and other images, which contain the sustenance of people's good wishes. From the perspective of style, Dunhuang colored sculptures initially learned from India and other places, with a strong foreign artistic style, and then gradually showed the characteristics of Chinese nationality, reflecting the transformation, inheritance and innovation of Dunhuang culture for Buddhist image-making.



Figure 12 Mogao Grottoes cave painted sculptures

(Source: https://p2.itc.cn/q_70/images03/20210709/3da033675039472da2208.jpeg)

2.3.3.7 Painting art

The painting art in Dunhuang culture is mainly produced and developed on the basis of receiving foreign art styles and integrating into the art of the nation. The original mural style learned from the “Western style” of the human body in India and Central Asia, and the painting effect was three-dimensional, known as the “Western region style” or “concave and convex method”. From the late Northern Wei Dynasty to the Western Wei Dynasty, influenced by the painting style of Gu Kaizhi and Lu Tianwei in the Eastern Jin and Southern Dynasties, a new style of “thin clothing, clear bones and clear images” was formed, and the image of flying sky also became elegant. In Sui and Tang dynasties, after absorbing foreign colors, the Chinese style was formed by combining line drawing techniques. The artistic style of painters represented by Yan Liben had a great influence on Dunhuang art. For example, the similarity between the imperial pictures seen in Cave 220 of Mogao Grottoes and Yan Liben’s Paintings of Emperors of All Dynasties reflects the close relationship between Dunhuang and Chang An when the Silk Road was connected, and the paintings of Chang 'an at that time had a profound impact on Dunhuang. During the high Tang Dynasty, the painting style of another famous painter, Wu Daozi, was also shown in Dunhuang murals. Wu Daozi’s painting lines are strong, with less color, “its potential circle turns to clothes floating”, that is, the so-called “Wu belt when the wind”, but unfortunately, the mural works drawn by Wu Daozi have not been preserved. The figure of Vimala Kirti painted in Cave 103 of Mogao Grottoes has strong and varied lines, which is believed to be influenced by Wu Daozi’s painting style. In addition, Zhou Fang's portrait of a beautiful woman and Li Sixun’s green landscape paintings is shown in Dunhuang murals, which become an important basis for us to understand the ancient Chinese painting art.



Figure 13 Mogao Grottoes sutra change painting

(Source: [https://picx.zhimg.com/v2-](https://picx.zhimg.com/v2-51865e446133bdb6f757e8cad7f25abe_720w.jpg?source=172ae18b)

51865e446133bdb6f757e8cad7f25abe_720w.jpg?source=172ae18b)

2.3.3.7 Dance art

There are a large number of music and dance scenes in Dunhuang murals. For example, there are two groups of 28 musicians playing different Musical Instruments on the left and right sides of Yaoshi Meridian on the north wall of Cave 220 in Mogao Grottoes, which not only shows the artistic height of music and dance in the Tang Dynasty, but also provides an important reference for us to understand the forms and musical instrument combinations of music and dance at that time.



Figure 14 Music and dance scene in the murals of Mogao Grottoes
(Source: Sohu.com, 2020, May 28)

2.3.3.7 Calligraphy art

There are a large number of calligraphies work unearthed in Dunhuang Sutra Cave, among which there are many calligraphic rubbings by famous artists such as Ouyang Xun and Liu Gongquan, which have made immeasurable contributions to the study of the development history and artistic value of Chinese ancient calligraphy art. A large number of Buddhist sutra writing works were found, from the two Jin Dynasties to the Song and Yuan Dynasties, showing the whole process of the development of calligraphy and characters, and even found complete court sutra writing works, such as cave for preserving Buddhist sutra P.3278 “Vajra Prajna Sutra”, which recorded the whole process of court sutra writing in the Tang Dynasty. On paper, 25 centimeters across and 37.5 centimeters across. Cursive writing. It is currently in the collection of the British Library. Found in the Mogao Grottoes.

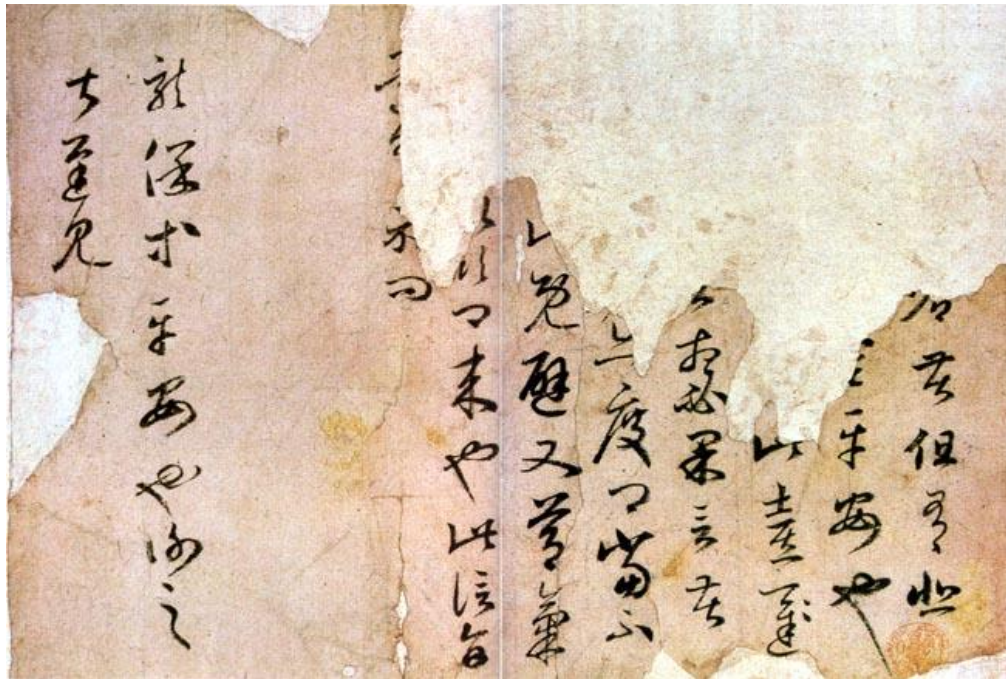


Figure 15 Wang Xizhi “Zhanjin Longbao” (Tang Dynasty version)

(Source: 9610.com, n.d.)

2.3.4 Summary

Dunhuang, as a small city in western China, has a long and prosperous history and culture. Its special geographical location makes it an important gateway to the outside world in ancient China. Therefore, it also absorbs different arts and cultures from the East and the West, which converge here and become the resources that Dunhuang is proud of and famous in the world today. Relying on the artistic and cultural resources left by predecessors and the unique geographical features, Dunhuang now attracts tourists from all over the world every year, and also brings considerable economic income and employment opportunities to the local area. It has a strong tourism and creative economy development potential, and can develop in various aspects of culture, art and natural scenery.

2.4 Overview of tourism in Dunhuang

Tourism is an industry that provides travel and sightseeing services to tourists based on tourism resources and facilities. Worldwide, tourism is a sunrise industry. Dunhuang, with its unique geographical location, desert scenery and the world-

famous Mogao Caves as a world cultural heritage site, has become a key supported area for tourism development in western China. Dunhuang has a long history and a splendid culture. It is rich in both above-ground and underground cultural relics and boasts unique tourist attractions. By the end of 2016, there were 265 cultural relics and scenic spots of various types remaining in Dunhuang. Among them, there were 3 World Cultural Heritage Sites (Mogao Caves, Yumen Pass Ruins and Xuanguan Ruins), 4 national key cultural relics protection units (Mogao Caves, Yumen Pass, Xuanguan Ruins and the Great Wall within Dunhuang), 12 provincial-level cultural relics protection units and 31 municipal and county-level cultural relics protection units. There is 1 5A-level scenic spot (Mingsha Mountain and Crescent Spring), 2 "4A" level scenic spots (Yangguan and Yadan, Landform National Geopark), and 8 "3A" level scenic spots (Dunhuang Film City, Sanwei Mountain Scenic Area, Dunhuang Night Market, Dunhuang Tongzhou Island, Dunhuang Leiyin Temple, Dunhuang Optoelectronic Expo Park, Danghe Ecological Park and the Thousand-year-old Dunhuang Crescent Spring Town Folk Culture Tourism Scenic Area). Meanwhile, Dunhuang City is also actively developing ecological self-driving adventure tourism resources mainly featuring the West Lake Wetland, characteristic sightseeing tourism resources composed of Longle Village in Yangguan Town, Yangjiaqiao Village and Yueyaquan Village in Yueyaquan Town, and folk and religious tourism resources mainly including the Historical Expo Park, Leiyin Temple and Xiyun Pass, which provide a huge development space for the tourism industry of Dunhuang City. Dunhuang, an ancient military stronghold, left behind many passes, among which Yumen Pass and Yangguan Pass are exemplary. Dunhuang, with its profound cultural heritage, boasts a strong cultural tourism industry. Due to its unique historical and geographical advantages, its tourism resources are highly monopolistic and scarce, and it has always been a popular tourist destination. Under the guidance of the "Belt and Road Initiative" and the cultural tourism strategy of Gansu Province, natural resources and cultural resources are combined to form an organic unity, and the Dunhuang cultural brand is gradually developed.

Table 3 Main scenic spots in Dunhuang

Name	Type/Category	Rating / Protection Level	Notes
Mogao Grottoes	World Cultural Heritage; Cultural relics site	World Heritage; Key national cultural relic under state protection	Signature cultural attraction of Dunhuang
Yumenguan Site (Yumen Pass)	World Cultural Heritage; Cultural relics site; Pass	World Heritage; Key national cultural relic under state protection	Ancient frontier pass
Xuanquan Site	World Cultural Heritage; Cultural relics site	World Heritage; Key national cultural relic under state protection	Important Silk Road relay/post site
Great Wall in Dunhuang	Cultural relics site	Key national cultural relic under state protection	Section of the Great Wall remains
Singing Sand Mountain & Crescent Spring	Scenic spot	5A	Iconic desert–spring landscape
Yangguan	Scenic spot; Pass	4A	Twin pass to Yumen Pass
Yadan Landform National Geopark	Scenic spot; Geopark	4A	Yardang landform landscape
Dunhuang Film and Television City	Scenic spot	3A	Film/TV base with historical sets
Sanwei Mountain Scenic Spot	Scenic spot	3A	Mountainous religious/cultural site
Dunhuang Night	Scenic spot	3A	Urban night-market

Name	Type/Category	Rating / Protection Level	Notes
Market			experience
Dunhuang Tongzhou Island	Scenic spot	3A	Leisure area
Dunhuang Lei Yin Temple	Scenic spot; Temple	3A	Also listed under folk/religious tourism
Dunhuang Photoelectric Expo Park	Scenic spot	3A	Expo/park attraction
Danghe Ecological Park	Scenic spot; Park	3A	Ecological riverside park
Millennium Dunhuang Crescent Spring Town folk culture tourist spot	Scenic spot; Folk culture	3A	Folk culture themed area
West Lake wetland (Dunhuang)	Ecological tourism resource		Basis for self- driving/adventure tourism
Longle Village (Yangguan Town)	Characteristic sightseeing resource		Rural/village tourism
Yangjiaqiao Village (Yueyaquan Town)	Characteristic sightseeing resource		Rural/village tourism
Yueyaquan Village	Characteristic sightseeing resource		Rural/village tourism
Historical Expo Park	Folk/religious tourism resource		Listed with Lei Yin Temple, Xiyunguan

Name	Type/Category	Rating / Protection Level	Notes
Leiyin Temple	Folk/religious tourism resource		Also, a 3A scenic spot
Xiyunguan	Folk/religious tourism resource		Gate/pass site

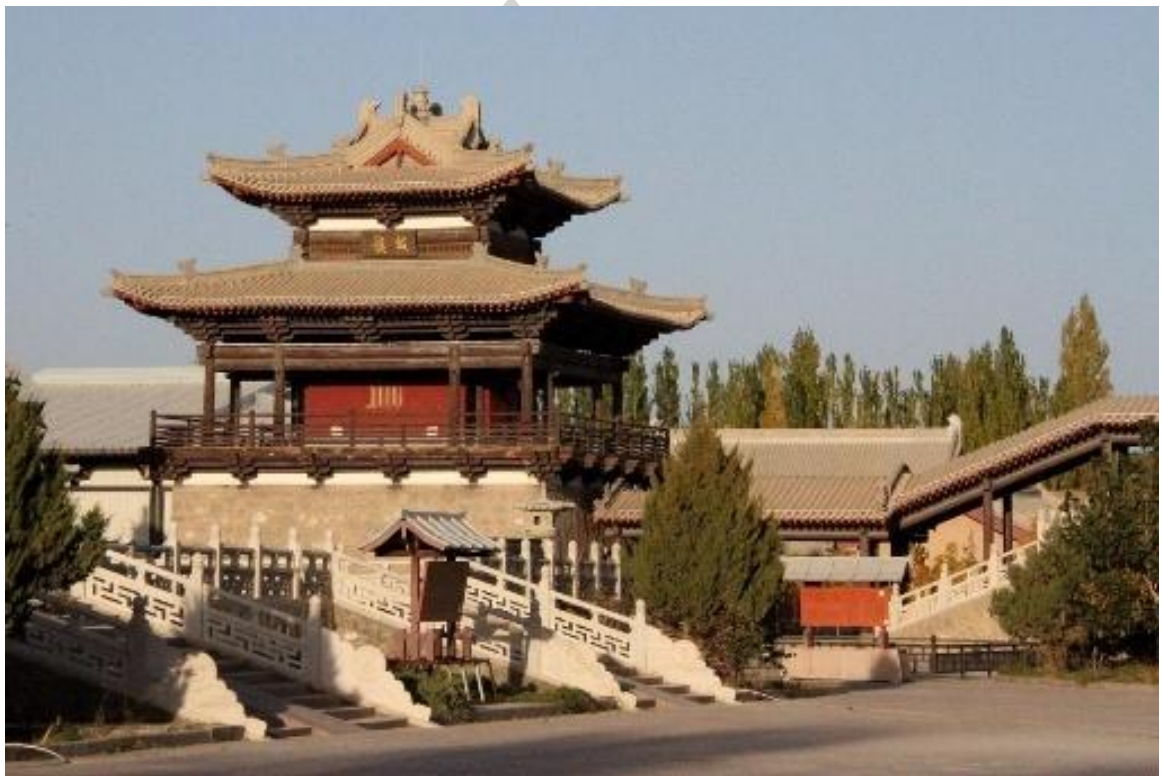


Figure 16 Leiyin Temple

(Source: <https://dynamic-media-cdn.tripadvisor.com/media/photo-o/11/2f/c0/30/monastery.jpg?w=2000&h=-1&s=1>)



Figure 17 Yadan National Park
(Source: Chinadiscovery.com, n.d.)



Figure 18 Yumen Pass
(Source: Chinadiscovery.com, n.d.)

2.4.1 Development of Dunhuang tourism

Since the opening to the outside world in 1979, the comprehensive reception capacity of Dunhuang has also been greatly improved. There are 150 hotels, restaurants, guest houses and hostels in the city, with a total of more than 10,000 beds, including 23 foreign-related star-rated hotels and 10 designated hotels for domestic tourism, with nearly 6,000 standard beds. There are 23 companies operating international and domestic tourism business, and 600 qualified tour guides have obtained tourism qualification certificates. So far, they have received tourists from more than 70 countries. Tourism enterprises in Dunhuang City have also developed the tourist source markets in Japan, South Korea, Hong Kong, Macao, Taiwan, Shanghai, Dalian, Hainan, Shenzhen and other places. (Jin, 2008, p. 14)

With the opening up of China, the tourism industry in Dunhuang has also entered the track of rapid development. Statistics show that the annual number of tourists in Dunhuang exceeded 500,000 in 1996; In 1998, the added value of the tertiary industry exceeded that of the primary industry for the first time, becoming the industry that contributed the most to the national economy. Since 1999, the added value of the tertiary industry in Dunhuang has exceeded the sum of the added value of the primary and secondary industries, and the development mode with tourism as the pillar has been established in Dunhuang.

Since the beginning of the new century, domestic tourism consumption has soared, the number of trips has increased, the time has been extended, and the tourism consumption has increased greatly. Dunhuang expanded the scale of tourism reception, built hotels, restaurants and hostels, and a number of rural inns and rural homes also appeared in large numbers around the scenic area; At the same time, it has also begun to explore the transformation and upgrading of the tourism industry, from the traditional development mode based on ticket economy and reception services to the overall improvement of the quality of the elements of “food, accommodation, travel, shopping and entertainment”.

In recent years, Dunhuang Scenic area has started from the supply side, actively developed tourism resources, adapted to the needs of tourists, and allowed tourists to better experience.

In 2017, Dunhuang received 900.45 million tourists from home and abroad, and achieved a total tourism revenue of 9.133 billion yuan. The tertiary industry with the cultural tourism industry as the core has IDed for more than 60% of the city's GDP. (Liu & Ma, 2018, November 4)

According to the news report on December 13, 2023, Dunhuang Mogao International Airport in 2023 to guarantee a total of 9,838 transport takeoff and landing, passenger throughput of 1200,117 people, cargo and mail throughput of 1,568.9 tons, an increase of 186.74%, 257.60%, 28.50% over the same period in 2022. Compared with the same period in 2019, it increased by 33.41%, 37.44% and 166.64%. After the passenger throughput of Dunhuang Mogao International Airport exceeded 1 million passengers on September 25, Dunhuang Airport continued to make efforts, and the passenger throughput exceeded 1.1 million passengers on October 22 and 1.2 million passengers on December 13. Dunhuang Mogao International Airport is expected to handle more than 1.22 million passengers annually in 2023. In 2023, Dunhuang Airport seized the opportunity of the recovery of the aviation market, and the main transport production indicators recovered rapidly. Since April this year, the monthly passenger throughput has exceeded 110,000 passengers for seven consecutive months, and the passenger throughput on August 5 has exceeded 7,516 passengers, setting a historical record of single-day passenger throughput since the opening of the air. From August 1 to 31, Dunhuang Airport secured 1,428 flights, transporting 185,000 passengers, setting a historical record of one-month traffic throughput since the opening of Dunhuang Airport. During the summer rush (July 1 - August 31), the passenger throughput of Dunhuang Airport was 365,000, an increase of 219.75% over the same period in 2022 and 45.33% over the same period in 2019. (Ju, 2023, December 18)

2.4.4.1 The Impact of tourism Development on the environment

However, the development of tourism has also brought irreversible damage to the Mogao Grottoes. In recent years, the number of tourists in the Mogao Grottoes has shown an obvious upward trend, and the annual reception has exceeded 4 million people. It is expected that the number of tourists to Dunhuang Mogao Grottoes will increase rapidly in the next 5 to 10 years. Because the tourists carry a certain water vapor and temperature, too much into the cave to visit, it is easy to cause

changes in the temperature, relative humidity, temperature and humidity on the surface of the wall and the concentration of carbon dioxide in the hole, which will not only make the murals produce Gaul, but also may cause the color of the murals. Mogao Grottoes are the source of Dunhuang culture and art, as well as the representative of the city. Its existence has benefited generations of people in Mogao Grottoes and created economic benefits for them. How to preserve Mogao Grottoes for a longer time and make the artistic and cultural spirit of Mogao Grottoes continue to generate income for the local people and become the eternal culture of the local people is a problem worth studying.



Figure 19 The murals in the Mogao Caves oxidized and fell off

(Source: <https://www.nbd.com.cn/rss/toutiao/articles/1663566.html>)

2.4.4.2 The Impact of the development of tourism on local people

Academic surveys generally find that the residents of Dunhuang support tourism as a whole. The most direct reason is that they can see increased income and employment opportunities. In contrast, the perception of social, cultural and environmental influences is slightly less important. Such conclusions are derived from local questionnaires and model analysis studies in Dunhuang. Researchers incorporated residents' perceptions of tourism in terms of "economy, social culture, and environment" into the same statistical model. The results showed that economic perception had the strongest impact on residents' attitudes, and many residents

explicitly expressed in the questionnaires their hope for "more standardized and clear community participation channels". (Chen Yongsheng et al. Research on Tourism Perception and Attitude of Residents in Dunhuang City)

2.4.4.3 The impact of tourism development on tourists' experience

Based on the observations from the previous research and follow-up visits, the tourism industry has indeed significantly amplified the destination volume and reach of Dunhuang: a typical single-peak season is formed around summer, with the airport and trunk buses fully loaded, and the number of visitors to the core scenic spots is released in a short period of time. The direct experience result brought about by this high seasonality and strong concentration is that major scenic spots (such as the Mogao Caves, the Singing Sand Mountain and the Crescent Spring, etc.) experience long queuing times, crowded waiting areas and slow traffic flow under the superimposition of high temperatures and sandstorms. Urban scenes (night markets, popular restaurants) are also experiencing congestion simultaneously. The time for queuing and waiting for a table has been significantly prolonged, and the perceived load on individuals (heat, dryness, and sandstorms) has further amplified the sense of congestion. Due to the rigid carrying line and reservation mechanism of the Mogao Caves, the supply elasticity during peak and off-peak seasons is limited. During peak seasons, the rhythm of "buying tickets, entering on time, and being passively diverted" often leads first-time visitors to focus their experience evaluations on "whether they can smoothly see the key caves" and "whether the waiting time exceeds expectations", rather than the more detailed aesthetic and learning process.

At the product structure level, the Mogao Caves support the destination's appeal with an "irreplaceable" and unique cultural core, but this also creates a psychological gap of the "experience ceiling" : In the mental IDs of most tourists, "When visiting Dunhuang, one must see the Mogao Caves", while alternative or complementary supplies (such as more in-depth explanation routes, age-specific and stratified Tours, and differentiated content at night or during off-season) are not strongly perceived, leading to a more common one-time consumption mindset that "seeing the core point once is equivalent to fulfilling the wish list". Coupled with the long spatial distances between scenic spots, the high transfer time (such as the Two Passes - Yadan Corridor), and the seasonal fluctuations of night cultural experiences

on the city side, the overall itinerary is more likely to be filled with "traffic, queuing, and check-ins" during peak seasons, diluting the subjective experience density of "immersion, learning, and interaction". The result is that the motivation for the first visit is strong and word-of-mouth promotion remains positive, but the willingness for repeat visits and a second in-depth tour is relatively weak. Common expressions are "I have seen all the classics, but I may not come again next time", or they only consider Dunhuang as a one-time node on a larger northwest route.



Figure 20 Tourists flock to the ninth floor of the Mogao Caves
(Source: https://gs.ifeng.com/a/20180819/6816370_0.shtml)

Overall, Dunhuang currently shows a compound trend of strong increase in popularity and accessibility, highly concentrated core appeal, marginal decline in experience during peak season, and overall cautious willingness to visit again. This is not only an inevitable outcome of the "scarcity, fragility and limited quantity" of cultural heritage, but also a realistic reflection of the fact that the product structure of destinations still dominates with "core viewing", and the recognition of alternative and extended experiences is insufficient.

2.4.5 Distribution of major scenic spots in Dunhuang and gathering of tourists

The high-density areas of tourism flow in Dunhuang City are mainly concentrated in the distribution areas of high-level tourism resources in Dunhuang.

From the core density distribution map of tourism flow, it can be found that the high-density areas of tourism flow are mainly concentrated in the Yadan National Geopark and the World Cultural Heritage Site. Yumen Pass Ruins, Yangguan Great Wall Ruins Tourist Area (AAAA-level Tourist Attraction), Dunhuang Mogao Caves World Cultural Heritage Site, Dunhuang Ancient City, Mingsha Mountain, Crescent Spring National Scenic Area (AAAAA-level Scenic Area), Mogao Caves Digital Exhibition Center. These tourism resources have high cultural and tourism value and are the core attraction and main tourist destination of Dunhuang tourism. The world cultural heritage represented by the Mogao Caves is renowned worldwide. It serves as the city card of Dunhuang and a symbol of Dunhuang culture, possessing extremely high historical and cultural value. Every year, it attracts tens of thousands of domestic and foreign tourists. The Singing Sand Mountain and Crescent Spring have been renowned worldwide as "desert wonders" throughout history. They are well-known domestic and international scenic spots that integrate tourism, vacation and leisure, sand sliding and fitness, cultural exchange and geological research. The Yadan Devil City, Yumen Pass, Yangguan Ruins and the Ancient City of Dunhuang attract a large number of tourists with their unique charm and historical and cultural value. These high-level tourism resources together form the core appeal of Dunhuang's tourism, making it the top choice for tourists visiting Dunhuang and a hot spot for the city's tourism flow. "Based on social large data multi-scale time and space differentiation characteristics of dunhuang tourism flow" (Ma, Chen & Chen, 2021).

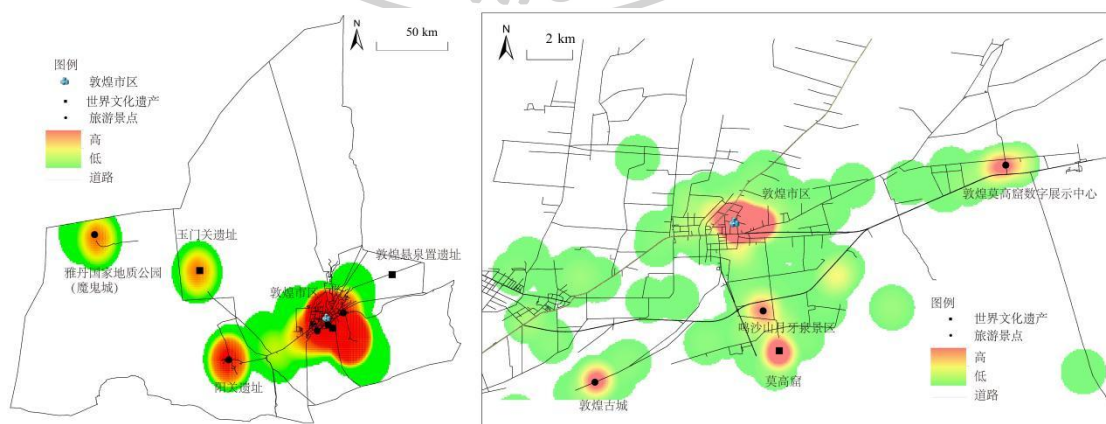


Figure 21 Kernel density of tourist flow in Dunhuang

From this, it can be seen that the majority of tourists in Dunhuang are concentrated within the urban area of Dunhuang. Due to the fact that most of the area in Dunhuang is surrounded by deserts, the activities and options available to tourists are very limited. Moreover, apart from the main urban area, the other several scenic spots are too far from the city center, which incurs high transportation and time costs for tourists. The tourism flow in Huangshi City exhibits the spatial differentiation characteristics of "high concentration and multiple centers", with prominent spatial imbalance, convergence and divergence. A core-edge tourism flows hierarchical structure and a tourism flow hotspot area with one core and multiple centers have been formed. The core hotspots of the Dunhuang tourism flow are mainly concentrated in the main urban area and its suburbs of Dunhuang City, including the Mingsha Mountain - Crescent Spring Scenic Area, the World Cultural Heritage Site of Dunhuang Mogao Caves, the Ancient City of Dunhuang, the Danghe Scenic Line, the Dunhuang Night Market, and the Digital Exhibition Center of Dunhuang Mogao Caves. The sub-core hotspots mainly include the Yadan National Geopark, the Yumen Pass World Cultural Heritage Site, the Yangguan Pass World Cultural Heritage Site and other areas. Overall, the tourism flow in Dunhuang City is mainly concentrated in high-level tourist attractions and high-level world cultural heritages.

Distances between main scenic spots:

Downtown — Yulin Grottoes : 170Km

Downtown — Yadang Parl : 160km

Downtown — Ming sha Mountain: 5km

Downtown — Yangguan Pass:70km

Downtown — Yumen Pass : 90km



Figure 22 Map of Dunhuang

(Source: <https://www.chinadiscovery.com/dunhuang-tours/maps/dunhuang-attractions-map.html>)



Figure 23 Map of Dunhuang Downtown

(Source: <https://www.google.co.th/maps/place/Dunhuang,+Jiuquan,+%E0%B8%81%E0%B8%B2%E0%B8%99%E0%B8%8B%E0%B8%B9+%E0%B8%8%E0%B8%B5%E0%B8%99/@40.5589494,94.4924572,8.42z/data=!4m6!3m5!1s0x37eac14a4a737231:0x7461bfc0c6bfc872!8m2!3d40.1421899!4d94.66197!16zL20vMDFkMWh3?hl=th&entry=ttu>)



Figure 24 Map of Dunhuang Downtown

(Source: Google map, <https://www.google.co.th/maps/place/Dunhuang,+Jiuquan,+%E0%B8%81%E0%B8%B2%E0%B8%99%E0%B8%8B%E0%B8%B9+%E0%B8%88%E0%B8%B5%E0%B8%99/@40.5589494,94.4924572,8.42z/data=!4m6!3m5!1s0x37eac14a4a737231:0x7461bfc0c6bfc872!8m2!3d40.1421899!4d94.66197!16zL20vMDFkMWh3?hl=th&entry=ttu>)

In these maps above, the red circle presents main scenic spots in the urban area; The black circle presents the main villages and communities in the urban area.

