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Beach tourists behavior and beach management strategy under the ongoing prevention and control of the COVID-19 pandemic: A case study of Qingdao, China

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ABSTRACT

The sudden outbreak of COVID-19 has led beach tourism to a complete halt in January 2020, disrupting millions of livelihoods and businesses. Due to the economic importance of beach tourism, many governments reopened tourist beaches after the number of confirmed cases decreased. It is essential to open beaches orderly to meet the needs of tourists, maintain beach’s health and restore coastal economy under the new reality. This paper selected Qingdao in China as a case study, drew on a questionnaire survey among beach tourists, summarized the effects of the COVID-19 on beach tourism industry and tourism enterprise, analyzed beach tourists’ psychology and behavior, and developed beach management strategy under the ongoing prevention and control of COVID-19. The results showed that the COVID-19 pandemic caused severe damage to beach tourism which bases on travel and mobility, and this industry was temporarily suspended. With the changing epidemic situation, beach tourism witnessed a gradual recovery from stagnation to local tourism. Meanwhile, tourism enterprises were hit by the devastating impact of the COVID-19, causing problems such as business reduction, tense cash flow, high operating cost and unclear market prospect. Under the normalization of pandemic prevention, tourists did not have severe fear and anxiety about the pandemic, and placed great importance on the prevention and control measures, emergency measures and pandemic risk level of the beach destination. The pandemic also reshaped the perception and mode of beach tourism. Ecological tourism, travelling with family, and local tourism became the primary choices for tourists. Beach congestion, health status, and the quality of tourism services were the biggest concerns for tourists. Additionally, social media and short video APP became the new marketing channels. Finally, beach management strategies were proposed from the aspects of pandemic prevention and control, emergency management