2.4.6 Distribution of other scenic spots in Dunhuang

In Dunhuang, the Mogao Caves, the Singing Sand Mountain, the Crescent Spring, the Yumen Pass and the Yardang Mountains often make up the top spots on the "must-visit list", but this does not mean that the itinerary can only revolve around a few hotspots. There are a number of secondary scenic spots and urban side experiences distributed in the city and its suburbs, such as the Dunhuang Museum, the Danghe Scenic Line and Night Market, Sanwei Mountain and Leiyin Temple, Dunhuang Film and Television City, West Lake Wetland, Tongzhou Island, rural walking spots (Longle Village, Yangjiaqiao Village), cultural Spaces ("Dunhuang Bookstore", etc.), and the Du Yongwei Museum, etc. Each of them offers diverse values such as supplementary historical context, observation of nature and landforms, experience of daily life and folk customs, night and social scenarios, as well as niche collections and local narratives. Incorporating these locations into the itinerary can, on the one hand, effectively divert peak passenger flow and reduce congestion and

waiting costs in core scenic spots. On the other hand, it can also extend the breadth and depth of the experience: during the day, complete "seeing and learning" at heritage sites; in the evening, complete "resting and feeling" at city riverbanks and bookstores; at night, complete "touring and playing" through performances and night markets. The next day, we completed the "See and Walk" activity by walking through wetlands and rural areas. Such an arrangement not only enables tourists to have a more balanced rhythm and a more three-dimensional memory, but also allows the culture and daily life of the destination to be seen more completely.

Table 4 Other Attractive Scenic Spots in Dunhuang Area

Attraction / Experience	Type & Highlights	Location / Distance from Downtown	Best For	Suggested Time	Notes
Dunhuang Museum	History & Silk Road exhibits; compact but high-quality	Downtown	Culture lovers; learners	1–1.5 h	Free/low fee; good for rainy evenings
Danghe Riverside Promenade	City riverside walkway; night views & leisurely stroll	Downtown	Families; photographers; walkers	0.5–1 h	Combine with night market/dinner
Shazhou Night Market	Local snacks + crafts bazaar	Downtown	Foodies; casual shoppers	1–2 h	Crowd level varies by season

Attraction / Experience	Type & Highlights	Location / Distance from Downtown	Best For	Suggested Time	Notes
Sanwei Mountain Scenic Area (3A)	Hill climb, temple heritage, city vistas	7–10 km from downtown	Hikers; religious culture	2–3 h	Great at sunrise/sunset; many steps
Leiyin Temple (3A)	Temple complex; quiet courtyards	Suburb/nearby	Quiet seekers; culture lovers	1–1.5 h	Often paired with Sanwei Mountain
Dunhuang Film City (3A)	Film sets; photo-friendly ancient streets	Suburb	Families; photo ops	1.5–2 h	More shows/sets than deep culture
Optics & PV Expo Park (3A)	Solar/renewable energy exhibits	Suburb	STEM/engineering fans	1–1.5 h	Niche, tech-focused
Danghe Ecological Park (3A)	Urban green space; jogging & waterside path	Edge of downtown	Families; joggers	0.5–1 h	Best around dusk
Tongzhou Island (3A)	River islet; light outdoor time	Near suburb	Nature-inclined visitors	1–1.5 h	Seasonal water levels

Attraction / Experience	Type & Highlights	Location / Distance from Downtown	Best For	Suggested Time	Notes
“Millennium Dunhuang – Crescent Spring Town” Folk Area (3A)	Folk courtyards; small performances & crafts	Near suburb	Local-life seekers	1–2 h	Livelier on weekends/festivals
Xihu National Nature Reserve (Dunhuang West Lake Wetland)	Desert wetland; reeds & migratory birds	40–60 km from downtown	Birders; nature photographers	2–3 h	Farther drive; check season & wind
Nanhu Oasis	Oasis–desert transition landform	Outskirts	Geomorphology/landscape fans	1–2 h	Scenery depends on season & water
Xuanquan Posthouse Ruins (World Heritage component)	Han-dynasty relay/post station ruins	60–70 km from downtown	History buffs	1–1.5 h	Ruin-type; minimal on-site displays
History Expo Park	City symbols,	Downtown	Leisurely stroll	0.5–1 h	Pair with museum/ni

Attraction / Experience	Type & Highlights	Location / Distance from Downtown	Best For	Suggested Time	Notes
/ City Culture Park	sculptures & landscaping				ght market
Longle Village / Yangjiaqia o Village (near Crescent Spring Town)	Rural walk; farmhouse meals; crafts	Near suburbs	Community & local-life visitors	1.5–2 h	Many activities by reservation
Resident Show “Encore Dunhuang” (and similar)	Immersive stage/light performanc e	Downtown or nearby theater	Performing- arts audience	1.5–2 h	Ideal night option
“Dunhuang Bookstore” & cultural spaces	Book selection + coffee + cultural/cre ative goods	Downtown / near scenic areas	Literary/leisu re visitors	0.5–1 h	Good for downtime or pre- departure
Roadside Land Art (e.g., “Son of the Earth”,	Public art/landsc ape photo stops	Along the road to Yulin Caves	Self-drive travelers	0.2–0.5 h	Short pull- over photo stops

Attraction / Experience	Type & Highlights	Location / Distance from Downtown	Best For	Suggested Time	Notes
“Mirage”)					
Du Yongwei Museum	Private folk collection; local antiques/pa intings; small but curated	Downtown or nearby location	Folk culture & collectors	0.5–1 h	Private/ind ependent; check opening hours/fees on site

2.4.7 Annual Tourist volume of Dunhuang

Based on the big data of the check-in frequency of tourists in Dunhuang City from 2016 to 2018, a seasonal change trend chart of the tourism flow in Dunhuang City was drawn. According to the standards of the China Meteorological Administration, the four seasons of spring, summer, autumn and winter are divided as follows: March to May is spring, June to August is summer, September to November is autumn, and December to February is winter. Analysis reveals that the seasonal variation characteristics of passenger flow in Dunhuang City are obvious. The passenger flow in Dunhuang City is mainly concentrated in summer and autumn. Generally speaking, the passenger flow in Dunhuang City shows a pattern of summer passenger flow > autumn passenger flow > spring passenger flow > winter passenger flow. (Ma Binbin 1, Chen Xingpeng 2, 3, Chen Fangting 1)

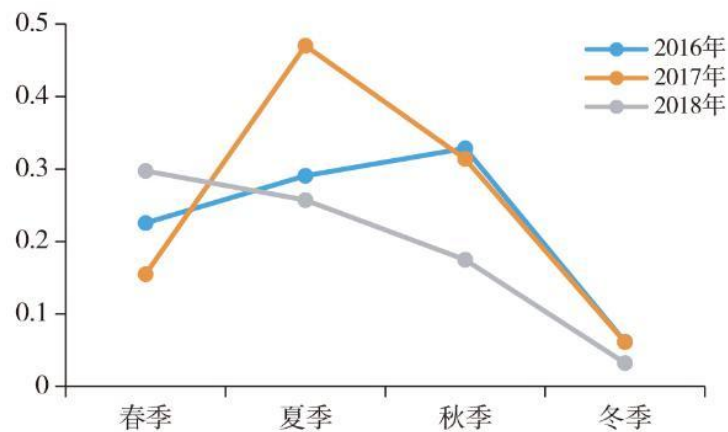


Figure 25 Seasonal variation of check-in frequency of tourists in Dunhuang
(Source: Ma, Chen & Chen, 2021)

Generally speaking, the tourism flow in Dunhuang shows significant dual characteristics of seasonality and spatial agglomeration. In terms of the seasonal dimension, the number of visitors is in the order of summer > autumn > spring > winter, indicating that the summer vacation and the "golden autumn" are the peak visiting periods. This model is in line with the long summer vacation, the increased comfort of the autumn climate and the improved outdoor accessibility. In terms of spatial dimensions, the high-density tourism flow areas are stably focused on high-level and world heritage resource clusters, including the Mingsha Mountain 、 Crescent Spring (5A), the Mogao Caves and Digital Exhibition Center, the Dunhuang Ancient City and the Danghe Scenic Line (main urban area - suburban core), as well as the Yadan National Geopark, Yumen Pass and Yangguan Pass (sub-core circles). Thus, a core-edge hierarchical structure of "one core and multiple centers" is formed. Constrained by the extensive desert background and the long distances between scenic spots, tourists' activities are highly dependent on the service and distribution functions of the main urban area. The peripheral scenic spots, on the other hand, show a relatively low frequency of visits due to the high transportation and time costs, demonstrating a distinct spatial imbalance and a coexistence pattern of convergence and divergence. Overall, the tourism flow in Dunhuang is clearly distributed in an agglomeration pattern dominated by world cultural heritage sites and high-level

scenic spots. The core attractions play a decisive role in the organization and spatial-temporal structure of the tourist flow.

2.5 Stakeholders of Dunhuang Tourism

In the development of tourism in Dunhuang, there are mainly three types of stakeholders. The first one is the management departments related to the Dunhuang region and scenic spots. These departments are mainly responsible for the unified maintenance and tourism development of all scenic spots in the Dunhuang region. They are functional departments of the government and have independent management systems. These departments hold the core resources for the development of tourism in Dunhuang. It also attracts outstanding local talents to join its development team. The second category belongs to the supply and operation of tourism resources, such as local or out-of-town tourism agencies, local artists and artist workshops, or restaurants, homestays and events held by local people, etc. The third category is the participants in tourism, including both Chinese and foreign tourists.

Among these three major types of stakeholders, those related to the scenic area are government staff. The government's work aims to protect the scenic area and study the archaeological value brought by the Mogao Caves Scenic Area. They do not give more consideration to the development of local tourism and the relevance of local people. Therefore, the researchers' studies mainly focus on the correlation between local people, local tourism resources and tourists, supply balance and sustainable development. According to the results of the visits, the tourism resources provided by the local people are more likely to be known by more tourists, whether they are Chinese or foreign tourists, to increase the popularity and dissemination of more local tourism products in the area. What tourists are more eager to know is how they can travel more comfortably and conveniently in the Dunhuang area.

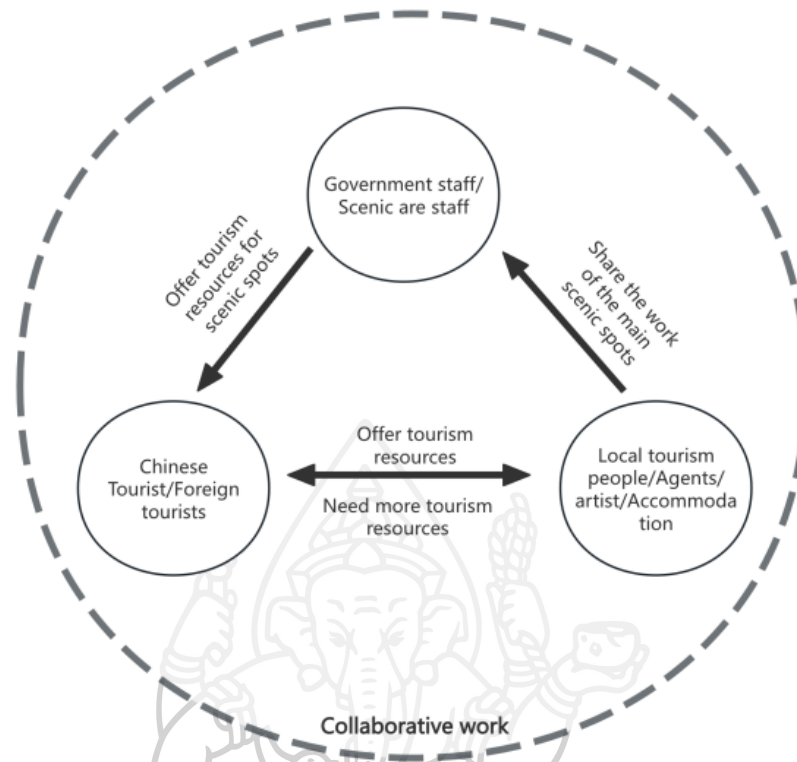


Figure 26 Stakeholders of Dunhuang Tourism

From this, it can be deduced that, in relation to the stakeholders of Dunhuang tourism: Under the rigid constraint of heritage protection, local tourism participants hope to alleviate information asymmetry and spatial accessibility costs through supply and demand matching mechanisms and collaborative governance solutions, optimize brand communication and service design of local supply, and thereby achieve supply balance and sustainable development at the destination level. In particular, more optimized and coordinated solutions should be provided for the information balance and supply plan between the tourism products offered by local people and tourists.

2.5.1 The impact of the development of tourism in Dunhuang on local stakeholders

The regional nature of culture determines that tourism, as a non-native activity, is inevitably a cross-cultural exchange activity, among which international tourism is the most typical. In the international tourism environment, cultural differences among members of different societies undoubtedly directly affect their social interactions.

Dunhuang is rich in tourism resources and its tourism market is widely distributed geographically. The Mogao Caves stand out particularly in this regard. Local residents often encounter exchanges, communications and influences of various regional cultures. The cross-cultural tourism behavior of inbound tourists is bound to have a certain impact on the traditional business methods and behavioral patterns of local tourism practitioners. According to interviews with local tourism practitioners, the main impact and problems they face are mainly reflected in the aspect of education.

The educational level of the local residents in Dunhuang is generally low. During the development of tourism in the Mogao Caves, many participants have realized that the biggest obstacle to communicating with foreign tourists is the language barrier. The language barrier has distanced many local people from the tourism industry. They are unable to explain the culture and art contained in the Mogao Caves to foreign tourists, nor can they better introduce the local cuisine and characteristic tourism products. It can be seen that language is the main obstacle to communication between the two sides. For local residents, apart from language factors, the lack of communication skills and opportunities is also an important factor affecting their communication with local residents. The factors influencing communication include different living habits and limited communication time, etc. In order to communicate better with foreign tourists, many residents expressed their hope to improve their language skills, learn corresponding communication skills, and hope that their next generation can receive better education.

In fact, the above-mentioned phenomenon is no longer only applicable to foreign tourists and local residents nowadays. It may also include tourists from other provinces visiting the area, as well as experts, artists and researchers who come to Dunhuang for related academic research. These people have a higher level of education and cognition. They force the communities and locals of Dunhuang into a gentry-like environment. The gap created in this way also makes the locals feel out of place in their hometown and it is difficult for them to better participate in the development of tourism in Dunhuang.

2.5.2 Summary

Due to its special geographical location, Dunhuang boasts unique artistic and cultural resources and tourism resources that integrate historical culture, artistic culture and geographical landform landscapes. Relying on the implementation of China's "Belt and Road" policy, Dunhuang has developed rapidly in the tourism industry. The development of tourism has created considerable economic income and job opportunities for the local government and people, and it is also a pillar industry for the survival of the local people in Dunhuang. However, the development of tourism has also caused irreversible damage to the main scenic spots in Dunhuang. The existence of the Mogao Caves is not permanent. If the Mogao Caves disappear, We also need to consider how the local people can continue to develop Dunhuang in their own way. On the other hand, the arrival of domestic and foreign tourists and researchers has caused a cultural gap among the local people of Dunhuang. Even some local people of Dunhuang are no longer willing to visit the Mogao Caves because they no longer understand the culture of the Mogao Caves and their language communication is not smooth. This makes it difficult for the local people to deeply integrate into the closed loop of Dunhuang tourism development. If the development of Dunhuang tourism only considers the role of the government and policies, It is difficult to achieve sustainable and circular development of the tourism industry, and thus the economic effects brought by the tourism industry are hard to benefit more local people on a wider scale.

Table 5 Open coding from Literature view

	Dunhuang 地区发展态势（数量与空间）
LC1	客流规模（疫情冲击下仍高位） 定义/含义：2018 年超 1000 万人次；2020 年受疫情影响仍超 900 万。 "Passenger flow scale (remains high despite the impact of the epidemic) Definition/Meaning: Over 10 million person-times in 2018; Despite the impact of the epidemic in 2020, the number still exceeded 9 million.

	Dunhuang 地区发展态势（数量与空间）
LC2	“小集中，大分散”的空间格局 三大旅游区相距较远，缺少串联节点。 The three major tourist areas are far apart and lack connecting nodes.
	旅游产品与敦煌当地形象 Tourism products and the local image of Dunhuang
LD1	停留短、活动单调、夜间供给不足 游客停留时间短；白天看点有限；夜间文化活动少，“长夜寂寞感”。 Short stays, monotonous activities, and insufficient supply at night Tourists stay for a short time. There are limited highlights during the day. There are few cultural activities at night, creating a sense of loneliness in the long night.
LD2	品牌与识别度不足 口号与标识系统不完善，部分旅游品牌尚未流行。 The brand and recognition are insufficient The slogan and logo system is not perfect, and some tourism brands have not yet become popular.
	居民参与与感知（社会可持续） Resident Participation and Perception (Social Sustainability)
LE1	经济感知强于社会/文化/环境 居民对旅游经济效应感知更强，整体处于“成熟巩固期”。 Economic perception is stronger than social/cultural/environmental perception Residents have a stronger perception of the economic effects of tourism, and the overall situation is in a "mature consolidation period".
LE2	需要更高水平的公众参与

	Dunhuang 地区发展态势（数量与空间）
	可持续发展需要更广泛公众参与与社会支持。 A higher level of public participation is needed Sustainable development requires broader public participation and social support.
	遗产保护压力 Pressure on heritage protection
LF1	洞窟微气候与环境负荷 游客携带水汽与热量进入洞窟，导致温度/相对湿度/墙面温湿/二氧化碳浓度变化。 Cave microclimate and environmental load Visitors bring water vapor and heat into the cave, causing changes in temperature/relative humidity/wall temperature and humidity/carbon dioxide concentration.
	管理体制与协同机制 Management system and collaborative mechanism
LG1	多头管理、协调不足 管理体系未完善；存在多头管理，景区与行业间、政府与研究机构间沟通协调机制不足。 Multiple management and insufficient coordination. The management system is not yet perfect. There is multi-headed management, and the communication and coordination mechanisms between scenic spots and industries, as well as between the government and research institutions, are insufficient.
	市场与客群结构 Market and customer group structure

	Dunhuang 地区发展态势（数量与空间）
LH1	代际结构与出行方式 70/80 后占比近半；暑期亲子/家庭游为主；性别相对均衡，女性略高。 Intergenerational structure and travel patterns The proportion of those born in the 1970s and 1980s is nearly half. Summer vacation is mainly for parent-child and family trips. The gender is relatively balanced, with females slightly taller.

2.6 Field investigation of polit research

This pilot research was carried out in December 2023. The research team organized a 13-member investigation group (10 Thai tourists and 3 Chinese tourists) to complete the visit to the core scenic area and urban supporting scenes of Dunhuang within two days. On the first day, the focus will be on the World Cultural Heritage Site, the Mogao Caves, and the Mingsha Mountain - Crescent Spring. In the morning, visit the Mogao Caves and listen to English explanations to learn about the art and preservation background of the caves. In the afternoon, we will move to Mingsha Mountain to experience sand dune hiking and camel riding. The next day, a long-distance trip was arranged. We drove to the Yulin Grottoes and visited public art installations along the way (such as "Children of the Earth" and "Mirage"). After returning to the city, we entered the "Dunhuang Bookstore" to experience the cultural and creative coffee space. Both night periods feature a walking experience of the city's night market, interspersed with local food tastings.

2.6.1 Pilot research Objectives

This trip focuses on three propose:

1. Gain a direct perception of the Dunhuang travel experience from the perspective of tourists and initially identify the key touchpoints that affect satisfaction and behavioral intentions;
2. Understand the real situation of destination supply during the off-season, including the accessibility of the interpretation language, the arrangement of

movement routes and timing, and the effectiveness of night activities and urban facilities.

3. Establish a problem list and an operational hypothesis framework for the subsequent systematic research in the direction of "experience economy, service design, and sustainable development", and clarify which links need to enhance the overall experience through process optimization, product supplementation, or load scheduling.

2.6.2 Experience Process and Initial Discoveries

According to the researchers' observations of the participants during the trip and the subsequent group focus and interviews, it was found that:

On the first day's combination, the visiting process of the Mogao Caves and the English explanations provided international tourists with a clear knowledge entry point, with strong narrative and a stable pace. Subsequently, the activities on the sandy ground of the Singing Sand Mountain and camel riding formed a distinct sensory memory, and the overall experience was evaluated as "highly valuable".

The long-distance journey on the second day brought about significant time and physical exhaustion. The lack of English explanations at the Yulin Grottoes led foreign tourists to have a relatively shallow understanding of the content, and the depth of their learning and appreciation was limited. Stops at public art spots during long drives offer visual changes, but fail to effectively alleviate continuous fatigue. Both night slots were chosen for strolling at the night market. Due to the supply in the off-season of December, the activity level of the stalls and the programmatic content were relatively low. Participants generally believed that the available experiences were limited and it was difficult to form a strong memory point. In contrast, the local restaurants arranged during the day received unanimous praise, presenting a contrast of "satisfied dining - insufficient content at night".

Based on the feedback from the past two days, participants generally recognized the quality of sightseeing and the sensory activities in the core scenic area of Dunhuang. However, they expressed expectations for improvements in the organization of long-distance transfer sequences, language support for international

visitors, the supply of activities at night during the off-season, and convenient services at the city level.



Figure 27 Pilot research
(Source, photographed by Qin, 2023)

2.6.3 Focus on the Group

The focus group is designed to select tourists who have already visited Dunhuang for discussion. This process enables researchers to understand the thoughts of different people and the issues they perceive, allowing them to better understand the problems and challenges they are facing as tourists at present, and to better comprehend the issues rather than relying on imagination. The participants in this focus group discussion are Mr.Ithipol Vimolsilp and Mr.Phusit Rattanapanop from Thailand. Both of them are university teachers in the field of art and culture, and they are at a relatively high level in terms of cognition and understanding. Therefore, the problems they see are more rational and objective. Discussions with them can help reveal the essence of the problem.

Mr. Ithipol Vimolsilp said that he really likes Dunhuang. The trip to Dunhuang gave him a very different experience. The world-famous Mogao Caves art gave him an impact on art and culture. A thousand years of art and culture are concentrated together, which is like a timeline of art and culture, leaving him in awe. This was also an unprecedented challenge. Winter was too cold for tourists from

Thailand, and coupled with the dry climate of the Gobi, he had to overcome these difficulties every day. But this experience was unforgettable for him, and he hoped to have the opportunity to visit Dunhuang again next time to experience more travel about the desert and the Gobi.

Mr. Phusit Rattanapanop said that apart from the difficulties mentioned by Mr. Ithipol Vimolsilp, he felt that the long distance between scenic spots was a problem for him, which would cause the feeling of a short distance along the road, and public services along the way, such as supply stations and restrooms, there are no other options available for tourists to experience. Moreover, apart from the Mogao Caves, it is difficult for them to communicate and have a deeper understanding of the cultural and artistic value of Dunhuang. These are the areas that he believes should be strengthened in famous tourist cities, which will help improve the experience of tourists in the travel destination. Besides, he also mentioned that Apart from the profound influence of the grotto culture on him, the camel riding experience in the desert in Dunhuang is also very wonderful. I hope there will be more such interesting experiences to make up for the extra travel time during the off-season.



Figure 28 Focus groups

(Source: Photograph during the focus group 2023)

In summary, the group discussions and interviews after the trip further pointed to three priority topics: optimizing the itinerary rhythm and relay stops of remote scenic spots, supplementing multilingual explanations and visual evidence at key heritage sites, and introducing more planned night experiences in off-season scenes to enhance overall coherence and willingness to stay.

Table 6 Open coding from Interview & focus group

	运营季节性与承载失衡（Seasonality & Capacity Imbalance）
IA1	淡旺季强分化（off-season downturn） 采访中直接提及冬季停业、客流骤降、经营仅能维持半年的叙述。 off-season downturns In the interview, it was directly mentioned that the business was closed in winter, the customer flow dropped sharply, and the operation could only last for half a year.
IA2	旺季资源紧缺（peak resource scarcity） 旺季“资源紧缺/配给不足”等一线经营者表述。 "peak resource scarcity" Expressions from front-line operators such as "resource shortage/insufficient allocation" during peak seasons.
IA3	承载压力与错峰导流（load & peak-shifting） 因夏季激增带来对洞窟的压力，建议通过城市其他项目实现“错峰”。 load & peak-shifting Due to the pressure on the caves caused by the sharp increase in summer, it is suggested to achieve "off-peak" through other urban projects.
	语言与文化解说缺口（Language & Interpretation Gap）
IB1	景区英语解说不足 受访外籍游客反映在榆林窟缺乏英语讲解。 The English explanations in the scenic area are insufficient The foreign tourists interviewed reported that there was a lack of English explanations at the Yulin Grottoes.
IB2	餐饮点的沟通障碍 菜单阅读、下单、菜品文化语境理解困难。

	运营季节性与承载失衡 (Seasonality & Capacity Imbalance)
	Communication barriers in the catering business It is difficult to read the menu, place orders and understand the cultural context of the dishes.
IB3	零售触点的文化翻译缺失 土特产/文创店难以有效传达产品背后的文化价值与故事。 The cultural translation of retail touchpoints is missing Local specialty or cultural and creative stores find it difficult to effectively convey the cultural value and stories behind the products.

2.7 In-deep field research

In February 2024, based on the problems identified in the previous pilot research, researchers re-entered Dunhuang in the form of on-site field research, conducting systematic observations and records around the Mogao Caves, the urban area, the suburbs, and related supporting industries. Researchers lived continuously for two months around the Mogao Caves and in the urban area. They used methods such as participatory observation and semi-structured interviews to gain a detailed understanding of the local tourism development and the participation of local people.

2.7.1 Seasonal tourism

During the two-month on-site observation, tourism in Dunhuang presented a typical seasonal curve of "steep peaks to deep valleys" : short peaks formed around the Spring Festival and at the end of the winter vacation, rapid drops on working days and after the festival, and the low period of the off-season was significantly prolonged. Seasonality is not only reflected in the scale of visitors, but also extends to the entire chain of supply structure, service rhythm and experience quality. Firstly, the contraction effect on the supply side is obvious: during the off-season, the frequency of guided Tours and shuttle services decreases, and night-time cultural activities temporarily increase. The catering and retail industries adopt response strategies of "shortening time, reducing product categories, and cutting staff", which leads to an

increase in the "hidden costs" for tourists in information acquisition, queuing, and transfer. Secondly, the mismatch between carrying capacity and experience is magnified during peak seasons: when the instantaneous passenger flow accumulates to core points (such as selected caves and the main entrance of Mingsha Mountain), the time for explanations to stay is compressed, the line of sight is blocked and the noise rises, and the micro-environment indicators approach the threshold, presenting a triple tension of "operational carrying capacity, experience carrying capacity, and micro-environment carrying capacity". Secondly, the imbalance in spatial distribution intensifies the structural impact of seasonality: the connection function of the corridor from Liangguan to Yadan is insufficient during the off-season. The sparse relay stations and long-distance transfers increase the perceived load on tourists, weakening the ability of the peripheral scenic spots to divert the core pressure. During the peak season, due to the insufficiency of supply points and interpretation nodes, it is difficult to form an effective corridor organization. Overall, the seasonality of Dunhuang is not a single-variable issue of "the number of tourists", but rather the result of a coordinated imbalance among "demand rhythm, supply elasticity, carrying threshold and spatial connectivity". Based on this, it is suggested that seasonal management be incorporated into regular operations: using time-slot reservations and rhythmic guided Tours to counteract the congestion during peak seasons; Maintain the continuity of the experience through the "minimum stable supply set" during the off-season (small-scale guided night Tours, light and shadow shows, and cultural and creative workshops at fixed times). Supplement the relay nodes of long-distance lines with a corridor-to-station system to reduce the perceived cost during the off-season and pre-set capacity for peak season diversion. Smooth out the fluctuations in demand by the seasonal gradient of prices and products (off-season combination tickets, in-depth study Tours/photography small groups).

Table 7 Open coding from filed trip

	基础设施缺口（infrastructure Gaps）
TA1	餐饮配套稀缺 & 自备补给成为刚需 在偏远/敏感景区周边很难提供餐饮基础设施，现场观察到游客自备食物。 Scarce catering facilities and self-provided supplies have become essential needs. It is difficult to provide catering infrastructure around remote or sensitive scenic spots. It was observed on the spot that tourists brought their own food.
TA2	行前信息与节奏设计的重要性 需要在行程中预设“补给—休息—观览”节奏。 The importance of pre-departure information and rhythm design It is necessary to preset the rhythm of "replenishment - rest - sightseeing" during the itinerary.
	进入与通达安全（Access & Safety at Heritage Sites）
TB1	台阶/崖壁通道的可达性与安全提示 现场存在狭窄攀登路径，对老人/低体能游客不友好，需导览与安全提示。 Accessibility and safety tips for step/cliff passage There are narrow climbing paths on site, which are not friendly to the elderly or visitors with low physical fitness. Guided Tours and safety tips are required. "
	保护—利用的现场张力（Conservation vs. Access in Situ）
TC1	高客流与承载平衡 世界遗产地人流集中，需以管理策略平衡参观与保护。 High passenger flow and capacity balance World Heritage sites are crowded with people, and management strategies should be adopted to balance visiting and protection.

TC2	生态敏感区域的配套边界 生态—文化敏感性决定了商业设施投放的边界。 The supporting boundaries of ecologically sensitive areas Ecological-cultural sensitivity determines the boundaries of commercial facility deployment.
	体验设计机会（From Gaps to Offerings）
TD1	把“缺口”转为“供给”：轻量餐饮与在地合作 现场缺口蕴含服务创新机会（流动餐饮/野餐区/在地盒餐）。 Turning 'gap' into 'supply': Lightweight Catering and Local Cooperation. The on-site gap holds opportunities for service innovation (mobile catering/picnic areas/local boxed meals).
TD2	教育化与多感官设计 将参观转化为“有意义、可记忆”的学习性体验。 "Education and multi-sensory design. Transform the visit into a "meaningful and memorable" learning experience.
	游客可观察行为（On-site Visitor Behaviors）
TE1	自组织的场景化用餐 游客在户外自发布置简餐，形成“停留—补给—再出发”的节奏。 Self-organized scenario-based dining Tourists spontaneously set up light meals outdoors, creating a rhythm of "stay - replenish - set off again".
TE2	入口聚集与秩序管理 入口处游客聚集，需做秩序与信息分流。 Entrance gathering and order management. At the entrance, tourists gather and it is necessary to implement order and

	information diversion.
	旅前—旅中一体化（Pre-trip to On-site Integration）
TF1	个性化/多感官/在地真实的行程策划 调研强调行前的个性化与多感官策划，服务现场更顺畅。 Personalized/multi-sensory/authentic local itinerary planning The research emphasizes personalized and multi-sensory planning before the trip, making the on-site service smoother.
	实地法对问题识别的作用（Value of Field Visits）
TG1	基于在地体验更精准地发现问题 文献与在地体验结合，研究者“进一步识别问题”。 Identify problems more accurately based on local experiences By combining literature with local experiences, researchers "further identify problems".

2.7.2 Interview local people about their participation in the tourism industry

According to the interview results, it is learned that local residents and small and micro business entities have a broad willingness to participate in the tourism industry. However, due to the limitations of entry barriers, scarce channels and uncertain returns, the actual participation shows the characteristics of "low intensity, fragmentation and non-institutionalization". The types of participation mainly include: direct services for tourists (catering, homestays, transportation and tour guide collaboration), cultural and creative products and handmade retail, as well as occasional community activities and festival volunteer support. Potential but underdeveloped types include: community tour guides, nature education explanations, intangible cultural heritage experience courses, "local tables" with local ingredients and theme markets, etc. The entry barriers are mainly concentrated in four aspects: First, ability and qualifications. The lack of tour guide certification, course standards and safety compliance guidance makes it difficult to enter the core channels. Secondly,

in terms of supply organization and coordination, the lack of a unified registration platform and brand endorsement makes it difficult for individualized supply to form a stable coupling with scenic spots and travel agencies. Thirdly, the distribution of returns and risks: large fluctuations during peak and off-peak seasons and weak bargaining power restrain long-term investment. Fourth, there is information asymmetry. There is a lack of data-driven feedback on tourist profiles, popular time periods, and content preferences, making it difficult to iterate products. At the same time, the positive elements are equally clear: local artists, handicraft managers and catering operators have a strong motivation for content innovation. Tourists have a high acceptance of "short time, light participation and learnable" experiences. Community Spaces and school/museum resources can provide carriers for curriculum-based supply.



Figure 29 Interview with Artist Du Yongwei
(Source: Photograph during the field trip by Researcher, 2024)

2.7.3 Problem Screening and Analysis

Based on all the above information, including literature research, pilot research and entity investigation, as well as the group focus of interviews sent during this research process, we integrated all the information to discover the correlations among them.

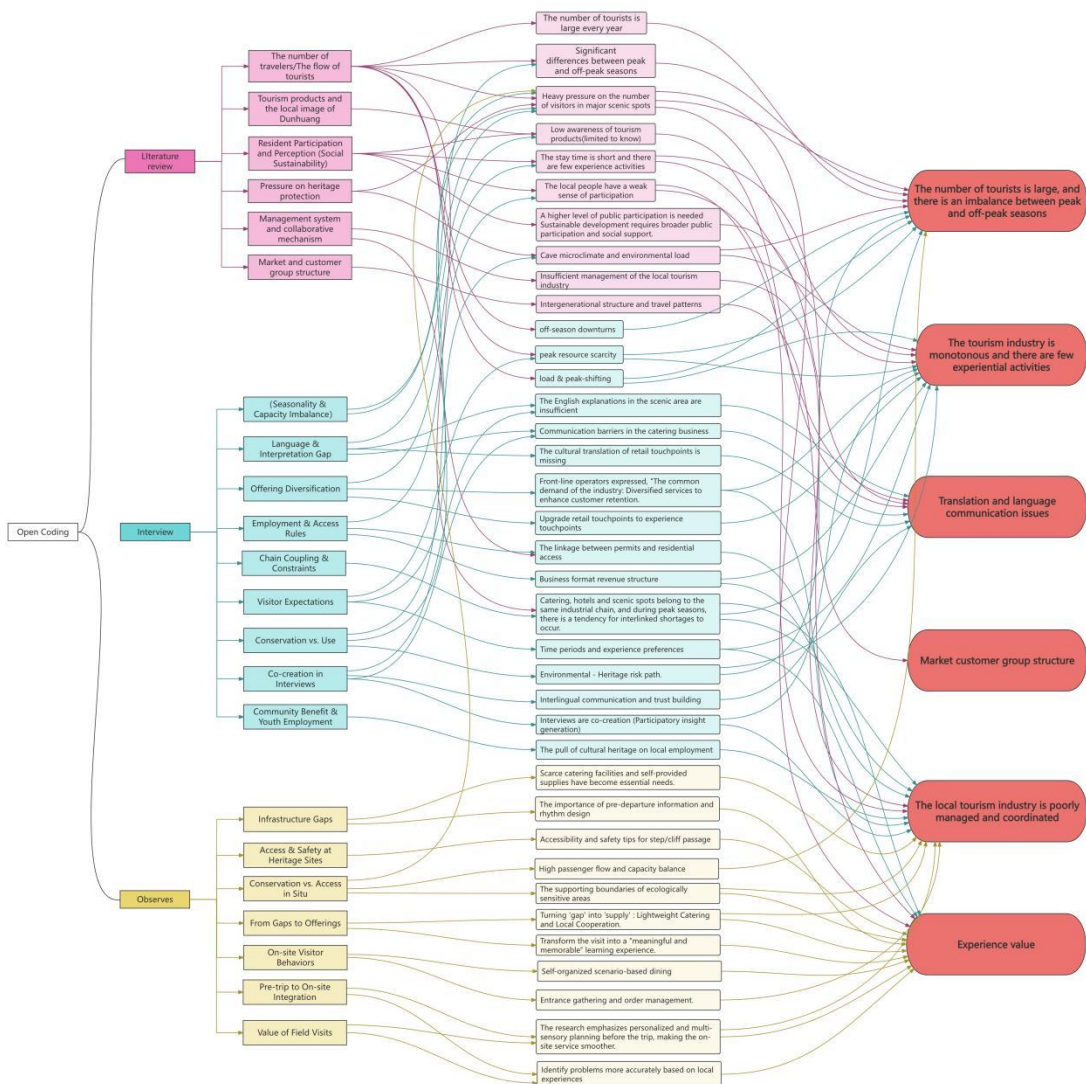


Figure 30 Open coding from Literature view & Pilot research & field trip

Based on the collection of the above data, including literature review, pilot research, in-depth interviews and field observations - this round of open coding has formed three "main axes of evidence", which mutually confirm and gradually converge into six higher-order problem domains. Firstly, there is an imbalance between seasonality and capacity: Both literature and interviews point to a high concentration of passenger flow during peak seasons and a lack of content during off-peak seasons. Further on-site observations revealed congestion in queues, difficulty in entering the park at different times, and smooth transitions, coupled with ecological and cultural relic protection pressures (such as worn paths and increased behavioral constraints). Secondly, the supply is monotonous and the experience is thin:

Influenced by the dominant structure of "ticket + guided tour", tourists often express that "they leave after watching and lack something to do". Although the resources in the suburbs and communities are abundant, they lack standardized products and stable entry points, making it difficult for them to accommodate the diversion. Thirdly, language and information barriers: There are multiple cross-language communication difficulties in areas such as food ordering, scenic spot etiquette, and cultural background. The information in brochures and tour guides is scattered, resulting in "seeing but not understanding deeply". Fourth, the market customer group structure is differentiated: There are obvious heterogeneous demands such as parent-child groups, the elderly, international tourists, and independent travelers. However, the current product intensity and rhythm classification are insufficient, making it difficult to precisely match. Fifth, insufficient management coordination: Multiple entities operate in parallel but lack a unified rhythm and interface rules. The coordination costs among appointments, transportation, venues, and communities are high, and the response to extreme weather or temporary adjustments is weak. Sixth, the spillover of experience value and local benefits is insufficient: Tourists' memory anchor points mostly remain at "must-see attractions", the community benefit chain is short, youth employment and participation are limited, and the cultural co-creation and educational attributes have not been fully activated.

2.7.4 Analysis of Local Stakeholders' request

To gain a deeper understanding of the views of relevant stakeholders after literature and field investigations, a questionnaire survey was conducted simultaneously during the field investigation in this study. The questionnaire is structured with a "hybrid scale and open-ended questions": The former uses a five-point Likert scale to measure respondents' subjective evaluations and agreements on issues such as destination seasonality, product diversity, participation opportunities, and language services; The latter is used to collect the specific narratives and scenario-based descriptions of the respondents. The sample covers major groups such as government/public institutions, heritage and cultural relics systems, cultural and tourism enterprises, communities and individual business operators, etc. The data analysis is carried out in two steps: First, descriptive statistics and inter-group

comparisons are conducted on the scale items to identify "consensus questions" with high consistency; Secondly, for open-ended questions, the initial coding and axis coding based on grounded theory are adopted to summarize high-frequency concepts and form themes. Based on the two types of evidence, the following four highly consistent demands and judgments are formed.

First, the significant deviation in the flow of people between peak and off-peak seasons has been unanimously identified as the primary issue affecting the operation and experience of the destination. During the peak season, there is a single-peak concentration, which leads to a sharp increase in queuing time, waiting duration and congestion in core scenic spots and urban side business types. In contrast, during the off-season, there is a significant demand trough and a decrease in facility utilization rate. Respondents generally pointed out that this strong seasonality not only raises operating costs and the difficulty of human resource allocation, but also amplifies negative experience memories on the tourist side, including congestion, queuing, high weather and temperature, etc., weakening the willingness to visit again.

Second, stakeholders generally believe that the types of activities available to tourists are limited, and their experiences and sense of participation are insufficient. Apart from the must-see heritage sites, age-specific and stratified guided Tours, night cultural activities, and local interactive projects are insufficient in terms of perception. The itinerary is often filled with "check-ins, transitions, and meals", and the density of learning, immersive experiences, and interactive sections is relatively low.

Thirdly, local residents and micro and small entities have a strong sense of threshold to enter the tourism system. The surveyed samples reflect that, apart from a few mature merchants and institutions, community residents, inheritors of handicrafts and intangible cultural heritage, and young returnees who start businesses in their hometowns are facing practical obstacles in terms of access qualifications, cooperation mechanisms, channel acquisition, and visibility of discourse. There is a disconnect between the supply of "what can be done/what can be done" and the market of "being seen/bought". This perception is particularly concentrated in the samples of suburban and rural areas and is regarded as the direct cause of uneven local benefits and ambiguous participation identities.

Fourth, the language communication predicament has been jointly pointed out by various entities, especially at the level of content understanding. There is a gap between professional narratives (art history, archaeology and geoscience) and the pre-language knowledge of tourists, which affects the effective transformation of cultural capital into experience value. The above-mentioned gap was magnified under the backdrop of peak season congestion and high temperatures with sandstorms, thereby intensifying tourists' overall perception of "high process costs and high comprehension thresholds".

2.8 Current Problems of Tourism in Dunhuang

Based on the data obtained from literature research, preliminary questionnaires and interviews, as well as two rounds of field investigations and the demands of stakeholders (including participatory observation, semi-structured interviews and situational records), the practical problems of tourism in Dunhuang are summarized by using the grounded theory coding path. After multiple rounds of comparison, the following six highly consistent and significant issues have been formed.

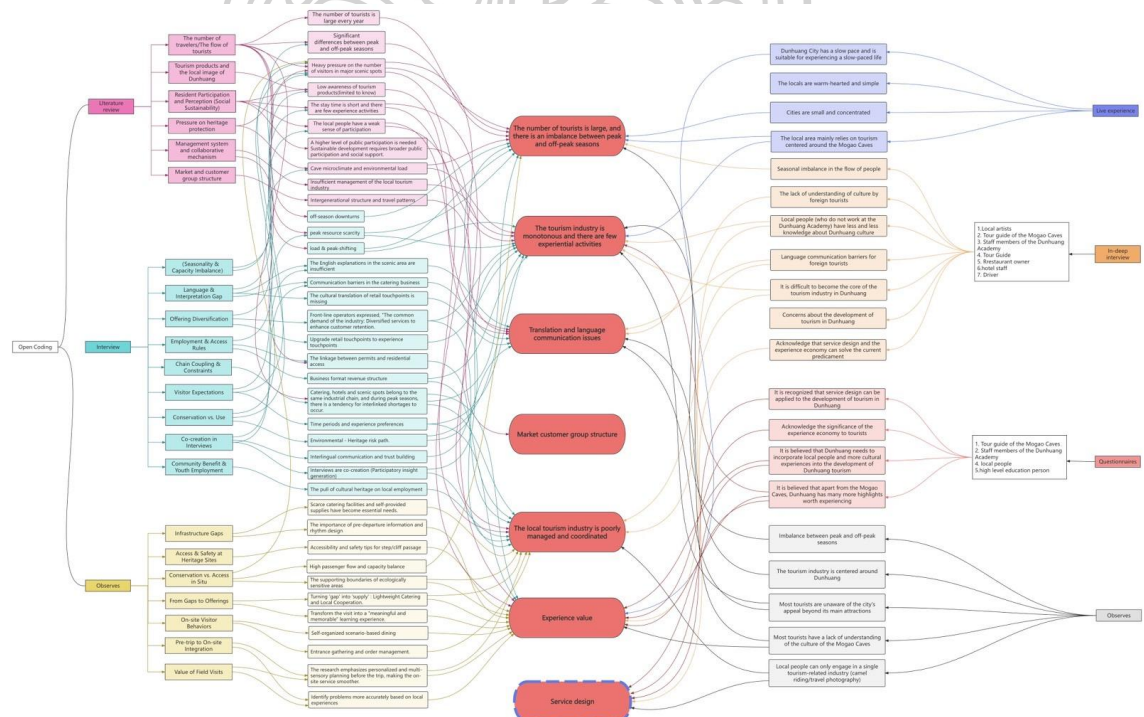


Figure 31 Axiad coding from Literature view & Pilot research & field trip & questionnaire

1. the tourism and cultural resources products are monotonous

At present, the main products of Dunhuang tourism are still the traditional Mogao Grottoes art and Culture appreciation tour and the Moon over the Mingsha Mountain The natural scenery tour of Ya Quan. At present, the development of these resources is only a small part and mostly at a shallow level Sightseeing Tours. From the perspective of the development of tourism products and the design of tourism activities, Dunhuang lacks tourism and cultural resources, There has been in-depth development and utilization. On the one hand, the cultural connotations of these tourism resources have not been fully explored, such as in Duyang The border culture and Silk Road culture reflected in the Guan and Yumen Passes, as well as the music depicted in the murals of the Mogao Caves, Dance and other art and culture have not been expressed in the form of tourism products. On the other hand, tourism cultural resources The development efforts are insufficient, such as in the Yadan National Geopark, Xihu National Nature Reserve, and Nanhu Oasis.

The development of areas such as Yitang Lake is still at a shallow level, which has led to the fact that the tourism products of Dunhuang are still cultural sites up to now heritage sightseeing is the main focus, and the tourism cultural products are monotonous, making the tourism activities seem dull and boring.

2. The deviation between peak and off-peak seasons

Although Dunhuang enjoys a very high reputation both at home and abroad, tourists' perception of it often has deviations.

According to a survey, tourists generally believe that Dunhuang is a remote and backward desert area, although Dunhuang is world-famous. The World Cultural Heritage Site, the Mogao Caves, the World wonder, the Singing Sand Mountain and Crescent Spring, as well as the Han cultural sites, the Two Passes and the Han Great Wall But all these are cultural sightseeing tourism products. They are mainly for viewing and offer no fun. Besides, what about the tourists

It is believed that the best time to visit Dunhuang is from May to October, which makes the peak and off-peak seasons of Dunhuang tourism very obvious. At the same time Some high-quality resources have not yet been well transformed into high-

quality tourism products, and the existing products are still the lack of corresponding basic supporting facilities and other means for organic integration has led to the overall image of Dunhuang not being distinct and prominent enough.

There is still a lack of a unified overall image promotion slogan and logo system for tourism culture 、 several tourism brands are still lacking It didn't sound.

3.The degree of public participation is low, and local residents have a relatively low perception of tourism culture.

The results of the investigation on the perception effect of tourism among the residents of the main community in Dunhuang show that the Dunhuang tourist destination, which is currently in the "mature consolidation stage", has a stronger perception of economic effects among its residents than of social, cultural and environmental effects. The characteristics of Dunhuang tourism culture determine that in the development of tourism in Dunhuang, it is necessary to enhance the protection of tourism culture. This requires increasing public participation in the process of tourism development. Youdaoplaceholder0 Social support and extensive public participation play a decisive role in the sustainable development of Dunhuang tourism. Public participation not only encompasses the active involvement of the public in relevant actions and projects for implementing the sustainable development strategy of tourism, such as the healthy social life of residents, the values and ethics of ecological protection, and the ways of tourism development and management, but more importantly People should actively change their mindset, establish the concept of sustainable tourism development, and then change their actions in a way that conforms to the sustainable development of tourism.

4.The tourism products are monotonous and fail to meet the demands of modern tourists.

In terms of the market formed by international tourists coming to China, the market share of Dunhuang and even Gansu Province is very low, and their competitiveness in the domestic tourism market is not strong. Tourists stay in Dunhuang for a short period of time. They come from thousands of miles away and can only visit for one day and stay for two nights. If they stay any longer, there will be nothing to see. The tourism activities are monotonous, and there are even fewer

cultural activities at night. Tourists feel very lonely in the long night in Dunhuang. The utilization rate of its resources and tourism facilities is not high. Most of them are in a state of "half-year economy". Coupled with the relatively single tourism reception, the actual development degree is low, and the potential resource advantages have not yet been brought into play. It is still in the early stage of development. The cultural tourism products currently developed can no longer meet the diverse demands of modern tourists.

5.The spatial layout of the five tourist areas is still unbalanced

From the perspective of geographical spatial distribution, the development of tourism resources in Dunhuang clearly shows the characteristics of "small concentration and large dispersion". The three tourist areas, namely the Mogao Grottoes Art and Culture Viewing Area, which is about 25 kilometers away from the city center, the Yumen Pass Han Great Wall Ruins Cultural Tourism Area, which is about 48 kilometers northwest of the city center, and the Yangguan South Lake Oasis Cultural Leisure Area, which is about 90 kilometers southwest of the city center, are relatively far apart. Moreover, there are no other tourist attractions (spots) that connect the three with each other. From the perspective of the distribution of major tourism resources, these points can be connected into lines or even extended to a surface through the development of other tourist attractions.

6.The tourism management system and coordination mechanism still need to be improved and rationalized

After years of hard exploration, the tourism management institutions in Dunhuang City have become increasingly complete and have embarked on a path of standardized management.

The tourism management system has not yet been perfected and there are some problems. For instance, in the case of multi-headed management, scenic spots and banks There is a lack of an effective coordination and cooperation mechanism in business management.

2.9 Case Study

The case study aims to clarify, through a systematic comparison of service design practices in Wadi Rum, Jordan, and Shaxi Ancient Town, Yunnan, how to achieve high-quality growth of destinations within the normative boundaries of sustainable development in an ecologically sensitive and culturally fragile context by means of value creation oriented towards the experience economy and supply mechanisms driven by service design.

The reason for choosing them is that the problems they face are very similar to those of Dunhuang: crowded during peak season, quiet during off-peak season, ecological and cultural relics need to be protected, insufficient evening activities, and unstable community participation. By comparing the specific measures taken by these two places (such as entrance control, time slot reservation, fixed night activities, and community content creation together, etc.), the researchers want to refer to case studies: First, what kind of design can make tourists feel it is "worth it" and be willing to recommend and come back? Second, how can we disperse the flow of people and prolong their stay without damaging the environment or heritage? Thirdly, how can we make it easier for local residents to participate, benefit together and form a long-term stable supply? Finally, the researchers hope to organize these feasible practices into a set of methods that Dunhuang can directly refer to, and to integrate protection, service and experience in an overall plan.

Case One: Wadi Rum

Wadilun is located in the south of Jordan, close to the Saudi border. It is a typical desert-rock hill complex landscape area in Jordan. The area is famous for its canyons composed of sandstone and granite, natural stone Bridges and steep cliffs. It also has significant evidence of human-land interaction due to a large number of rock paintings and inscriptions from the prehistoric to Nabatean periods.

The tourism in Wadilun mainly consists of guided four-wheel drive off-roading, camel riding, hiking and climbing. This tourism scene is very similar to that of Dunhuang. However, in Wadilun, Jordan, the relationship between tourism and the local Bedouins is "bound together" : tourists first get tickets and listen to safety instructions at a unified tourist center, and then are led into the desert by licensed guides in four-wheel drive vehicles or camels, following the prescribed routes, which

is both safe and does not damage the environment. Most of the campsites are run by local families. They stay in tents, enjoy barbecued meat on the ground stove, drink bedouin tea, turn off the strong light at night to watch the stars and listen to the guide tell stories about astronomy and the desert. All these have turned their daily life into experiences that tourists can buy. All these tourism links create economic value for the local area and its residents. Part of it is tour guide fees, accommodation and catering, handicrafts, and the other part is peripheral services such as vehicle maintenance, supplies, and transportation, which is equivalent to keeping the consumption within the local area as much as possible. To prevent price gouging and cut-throat competition, the community has an association to set suggested prices, arrange shifts and handle complaints. During the peak season, more orders are arranged, while during the off-season, basic income is maintained through regular stargazing and light activities. In terms of environmental protection, the campsite will sort garbage for collection, treat wastewater, and limit lighting. The guide will also remind people not to wander around and not to leave tire tracks or footprints. Online platforms and tourist centers publicly disclose routes, prices and reviews. Tourists can provide feedback when they encounter problems. Word-of-mouth directly affects the business of guides and campsites. In this way, the local people are not merely "cooperating with tourism", but also the main providers of tourism experiences and the "gatekeepers" of the environment. They not only guard the desert and the night sky, but also keep more of the tourism revenue within their own communities.



Figure 32 Wadiren Campsite

(Source : https://cn.tripadvisor.com/Hotel_Review-g303973-d6580976-Reviews-Wadi_Rum_Night_Luxury_Camp-Wadi_Rum_Al_Aqabah_Governorate.html)

Case Two: Guzhen from Shaxi, Yunnan, China

In the ancient town of Shaxi, Yunnan Province, the value of tourism for tourists begins with "slowing down, walking in, and participating together" : after entering the ancient town, the signage is clear, and vehicle and pedestrian traffic are separated, allowing tourists to leisurely stroll around the stone-paved streets and the ancient stage with peace of mind. Many experiences are not just about taking a quick look and then leaving. Instead, they are led by locals themselves, such as walking a section of the ancient Tea Horse Road with a guide, learning a handicraft in a workshop, or listening to a local story or play in a courtyard on Sideng Street. In terms of accommodation and meals, most of the homestays are renovated old houses. The landlords will introduce the origin and rules of the courtyards. The restaurant focuses on local ingredients and seasonal menus, allowing you to taste local flavors without being fooled by "tourist meals". To avoid making the ancient town crowded and noisy, the operation is as "lightweight" as possible: small-scale guided Tours, workshops, weekly markets and night walks replace the bus-style crowds. This not only protects the environment and the texture of the streets and alleys, but also allows tourists to be more immersed. Prices, routes, opening hours and precautions can all be found at the

tourist center and online platforms. Many stores and tour guides also have their own pages and reviews, making it convenient for comparison and reservation. If you encounter any problems, you can give feedback. Word-of-mouth will directly affect subsequent orders, forming a positive cycle of "good service, high evaluation, and stable business".



Figure 33 Local people involved in tourist reception in the ancient town of Shaxi, Yunnan

(Source : <https://cn.nytimes.com/china/20160329/c29shaxi/>)

Overall, Shaxi does not rely on "piling up scenic spots", but rather weaves together readable streets and alleys, livable courtyards, local flavors to taste, handicrafts to learn and stories into a gentle journey: the pace is not fast, the interaction is genuine, and the information is transparent. What tourists get is a local experience closer to life. The ancient town, on the other hand, retains the benefits within the community and keeps the culture alive in the present without damaging its original appearance.

Summary: The problems encountered by Wadilun and the ancient town of Shaxi in Yunnan are similar to those of Dunhuang, but both have worked out a set of practical solutions. In the vast desert, Vadiren has implemented safety and

environmental protection in every detail by means of a unified entrance, reserved zones, fixed routes, guided Tours and intermediate rest stops. In the evening, regular programs such as stargazing are used to extend the stay and disperse the crowd. Local people are also invited to participate in running the campsite and act as guides, with the money remaining in the community.

Shaxi has taken a "lighter" approach: clear signage, slow-paced streets and alleys, small-scale explanations and handicraft workshops, local dining tables, along with transparent rules and revenue-sharing mechanisms, providing residents with channels to participate and preventing them from "defaulting" even during the off-season.

The inspiration for Dunhuang is very direct: for instance, long-distance routes such as "Liangguan to Yadan" can be made into designated routes that are "reserved, divertable and replenished". Add multilingual and clear information; Make stargazing, guided night Tours and local workshops regular night and off-season activities; Bring in the locals and the community. This way, it neither harms cultural relics nor the ecological environment, nor does it make the tourists' experience smoother and more worthwhile, allowing them to stay longer and consume more healthily.

For tourists, if more local tourism resources and services are provided, they will have more choices, which will help relieve the pressure on the main scenic spots in the Dunhuang area and also offer tourists more travel options that match their interests and hobbies.

2.10 Summary

This chapter systematically summarizes the current predicament of tourism in Dunhuang based on the methods of multi-source evidence integration and grounded theory: By integrating literature and statistical materials, preliminary questionnaires and interviews, as well as two rounds of field research (participatory observation, semi-structured interviews, and situational recording), six highly consistent themes were extracted through open coding, main axis coding, selective coding, and constant comparison methods, and condensed into the core issue of "systematic imbalance driven by the irreplaceability of heritage". The six themes are as follows: First, the development of cultural resources is insufficient and the product structure is single.

The supply is highly concentrated on the viewing of the Mogao Caves and the natural check-in at the Mingsha Mountain and Crescent Spring. The music/dance in the border and Silk Road narratives and murals have not been effectively experienced and translated. Most natural and ecological sites remain at a superficial level of utilization. Secondly, the overall image of the destination is ambiguous and its dissemination and conversion are insufficient. Although it has high popularity, its memory points are thin, lacking a unified narrative and visual identity. The visibility and availability of derivative content on the city side are relatively weak. Thirdly, insufficient public participation and weak perception of local culture. Residents mainly perceive economic benefits while the channels for participation are not clear, making it difficult to form sustainable local benefits and cultural subjectivity. Fourth, the products are difficult to meet diverse demands. Nighttime and age-specific stratified experiences are scarce, and the length of stay and the willingness to revisit are cautious. Fifth, the spatial layout is unbalanced and the interaction is weak. The distance between scenic spots is long, the connection is weak, and the cost of transfer is high. There is a lack of more experience activities besides the main scenic spots, which also leads to tourists' insufficient understanding of the culture. Sixth, the management system and coordination mechanism need to be straightened out. There is insufficient multi-headed management and horizontal coordination among scenic spots, industries, and political research institutions. The rhythm and evaluation sharing mechanism for protection and utilization are not sound. Under this framework, this chapter also lays the logical and evocative foundation for the practical model of experience economy and service design to achieve sustainable development through the study of cases.

Chapter 3

Research Methodology

According to the previous chapter, the current predicament and development trajectory of the tourism industry in Dunhuang have been clearly identified. The development of the tourism industry in Dunhuang needs to take into ID the coordinated operation of more local people and local resources, while also considering the travel experience value of tourists. The improvement of travel experience value can effectively enhance the sustainable development of the local tourism industry. However, different tourists, the definition and perception of tourism experience vary. Therefore, it is very important to provide tourists with an effective screening method for travel. This method should not only meet the travel demands of different tourists but also be able to operate in coordination with local tourism resources. The purpose of this chapter is to integrate the previous information and through the method of service design travel models that can be put into practice to help the sustainable development of tourism in Dunhuang.

3.1 Research Methods

This research adopts a hybrid research approach, combining quantitative and qualitative methods. The qualitative research method is mainly aimed at determining the historical background of Dunhuang and the development context of its tourism industry through literature study, field investigation, group focus, and interviews. Among these data, there are a large number of qualified articles, news, and comments, etc., to determine the current development status of Dunhuang's tourism industry. Then, through the method of grounded theory, the collected information is encoded and grouped. Different collection methods use different codes to determine the accuracy and differences of information in different data groups. Then, based on these codes, the significance of the research problem is determined step by step through analysis and refinement. Using quantitative research with these questions in mind is to make the research questions more explicit, prove the commonalities of the problems,

and also provide methods for verifying the results of the models designed later. These methods mainly include questionnaires and Likert scales.

The entire research will follow the methods and processes of service design.

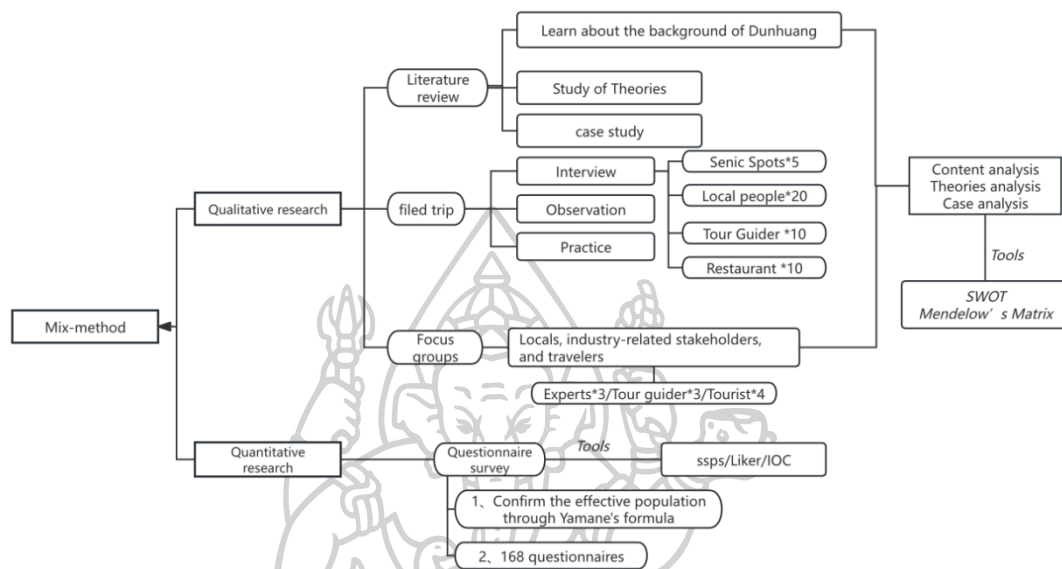


Figure 34 Methods diagram

3.2 Research Process

This research was conducted entirely based on the method of grounded theory. Grounded theory emphasizes that data collection must be all-round and undergo multiple screenings to ultimately extract the commonalities of information in different groups after no new information can be generated.

This research began in 2022. The first approach adopted was literature research, which included published journals, articles, news, and reviews. The information contained the historical background, development context, and current status of tourism of Dunhuang, etc. These pieces of information were written into primary codes through grounded theory methods to facilitate the integration of subsequent information.

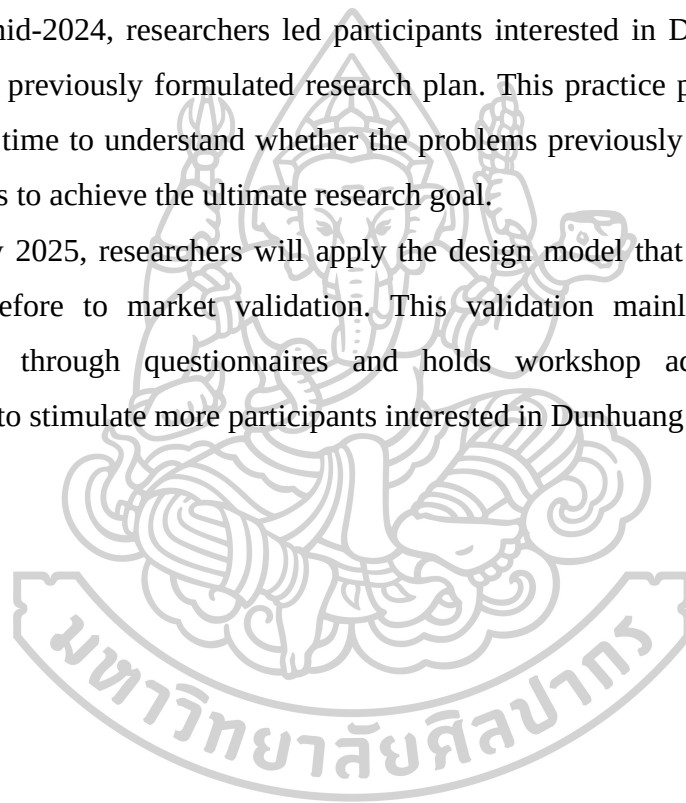
In 2023, the researchers led the participants to join the pilot research on Dunhuang tourism. During this process, group focus and interviews were conducted with the participants, and the obtained results were encoded with grounded theory.

In early 2024, researchers conducted in-depth field investigations of tourism in Dunhuang and interviews with local stakeholders based on previous information, and obtained more diverse information results for coding. In addition, to study the accuracy of the information, more local stakeholders were surveyed through questionnaires and analyzed using the Likert scale.

In mid-2024, as the problems of tourism in Dunhuang gradually became clear, researchers formulated solutions to the problems and the practical process of the research.

After mid-2024, researchers led participants interested in Dunhuang to put into practice the previously formulated research plan. This practice process was repeated twice, each time to understand whether the problems previously discovered could be solved, so as to achieve the ultimate research goal.

In early 2025, researchers will apply the design model that has been repeatedly practiced before to market validation. This validation mainly collects feedback information through questionnaires and holds workshop activities and online exhibitions to stimulate more participants interested in Dunhuang tourism.



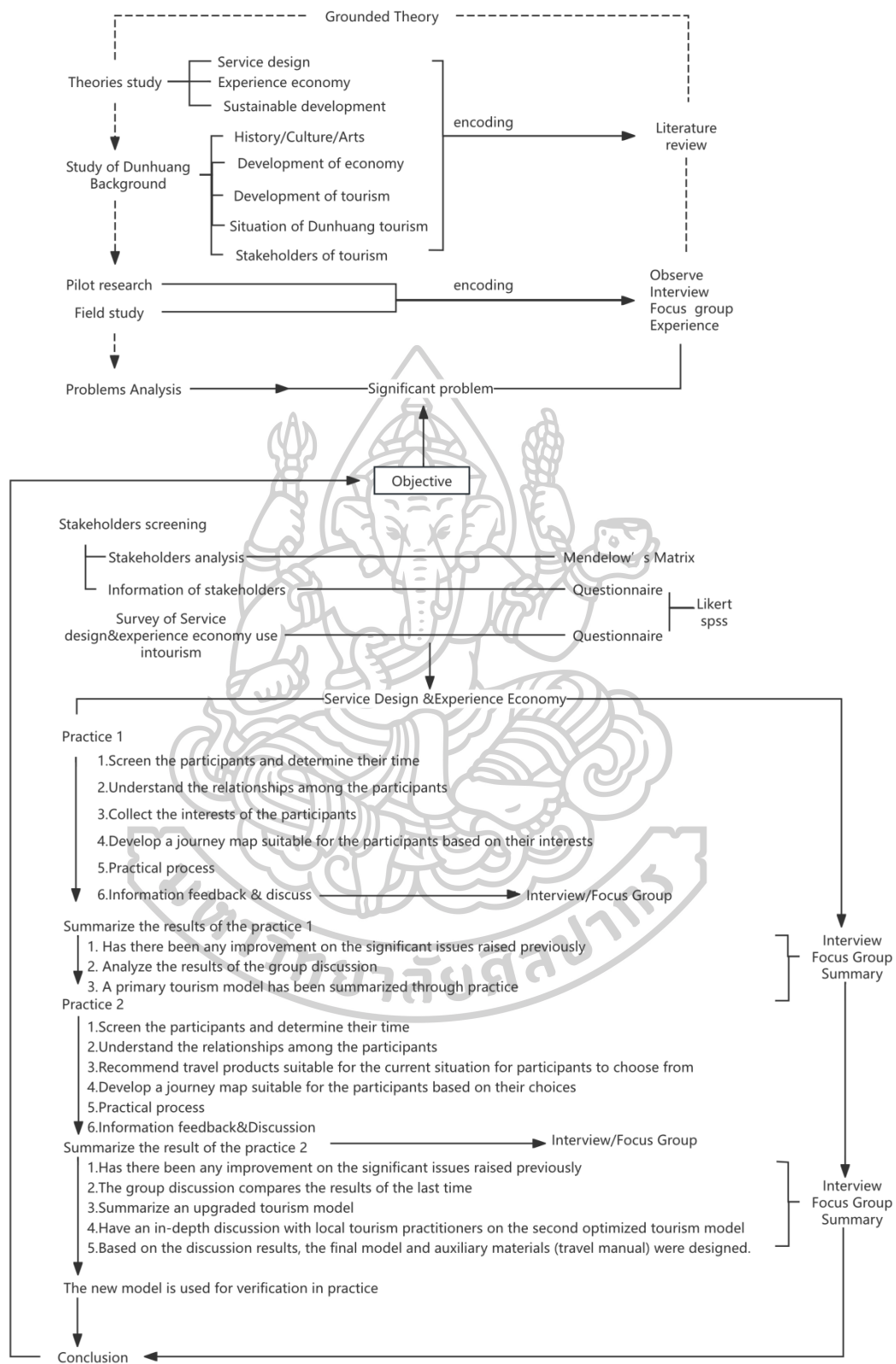


Figure 35 Research process

3.3 Research Methods

This research takes service design, experience economy and sustainable development as the overall framework. Firstly, it conducts a systematic theoretical study based on the grounded theory method, sorts out the principles and processes of service design, the value generation mechanism of the experience economy, as well as the goals and evaluation dimensions of sustainable development, and accordingly constructs the research basis of the Dunhuang context. This includes the historical and cultural and artistic background, the evolution of regional economy and tourism, as well as the current industrial structure and the map of major stakeholders. Subsequently, data acquisition was advanced through a combination of preliminary pilot projects and field research. Organize a small-scale pilot investigation and multiple rounds of on-site visits, and adopt methods such as immersive observation, situational experience, semi-structured interviews and focus groups to simultaneously record facts and narratives from both the tourist experience end and the supply and operation end. Initially summarize the significant problems of Dunhuang tourism in terms of seasonal carrying, product structure, language information and collaborative governance. During the stakeholder research stage, scope screening and stratification are conducted first. Then, Mendelow's Matrix analysis is used to identify the core group, and their understanding of the research topic is evaluated through demographic and educational, occupational, age and other background information to ensure the pertinence and feasibility of subsequent suggestions. Two types of questionnaire surveys were immediately implemented. One was used to compare the perception differences of prominent issues among groups in different locations, and the other was used to assess the acceptability and expected effectiveness of the implementation of service design and experience economy in Dunhuang. Measurements were made respectively on service design, experience economy and their supporting role in sustainable development. Based on the above evidence, the research has entered two rounds of service design-oriented practical verification: In the first round of practice, participants were screened and the travel time and relationship structure were determined. Interest preferences were collected, the journey map was customized and the itinerary was implemented. Feedback was collected through discussions, interviews and focus groups afterwards. The improvement degree of existing

problems was examined, and the experience was summarized with SWOT to propose the primary tourism model. In the second round of practice, the recommendation of current season products and the participants' autonomous choice were strengthened, the itinerary coordination and rhythm control were optimized, and the implementation and review were carried out again. An upgraded model was formed by comparing the results of the previous round, and local tour guides and operators were invited to conduct in-depth discussions. The key points of the model's implementation on the supply side were refined into standard operating rules, and bilingual travel manuals and other auxiliary materials were compiled based on this. Ultimately, the research put the optimized model into real scenarios for application verification. By integrating literature evidence, quantitative questionnaires, qualitative materials, and the process results of two rounds of local practices, it completed the argumentation of the sustainable development path of tourism in Dunhuang and formed conclusions and improvement directions oriented towards destination governance and industry practice.

3.4 Summary

The construction of the research method is centered on the goal of "enhancing the tourist experience of Dunhuang under the premise of protecting its heritage and promoting the common benefits of the local area", and has established a complete research path from problem identification to the implementation of the plan. In terms of methods, a hybrid framework of "qualitative first, quantitative follow-up, and service design-driven iteration" is adopted: literature, field research, interviews, and focus groups are used to identify the current problems of tourism in Dunhuang. Use the method of questionnaire survey to verify the commonality and strength relationship of the problems; Then, through co-creation workshops, journey maps and service blueprints, an experience itinerary from generation to testing and then to optimization is formed to create an executable travel service model. In terms of the process, the research time cycle was clearly defined (mainly literature research in 2022, field investigation in 2023, on-site and two rounds of iteration in 2024, and verification in 2025), the subjects and sampling (government/institutions, practitioners, residents and domestic and foreign tourists stratified according to the Mondelo

Quadrant). The final output includes: A travel service model, along with its corresponding usage methods, provides an operational basis for subsequent promotion and continuous optimization.



Chapter 4

Design Practice

In the previous research, in the second chapter, the researchers, based on grounded theory, conducted in-depth preliminary research and experiential field investigations through literature, articles, news, as well as observations, experiences, interviews, and group discussions. They identified the significant problems currently faced by the tourism industry in Dunhuang. In the development of the tourism industry in Dunhuang, local people have not better joined the closed loop of this industry. The common development enjoys the dividends of The Times. Tourists also think that the local cultural attractions have more experience value. For those who do not understand the art and culture of Dunhuang, the memory points of the experience are not strong enough. Especially for foreign tourists, due to the lack of smooth language communication, they may not even be able to better experience the local cuisine. At the same time, the imbalance between peak and off-peak seasons has caused pressure on the development of Dunhuang in terms of the environment, heritage protection and other aspects. To systematically address these issues, in Chapter Three, the researchers designed a practical process based on the service approach, attempting to discover solutions to the problems identified in the previous research through this process, and thereby summarize a model. This model can not only effectively solve the current problems faced by Dunhuang but also be applied to other similar tourist destinations. Therefore, in this chapter, the researcher will follow the research process established in the early stage to complete the practice of this research. According to the basic concepts of service design, it needs to be centered on the user (stakeholder), and the researcher will start from the screening of stakeholders.

4.1 Stakeholders of Dunhuang Tourism

Based on the previous field and open coding results, this study stratifies the stakeholders. High-power and high-interest groups include municipal administrative departments, ecological and cultural relics protection units, research institutions and core scenic area operators. They hold the power of resource allocation, rule

formulation and interpretation, and are the key decision-makers of important tourism resources in the Dunhuang area. The medium-power but high-interest groups are mainly composed of the supply side, such as hotels/homestays, restaurants, travel agencies, tour guides and drivers, small performance/cultural and creative teams, suburban communities and handicraft/intangible cultural heritage workshops, etc. They directly determine the availability and quality of the itinerary touchpoints and are the implementing subjects of "experience density, night supply, and suburban diversion". The group with relatively low power but strong interest consists of domestic and foreign tourists (including first-time visitors, repeat visitors and visitors of different age groups). These stakeholders are the speakers of the value of the travel experience in Dunhuang. Their results directly affect whether Dunhuang's tourism can develop sustainably. Therefore, in the development of Dunhuang's tourism industry, tourists are at the center of the stakeholders and the central users of the tourism industry. All travel designs will revolve around tourists.

4.1.1 Classification of Stakeholders

The stakeholders of the tourism industry in Dunhuang are generally divided into 18 categories. However, the close relationship between different categories and this research is not exactly the same. As mentioned earlier, some stakeholders, although they hold the core resources, do not mean that the experience value of tourists is their top priority. Therefore, in order to conduct a clearer analysis of the stakeholders, the researchers will carry out a more in-depth analysis of them.

Table 8 Stakeholders

Inside of Dunhuang	Outside of Dunhuang
1. Leaders of government departments	
2. Dunhuang Academy tour guides	
3. Scenic spot staff	15. Chinese tourist
4. Employees of government departments/Scenic area	16. Foreign tourist
5. Hotel, Residence	17. Artists and researchers
6. Dining room	18. Travel agency
7. Local villagers	

Inside of Dunhuang	Outside of Dunhuang
8.Tour guide 9.Driver 10.Local artist 11.Communities inside Dunhuang 12.Local tourism workers 13.Employees of Environment and ecology department 14.Employees of Department of Archaeological Research and Conservation	

4.1.2 Stakeholder Analysis

According to Mendelow's matrix, researchers classified the stakeholders in the above classification based on their impact on the development of tourism in Dunhuang. Those with a higher emphasis on development influence rights and those with a higher interest were respectively grouped into different quadrants. We can see that some stakeholders, despite having government support for the development of tourism in Dunhuang, However, they may not be interested in providing customers with more experience value. Influenced by government regulations, such stakeholders find it difficult to think about how local people can join in. Most of the stakeholders related to this research are concentrated on high interest but low rights. They need new models to help them better join the development of the tourism industry.

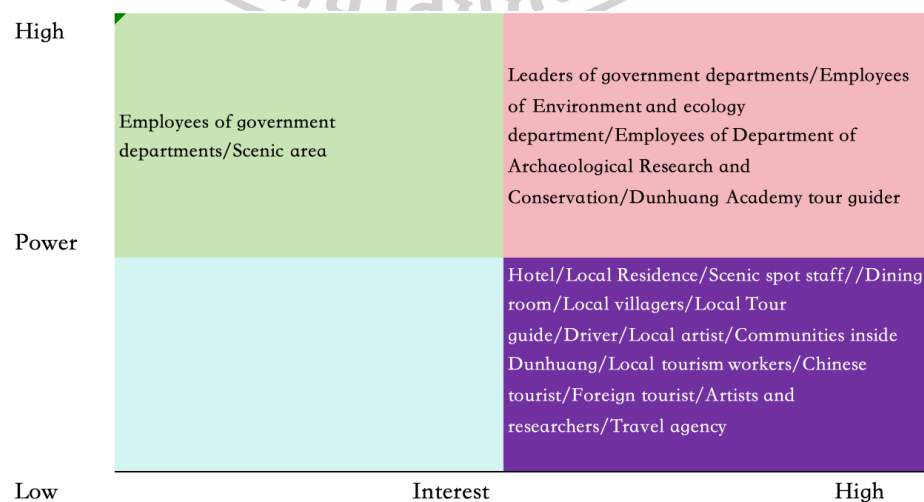


Figure 36 Mendelow's stakeholder matrix

4.1.3 Summary

According to the analysis of Mendelow's stakeholder matrix, it can be seen that among the stakeholders selected by the researchers, the classification is quite clear. Throughout the entirety of research pertaining to Dunhuang, both indigenous residents and foreign visitors unequivocally articulate their keen interest in Dunhuang, particularly with regard to its travel opportunities and cultural heritage. Furthermore, there is a prevailing sentiment that Dunhuang warrants protection or preservation to facilitate sustainable development. These two groups of people are divided into those with rights and those without rights. Although generally speaking, the red area is the stakeholders that should be focused on and investigated in the research, since the Dunhuang area and protection are basically implemented directly by the government at present, the biggest advantage of the stakeholders in this area is that the research brings policy support, rather than changing them. The most directly affected stakeholders in this study are concentrated in the purple area. People in this area are those who directly experience and create services, and their views and ideas can provide direct suggestions or even participate in the implementation of the research program.

4.2 Views of Core Stakeholders on the Development of Tourism in Dunhuang

In order to gain a deeper and broader understanding of the views of core stakeholders on the existing issues in Dunhuang, in addition to the previous interviews and focus groups, a questionnaire survey was also conducted among the stakeholders. The purpose of the questionnaire survey is to narrow the scope and focus more on the core stakeholders. These first-tier stakeholders have direct participation in the core issues. In addition, questionnaires can quickly collect the results of this information.

4.2.1 Questionnaire survey information of relevant stakeholders

In order to accurately analyze the demographic characteristics of 168 respondents in the research on sustainable development experience economy and service design in the Dunhuang area, a combination of descriptive statistical

techniques was adopted. Descriptive statistics are crucial for summarizing and interpreting the fundamental characteristics of research data, providing a simple overview of the sample and measurements. The main statistical tools used include frequency distribution, percentage, mean and standard deviation, depending on the nature of each demographic variable.

For categorical variables such as gender, age group, education level, occupation, and stakeholder group (e.g., tourist, local resident, and tourism professional), frequency counts and percentages were computed to illustrate the distribution of respondents across each category. The frequency (f) represents the number of individuals falling within each specific category, while the percentage (p) was calculated using the following formula:

$$\text{Percentage } (p) = (f/n) * 100$$

Where:

f = frequency of responses in a particular category

N = total number of respondents (in this case, 168)

p = proportion of the category expressed as a percentage

For continuous or ordinal demographic variables such as age or years of experience (for professionals), measures of central tendency (mean) and dispersion (standard deviation) were applied. The mean was calculated using:

$$\bar{x} = \sum x_i / n$$

Where:

x_i = each individual value

n = number of observations

The standard deviation (SD), which indicates the spread of values around the mean, was calculated using:

$$SD = \sqrt{\sum (x_i - \bar{x})^2 / n - 1}$$

These statistics were computed using SPSS (Statistical Package for the Social Sciences) software version [insert version if available], which facilitated data entry, coding, analysis, and visualization. Bar charts and pie charts were also generated for categorical variables to support visual interpretation of the demographic composition.

The accurate and methodical analysis of demographic characteristics provided a foundation for subsequent inferential analysis and interpretation of stakeholder perspectives, allowing the study to identify potential correlations between demographic factors and attitudes toward experience economy principles and service design applications in sustainable tourism development.

Table 9 Age of Respondents

Variable	Category	Frequency (n)	Percentage (%)
1. Age	18–24	29	17.30%
	25–34	50	29.80%
	35–44	44	26.20%
	45–54	31	18.50%
	55 and above	14	8.30%
	Total	168	100%
2. Gender	Male	90	53.60%
	Female	75	44.60%
	Prefer not to say	3	1.80%
	Total	168	100%
3. Occupation	Tour Operator	27	16.10%
	Tourist	61	36.30%
	Local Resident	43	25.60%
	Government Official	15	8.90%

Variable	Category	Frequency (n)	Percentage (%)
	Business Owner	22	13.10%
	Total	168	100%
4. Education Level	High School	34	20.20%
	Bachelor's Degree	77	45.80%
	Master's Degree	42	25.00%
	Doctorate	13	7.70%
	Total	168	100%

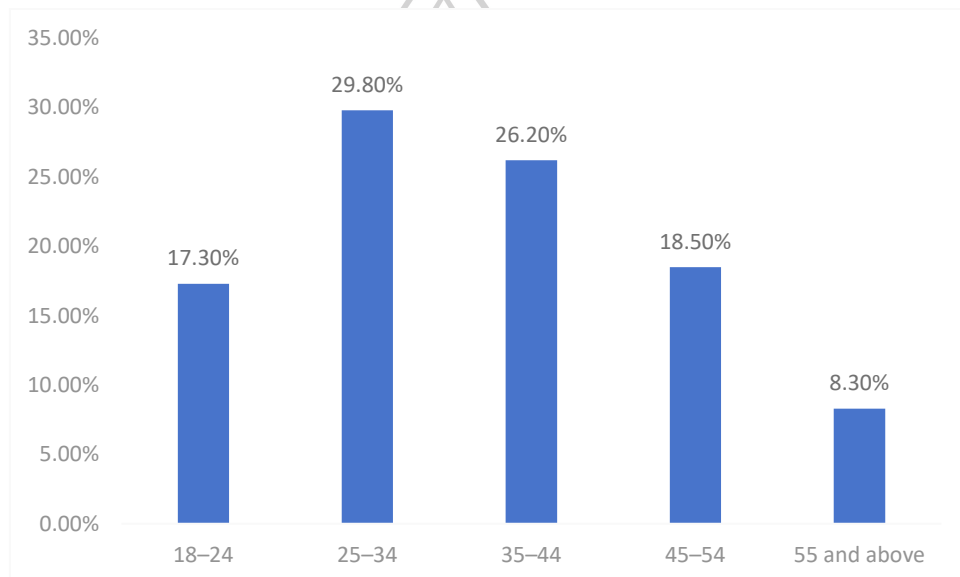


Figure 37 Age of Respondents

The age distribution of respondents reveals that a significant portion, approximately 56%, falls within the 25–44 age range. This demographic segment is often regarded as highly engaged, technologically competent, and open to new experiences. In the context of Dunhuang, where cultural heritage and natural beauty intersect with tourism development, this age group represents a key market for immersive, educational, and personalized travel experiences. Their active lifestyle and curiosity make them more likely to seek out experiences that go beyond traditional sightseeing, including eco-tourism, cultural workshops, and community-based interactions.

The prominence of this age group suggests that service design strategies in the Dunhuang area should prioritize experiential learning opportunities, digital integration (e.g., mobile guides), and sustainability-conscious tourism models. Interactive and participatory experiences that allow tourists to engage with local heritage and environmental conservation efforts are likely to be well received. Additionally, incorporating digital convenience through apps and real-time feedback systems can enhance user satisfaction and encourage repeat visitation while promoting responsible tourism behaviors aligned with sustainable development goals.

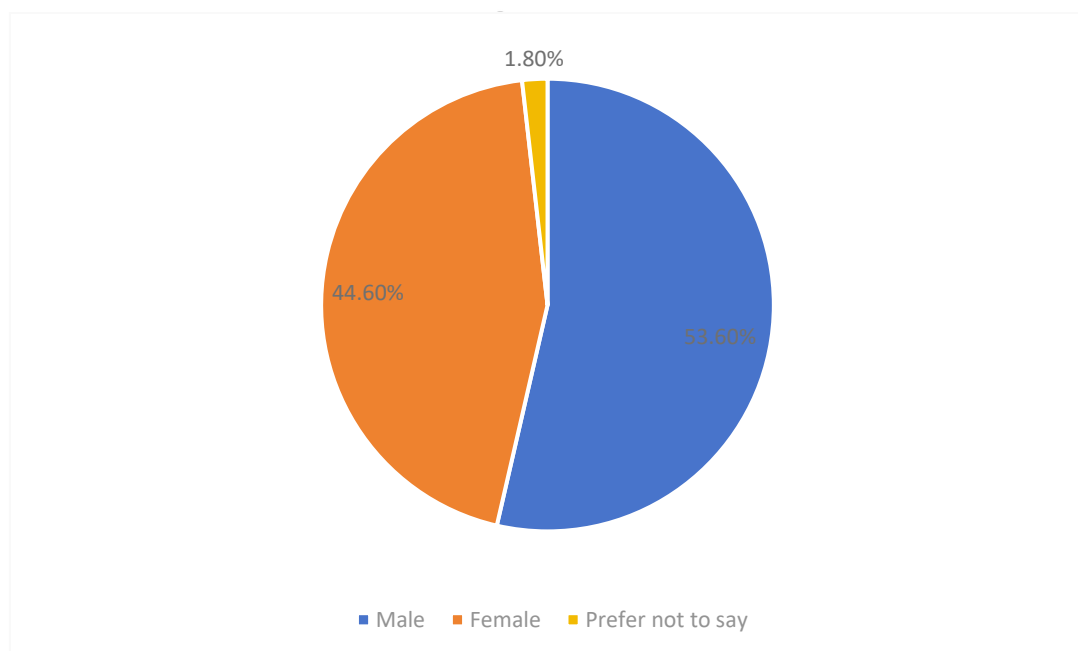


Figure 38 Gender

The study shows a nearly balanced gender distribution, with 53.6% male and 44.6% female respondents. Such parity indicates that both men and women are actively participating in tourism-related activities in the Dunhuang area. This balance is vital for understanding varied travel motivations, expectations, and satisfaction levels from a gendered perspective. While males may lean toward adventure or cultural exploration, females often express greater interest in safety, authenticity, and meaningful experiences. Recognizing these differences is essential for shaping tourism products and services that are both inclusive and gender-sensitive.

Gender-sensitive service design should be central to sustainable tourism development in Dunhuang. Facilities, itineraries, and communication materials should

reflect the diverse needs and preferences of all gender groups, including families and solo travelers. Ensuring safety, promoting accessibility, and embedding narratives of inclusivity—such as through female-led local tours or gender-equal storytelling—can enrich the visitor experience while supporting the area’s broader development goals. Moreover, gender-aware policy frameworks can help local stakeholders, particularly women in the community, benefit economically through empowerment in tourism-related enterprises.

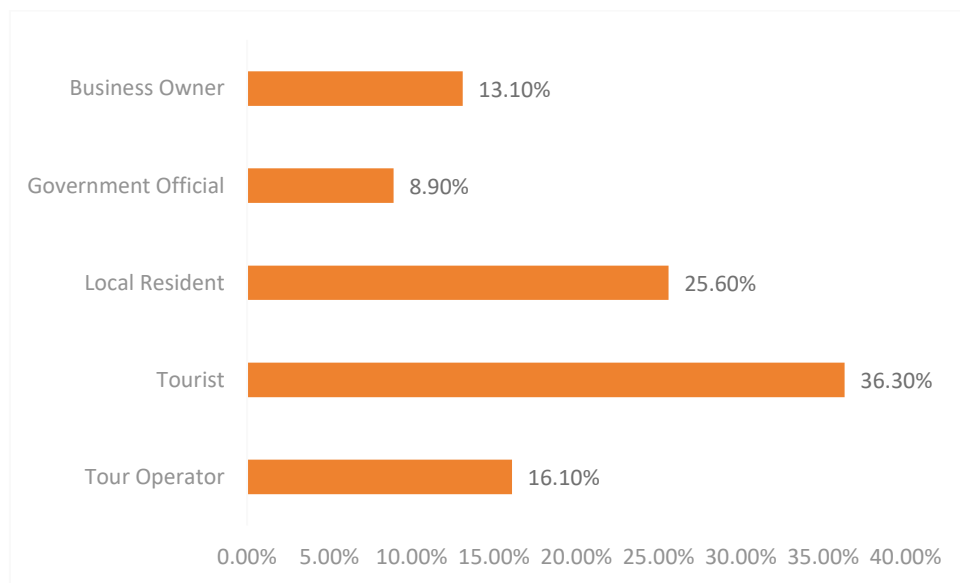


Figure 39 Occupation

Respondents’ occupational backgrounds show a wide representation, with tourists (36.3%) and local residents (25.6%) forming the largest groups. The rest include tour operators, government officials, and business owners, illustrating a comprehensive stakeholder ecosystem. The strong representation of tourists signifies a high demand for quality experiences, while the local residents' perspectives are critical for understanding community sentiment toward tourism. When these two groups are considered together, it becomes clear that tourism development in Dunhuang is not merely about visitor satisfaction, but also about aligning that satisfaction with community interests and capacities.

Effective service design and sustainable tourism policies must strike a balance between the expectations of tourists and the realities of local communities. Incorporating local knowledge, skills, and cultural practices into tourism offerings can

create authentic experiences while fostering economic resilience for residents. Moreover, engaging residents in co-designing experiences and decision-making processes can lead to greater community support and reduced social tensions. Recognizing the contributions of all occupational groups will also aid in building a collaborative model for sustainable tourism that is grounded in shared responsibility and mutual benefit.

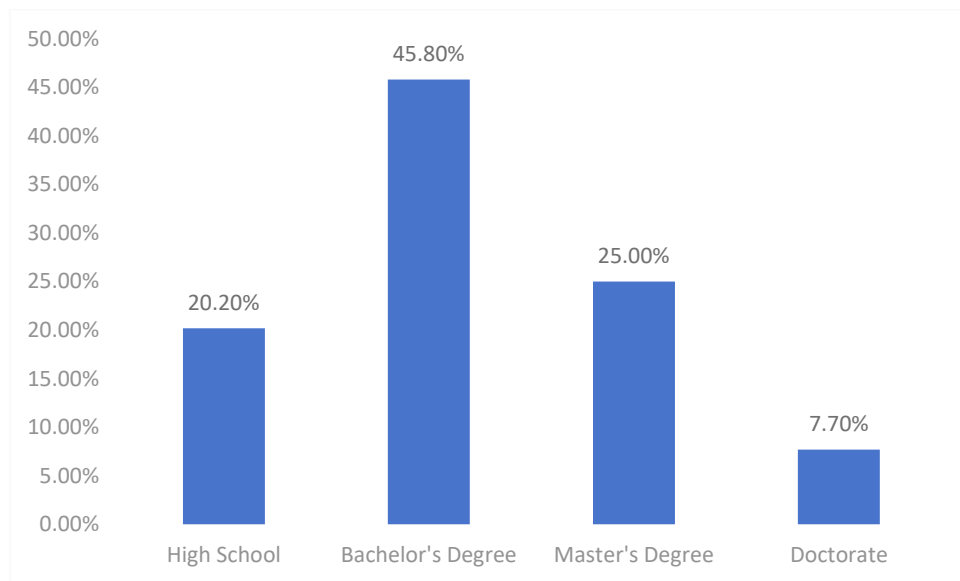


Figure 40 Education

It is worth noting that 78.5% of the respondents have at least a bachelor's degree, and a considerable number of them also hold master's and doctoral degrees. This high educational attainment indicates that the sample group has a relatively high level of intellectual participation and is more inclined to attach importance to the depth, significance and quality of the travel experience. Well-educated tourists often prefer activities that can enhance their understanding of the local culture, history and environmental dynamics. Similarly, well-educated local stakeholders and service providers may be more willing to accept training, innovation and sustainability-oriented interventions.

4.2.2 Summary

The high educational level of the respondents has provided valuable suggestions for the research and formulation of service design. Their suggestions play

a core and key role in the development of tourism in Dunhuang. They can become the first group to understand the importance of service design and experience economy in Dunhuang, which is conducive to driving more people to follow in the future. Therefore, how they view service design and the application of the experience economy in the later stage is of vital importance. The participation of these people will help launch advanced, content-rich and intellectually challenging tourism projects in Dunhuang. These projects can include carefully planned museum Tours, archaeological site explanations, academic lectures and sustainable development seminars. Furthermore, stories that emphasize heritage protection, ecological responsibility and social impact can deeply touch this group. This educational background also supports data-driven and feedback-oriented service improvement measures, which helps position Dunhuang as a model of culturally rich and sustainably managed tourism.

4.3 Questionnaire survey on views on current significant problems

Based on the analysis of grounded theory, it has been confirmed that the current development of tourism in Dunhuang is confronted with issues such as an excessive number of tourists, an imbalance between peak and off-peak tourist seasons, crowded cultural attractions, insufficient experience projects, low emotional value for tourists, incomplete mobilization and participation of local tourism resources, and a low possibility of tourists' secondary visits. Therefore, in order to understand among the core stakeholders, A questionnaire survey was conducted on how many types of stakeholders are troubled in these areas and what difficulties they face respectively to analyze the distribution of these problems among core stakeholders.

They will judge based on their own opinions whether the problem has an impact on the industry they are exploring and whether it is a trouble for them.

Table 10 Stakeholders' recognition of significant issues

Problems	Stakeholder problems													
	Hotel	Local Residence	Scenic spot staff	Dining room	Local villagers	Local Tour guide	Driver	Local artist	Communities inside Dunhuang	Local tourism workers	Chinese tourist	Foreign tourist	Artists and researchers	Travel agency
The number of tourist is large	●	●	●	●	●	●	●			●	●	●		●
Imbalance between peak and off-peak seasons	●	●	●	●		●	●	●	●	●				●
The tourism industry is monotonous					●	●	●	●	●	●	●	●	●	●
Few experiential activities						●	●	●	●	●	●	●	●	●
Translation and language communication	●	●	●	●	●	●	●	●	●	●		●	●	●

After investigation, we can see that for practitioners in industries such as hotels, scenic spots, and restaurants, whether there are diverse experience projects is not important to them. However, they are troubled by the deviation between peak and off-peak seasons. In summer, there is a shortage of rooms, while in winter, the vacancy rate is relatively high. Tourists and local communities, villages, artists, and tour guides are more concerned about whether there are diverse experience projects. This way, they can join in to increase their income, and tourists can also experience more value and have more choices to stay for a few more days. Among them, tourists are not very sensitive to the peak and off-peak seasons because the existing recommendation information is basically for reference in summer. I have never considered traveling in winter. The common problem for all people is the issue of language communication.

The classification of this information is of great significance to this research. Researchers can clearly see at which touchpoint these tourism resources are integrated into the context of tourism service provision. Different practitioners have biased views on the issue, so it is not possible to solve a single type of problem. These problems are all intricately intertwined. The application of service design will make this process clearer.

4.4 Questionnaire Survey on the Application of Experience Economy and Service Design in the Tourism industry of Dunhuang

4.4.1 Views on the Application of service design concepts in the tourism industry of Dunhuang

This section aims to determine the application extent of service design principles in the tourism industry of the Dunhuang area. The respondents were asked whether they believed that the service design theory had been applied in the development and provision of tourism services in Dunhuang. Subsequently, their degree of agreement with several statements reflecting the specific application aspects of service design was measured through a Likert scale questionnaire, such as customer-centricity, experience design, personalization, and stakeholder collaboration.

The responses were scored using a 5-point Likert scale, where:

1= Strongly disagree

2= Disagree

3= neutral

4= Agreement, and

5= Strongly agree.

Table 11 Application of Service Design in Dunhuang Tourism Industry

Statement	N	Mean	Std. Deviation
The tourism services in Dunhuang area are tailored based on customer needs.	146	4.201	0.732
Tourism operators in Dunhuang focus on creating seamless customer experiences.	146	4.288	0.693
Service design in Dunhuang enhances the overall quality of tourism services.	146	4.247	0.718
The tourism sector in Dunhuang provides a high level of personalization through service design.	146	4.048	0.765
There is effective collaboration among tourism stakeholders to improve service design in Dunhuang.	146	4.096	0.748

Statement	N	Mean	Std. Deviation
Service design principles are integrated into marketing strategies of Dunhuang tourism.	146	3.863	0.841
Service design helps improve the sustainability of the tourism services in Dunhuang.	146	4.178	0.703
Aggregate Mean and Std. Deviation		4.132	0.743

As shown in the table, respondents strongly agreed that the tourism operators in Dunhuang focus on creating a seamless customer experience (average = 4.288, standard deviation = 0.693). This indicates that experience design, as a core aspect of service design theory, is a key priority in the provision of tourism services in this region. A relatively low standard deviation indicates a high degree of consistency in the sample, meaning consistency in customer perception.

The respondents also strongly agreed that the service design has enhanced the overall quality of tourism services in Dunhuang (average value = 4.247, standard deviation = 0.718). This discovery confirms that integrating service design principles can positively impact tourism quality by enhancing elements such as efficiency, responsiveness, and customer satisfaction. These results indicate that there is a clear point of convergence between design thinking and excellent service.

The average score was 4.201. Most respondents believed that the tourism services in Dunhuang were tailor-made according to the needs of customers. This reflects the user-centered concept of service design, indicating that stakeholders are actively collecting and implementing customer feedback to shape tourism products. The standard deviation is moderately low (0.732), highlighting the universal consistency and indicating that personalized travel experiences are indeed a universal feature.

When asked whether personalization was embedded in service provision, respondents agreed (average = 4.048), although the standard deviation was slightly higher (0.765). This indicates that although personalization is evident in the tourism industry of Dunhuang, the extent may vary depending on service providers or target market segments, highlighting opportunities for improvement in terms of consistency and inclusiveness.

The average score for projects related to stakeholder collaboration was 4.096, indicating that it is generally believed that cooperative relationships have been established among various stakeholders to enhance service design. The research results show that there is cooperation among local governments, private tourism operators and community actors, and they play a role in the development of services. However, the response also pointed out that there is still room for improvement in strengthening inter-organizational connections and coordinating planning.

The average score was 3.863, and respondents moderately agreed that the service design had been integrated into the marketing strategy of Dunhuang tourism. A lower score and a higher standard deviation (0.841) may indicate a gap between design-oriented service planning and its market communication or promotion. This field can benefit from improved information delivery strategies to better reflect the value proposition created through service design.

Finally, the respondents unanimously agreed that service design is conducive to the sustainable development of tourism in the region (average value = 4.178, standard deviation = 0.703). This further strengthens the role of service design in promoting long-term, environmentally friendly and socially inclusive tourism practices - especially in culturally and ecologically sensitive destinations like Dunhuang.

In conclusion, the research results of this section indicate that there is an overall positive view on the application of service design principles in the tourism industry of the Dunhuang area. The average score is 4.132, which indicates that service design is regarded as a key factor in enhancing tourism quality, customer experience and long-term sustainability. However, the low scores in areas such as marketing integration and continuous personalization highlight the need for enhanced coordination and capacity building among stakeholders. The insights gained can provide references for future policies and design strategies based on user needs, cultural authenticity and system collaboration.

4.4.2 Views on the Application of the concept of experience Economy in the tourism industry of Dunhuang

The analysis combines the experience economy theory of Pien and Gilmore (1999), emphasizing the transformation from service to experience and being consistent with sustainable development, such as: economic growth, environmental protection (tourist diversion), and sustainable development of cities and communities (people). Respondents were asked to use a five-point Likert scale to indicate their degree of agreement with various statements, where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. The results are shown in Table.

Table 12 Application of experience economy in Dunhuang Tourism Industry

Statement	N	Mean	Std. Deviation
Dunhuang tourism creates memorable experiences for visitors.	146	4.312	0.651
Tourists in Dunhuang are actively engaged in co-creating their travel experiences.	146	4.178	0.732
The tourism experience in Dunhuang emphasizes emotional engagement with visitors.	146	4.26	0.69
Service providers in Dunhuang focus on creating unique and immersive experiences for tourists.	146	4.247	0.682
The tourism sector in Dunhuang creates experiences that appeal to multiple senses (sight, sound, taste, etc.).	146	4.219	0.716
Experience economy theory has helped improve the quality of tourism in Dunhuang.	146	4.123	0.755
There is a strong focus on providing personalized experiences for each tourist in Dunhuang.	146	4.198	0.709
Aggregate Mean and Std. Deviation		4.219	0.705

The respondents strongly agreed that Dunhuang tourism has created an unforgettable experience for tourists (average value = 4.312, standard deviation = 0.651). This is the core principle of the experience economy theory: service providers must plan unforgettable activities for their clients. Enhance the contribution of tourism to the local economy through high-quality visitor participation.

The score for "Dunhuang Tourism Experience emphasizing emotional interaction with tourists" was the highest (4.260) highlighting that tourism experience goes beyond transactional services and can establish emotional connections with tourists. This emotional depth helps enhance brand loyalty and long-term tourism sustainability.

Another notable consensus is that "service providers in Dunhuang are focused on creating unique and immersive "experiences" (average = 4.247) indicating that they are strategically shifting towards providing experiences that can distinguish Dunhuang from other destination areas.

Youdaoplaceholder0 agreed that tourists are co-creators of their travel experiences (average = 4.178) which reflects a participatory tourism model that emphasizes interaction and user-generated value. This kind of participation represents a shift from passive consumption to active engagement, which is a hallmark of the experience economy.

Furthermore, the tourism industry's focus on multi-sensory engagement (average = 4.219) further confirms the overall design of the experience, including visual (art, desert), sound (music, local language), and taste (cuisine), which enriches the visit and stimulates repeat visits and recommendations.

However, the direct impact of the experience economy theory on quality improvement (average = 4.123) scored slightly lower, which might indicate that although experience-rich activities have emerged, the formal integration of this theory is still in the process of development. Similarly, the personalized experience (average value = 4.198) was highly evaluated, but it still needs further segmentation and customization.

The research results confirm that the tourism industry in Dunhuang has effectively applied the principles of the experience economy theory, especially in creating unforgettable, emotionally engaging, immersive and multi-sensory tourism

experiences. The average score of the data is 4.219, highlighting the successful transformation of the region from service provision to experience planning. Continuous improvement can focus on strengthening the theoretical foundation of employee training, product development and marketing strategies to further enhance the quality and sustainability of experience tourism.

4.4.3 Views on how the experience economy can effectively promote the sustainable development of tourism in Dunhuang

Sustainable development is the common development of people, the economy and society. The interests of one of them should not be compromised to achieve the other. Respondents were asked to use a five-point Likert scale to indicate their degree of agreement with various statements, where 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. The results are shown in Table.

Table 13 Application of experience economy effectively promote in Dunhuang Tourism Industry

Statement	N	Mean	Std. Deviation
The tourism experiences in Dunhuang promote environmental sustainability.	146	4.26	0.687
Experience-based tourism in Dunhuang provides long-term economic benefits to local communities.	146	4.288	0.658
The tourism experiences in Dunhuang foster cultural sustainability by promoting local traditions and heritage.	146	4.342	0.63
The design of tourist experiences in Dunhuang is mindful of minimizing negative environmental and social impacts.	146	4.198	0.722
Experience economy approaches in Dunhuang help achieve SDG goals related to economic growth and social inclusion.	146	4.212	0.701
The tourism industry in Dunhuang creates inclusive experiences that cater to diverse groups of people.	146	4.15	0.749

Statement	N	Mean	Std. Deviation
Experience economy practices in Dunhuang encourage sustainable consumption and production patterns.	146	4.178	0.735
Aggregate Mean and Std. Deviation		4.232	0.698

The research results show that respondents generally believe that applying the theory of experience economy to the tourism industry has significantly promoted the sustainable development of the Dunhuang area. The overall average score of all items was as high as 4.232. This has confirmed that stakeholders believe experience-based tourism is a positive force for achieving sustainable development

One key area of strength emphasized in the response is cultural sustainability, among which the statement "The tourism experience in Dunhuang promotes cultural sustainability by upholding local traditions and heritage" received the highest average score (4.342). This indicates that the tourism activities in this region have been meticulously planned, aiming to protect and promote the local identity, art, folk customs and religious history, especially around the Dunhuang Mogao Caves and the heritage of the Silk Road. By emphasizing local culture and heritage in experience design, tourism closely aligns with sustainable cities and communities, ensuring that development does not erode cultural assets but instead strengthens them.

Equally important is the view that experience-based tourism contributes to the long-term economic benefits of local communities, with a score as high as 4.288. This reflects the successful integration of local businesses, artisans and service providers into the tourism value chain. Through immersive and personalized experiences such as desert camping, cultural performances and handicraft workshops, residents can generate income, diversify employment opportunities and reduce their reliance on seasonal tourism.

In terms of environmental sustainability, respondents strongly agreed (average = 4.260) that the tourism experience in Dunhuang has promoted environmental protection practices. This indicates that tourism projects based on natural and cultural heritage are being implemented with environmental awareness, such as developing

more attractive activity sites to make it possible for tourists to travel during off-peak hours.

In conclusion, the data supports the conclusion that the tourism industry in Dunhuang has successfully applied the theory of experience economy to promote sustainable development. The region has made commendable progress in cultural protection, enhancing economic well-being, environmental protection and the transition towards inclusiveness. However, continuous efforts are still needed to further embed sustainable consumption practices and address the remaining gaps in inclusive tourism, so as to ensure that development is comprehensive, fair and resilient.

4.5 Service design practices aimed at enhancing the travel experience

In October 2024, a carefully planned on-site experience event was held in the Dunhuang area, open to people and tourists from all walks of life who are interested in the region's culture, art and rich experiences. This plan is not only aimed at determining whether the service design approach can provide higher experience value for participants, but also hopes to collect the opinions of astute individuals who can offer valuable insights. These opinions are helpful for the practical application of service design and experience economy theories in the tourism industry of Dunhuang.

4.5.1 Dunhuang Travel Time and Participant Information

The participants of this trip are not ordinary tourists. They have received higher education and have considerable disposable income, which makes them an ideal group for evaluating and influencing high-end cultural tourism products. These people have a profound understanding of art, culture and history, and many of them also possess relevant experience and professional knowledge in the tourism industry. This unique combination of backgrounds ensures that their observations and experiences are not only insightful but also can provide constructive suggestions for improving the tourism design and development strategies of the region.

Table 14 Participant information lists

Group 1					
Purpose	Through the method of service design, create a platform that enables customers to have more local characteristic experiences and can also drive local characteristic resources to participate together				
Participant infomation					
	Time	Education level	Preferences	Travel team	Nationality
Participant1	Oct	Doctor	Arts/Nature	Friends	Thai
Participant2	Oct	Doctor	Arts/Nature		Thai
Participant3	Oct	Doctor	Arts/Nature		Thai
Participant4	Oct	Master	Arts/Nature		China
Participant5	Oct	Master	Arts/Nature		China
Participant6	Oct	Bachelor	Arts/Nature		China

4.5.2 Collection of Participants' Travel Interests

In order to enable the participants to understand and choose the browsing locations they were interested in in advance, before this departure, the researchers first collected the hobbies of the cool practitioners and sorted out the scenic spots suitable for them to visit based on their hobbies and interests.

1. The interests expressed by the participants were diverse, but all centered around the unique cultural heritage of Dunhuang. The main themes include: Tourism focusing on Buddhist knowledge, especially visiting the Mogao Caves, is renowned for its ancient religious murals and architecture.

2. Explore the local pedestrian streets, such as Shazhou Night Market, and immerse yourself in the authentic local life and cuisine.

3. Understand the historical development of Dunhuang, from its role on the Silk Road to its modern revival.

4. Experience the beauty of the natural desert at scenic spots such as Mingsha Mountain, providing opportunities for visual enjoyment and sensory immersion.

Based on the background of the participants, the researchers designed a travel route for them, with cultural and artistic exploration as the main experience, and

understanding the most classic Mogao Caves as the main representative of the itinerary.

4.5.3 Dunhuang Travel Map

After the participants selected the projects, they were interested in for this trip, the researchers made a detailed travel map for this trip. We will follow the travel map below (figure) to complete this practical activity. The two-day itinerary of this practical activity includes very popular scenic spots in Dunhuang tourism. Participants can choose them by themselves, and the researchers will manage the time.

Table 15 Journey map

Date/T ime	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
D1	Breakfast	Mogao Cave&Mogao museum				Lun ch	Minsha monutain&camel riding				Dinner&shazhou night market			
D2	Breakfast	Dang river park&Dunhuang book store				Lun ch	Souvenir's store				Dinner&shazhou night market			

4.5.4 Travel practice

During the trip to Dunhuang, especially when exploring remote heritage sites such as the Mogao Caves, an important logistical detail emerged: the limited availability of nearby restaurants and catering facilities. This aspect of the journey is vividly captured in the photo. For instance, in the third picture, it can be seen that tourists are preparing a simple meal of their own outdoors. Portable food containers, bottled water, snacks and disposable tableware are scattered on the benches. This arrangement highlights the necessity for tourists to plan their meals in advance.

Given the cultural and ecological sensitivity of the main scenic spots in Dunhuang, many of them are located in remote deserts or mountainous areas. It is impractical and unsustainable to expect to establish extensive commercial infrastructure, such as restaurants, in these places or nearby. Therefore, it is

recommended that tourists bring their own food and drinks, especially when planning a long trip that may last for several hours.

In addition to convenience, carrying personal food supplies can also make the travel experience smoother and more flexible. It enables tourists to manage their time and energy by themselves, stay hydrated and avoid taking detours in search of food. This also contributes to sustainable tourism practices, reduces reliance on temporary vendors, minimizes waste, and maintains the tranquility of the cultural heritage environment. During the visit to Dunhuang, tourists often encounter few restaurants, so it is recommended to bring your own food supplies. This is an essential item that needs to be prepared in advance by travelers.



Figure 41 Participant made their own lunch

Therefore, from the perspective of practical and sustainable tourism, bringing your own food is not just a suggestion; it has become an indispensable preparation step. Travel organizers and tour guides should clearly convey this in advance and consider including planned meal times in the itinerary, which may be in the shady designated rest area as shown in the picture.

The picture shows a group of tourists standing at the entrance of one of the iconic grottoes in Dunhuang, which might be part of the Mogao Caves. These grottoes are UNESCO World Heritage Sites, carrying tremendous historical, religious and artistic significance, and were part of the ancient Silk Road. The architecture and exquisite carvings reflect the rich cultural heritage of the region. The tourists gathered

here pointed out the charm of Dunhuang as a cultural destination. However, the large flow of people also poses challenges to protection. Against this backdrop, sustainable development needs to strike a balance between access and protection, which may be achieved through managing visiting hours, digital Tours and educational signs. This also aligns with the concept of the "experience economy", with the focus on providing meaningful, memorable and educational experiences, rather than merely passively viewing cultural relics.



Figure 42 Tourists at the entrance to one of the iconic cave temples in Dunhuang

The second picture captures the scene of tourists climbing the narrow steps on the cliff to enter the cave temple. This scene profoundly reflects the challenges faced by such heritage sites in terms of physical design and accessibility. Although the original buildings must be protected, modern safety and accessibility standards must also be met. From the perspective of service design, this highlights the necessity of providing guided tour assistance, safety briefings, routes suitable for age and people with mobility issues, and even possibly digital enhancements for those who cannot enter the cave in person. The queuing situation and interest of tourists also indicate a strong demand for interactivity and immersive cultural experiences, demonstrating how reasonable visitor flow planning and information services can both enhance satisfaction and prevent the degradation of heritage sites.

The third and fourth pictures show tourists preparing their own meals outdoors, reflecting a key gap in service provision. In the Dunhuang area, especially near the grotto clusters, there is a lack of sufficient restaurants or catering facilities, making self-service dining an important part of the tourist experience. From the perspective of service design, this is both a problem and an opportunity. On the one hand, the lack of food service may reduce the quality of the experience, especially for older travelers or international tourists who are not familiar with local arrangements. On the other hand, this gap also provides a clear opportunity for sustainable and locally integrated service innovation - such as mobile food vendors, picnic areas offering traditional Dunhuang cuisine, or collaborating with local farmers to provide boxed meals. Integrating these elements into tourist packages can enhance the overall experience while supporting local livelihoods.



Figure 43 Tourists climbing a narrow stairway carved into the cliff to access the cave temples

Figure a vital part of the Dunhuang cultural tourism experience—a guided tour through the renowned Mogao Caves, one of the most significant sites of Buddhist art and architecture along the ancient Silk Road. This scenic area houses hundreds of grottoes carved into desert cliffs, filled with intricate murals, sculptures, and inscriptions dating back over a thousand years. Touring this site offers a unique opportunity to witness firsthand the artistic legacy and religious devotion of past civilizations. For foreign visitors, having dedicated guides is especially crucial, as it

ensures that language barriers do not limit the depth of understanding or appreciation of the site's historical and spiritual significance.



Figure 44 Tourists at the entrance to one of the iconic cave temples in Dunhuang

The tour guide service specifically designed for international tourists is a well-considered element in the service design, aiming to promote inclusiveness and enhance the experience. These tour guides not only translate languages but also act as cultural intermediaries - interpreting symbols, telling traditional stories and background meanings that might be overlooked. Their presence significantly enhances the overall accessibility of the scenic spot, helping visitors from diverse backgrounds to connect with the complex totems and multi-layered stories within the cave. This personalized service enhances the emotional and educational value of the visit, making it an unforgettable and fulfilling journey through Chinese historical sites.

From the perspectives of the experience economy and sustainable development, this approach demonstrates how heritage tourism can be significantly enhanced through cultural sensitivity and user-centered service design. Providing high-quality, guided Tours for foreign tourists can promote deeper participation, foster cultural respect, and support responsible tourism behavior. In addition, by investing in multilingual professional staff, the Mogao Caves Scenic Area has created meaningful job opportunities for local experts, thereby promoting local economic

development and ensuring the sustainable protection and sharing of Dunhuang's invaluable cultural resources.



Figure 45 Experience the stunning Gobi landscape at Mingsha Mountain, challenge your limits, and enjoy a camel ride adventure

The picture highlights an iconic and exciting part of the Dunhuang travel experience - visiting the breathtaking Mingsha Mountain and exploring the vast Gobi Desert landscape. This scene is renowned for its golden sand dunes and magnificent scenery, creating an captivating natural backdrop that stirs up boundless imagination among visitors. Walking or cycling through this environment allows tourists to resonate with the original beauty and ancient mystery of the Silk Road. This is not only a visual feast but also a rich sensory experience. The hot climate, the texture of the sand and the scale of the sand dunes have left a deep impression on those who venture deep into the desert.

One of the highlights of this event is the camel riding adventure. Camel rides through the sand dunes are not only a form of leisure and entertainment - they are also symbolic trips that echo the ancient routes of merchants and pilgrims who once passed through Dunhuang. Participants are invited to challenge their physical limits, traverse undulating terrain and endure harsh weather conditions, which brings a gentle yet unforgettable adventure experience. This physical investment, the intersection of physical strength and emotional stimulation, elevates the experience from passive observation to active participation, making it a powerful tool in the experience economy.

From the perspectives of service design and sustainable tourism, experiences like this can be optimized to ensure they are both influential and responsible. Although camel rides and desert Tours offer high experience value, attention must be paid to animal welfare, environmental protection and cultural sensitivity. Integrating guided Tours, safety protocols, and educational stories about the region's ecology and history can enhance the experience while promoting respect and sustainable behavior among tourists. Ultimately, this data reflects how carefully planned immersive adventure tourism can establish a deep emotional connection between tourists and the local area, support the local economy and long-term conservation goals.



Figure 46 The Shazhou Night Market and its snacks

The picture shows the bustling atmosphere of the Dunhuang Shazhou Night Market, which is an important cultural and social hotspot for both locals and tourists. This market is a richly sensory environment, with colorful stalls, steaming hot street snacks wafting through the air, and lively conversations. As the core node of Dunhuang's tourism industry, night markets not only provide space for economic exchanges but also play a crucial role in shaping tourists' cultural impression of the region. The variety of snacks offered is extensive, ranging from grilled lamb kebabs to hand-pulled noodles and traditional desserts. These delicacies closely connect Dunhuang with the heritage of the Silk Road. For centuries, flavors and cooking techniques from various parts of Central Asia have converged and merged here.

Night markets also reflect the interaction between authenticity and accessibility. Many dishes retain traditional cooking methods and local ingredients, but more and more efforts are being made to adapt to the preferences and dietary

restrictions of international tourists. However, challenges still exist, especially in terms of communication. Many food vendors say they have difficulty explaining their dishes to foreign tourists because tourists usually rely on visual cues to decide what to eat. Without translated menus or detailed descriptions, tourists may avoid unfamiliar foods or miss culturally significant dishes. This not only affects the tourist experience but also limits the opportunities for deeper cultural exchange through food.

From the perspectives of the experience economy and sustainable tourism, the Shazhou Night Market represents a high-value experience asset. Food here is not merely something to satisfy hunger; it has become an interactive cultural product that can create unforgettable moments and emotional resonances. To enhance this potential, service design strategies can include implementing multilingual signage, interactive food maps, and even offering guided tasting Tours to promote understanding and participation. These improvements will enable tourists to establish a deeper connection with the local culinary heritage while providing financial support to small businesses. By doing so, the market can develop into a more inclusive, educational and sustainable tourism experience, continuing to celebrate and protect Dunhuang's unique identity.

4.5.5 Discussion

During the process of the itinerary practice, we also held focused group discussions. Figure shows the process, structure and dynamics of the interviews and exchanges with local stakeholders in the Dunhuang area. Aimed at obtaining practical information and personal insights. This approach enables respondents, such as restaurant owners, shopkeepers and tour guides, to speak candidly about their experiences, challenges and expectations in the local tourism industry. Meanwhile, researchers can also observe non-verbal signals, emotional responses, and the interpersonal context in which these conversations occur.



Figure 47 During the trip, group discussions were held on service experience issues and highlights, as well as the needs of travelers

A key link in the communication process is to overcome language and cultural barriers. Often, interpreters or translation tools are needed to promote mutual understanding, especially when interviewing practitioners with limited foreign language proficiency. This step is not only crucial for accuracy, but also helps build trust and encourages deeper thinking. In some interviews, visual AIDS and practical cases (such as displaying specific souvenirs or menu items) were used to root the discussion in concrete and relevant contexts. These communication strategies are particularly necessary for extracting insights into local needs, especially those related to language support, cultural storytelling and service innovation.

From the perspectives of service design and the experience economy, the interview and communication process itself has become a kind of co-creation behavior. By allowing practitioners to directly participate in research, they can express their needs and propose potential solutions.

The participants of this trip believed that they were deeply impressed by the travel experience in Dunhuang and that the entire itinerary was arranged from the perspective of tourists. However, they were not familiar with many of the local features, which might not be related to their usual interests and hobbies. But they were also very eager to join in and experience them. It is suggested that in the practice of the next trip, options be provided first. Let them first have a comprehensive understanding of the travel information of Dunhuang.

In addition, this trip was an off-peak one, right at the beginning of the off-season. They had a great experience with the fact that there weren't many people, and they could also feel the cooler weather.

The picture records an important moment during the research process, capturing face to face visits and direct interactions with local practitioners, specifically the owner of a tourism specialty store in Dunhuang. This exchange provided valuable insights and revealed the real living conditions of small and medium-sized business operators in the tourism industry. The owner of the specialty store shared his views on customer behavior, product preferences, and the challenges faced in catering to a diverse international customer base. This kind of fieldwork is crucial for rooting theoretical research in practical experience and can reveal subtle understandings that are usually difficult to obtain from broader datasets or secondary materials.



Figure 48 Visit to local practitioners and interview with the owner of a tourist specialty shop

In the interview, a recurring theme emerged: the difficulty of effectively conveying the cultural value and story behind the souvenirs being sold. The shopkeeper explained that many products, such as handicrafts, local artworks and regional specialty goods - are deeply rooted in the cultural heritage of Dunhuang. However, due to limited language support and a lack of explanatory materials, international tourists often regard these items as ordinary rather than meaningful things. This leads to a transactional experience rather than a transformative one, thereby weakening the potential for an emotional or educational connection between tourists and the destination. The shop owner expressed interest in finding solutions

that could help convey the story behind each item, such as multilingual signs, QR codes linking to storytelling videos, or short cultural explanations provided by trained locals.

From the perspectives of service design and the experience economy, it enables tourists to be more deeply involved in the local culture. As a touchpoint during a tourist's journey, a specialty store is not only a retail space but also a platform for cultural exchange and experiential learning. Service design that enriches understanding through storytelling and sensory interaction can not only enhance the visitor experience but also increase the perceived value of the product. For sustainable development, these intervention measures support the local economy by promoting the sale of genuine cultural goods and empower local artisans and business owners to thrive in the highly competitive global tourism market.

At the end of this practice, the researchers asked the participants who had participated in each stage of this practice the questions they had collected previously. Including tourists and providers of travel resources, they believe that the areas marked with red dots were significantly touched upon and solved in this practice, but half of the problems still have not been effectively touched upon in this practice.

Table 16 The red dots represent the problems that have been effectively solved in practice

Stakeholder problems 2.0																		
				Hotel	Local Residence	Scenic spot staff	Dining room	Local villagers	Local Tour guide	Driver		Local artist	Communities inside Dunhuang	Local tourism workers	Chinese tourist	Foreign tourist	Artists and researchers	Travel agency
Problems																		
The number of tourists is large				●	●	●	●	●	●	●				●	●	●		●
Imbalance between peak and off-peak seasons				●	●	●	●		●	●	●	●	●	●				●
The tourism industry is monotonous								●	●	●	●	●	●	●	●	●	●	●
Few experiential activities									●	●	●	●	●	●	●	●	●	●
Translation and language communication				●	●	●	●	●	●	●	●	●	●	●		●	●	●

4.5.6 Analysis of Discussion Results

Table 17 Analysis of the group discussion results (SWOT)

S	1.The travel time is in October, which is approaching the end of the peak season. It is relatively easy to book local tour guides and vehicles. Through the journey, we also learned that they do have more time. Even local restaurants or souvenir shops have had the opportunity to have in-depth communication with us and introduce more local culture and customs to the tourists. 2. Hotel prices are gradually decreasing, making travel more cost-effective. 3. With a translator accompanying throughout the journey, foreign tourists can have a deeper understanding of the local culture. 4. The natural scenery is even better, even surpassing that of scenic spots. 5. I hope to learn about the travel destination before traveling.	1.There are quite a lot of people at the scenic spot, and the experience is not good. 2. Failed to gain a deeper understanding of the local culture and other fields. 3. Want to know about the local people's lives. 4. Besides the night markets with many tourists, I also want to experience the restaurants frequented by locals. 5. The weather is getting colder and colder, and the challenges are huge.	W
	1.The changeable climate is suitable for travelers with different challenges. 2. Local specialties are added to offer guests more choices	1.The local people have a low level of English proficiency. 2. The main attractions in Thailand are the large number of people, and the pressure on the	

O	3. Collaborate with local tourism resources to jointly develop creative routes.	attractions is high 3. Local people and communities have failed to better participate in the development of tourism in Dunhuang	T
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Summary: Based on SWOT, overall, Dunhuang has significant advantages at the peak and off-peak season (October): it is easier to book tour guides and transportation, hotel prices are lower, and businesses have more time for deeper cultural exchanges. If equipped with a translator or multilingual tour guide, the depth of understanding of foreign tourists will be significantly enhanced, and the natural landscape experience will be excellent.

However, the current pain points are as follows: the core scenic spots are highly crowded, cultural understanding remains superficial, there is a lack of channels to immerse in local life, dining experiences are overly concentrated in night markets, and the cold winter brings inconvenience to both physical sensations and travel.

The opportunities mainly lie in: making use of seasonal differences to create stratified products (with both challenging and easy types coexisting), enriching local characteristic projects and supplies, and jointly creating creative routes with local resources to achieve diversion.

Threats and constraints include: weak English services, high pressure on top scenic spots, and insufficient community participation.

Based on this, the priority directions should be: productizing the shoulder season (with off-peak hours and price advantages), establishing a multilingual information and tour guide layer, embedding local dining/community experiences into the itinerary to enhance "participation, understanding, and memory", and dispersing the flow of tourists and reducing the pressure on the core area through creative routes co-created with the community.

4.5.7 Conclusion of the First Practice of WTE model

Based on this practice, we have proposed a service design model centered on "WTE = Who+Time+Experience" : first, clarify "Who will come" (Who), then

accurately determine "when will come" (Time), and finally make "how will Experience" (Experience) specific and verify iterations. The specific approach is to clarify key information such as their motivation preferences (art/humanities/history/nature), language and budget, physical strength and companion structure through inquiry. Then, based on the tourists' interests and hobbies, the initial corresponding tourist attractions are selected and customized to provide to the tourists, making time plans for their travel maps. In this way, WTE solidifies the logic of "starting from people, determining boundaries by time, and arranging around experiences" into a replicable workflow, which can not only provide appropriate content according to the differences among different groups of people, It can also avoid visiting scenic spots that do not match one's interests during the trip, thus avoiding the waste of time cost.

However, during the group discussion of the trip, it was found that although the practitioners provided their own interests and hobbies, they were also very eager to know what other local scenic spots or experiences they could participate in and discover? Therefore, they believe that this link needs to be optimized. Not all tourists only do things related to their interests. Maybe new experiences have given them new interests, and their new choices might enable another industry related to the locals to join in.

The local souvenir shops and tour operators who came into contact with this time believed that the most difficult issue was language communication. However, in the group we practiced, since we had interpreters in advance, this problem was not highlighted.

In conclusion, this practice can indeed help tourists choose the best travel mode to a certain extent during their journey. However, in terms of providing a better experience and discovering unknown adventures, it still falls short, especially in terms of interaction with local people and resource allocation, which appears weak. Therefore, there is still room for improvement in this model.

4.5.8 A second practical trip to Dunhuang

Based on the gains and shortcomings of the previous round of WTE model, the next practice will be initiated with the goal of "better discovery, deeper interaction,

and easier communication". Based on the principle of "starting from people, determining by time, and arranging around experience", we have added two key modules: The first one is Exploration and Discovery. While customizing the main itinerary for each visitor, it also includes optional "discovery periods" and "local proposal lists". Local residents, store owners and creators jointly provide small activities and micro-routes that can be participated in (such as handicraft experiences, desert starry sky, artist workshops, Dunhuang Bookstore, etc.). Encourage tourists to try new experiences that are "beyond their interest labels" under the premise of safety and time control. The second is the multilingual information Layer (Language Layer) - standardizing the communication advantages that previously relied on interpreters into reusable multilingual materials and concise guidelines (travel manuals, including features that need to be highlighted), and providing printed or online document carriers at key touchpoints to lower the language threshold.

4.5.9 Time and Participant Information

To better compare the differences between the two experiences and optimize the results, the researchers invited the same group of practitioners who participated in the first practice to join the pilot program of the Dunhuang travel research again in February 2025.

Table 18 Participant information

Group 2					
Purpose	Through the method of service design, create a platform that enables customers to have more local characteristic experiences and can also drive local characteristic resources to participate together				
Participant information					
	Time	Education level	Preferences	Travel team	Nationality
Participant1	Feb	Doctor	Arts/Nature	Friends	Thai
Participant2	Feb	Doctor	Arts/Nature		Thai
Participant3	Feb	Doctor	Arts/Nature		Thai
Participant4	Feb	Master	Arts/Nature		China
Participant5	Feb	Master	Arts/Nature		China
Participant6	Feb	Bachelor	Arts/Nature		China

4.5.10 Highlights of Dunhuang Travel in the current season

Based on the experience from the previous practice, this time we will first offer participants the highlights and options of the current season's travel. These highlights include both cultural and historical landscapes as well as local artist workshops. Participants will directly choose local tourism products instead of being screened based on their interests and hobbies. In this way, Tourism resource providers can filter out outdated tourism products for tourists, and tourists themselves can make direct choices. The results are more direct, and tourists can also come into contact with more activities beyond their own understanding.

Table 19 highlight in Dunhuang of February

Attraction Name	Category	Location	Key Features Description				
Mogao Caves	UNESCO World Heritage	25km SE of Dunhuang	Also known as "Caves of a Thousand Buddhas," featuring 735 caves, 45,000 m ² of murals, and 2,415 painted clay sculptures. Showcases Buddhist art from the 4th-14th centuries, with Tang Dynasty murals being the most exquisite. The Library Cave yielded over 50,000 ancient manuscripts.				
Minsha mountain	Natural Wonder	5km S of Dunhuang	A rare desert phenomenon where sand dunes produce singing sounds when wind blows. The crescent-shaped spring has never dried for millennia. Activities include camel riding, sandboarding, and sunset viewing. Adjacent to ancient Leiyin Temple.				
Yangguan Pass	Historical Site	70km SW of Dunhuang	A vital Silk Road frontier pass ("Beyond Yangguan, no old friends remain" - Tang poetry). Preserves				

Attraction Name	Category	Location	Key Features Description				
			beacon towers, museum exhibits, and ancient road ruins. Offers cultural experiences like replica passport stamps.				
Yumen Pass	Historical Site	90km NW of Dunhuang	Han Dynasty strategic frontier ("No spring breeze crosses Yumen Pass" - Tang poem). Features remain of square fortress, Han Great Wall sections, and granary ruins in the Gobi Desert.				
Yardang Geological Park	Natural Landscape	180km NW of Dunhuang	Known as "Devil City," displaying spectacular wind-eroded landforms resembling fleets, peacocks, and sphinxes. Divided into North Section (standard tour) and South Section (4WD adventure). Best viewed at sunset.				
Dunhuang Ancient City	Film & Culture	20km SW of Dunhuang	A 1987-built Song Dynasty-style replica for movie "Dunhuang." Recreates ancient streets, yamen offices, and taverns. Now a film set offering costume photography and archery experiences.				
Western Thousand Buddha Caves	Grotto Art	35km SW of Dunhuang	Northern Wei-Tang period caves carved along Danghe River cliffs. 22 surviving caves contain murals stylistically linked to Mogao, featuring delicate donor portraits and narrative paintings.				
Dunhuang Museum	Cultural Institution	Dunhuang City Center	Houses 13,000+ artifacts showcasing 6,000 years of regional history. Highlights include Han bamboo slips,				

Attraction Name	Category	Location	Key Features Description				
			silk textiles, Mogao relics, and replicated Library Cave documents. Features a full-scale replica of Cave 45.				
Shazhou Night Market	Folk Experience	Dunhuang Downtown	Largest night market with food stalls (try donkey meat noodles, apricot juice, lamb skewers), handicraft zones (luminous cups, painted sculptures, silk scarves), and local product sections.				
Mogao Artists Village (Duyongwei museum)	Cultural Experience/Art Village	Southeastern suburbs of Dunhuang (near Mogao Caves)	A hub for Dunhuang art preservation, featuring traditional crafts like clay sculpture, mural replication, and painting. Visitors can join workshops (e.g., mineral pigment making, mural sketching) and meet inheritors of intangible cultural heritage. The architecture blends Dunhuang earthen aesthetics with modern design, hosting regular art exhibitions and lectures.				

4.5.11 Dunhuang Journey Map

Table 20 2nd Journey map

Date/ Time	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
D1	Breakfast	Dunyongwei Museum&painting experience				Lunch	Dunhuang Ancient City				booking local dinner			
D2	Breakfast	Yardang Geological Park				Lunch	Yumen pass				booking local dinner			
D3	Breakfast	yue yaquan village				Lunch	Dunhuang Museum				booking local dinner			

This time, although it was the same group of guests, they found themselves visiting more travel destinations that interested them. Surprisingly, without any intervention, their itinerary was extended by one day through self-guided choices compared to the original plan. This additional day not only covered local artist workshops but also extended to national geological parks in more distant areas. Even the villages where local people live are their choices. Moreover, this trip did not cover the originally popular scenic spots in the Dunhuang area. Therefore, it can be indicated that, on the premise of providing tourists with more effective information, they are interested in participating in travel activities outside the popular scenic spots. Such behavior can effectively relieve the pressure on popular scenic spots and increase the sense of participation in other local scenic spots. Longer time spent in the local area has, in an intangible way, created more economic income. It is also worth noting that this traveler is more willing to try local cuisine. Therefore, apart from the popular Shazhou Night Market, other local restaurants are included in the itinerary planning.

During my second practical visit to the Du Yongwei Art Museum, I listened to Professor Du Yongwei's introduction and also participated in his pigment workshop. Experience the local specialties.



Figure 49 Mineral Pigment practice



Figure 50 Professor Du Yongwei explained the history and development of Dunhuang City to the participants

We also went to the Yueyaquan Village and learned about the living conditions of the local people.



Figure 51 Take a leisurely walk-through yuya quan Village, observe camel breeding, and get a firsthand experience of local life

4.5.12 Group discussion of participants

Participants unanimously agreed that this round of the itinerary was significantly richer and more three-dimensional than the previous one: After obtaining more comprehensive information and a clear basic itinerary, everyone voluntarily extended the itinerary by one day without external intervention and proactively expanded the itinerary to non-"popular scenic spots" such as local artist workshops, national geological parks, and local villages. At the same time, the Du Yongwei Art Museum (including the pigment workshop) and the Dunhuang Museum will be included in the route to make the chain of "seeing, learning and doing" more complete. Group members emphasized that information accessibility is a key variable that triggers autonomous exploration: when there are understandable, comparable and

actionable local options, even if the original interest points to the core attractions, there will still be an urge to "go and see something else". Another consensus is the localization of dining choices: in addition to the Shazhou Night Market, more local restaurants have been included. This not only enhances the freshness of the flavors but also significantly increases the opportunities for communication with the store owners. Regarding the experience and feelings, the participants generally mentioned three points: First, the dimensions of urban culture and contemporary art have been filled in, and the understanding of Dunhuang is no longer limited to "murals and deserts"; Second, completing activities (such as workshops and walks) together with local people can deepen the "memory points". Thirdly, in Spaces outside popular scenic spots, one feels more at ease, has more freedom in taking photos and staying, and has a more stable emotional curve. Some members also reminded of two points that need attention: First, the traffic and time management at remote points should be more explicit (such as assembly points and return times); second, there is still room for improvement in basic English prompts (menus, instructions, precautions, etc.). It is also worth mentioning that the improvement from this practice has made them more interested in sharing with friends, as they believe they have explored travel destinations that are hard to find on the Internet. What is more worthy of attention is that among the problems listed in the early stage, both the participants and the providers of tourism products believed that the problems listed in the second practice could basically be solved. However, a small number of problems still remained. These problems were all due to the excessive number of tourists in the tourism industry of Dunhuang. This is an objective fact and also a region that relies on tourism for survival. An unchangeable fact.

Table 21 The blue dots represent the problems that were effectively solved in the second practice

Stakeholder problems 3.0														
	Hotel	Local Residence	Scenic spot staff	Dining room	Local villagers	Local Tour guide	Driver	Local artist	Communities	Local tourism	Chinese tourist	Foreign tourist	Artists and	Travel agency
Problems														
The number of tourist is large	●	●	●	●	●	●	●			●	●	●		●
Imbalance between peak and off-peak seasons	●	●	●	●		●	●	●	●	●				●
The tourism industry is monotonous					●	●	●	●	●	●	●	●	●	●
Few experiential activities						●	●	●	●	●	●	●	●	●
Translation and language communication	●	●	●	●	●	●	●	●	●	●		●	●	●

4.5.13 Second Practice and WTOCI Model

Based on the first round of WTE workflow, this study followed the service design closed loop of "research, co-creation, prototype, practice, and review", and upgraded to form the WTOCI (Who, Time, Orientation, Coordinate, Iteration) model. It's Who and Time layers continue to serve as the base, respectively completing the pre-calibration of tourist segmentation and seasonal/carrying constraints. The newly added Orientation layer enhances discoverability through "exploration periods plus local proposal lists", enabling visitors to go beyond their original interests and proactively access non-core and more local content under safe and controllable conditions. The Coordinate layer will manage and coordinate local tourism resources, including contacting local artists, local tour guides, etc., to enable local tourism resources to collaboratively create tourism products that serve tourists' ideas. Iteration refers to the fact that in the newly upgraded process, customers have more interests willing to share. These interests will not only influence future tourism participants and local tourism product providers, but also become well-known to the public as a result, thus achieving updates. Compared with WTE, WTOCI achieves growth in three aspects: First, it enhances tourists' independent exploration and promotes the dispersion from crowded hotspots to multiple points; Second, increase the diversity and experience of travel through cross-subject collaboration; Third, achieve continuous optimization through data-driven means, thereby simultaneously enhancing the depth of experience, expanding community participation and benefit coverage under the constraints of heritage protection.

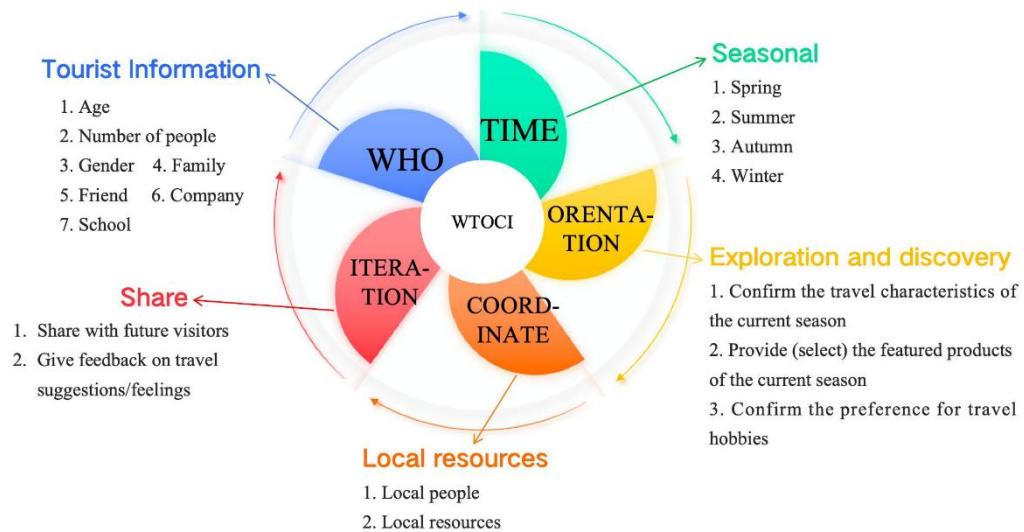


Figure 52 WTOCI

4.5.14 Co-creation and Model Suggestions

From the perspective of the participants, the implementation of this model can basically provide them with a better process for arranging their trips. However, the tourism industry is not a single entity, so the model also needs to be recognized by practitioners in the tourism industry. Therefore, at this step, researchers will conduct simulation tests with relevant practitioners in the tourism industry through derivation and in-depth discussion. This simulation test was participated in by local tour guides in Dunhuang. The specific approach was that the tour guides, based on whether the providers and coordinators of tourism products could clearly understand the operation mode of this model and whether it could be helpful for them to solve customer demands. All three tour guides who participated in the in-depth discussion agreed that this model is more focused on the perspective of tourists. However, from the perspective of front-line practitioners, WTOCI still centers on tourists at the implementation level but is not detailed enough on the supply side. The main deficiencies are concentrated in the following aspects:

(1) Insufficient detail of Orientation: Only "Seasonal orientation" and "exploration list" are proposed, but there is a lack of standardized product libraries

corresponding to seasonal customer groups, which may make it difficult for tour guides to quickly assemble itineraries based on this.

(2) Coordinate lacks clear indication: The linkage classification for different seasons is not directly provided;

(3) The information and language layers are not standardized: Multilingual materials, action introductions, scenic spot introductions, menus and allergy tips, and there is no unified multilingual introduction for popular scenic spots. It still relies on individual interpretation and on-the-spot performance, making it difficult to replicate on a large scale and causing great translation pressure.

(4) Insufficient replicability of the model: The lack of operation manuals and model usage guidelines makes it difficult for other similar scenic spots to follow and use them.

(5) How can the platform establishment in the Iteration stage better integrate all information in the same place that can be seen by both tourists and suppliers? It can achieve direct information communication between customers and operators, so as to achieve information updates and sustainable development.

In conclusion, WTOCI can enhance the willingness to formulate and explore with a "people-oriented" approach. However, for it to be stably adopted by tour guides and suppliers, the five key elements of "productization of the current season, classification, information standards, collaborative indicators, and user guidelines" still need to be specified.

4.6 DESM Model

Based on the above group discussions and feedback from front-line tour guides, it can be seen that although WTOCI has effectively enhanced the willingness to plan and explore "people-oriented" itineraries, it still lags behind in terms of the executability of the supply side and the long-term operation at the destination level. In response to the remaining issues such as insufficient productization of the current season, unclear interaction between seasons and customer groups, lack of standardization of multilingual information, difficulty in model replication, and lack of a public platform for iteration, researchers, based on WTOCI, created through

direct communication and collaboration with local tour guides. And construct DESM (Dunhuang Experience Sustainable Model).

DESM is a closed-loop model that combines the service design process with the experience economy: First, set boundaries with "time and season" and carrying capacity. Then, complete targeted matching by "providing a product list first and then allowing tourists to choose on their own". Through local collaboration, break down the list into executable intervals. Finally, form a continuous iteration from sharing to repeat visits to reuse, thereby alleviating the pressure of peak seasons, enriching supply, enhancing cultural understanding, and keeping the benefits within the community.

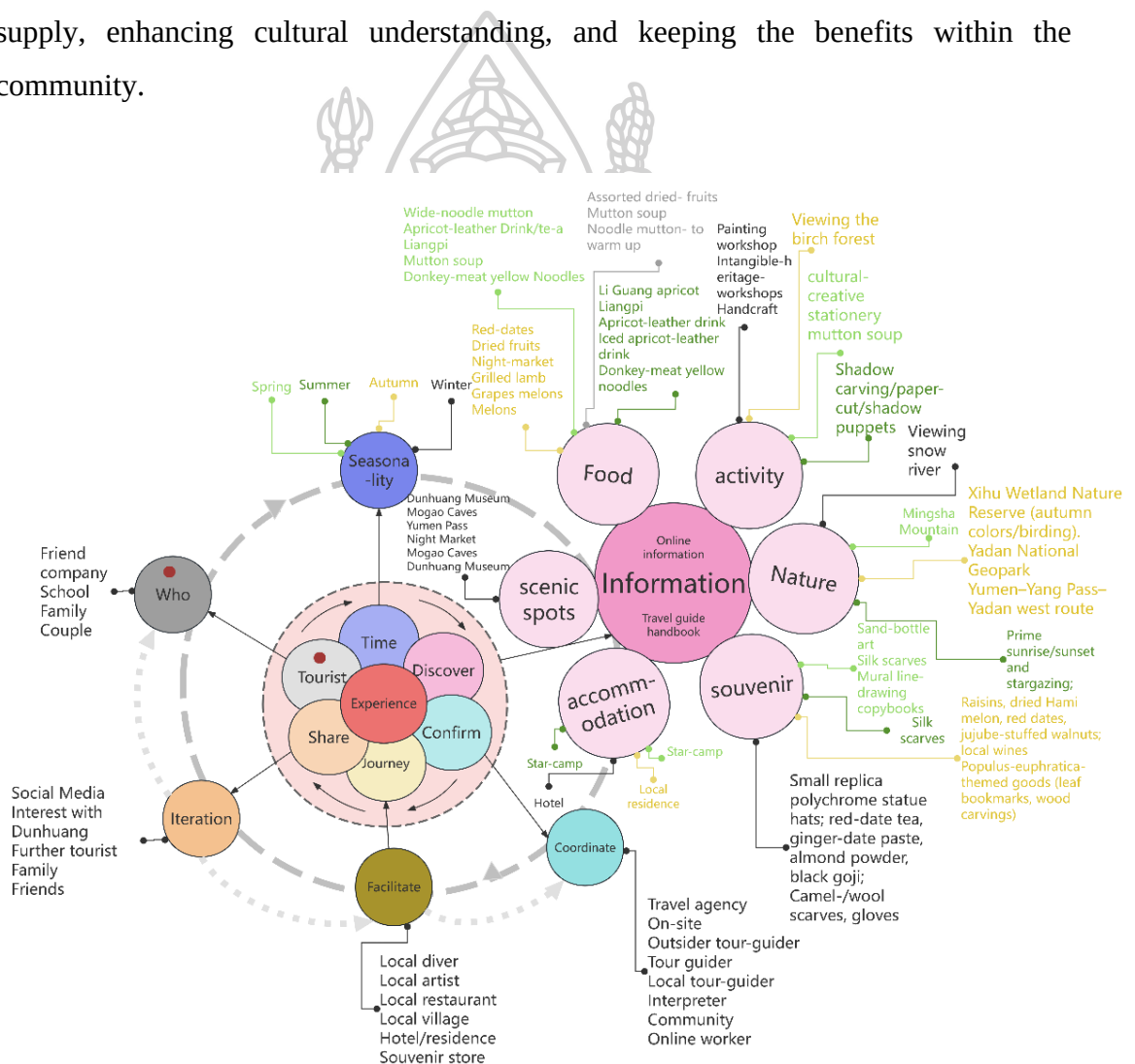


Figure 53 Dunhuang Experience Sustainable Model (DESM)

4.6.1 Development of DESM Model

Based on the first-round model (WTE), a closed-loop framework was studied and formed with Who, Time, Orientation, Coordinate, and Iteration (WTOCI) as the backbone: starting from the tourist profile, it enters the time/season and carrying constraints; In the targeting stage, a "seasonal candidate product list" is generated. Subsequently, through collaboration, the list is matched with local people/resources to form an executable itinerary, and finally enters the iterative sharing and reuse stage. After the second round of practice and questionnaire test, the framework was regarded by the participants as "more interesting, more practical, and enhanced the willingness to visit again".

The core process of this model is WTOCI (Who, Time, Orientation, Coordinate, Iteration).

Who (Tourist Profile, to identify the type of companions (family/ couple/ school/ companion/ etc.), this positioning enables service providers to clearly understand the attributes of customers, including the type of hotel and so on. Time (Time/Season) confirms the travel time, and then screens suitable products based on the seasonal window and carrying threshold, giving priority to achieving "enhancing charm in the off-season and diverting traffic in the peak season".

The key improvement of Orientation (Directional Discovery) is "providing a product list first and then allowing visitors to choose by themselves", rather than forcibly grouping based on interests in advance (practical operation has proved that the latter is not accurate).

Coordinate, Connect the list with local people/resources (guides, catering, transportation, artisans, community venues, etc.) to generate an executable service blueprint/Journey Map.

Iteration, Collect experience feedback, generate sharing and revisit incentives, and solidify the "effective path" into a template to enter the next round.

Based on the core process of WTOCI, it has been proven in the second practice to effectively solve the problems faced by tourists and tourism providers. However, in terms of details, it still fails to meet the derivation requirements of relevant

stakeholders. Therefore, after seemingly co-creation and discussion, it is believed that the DESM model is more optimized.

4.6.2. Introduction to the DESM Model

The picture is divided into three layers of meaning around the central "experience" petal:

Central six-petal (corresponding to the key movement of WTOCI)

1. Tourist/Who: Starting point.
2. Time (Time/Season) : Set the time first and then the product.
3. Discover/Orientation (Discover/Orientation) : Display seasonal product lists, and visitors make their first round of self-selection.
4. Confirm: Complete information confirmation and communication using a multilingual travel guide and keyword/cultural reminders
5. Journey: Connect and execute the touchpoints using the Journey Map.
6. Share /Iteration: Form a cycle of word-of-mouth and return visit incentives.

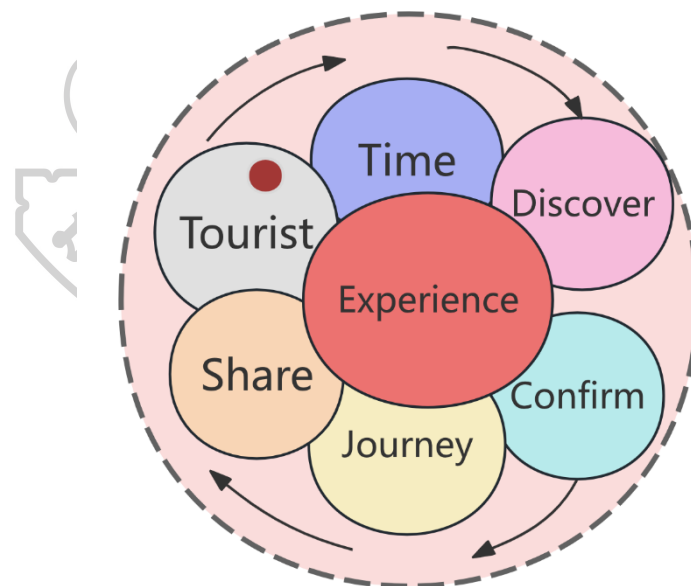


Figure 54 Central six-petal of DESM model

7. Green Information (Information Pool) on the right
8. Break down food, handicrafts, nature, humanistic/Buddhist art, community

activities, etc. into "experience chunks" (SKUs) for the Orientation stage to combine into plans for different seasons and different groups of people.

9. The top color Seasonality (Four seasons). Emphasize "highlights in every season": For instance, make "Winter extreme climate challenges, star camps" and the like the main attractions during the off-season to facilitate time diversion.

10. Blue Coordinate at the bottom right

The back-end processes such as online/offline organization, translation, transportation, guidance, catering and procurement ensure the implementation of "from list to itinerary".

11. The yellow below "Facilitate"

Local restaurants, artisans, villages, souvenir shops, etc. become touchpoint collections; The Chinese-English manuals, thematic maps and sustainable materials produced in the research serve both as communication media and touchpoints for green behaviors.

12. Golden Iteration (Iterative Propagation) on the left

Social media, word-of-mouth, and friend recommendations - spread, replicate, and optimize the experience again to move on to the next round.

13. The outermost dotted line is Sustainable (sustainable outer ring)

It represents a cycle within the boundary of "protection and sharing" : alleviating the pressure on core sites and enhancing local participation through seasonal diversion + multi-point supply + community benefits.

4.6.3 DESM Usage Instructions

4.6.3.1 Tourist Perspective

For first-time or repeat visitors, they can follow the steps below to plan their own high-experience-value itineraries.

1. Preparation stage (Who/Time): Determine the participants and the relationships among them.

2. Determine the time and boundary: Select the season and specific date to facilitate the confirmation of the highlights of the itinerary at the destination in that season.

3. Selection Stage (Information): Based on the previous target audience and seasonal positioning, at this stage, you can directly select the travel highlights corresponding to different seasons listed in the model, which is efficient and convenient.

4. Booking stage (Coordinate): After participants have selected the required travel experience products, they can get in touch with local resource providers through online, travel agency, offline connection, phone contact, or coordination by interpreters to arrange the journey map of the travel products.

5. Experience Stage: When tourists arrive at the travel destination, they can experience their travel plans one by one according to the pre-prepared journey map. In this stage, if tourists arrange their own itinerary, they can contact the tourism product suppliers they have previously contacted by themselves. This mode of travel requires tourists to have the ability to plan and arrange very meticulously. If the reservation is made through a travel agent or a tour guide, this step won't require much attention. The tour guide and the travel agent will arrange the travel time reasonably for the tourists.

6. Sharing Stage (Integration): A good travel experience, a journey that conforms to the seasonal setting and the tourists' ideas, will be shared by more people. During this stage, both tourists and tourism product suppliers will gain experience and feedback during this journey. These experiences and feedback will provide experience value for future tourists who want to travel.

4.6.3.2 Perspective of Travel Providers

For travel providers, they can follow these steps to offer more valuable and targeted travel services to tourists, thereby enhancing the value of the customer experience.

1. Preparation stage (Who/Time): Determine the participants and the relationships among them.

2. Determine the time and boundary: Confirm the season and specific date of the customer's trip to facilitate the identification of the highlights of the itinerary at the destination during that season.

3. Selection Stage (Information): Based on the previous customer base and seasonal positioning, at this stage, the travel highlights corresponding to different

seasons listed in the model can be directly provided to customers for selection, which is efficient and convenient.

4. Booking stage (Coordinate): After the participants have selected the required travel experience products, we can help the customers coordinate with local resource providers through online, travel agency, offline connection, phone contact, etc., to get in touch and arrange the journey map of the customers' travel products.

5. Experience Stage: In order to provide tourists with a better travel experience value, in this link, it is very important to coordinate local travel resources to achieve seamless connection between experience products. Whether it is local villages, communities, artist workshops or tourist souvenir shops, etc., they all need to be reserved and planned in advance to avoid wasting customers' travel time or having a bad experience.

Sharing Stage (Integration) A good travel experience, a journey that conforms to the seasonal setting and tourists' ideas, will be shared by more people. At this stage, both tourists and tourism product suppliers will gain experience and feedback during this journey. These experiences and feedback will provide experience value for tourists who want to travel in the future and also add new experience value for tourism product providers.

4.7 Design Work Creative Processes

In previous interviews and group discussions with practitioners and local tourism project providers, the issue of standardizing information and language communication was repeatedly mentioned. The establishment of the model is aimed at providing customers with a more optimized experience through service design to achieve the goal of sustainable development of tourism in Dunhuang. In the operation process of this model, a general knowledge manual is also required. This manual can present the core and extended elements of Dunhuang in a structured and card-like manner, covering natural landscapes, historical sites, art and culture, religious sites and local experiences, and is equipped with modules such as food analysis, local specialty purchase guidance, seasonal and route tips, etc. Each entry provides a brief introduction, highlights, location/distance, best time slots and ways to participate,

making it easy to "understand after reading". For example: Mingsha Mountain - Crescent Spring, Yadan National Geopark, Yangguan/Yumen Pass, Han Great Wall, West Thousand Buddha Caves, Yulin Grottoes, Dunhuang Museum and local workshops (such as Du Yongwei Art Museum/Studio), immersive performance of "Dunhuang Again", desert camping, etc., are all organized in both Chinese and English. The food section provides explanations on the flavors and cultural origins of donkey meat yellow noodles, mutton mixed sauce, Hu Yang braised pancake, scallion beef pancake, bubble oil cake, five-poisoned pancake, apricot peel water, Dunhuang yogurt, etc. The specialty products section summarizes the characteristics, seasons, purchase and customs carrying tips of Li Guang apricots (fresh fruits/dried apricots), dried figs, sea buckthorn (fresh fruits/freeze-dried powder), licorice, Cymorium songaricum, Cistanche deserticola, Apocynum venetum leaves, etc., and also provides shopping and health tips for international tourists. The manual also provides "Tips/Best Seasons/Transportation Suggestions/Cultural Etiquette", classified summary tables and icon guidance to help with quick positioning and horizontal comparison. Such a travel guidebook is a replicable and shareable tool designed to address language communication barriers, a quick destination guide.

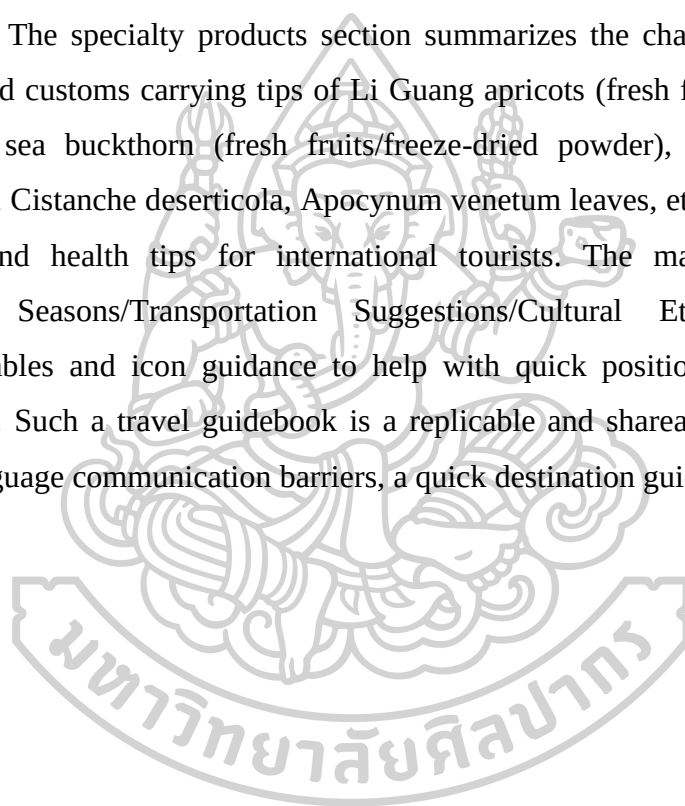




Figure 55 Travel Guide handbook

This study introduces "visual travel maps" as an operational tool in the DESM process at the methodological level, aiming to externalize destination elements and itinerary decisions with low cognitive load. The sources of mapping data include the organization of preliminary data, on-site surveys and route records, and have been repeatedly proofread and semantically refined through stakeholder co-creation workshops. The layout adopts a strategy of parallel Chinese and English and prioritizing illustrations, encoding transportation hubs, daily routes, major scenic spots, supply points and safety tips with a unified symbol system. The suggested routes for different dates are distinguished by color, and key nodes are accompanied by functional annotations and visit sequence prompts, supporting quick positioning and dynamic adjustment during the journey. The map is one-to-one matched with the highlight list of the current season, available destinations, dining and cultural touchpoints, and interlinked with the travel guide through QR codes, forming hierarchical information architecture from overview to details. The carrier provides both printable and mobile-compatible versions simultaneously, meeting the usability

requirements for offline reading and weak network environments. The layout follows the principles of high contrast and less text to reduce language and information barriers and adapt to visitors of different native languages and age groups. This tool is embedded with a process of "confirming the season and population, matching seasonal products, local collaboration, following the journey map, and sharing after the trip", and it undertakes functions such as route anchoring, time budgeting, resource connection, and emergency re-planning on site. The tour guide and the supplier can complete the reservation arrangement and time division based on this. Visitors can make immediate decisions and cooperate with their companions accordingly. Through institutionalized use, research transforms information accessibility and contextual immersion in the experience economy into operational service design elements, providing replicable media and methodological support for sustainable destination governance.



Figure 56 Map-The theme of Dunhuang's humanistic history

To enhance the cultural experience density during the journey and test the operability of local collaboration, this study embedded workshops themed on Dunhuang patterns and mineral pigments at the itinerary nodes. The workshop adopts a participatory design paradigm and is jointly hosted by researchers and local art practitioners. The process consists of five sections: pattern inspiration, material recognition, technique demonstration, individual creation, and collective review. The picture shows on-site records at different stages: Participants gradually understand the modeling rules and color logic during the process of tracing and deforming the Dunhuang patterns. During the pigment grinding and color testing process, gain an intuitive experience of the material's texture and layering. During the creation and mutual evaluation stage, personal understanding is expressed through oral narration and presentation, and the works are matched with the details of the murals visited. This design transforms abstract literature and exhibition information into tangible and perceptible operational activities, enabling cultural information to transition from viewing to practice, lowering the barriers of language and information, and strengthening memory cues and emotional connections.

At the methodological level, the workshop and the DESM process form a closed loop before and after. The first section uses visual maps and travel guides to warm up information and guide interest. The middle section connects the cognitive gap after visiting scenic spots through creative practice. The last section, through sharing works and peer evaluation, accumulates narrative and image evidence that can be reused. To ensure process quality, safety and material notifications are set up before the event. During the event, local mentors provide one-on-one guidance. After the event, short reflection texts and image files are collected and included in the current season's experience library and subsequent route product iterations. This design not only offers tourists portable cultural relics but also provides a stable entry point for local artists and small studios to participate, enhancing the visibility and revenue correlation of the community in the tourism experience



Figure 59 Dunhuang-themed Cultural workshop

Researcher also held an online exhibition titled "Research Process Exhibition on Dunhuang Tourism Experience and Service Design". The exhibition, following the timeline of the research, systematically presented the complete closed loop of this study from problem discovery, field investigation, method iteration to practical verification.

As an indispensable part of this research, holding the "Exhibition on the Research Process of Dunhuang Tourism Experience and Service Design" is an inevitable requirement based on rigorous academic logic and practical ethics. Firstly, this study adopts the grounded theory method, whose reliability and validity are highly dependent on the transparency and traceability of the research process. The exhibition systematically presents a complete chain of evidence from field investigation, data coding to multiple rounds of design practice, transforming abstract methodologies into reviewable entities, thereby fulfilling its commitment to academic rigor and providing solid and visual support for the conclusions of the papers. Furthermore, exhibitions serve as a crucial mechanism for knowledge transfer and social dialogue. They transform the discoveries confined to academic papers into public knowledge that can be intuitively understood and discussed by tourism operators, community members, and policymakers, significantly expanding the social influence of research findings.

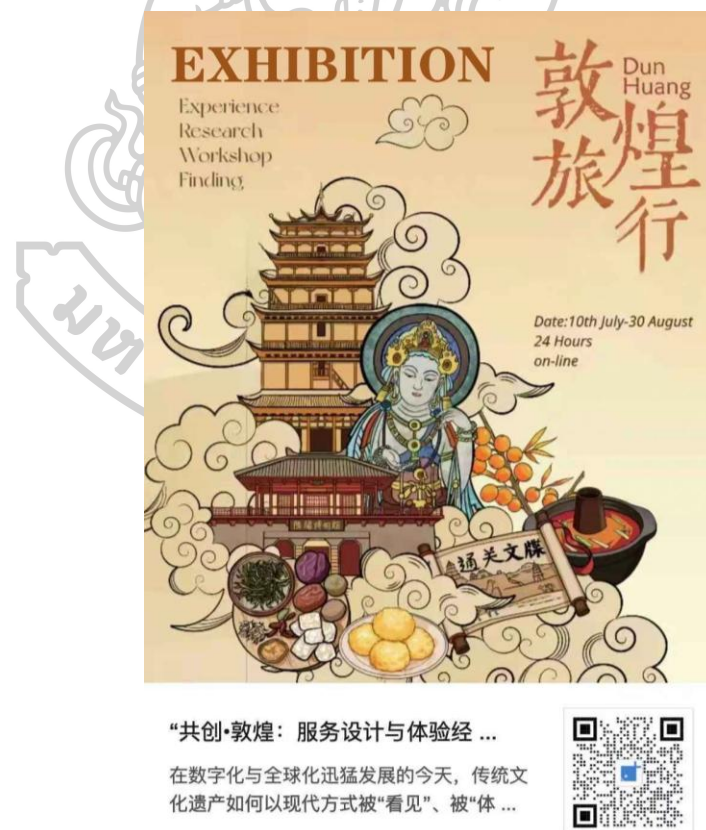


Figure 60 Research Process Exhibition on Dunhuang Tourism Experience and Service Design

The creative process behind the design work is deeply rooted in user-centered design and contextual immersion. The researcher began with comprehensive field research, involving visits to Dunhuang, interviews with tourists, consultations with cultural scholars, and collaboration with local artisans. This phase helped uncover what travelers find memorable, what stories remain untold, and how cultural expressions can be visualized in accessible formats.

4.8 Application of DESM Model in Dunhuang Tourism

To verify whether the latest model and travel manual can provide more accurate travel experiences for tourists visiting Dunhuang, in May 2025, researchers, in collaboration with local travel agencies, applied this model to the planning of this trip. The participants of this trip were three groups of tourists who made reservations online. The specific information is as follows:

Table 22 Information of tourist

	Time	Travel team	Nationality
Tourist 1	May	Family & friend	China
Tourist 2	May		China
Tourist 3	May		China
Tourist 4	May		China
Tourist 5	May		China
Tourist 6	May		China
Tourist 7	May	family	France
Tourist8	May		France

Among the tourists this time, they come from two different countries. Two groups of guests are families and they know each other. The other group is from France and they don't know the other two groups. They will travel in Dunhuang for two days.

Before they set off, the travel agency sent them travel brochures respectively and also a list of travel highlights for the current season.

Table 23 Highlight information in Dunhuang of May

	Main Attraction	Best Time/Intensity	Highlights	Alt/Overflow
1	Mogao Caves + Digital Center	Morning; reservation; Low–Med	UNESCO heritage, immersive films	Western Thousand Buddha Caves
2	Mingsha Dunes – Crescent Spring	Sunset/early AM; e-cart option; Med	Desert + oasis contrast, sand activities	Early AM reverse light entry
3	Dunhuang Museum	Afternoon; Low	Silk Road artifacts and context	—
4	Yangguan (Yang Pass)	PM to sunset; Med	Frontier culture, sunset	Pair with Yumen as alternative
5	Yumenguan (Jade Gate Pass)	PM to sunset; Med	Han Great Wall remains	Pair with Yangguan as alternative
6	Yadan National Geopark	Half-day to full- day; Med	Yardang landforms 'Ghost City'	Wetlands / nearer landforms
7	Danghe Riverside Promenade	Dusk; Low	City stroll & night view	Alternative to crowded night market
8	'Encore Dunhuang' Immersive Show	Night; Low	Dramatized cultural immersion	Indoor lecture / performance

	Main Attraction	Best Time/Intensity	Highlights	Alt/Overflow
9	Local Art/Intangible Heritage Workshops	AM or PM; Low	Pigment/Pattern/Handicraft making	Other workshops
10	Community Table & Walks	Lunch/Dinner; Low	Eat with locals, neighborhood strolls	Local eateries / alt. walks

Ultimately, they all chose yangguang/ Mogao Caves together. After the two joint trips, the French tourists were more eager to experience the Dunhuang Museum, while the two groups of tourists in the family group chose to go to the Mingsha Mountain. Therefore, according to the process of the model, the travel agency made a journey map for them after the tourists confirmed the products.

Table 24 Journey map for tourist

Chinese Family														
Date/Time	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
D1	Breakfast	Mogao Cave&Mogao museum				Lunch	Minsha mountain&camel riding				Dinner&shazhou night market			
D2	Breakfast	Yangguan				Lunch	Souvenirs store				booking restaurant			
French														
Date/Time	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00
D1	Breakfast	Mogao Cave&Mogao museum				Lunch	Dunhuang Museum				Dinner&shazhou night market			
D2	Breakfast	Yangguan				Lunch	Souvenirs store				booking restaurant			

During the two-day trip, they will depart from the hotel at the same time every morning, travel separately in the afternoon due to different choices, and have meals together again.

When they arrived in Dunhuang, the travel agency distributed travel brochures (in both languages) to them to help them quickly understand the local characteristics. Then lead them to experience the charm of Dunhuang according to the process formulated by the journey map.



Figure 61 French tourists are in the museum cafe



Figure 62 Chinese tourists at the Mogao Caves and Yangguan Pass

4.8.1 Analysis and summary of Experience Results

Towards the end of this trip, we still held group discussions with the participants to collect their experiences of this activity. From the perspective of tourists, we received the following feedback:

1) The information is accessible and consistent with cognition

All groups emphasized that the bilingual travel guidebook combined with the highlight list of the season enables people of different nationalities and travel experiences to be "on the same page". A French tourist said, "Even without a guide, I can quickly figure out the highlights, best times and precautions of each spot with the manual." Both families also mentioned that the elders and children quickly

understood the key points of the itinerary through ICONS and Chinese pages, reducing repeated explanations.

2) Autonomous selection and itinerary determination are smoother

The pre-sent travel highlights recommendations organize and send the travel products of the current season. Everyone can select them online first, and then the travel agency will generate the journey map according to the model. The experience of this service is very good, saving them the time of looking for travel guides by themselves. A French tourist said, "I can retain my preference for museums while sharing part of the main storyline with other groups and no longer worry about being forced to visit places I'm not interested in." The family group added, "Fixing 'shared mornings and separate afternoons' actually makes us feel more at ease."

3) Dual perception of cost and time efficiency

After making the rules of "starting together, experiencing separately and dining together", all three groups felt that the transportation and ticket booking costs had decreased and the waiting and communication time had been reduced. The family group mentioned, "If we travel the popular sections together, the resources of the vehicle and the tour guide can be combined, making it more cost-effective." A French tourist added, "Dining together makes ordering more efficient and it's easier to taste local cuisine."

4) The social and learning effects of "traveling the same path but not the same trip".

Participants generally prefer the design of "meeting at noon or for dinner" : it allows them to share their exploration experiences without interrupting their personal interest lines. Family tourists said, "Children will be more curious about the exhibits when they hear the French uncle talk about his new discoveries in the museum at the dining table." French tourists also said that through family sharing, they had a more comprehensive expectation of the ways to enjoy the Singing Sand Mountain.

5) More focused memory points and a deeper understanding of culture

The common main thread (Yangguan/Mogao Caves) ensures "what must be seen when visiting Dunhuang", while the differentiated modules (museums and Mingsha Mountain) make the memory anchor points clearer.

6) Language and cross-cultural communication are more friendly

French tourists particularly affirmed the multilingual tips in the manual (venue etiquette, food allergies, payment methods, restroom and meeting point ICONS), saying, "There are far fewer requests for help and misunderstandings on the spot." The family group also mentioned that the menu and allergy warnings reduce ordering anxiety, and both the elderly and children are more willing to try local dishes.

7) Overall satisfaction and willingness to visit again

All three groups gave the evaluation of "high satisfaction and willing to recommend". The French tourist explicitly stated, "If I come again, I will add the suburban geology and intangible cultural heritage workshop to my second itinerary." The family group said they would recommend the manual to their friends, "because it turns traveling from 'passive group joining' into 'active choice'."

From the perspective of a travel agent, we have received the following feedback:

1) In terms of service: The unified manual and card information have reduced the workload of Q&A and repetitive explanations in the early stage, making it more convenient to make time-slot reservations in scenic spots and arrange meals in a centralized manner.

2) In terms of product supply: Differentiated choices have driven up the selection rates of non-popular locations and local projects. "It's no longer necessary to cram all guests into the same 'popular template'." This situation can address the issue of excessive foot traffic at popular attractions and rationally divert guests.

3) Collaborative experience: Making "the same morning, separate afternoons, and unified meals" into a process component helps cross-team resource allocation and also facilitates tour guides in controlling the pace and risks.

In summary, the concentrated feedback from the participants confirmed the combined value of "model Travel Guide handbook": on the one hand, the information was standardized and bilingualized, significantly enhancing understandability and autonomous choice; On the other hand, the arrangement of "common - separate - reunite" not only saves costs and time but also brings about social sharing and cultural deepening. For the supply side, the burden of front-end communication and mid-stage collaboration has decreased, and non-popular and local supplies have gained more opportunities to showcase themselves. Overall, it presents a positive effect of "more accurate experience, more stable diversion, and more cost-effective collaboration".

4.8.2 Participant Suggestions

In the group discussion, they also specifically mentioned the need for a "shared experience platform" that can be used by both domestic and foreign tourists. The real problem now is that foreign tourists are more accustomed to using Facebook/Instagram, while domestic tourists mostly use wechat Moments/Xiaohongshu. As a result, "the experiences and travel guides of the same trip are fragmented on different platforms", and they cannot be seen by each other or reused in the pre-trip decisions of the next batch of travelers. Therefore, researchers believe that this might indeed be a factor influencing the final step, the coverage of sharing. Thus, researchers began to look for a platform that could be shared by tourists from both Chinese and foreign countries and regions as well as tourism operators.

4.8.3. Screening and establishment of sharing platforms

Considering that in the previous pilot, the sharing method of foreign participants was usually achieved through the overseas social platform Facebook. Due to the restrictions on this platform in the Chinese mainland, their sharing was limited. However, Chinese practitioners usually did so through their personal self-media, and the dissemination speed of this method was very slow. More importantly, None of these shares can reach a more open data, making it difficult to connect tourists with local tourism practitioners. Their joint sharing, interaction and discussion are the key actions for the sustainable development of tourist destinations. The limited influence has prompted researchers to seek more effective platforms to help tourists and tourism practitioners better connect and attract a larger audience. Expand their interest in sharing their travels. By leveraging the reach and interactivity of digital platforms, they proactively promote the concept of applying service design to Dunhuang research, encouraging discussion, sharing and wider dissemination.

Researchers consider that using social media platforms provides a powerful means to connect with a diverse audience, collect feedback, and build communities around common interests. Among the most popular platforms, Xiaohongshu, Facebook, Douyin and Weibo each have their unique features and are suitable for different promotional strategies. A detailed analysis of these platforms reveals their

user groups, content preferences, and operational advantages, providing insights into how to leverage these platforms to advance research goals. By strategically selecting and leveraging these platforms, researchers hope to verify the feasibility of their service design methods and stimulate greater public participation in Dunhuang culture and experience projects.

4.8.3.1 Platform Screening and Analysis

Xiaohongshu is a platform that is particularly popular among young and urban women. Over 70% of its users are women born in the 1990s or 2000s, mainly residing in first-tier or new first-tier cities. The user base of this platform is highly interested in content related to beauty, fashion, travel, home decoration, fitness and parenting, making it a center for lifestyle inspiration and consumption decisions. The advantage of Xiaohongshu lies in its "sales" economic model. Users trust the products and experiences recommended by the platform, and these recommendations are usually influenced by detailed reviews and aesthetically pleasing content. Its business model is driven by brand collaboration and e-commerce traffic, making it an ideal platform for promoting Dunhuang-themed souvenirs or travel experiences, especially suitable for those who value a refined and culturally rich lifestyle. However, its focus on a female-centered urban audience may limit its reach to other groups, such as elderly users or international tourists, who may also be interested in Dunhuang's cultural products.

Douyin (TikTok in China) is a global phenomenon, especially favored by Gen Z users aged 16 to 24, who ID for more than 50% of its user base. Its content mainly consists of short and captivating videos, covering areas such as entertainment, dance, music, beauty, games and virus challenges. TikTok's algorithmic recommendation system ensures the rapid spread of content, often triggering viral spread, making it a powerful tool for reaching a wide and diverse audience. The low threshold for content creation on the platform enables both individuals and brands to produce attractive videos, and its reliance on Internet celebrities (Kols) and live-streaming e-commerce further enhances its promotional potential. For the Dunhuang project, Douyin can be used to create short videos with outstanding visual effects, showcasing the cultural heritage, art or travel experiences of the region, which is expected to reach a global audience. However, its young user base and entertainment-

centered content may pose challenges in terms of the depth of conveying the historical and cultural significance of Dunhuang.

Weibo, often described as the Chinese version of Twitter, is a dynamic platform with a wide user base, mainly concentrated between the ages of 18 and 40, and is particularly favored by entertainment fans, celebrity followers, and those involved in public discussions. Its content covers entertainment gossip, social issues, celebrity updates, and niche interests such as anime, and it has enhanced its visibility through a hot topic (trending search) system. Weibo's role as a center of public opinion makes it a powerful tool for stimulating discussions and shaping narratives. Key opinion leaders (KOLs) and official IDs such as CCTV have a significant influence on it.

News, with 120 million followers. The community features of this platform, including theme groups and fan-driven "super topics", enable users to connect through common interests, making it an ideal place to discuss Dunhuang culture, art and tourism. Due to fewer regional restrictions, the platform has high accessibility for both Chinese and international users, further enhancing its applicability in meeting the goals of researchers.

Facebook has over 2.9 billion monthly active users worldwide, mainly targeting mature audiences aged 25 to 50, including home users and business professionals. Its content focuses on social sharing, news, community interaction and business promotion, supported by powerful group and page functions. Although Facebook's global influence makes it an ideal platform for promoting Dunhuang to international audiences, its unaccessibility in Chinese mainland limits its appeal to Chinese users, who constitute an important part of the project's target audience. Furthermore, Facebook emphasizes network relationships based on acquaintances, which may not effectively meet the researchers' demands for open and transparent discussions on the Dunhuang culture and experience value. However, for overseas tourists or the diaspora community, Facebook can serve as a supplementary channel to share content about the global cultural significance of Dunhuang.

Table 25 Platform Comparison Table

Platform	Main User Age	Core User Profile	Content Format	Main Market	Monthly Active Users (MAU)
Xiaohongshu	18-35	Young women, urban professionals	Images/Text/Short videos/Promotions	China	300M+ (2023)
TikTok	16-30	Gen Z, trend enthusiasts	Short videos/Live streams	Global (mainly Europe, US, Southeast Asia)	1.5B+ (2023)
Weibo	18-40	Entertainment fans, celebrity followers	Images/Text/Short videos/Trending topics/Communities	Global	580M (2023)
Facebook	25-50	All age groups, social networks	Images/Videos/Communities	Global (mainly Europe, US)	2.9B+ (2023)

Among these platforms, Weibo stands out for its high degree of alignment with the project's target audience and operational advantages. Its user base is mainly aged between 18 and 40, which is very close to the age range of potential Dunhuang enthusiasts, including students, young professionals and cultural lovers. Weibo's hot topic system ensures that captivating content gains high exposure, while its community functions, such as theme groups, topic tags and fan communities, create dedicated Spaces for discussions related to Dunhuang. Unlike Facebook, Weibo is open to both Chinese and international users, making it a multi-functional platform that attracts a diverse audience. Furthermore, as a center of public opinion, Weibo enables researchers to leverage existing conversations on culture and tourism to expand the reach of their service design initiatives.

4.8.3.2 The Weibo ID was established

Researchers have created a Weibo ID named "Dunhuang_lover" as a central platform for promoting Dunhuang culture and experiencing activities. This ID feature's multiple theme groups, covering various interest areas such as Dunhuang cuisine, art, culture, community, and souvenir design. These groups meet the diverse

needs of users, enabling enthusiasts, tourists and local stakeholders to engage in meaningful communication, share experiences and exchange ideas. The ID homepage promotes broader interaction. Users can comment, share and discuss the content, creating a community atmosphere. Researchers observed that the page views of their posts steadily increased, and user engagement continuously rose through comments, forwards and discussions, indicating that a sustainable dissemination channel has been formed. This organic growth indicates that the interactivity and trend-driven environment of Weibo have effectively enhanced the project's visibility.

The success of the Weibo ID "Dunhuang lover" has also brought practical results to the research project. Through the promotional efforts of this ID, users have expressed their interest in participating in seminars and cultural activities themed on Dunhuang, which proves that the platform can transform online interaction into concrete actions. Local communities and tourism operators have also begun to get involved, using the platform to promote their products and services, such as tour guide services or handicrafts, thereby enriching the content that tourists can experience. By creating a space that enables stakeholders, from tourists to local artisans, to connect, researchers have laid the foundation for supporting service design to be applied to a collaborative ecosystem for the tourism and cultural industries in Dunhuang. The ability of Weibo to promote these connections highlights its value as a communication tool and a community-building tool.

In conclusion, the strategic use of social media platforms, especially Weibo, has played a crucial role in overcoming the limitations of the researchers' initial pilot project. By leveraging the extensive coverage, trend-driven traffic and community functions of Weibo, researchers have successfully enhanced the visibility of their service design approach in the Dunhuang research. The Dunhuang lover ID has not only sparked discussions and interactions, but also cultivated a growing community of enthusiasts, tourists and local stakeholders.

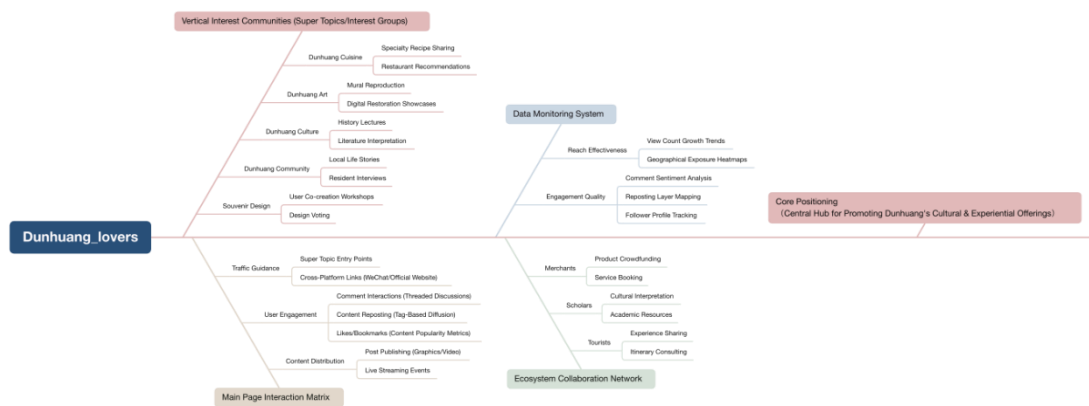


Figure 63 Structure of “Dunhuang_lovers”platform



Figure 64 Weibo “Dunhuang_lover”

4.9 Summary

This chapter mainly focuses on the process of service design. It conducts two rounds of practices and iterates the service model in response to the core issues of Dunhuang tourism identified through grounded theory in the early stage, such as congestion and seasonal fluctuations at heritage sites during peak seasons, superficial cultural understanding of tourists, cross-language communication frictions, and insufficient participation of communities and small supply entities. The research adopted a hybrid approach including participatory observation, focus groups, questionnaires, and stakeholder interviews. The first round of practice formed a WTE model: by using customer positioning, seasonal/carrying boundary control, and interest-based itinerary combination and journey mapping, ineffective touchpoints and time loss were reduced. At the same time, it reveals tourists' potential demand for

"guided exploration beyond their existing interests" and a closer coupling with community supplies. Therefore, in the second round, the model was expanded from the original WTE to WTOCI, adding three touchpoints on the basis of "people and time" : First, a "seasonal, curated list" was provided to offer guided exploration and achieve hotspot diversion; Secondly, through cross-subject collaboration (such as tour guides, transportation, workshops, local dining tables, community venues, etc.), transform the list into an executable and capacity-constrained itinerary. Thirdly, it supports continuous iteration through a closed loop of practice, sharing and reuse. However, in the later discussions, practitioners provided feedback and pointed out the shortcomings of the supply side: the lack of a standardized product library by "season and customer group", the failure to form a unified standard for multilingual information, and the absence of replicable operation manuals and platforms make it difficult for both tourists and the supply side to jointly see and update the iterations. After integrating two rounds of practice and discussion, the researchers proposed the DESM (Dunhuang Experience Sustainable Model) model: The effectiveness of DESM is based on the system mechanism of "season, information, collaboration, and iteration", and verifiable improvement evidence has been formed on both the user side and the operation side: After practitioners adopted the DESM approach to assist travelers through the processes of "tourist attribute positioning, seasonal orientation, local collaboration, journey mapping, and review and sharing", they generally reported that it was easier to discover products that suited them, travel guides were practical and significantly reduced reliance on interpretation, and they were willing to revisit in different seasons, etc. Travel agents have clearly felt that the travel plans chosen by tourists following the model process of DESM have indeed, in an intangible way, diverted tourists from concentrating them in popular scenic spots. Moreover, they learned about the highlights of travel in other seasons and thus expressed their willingness to take on the challenge of winter during their next visit.

In summary, through two rounds of practice and model iteration, this chapter has successfully upgraded the method model for collaborative operation from the perspective of tourists to the destination level. The core of the model lies in: taking seasons and carrying capacity as boundaries, list-based orientation and local collaboration as the key points, bilingual manuals as the information foundation, and

sharing and follow-up visits as the iterative mechanism, to form a replicable framework for the travel industry that can not only divert hotspots and enhance experience density, but also expand community participation and revenue coverage.



Chapter 5

Conclusion and Discussion

As a key node on the Silk Road and a core area of world cultural heritage, Dunhuang is confronted with the challenges of "protection, utilization and development". On the one hand, it is necessary to ensure the safety of non-renewable heritages such as the Mogao Caves and the continuity of academic research. On the other hand, it is necessary to respond to the constantly growing and diversified tourism demands, driving the local economy and communities to benefit together. Based on previous literature research and field investigations, it is known that the problems of tourism in Dunhuang mainly focus on four aspects: (1) Strong seasonality, congestion during peak seasons and imbalance in carrying capacity, single supply side, dominance of ticketing tourism, insufficient local products that can be participated in, difficulties in diversion and extended stay, etc., all lead to insufficient tourist experience. (2) Language and information barriers, asymmetry of cross-language information and high on-site communication costs, cultural understanding remaining at the surface level. (3) The participation of communities and micro and small enterprises in the local tourism industry of Dunhuang is insufficient, and the entry threshold for the industry is high. Therefore, this study centers on the overall goal of enhancing the tourist experience, expanding local participation, and achieving sustainable destinations under the constraints of cultural relics protection. Theoretically, this study comprehensively adopts the three major theories of experience economy, service design, and sustainable development as the research basis. In terms of methods, a mixed research approach was adopted: Taking grounded theory as the main line, continuous comparison and abstraction are carried out in the cycle of literature review, pilot research, long-term field investigation, stakeholder interviews/focus groups, questionnaires and quantitative evaluation. Service design tools such as journey maps and stakeholder maps are integrated throughout problem identification, solution co-creation and iterative verification. Following this process, the research successively proposed and verified three progressive models: WTE, which was used to study the initial basic logical process standardization; On this basis, it is expanded to WTOCI, incorporating seasonal orientation, cross-subject

collaboration and iterative sharing. Ultimately, a closed-loop Model DESM (Dunhuang Experience Sustainable Model) at the destination level was formed, with seasonal/carrying calendars, multilingual information standards, seasonal productization, collaborative indicators, and iteration into practical operation processes.

To verify the validity and replicability of this model, the study, on the one hand, reduces the cost of tourists' decision-making and cross-language communication through the combination of information and processes such as "bilingual travel manuals, seasonal product lists, and journey maps"; On the other hand, on the operation side, introduce collaborative rules such as "co-travel in the same section, time-sharing and diversion, and unified dining", promote non-popular locations and local experiences to be included in the optional list, and expand the community's beneficiary base. Two rounds of practice and review have shown that the accessibility of information, the matching degree of experience and the depth of cultural learning have all been improved. The sense of congestion and waiting time during peak seasons have decreased. The diversion has become more stable and the willingness to visit again has increased. At the same time, the ability of community micro and small enterprises to be "seen, selected and executable" has been enhanced.

5.1 Service Design Methods and Experience Economy for the Sustainable Development of Tourism in Dunhuang

5.1.1 The service is designed to support the sustainable development of the tourism industry

Service design is user-centered, adhering to the principles of collaboration, process, materialization, and integrity. It integrates visitor classification (Who), seasonal/carrying boundaries (Time), itinerary planning and route planning (Orientation/Coordinate), as well as review and Iteration (Iteration) into an executable and replicable workflow. In the early stage, by positioning the crowd, season and time, the information of tourists and the highlights of local travel destinations are controlled. In the middle stage, based on the choices of tourists, local resources are flexibly allocated, and even different groups of guests are paired to go to the same destination,

thereby reducing the travel cost of individual or single groups of tourists. In the later stage, according to the development path of tourists' itinerary, by rationally allocating local resources and coordinating them, every trip can create travel experiences for tourists and be shared with other visitors. For Dunhuang, this means, without exceeding the heritage carrying capacity, increasing the density of effective experiences per unit time, reducing cross-language and on-site uncertainties, and incorporating micro-supplies (community dining tables, workshops, and night-time micro-experiences) into standardized collaboration to support sustainability from a mechanism perspective.

5.1.2 The experience economy contributes to the sustainable development of tourism

The experience economy emphasizes the value of experience that can be remembered, retold and trigger transformation, expanding the traditional "just a visit" into a multi-level structure of "visiting, learning, experiencing and combining". From creating a sense of ceremony and highlights with "must-see heritages" such as the Mogao Caves, to the greater interest of participants in intangible cultural heritage/artist workshops, through the form of collaborative scheduling of co-creation, different groups of customers are brought together to eat together, forming participation and emotional connection. These experiences are not available in the traditional travel process. These practices were confirmed in the interviews to bring tourists a different travel experience. Everyone expressed their willingness to come back next time to experience the itinerary of other seasons. The amplification of the experience economy in travel not only ensures that the cultural core is not diluted but also guides the flow of tourists to non-popular and nearby resources, prolonging the length of stay and increasing the breadth of local consumption, promoting a virtuous cycle of "diversion, enhancement - revisit" from the content side.

5.2 Design of DESM Model

The design of the DESM model is based on continuous observation of two rounds of destination practices and stakeholder discussions: During the actual trip, tourists can follow the process of "first determining the group and season, then looking at the

seasonal list, coordinating with the local area, following the journey map, and sharing after the trip" to independently complete the closed loop from information understanding to route decision-making. On-site decision-making is smoother, and the reliance on interpretation is significantly reduced with the support of the travel manual. Under the rhythm of "common main line, time-sharing and diversion, and unified dining", tour guides and travel agencies can complete reservations and resource assembly earlier. Other travel destinations transition from "being seen" to "being able to deliver", thus forming a stable practice of hotspot diversion and time and space rebalancing. After the trip, through group discussions and case reviews, the experiences of both tourists and suppliers are accumulated back into the current season's list and operation guidelines. And share it on media platforms for everyone's reference and discussion. The next round of itinerary will be fine-tuned based on this, demonstrating the model's learnability and replicability as well as the sustainable sharing of information.

In terms of achieving the research objective, DESM clearly divides every step of the trip. First, it determines the season and time, and provides tourists with avocado options within the corresponding season, allowing them to know where it is worth visiting and avoiding repeated setbacks in the unfeasible time window of the itinerary. At the same time, it provides tourists with the travel features of each season. These features include the local off-the-beat-path travel routes of the season, stimulating tourists' interests beyond the popular routes, thereby incorporating local travel resources. This step can not only naturally divert the flow of people at popular scenic spots but also invisibly enhance the presence of local resources. It is necessary to enable local people and local resources to effectively participate, especially in the subsequent collaborative and accompanying aspects, such as in-depth museum reading, local workshops, community dining tables, desert starry sky, geological parks, and urban walking Tours, all of which require the cooperation of local people. The bilingual travel guide, as a tool for DESM operation, can quickly explain information about the Dunhuang area, scenic spots, cuisine, souvenirs, etc., initially solving the burden of language.

Overall, the DESM model meets these three research goals in a clear and practical way.

Firstly, in order to study service design and the experience economy, and to collaborate with local people and resources to explore products suitable for Dunhuang tourism, DESM transformed these ideas into operational processes. First, it is necessary to understand who the tourists are and when they will come. Then, plan seasonal options, involve local partners in planning and delivery, and finally conduct structured reflection after each trip. Through this cycle, workshops, community tables, artist studios, evening micro-experiences and city walks are transformed from scattered ideas into reservable units suitable for the interests and abilities of different travelers. Collaboration with guides, communities and small suppliers was embedded from the very beginning, so new products emerged through genuine collaborative production rather than top-down design.

Secondly, in order to analyze local resources and, from the perspective of the experience economy, formulate more travel consumption plans that enhance local participation, DESM organized the supply side. List, describe and standardize local assets based on the time window, team size, work level, etiquette and risk. Then they are compiled into seasonal candidate lists and bilingual manuals, so that tour guides can combine heritage sites with nearby or less well-known attractions at a lower planning cost. This approach naturally guides tourists beyond the main attractions, increases the chances of communities and small producers being selected, and provides them with a predictable way of hosting, thereby enhancing their motivation and ability to participate.

Thirdly, in order to design a tourism industry model that enhances the quality of tourism and the experience of tourists, the DESM model was developed based on the service design process to offer more valuable experiential journeys. It provides the necessary operation tools and operation procedures. Seasonal and capacity calendars define when and how to access core sites. The bilingual travel manual, as one of the features in this model, enhances the possibility for tourists to understand quickly. This model can effectively promote the sustainable development of travel destinations similar to Dunhuang.

In conclusion, DESM combines service design and the experience economy with the down-to-earth collaboration of Dunhuang. It broadens the range of products suitable for different travelers, brings locals into the value chain in a stable and visible

way, and enhances the overall quality of travel through orderly coordination and simple reusable materials. These three goals reinforce each other, generating a practical and teachable model that is ready to adapt to similar heritage destinations

5.3 Discussion

This study integrates service design and the experience economy into a destination operation model (DESM) oriented to the Dunhuang context. Its core contribution lies in reconstructing the organizational mode of "tourists - time - local supply". Firstly, DESM adopts a process of "first sketching the boundaries of the season, then curating the current season, then collaborating on execution, and finally reviewing and consolidating", which brings forward the originally scattered choices and on-site judgments into executable rules, thereby enhancing the experience density and itinerary stability without exceeding the capacity of cultural relics protection. Secondly, the model has upgraded the diversion mechanism from temporary response to institutionalized curation: by fustigating "mainline heritage and exploration slots", it not only retains the highlights of core heritage but also guides the nearby suburbs and communities with seasonal optional modules, alleviating congestion during peak seasons, filling the gaps during off-peak seasons, and forming a more balanced patio-temporal distribution. Secondly, DESM incorporates communities and micro and small entities into the standard supply sequence, and through product cards and collaborative rules, it unblocks the path of "being seen, being selected, and being deliverable", promoting local participation to shift from occasional to regular. Overall, the model is not merely a simple superposition of activities, but rather takes seasons, information, collaboration and iteration as the framework to establish a complete closed loop from pre-trip decision-making to post-trip learning, enabling destination operation to shift from ticket logic to experience logic and collaboration logic.

5.4 Limitations

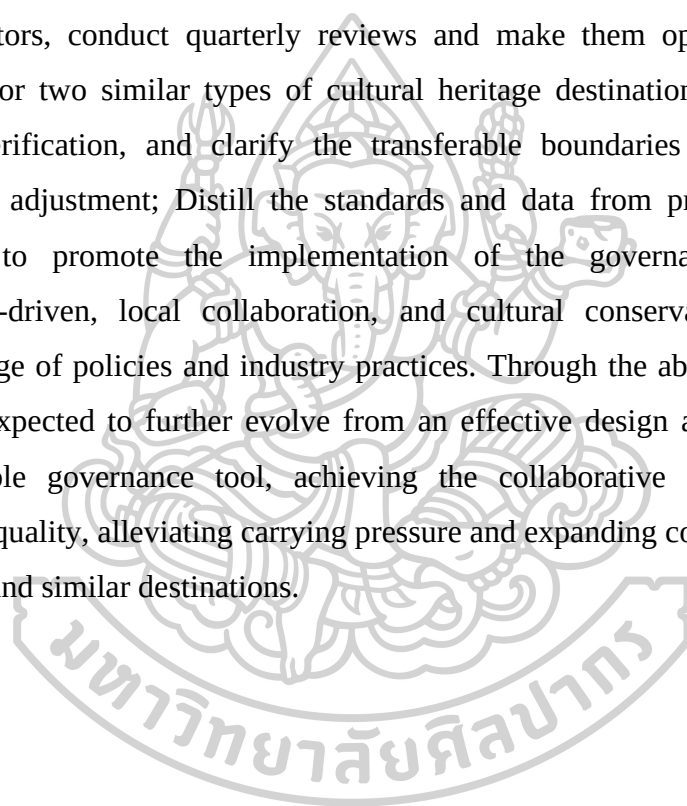
Although two rounds of practice have demonstrated that DESM is available and replicable, there are still some limitations in the time period of the research. Firstly, the sample and scenario coverage is limited, and the performance under extreme

weather, ultra-peak days or extremely large team scenarios has not been systematically tested yet. Secondly, the product library that intersects with seasons and customer groups still needs to be further refined, including intensity classification, risk warnings, suitable target groups and alternative routes, etc. Otherwise, it will affect the rapid assembly efficiency of tour guides. Thirdly, the unified tone and quality governance of multilingual information have not yet been fully institutionalized, and individual differences may lead to inconsistent expression styles and details. Fourth, the reception capabilities and compliance levels of communities and small and micro enterprises vary greatly. Standardized training and certification are still needed in areas such as food hygiene, insurance and safety, basic multilingualism, and cultural relics protection etiquette. Fifth, the research focuses on the process assessment of "design and operation", and longer-term tracking and comparative studies are still needed regarding the long-term economic, social and environmental effects.

5.5 Suggestion for future researcher

Three sets of suggestions are put forward for the implementation of institutionalization and continuous optimization. First, improve systems and tools. Standardize the product library and carrying calendar, clearly define the window period, upper limit of the number of people and alternative paths; Establish multilingual information standards and quality governance processes, unify terms, layouts and ICONS, and form a universal template that is trainable and assessable. The purpose of the construction is to build a prefectural-level shared platform (DESM Hub), which undertakes the data return and version management before, during and after the trip. The front end is convenient for release and retrieval, and the back end is convenient for quantification and compliance management. Second, enhance capabilities and collaboration. Promote the certification and regular training for communities and small and micro enterprises, covering reception procedures, risks and insurance, food hygiene, basic multilingual and cultural relics protection etiquette, and establish a closed loop of appointment, performance, evaluation and improvement. Refine the operational procedures for cross-subject collaboration, clarify the

interfaces and rhythms among tour guides, transportation, venues, workshops and catering, and set up backup plans and conduct regular drills for extreme weather, temporary closures and sudden increases in passenger flow. Strengthen cultural relics protection and safety education in communication with tourists, and explore a return mechanism of "each micro-donation - community fund - public report" to enhance social trust. Third, improve assessment and promotion. Establish a long-term assessment framework, incorporate carrying capacity mitigation, diversion stability, community benefit coverage, compliance performance and environmental impact into core indicators, conduct quarterly reviews and make them open and transparent. Select one or two similar types of cultural heritage destinations to conduct cross-scenario verification, and clarify the transferable boundaries and key points of localization adjustment; Distill the standards and data from practice into industry guidelines to promote the implementation of the governance framework of "experience-driven, local collaboration, and cultural conservation-friendly" in a broader range of policies and industry practices. Through the above-mentioned path, DESM is expected to further evolve from an effective design and operation model into a stable governance tool, achieving the collaborative goals of enhancing experience quality, alleviating carrying pressure and expanding community benefits in Dunhuang and similar destinations.



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Appendix

Appendix I: Questionnaire

Demographic Information:

1. Age:

- ☐ 18-24
- ☐ 25-34
- ☐ 35-44
- ☐ 45-54
- ☐ 55 and above

2. Gender:

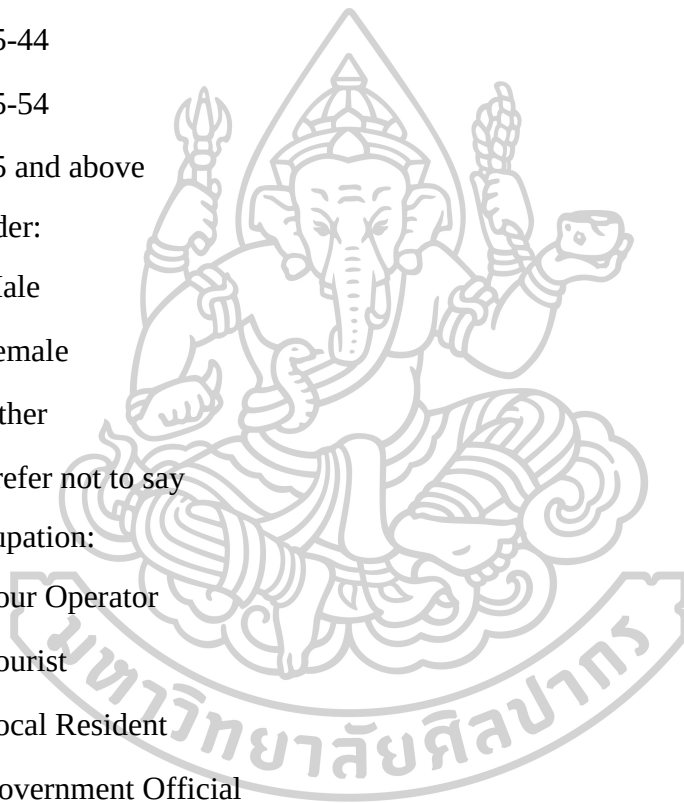
- ☐ Male
- ☐ Female
- ☐ Other
- ☐ Prefer not to say

3. Occupation:

- ☐ Tour Operator
- ☐ Tourist
- ☐ Local Resident
- ☐ Government Official
- ☐ Business Owner
- ☐ Other (Please specify): _____

4. Education Level:

- ☐ High School
- ☐ Bachelor's Degree
- ☐ Master's Degree
- ☐ Doctorate
- ☐ Other (Please specify): _____



A survey on the awareness of local tourism practitioners in Dunhuang regarding service design and the experience economy.

Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Code	Questions	1	2	3	4	5
SD1	I understand the basic concepts and process of service design					
SD2	Our service processes have been systematically designed and optimized					
SD3	We value the analysis of customer journey pain points					
SD4	We encourage customers to participate in the service process (e.g., feedback, co-design)					
SD5	I believe service design helps improve customer satisfaction and return rates					
SD6	I hope to receive more training or guidance on service design in the future					
EE1	I understand that experience economy creates value by stimulating customer senses and emotions					
EE2	We intentionally integrate local culture and storytelling into our services					
EE3	We design interactive, photo-worthy, or memorable service settings					
EE4	We value personalized customer experiences (not just functional services)					
EE5	We constantly improve the experience process based on customer feedback					
EE6	I believe experience economy helps strengthen brand influence					
O1	Have you ever proactively considered the overall customer experience? Please provide an example.					
O2	What kind of training, resources, or support do you expect regarding service design and experience economy?					

Objective 1: To determine the application of service design theory in the tourism industry in Dunhuang area

Please indicate your level of agreement with the following statements regarding the application of service design in the Dunhuang tourism industry. Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Statement	1	2	3	4	5
The tourism services in Dunhuang area are tailored based on customer needs.					
Tourism operators in Dunhuang focus on creating seamless customer experiences.					
Service design in Dunhuang enhances the overall quality of tourism services.					
The tourism sector in Dunhuang provides a high level of personalization through service design.					
There is effective collaboration among tourism stakeholders to improve service design in Dunhuang.					
Service design principles are integrated into marketing strategies of Dunhuang tourism.					
Service design helps improve the sustainability of the tourism services in Dunhuang.					

In your opinion, how can service design principles be improved or better applied in the Dunhuang tourism industry?

Objective 2: To explore sustainable development of the tourism industry in Dunhuang region based on service design theory

Please indicate your level of agreement with the following statements regarding sustainable development of tourism based on service design theory in the Dunhuang region. Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Statement	1	2	3	4	5
The tourism services in Dunhuang area are tailored based on customer needs.					
Tourism operators in Dunhuang focus on creating seamless customer experiences.					
Service design in Dunhuang enhances the overall quality of tourism services.					
The tourism sector in Dunhuang provides a high level of personalization through service design.					
There is effective collaboration among tourism stakeholders to improve service design in Dunhuang.					
Service design principles are integrated into marketing strategies of Dunhuang tourism.					
Service design helps improve the sustainability of the tourism services in Dunhuang.					

Objective 3: To explore the application of experience economy theory in the tourism industry of Dunhuang area

Likert Scale Questions (1 - Strongly Disagree to 5 - Strongly Agree)

Please indicate your level of agreement with the following statements regarding the application of experience economy theory in the Dunhuang tourism industry. Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Statement	1	2	3	4	5
Dunhuang tourism creates memorable experiences for visitors.					
Tourists in Dunhuang are actively engaged in co-creating their travel experiences.					
The tourism experience in Dunhuang emphasizes emotional engagement with visitors.					
Service providers in Dunhuang focus on creating unique and immersive experiences for tourists.					
The tourism sector in Dunhuang creates experiences that appeal to multiple senses (sight, sound, taste, etc.).					
Experience economy theory has helped improve the quality of tourism in Dunhuang.					
There is a strong focus on providing personalized experiences for each tourist in Dunhuang.					

What improvements would you suggest to better integrate experience economy principles into tourism in Dunhuang?

Objective 4: To explore sustainable development of the tourism industry in Dunhuang region based on experience economy theory

Please indicate your level of agreement with the following statements regarding sustainable development of tourism based on experience economy theory in the Dunhuang region. Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Statement	1	2	3	4	5
The tourism experiences in Dunhuang promote environmental sustainability.					
Experience-based tourism in Dunhuang provides long-term economic benefits to local communities.					
The tourism experiences in Dunhuang foster cultural sustainability by promoting local traditions and heritage.					
The design of tourist experiences in Dunhuang is mindful of minimizing negative environmental and social impacts.					
Experience economy approaches in Dunhuang help achieve sustainable development related to economic growth and social inclusion.					
The tourism industry in Dunhuang creates inclusive experiences that cater to diverse groups of people.					
Experience economy practices in Dunhuang encourage sustainable consumption and production patterns.					

How can experience economy principles be further applied to promote sustainable development in the Dunhuang tourism industry?

Effectiveness Evaluation Questionnaire for Dunhuang Travel Handbook/Map Design

After experiencing the Dunhuang travel handbook, please evaluate its design performance.

Use a scale of 1-5, where 1 = Strongly Disagree, 5 = Strongly Agree.

Statement	1	2	3	4	5
The explanations of mural symbols (e.g., flying apsaras, caisson ceilings) in the handbook helped me understand Dunhuang's artistic value					
The multilingual travel handbook enables tourists to quickly comprehend attractions					
The travel handbook serves as an efficient tool for learning about Dunhuang					
The Dunhuang artistic elements on eco-bags effectively convey cultural identity					
Cultural sensitivity reminders in the handbook (e.g., maintaining silence in meditation zones) enhanced my respect for local customs					
The multilingual keyword glossary facilitated cultural exchanges with local practitioners (e.g., discussing food/souvenirs)					
Travel maps and handbooks sparked my interest in Dunhuang culture					
The language versions of printed materials covered my native language needs					
The themed maps allowed quick understanding of Dunhuang's route features					
Overall, these materials reduced my pre-trip preparation workload for visiting Dunhuang					

VITA

NAME

Ping QIN

INSTITUTIONS ATTENDED PUBLICATION

2021 Enrolled in the Doctor of Philosophy Program in Culture-based Design Arts, Silpakorn University

Qin, P. & Phuwanart, R. (2025). Buddhism Cultural Tourism Routes to Promote Dunhuang Culture Development: Systematical Literature Review. Journal of Wisdom in Political Science and Multi-disciplinary, 08(05).

Qin, P. & Sarawuth, P. (2023). A Combination between Traditional Art and Sci-Fi Art: The Mural Arts of Dunhuang Mogao Grottoes with Cyberpunk Artistic Style. Lawarath Social E-Journal, 05(02), 199-216.

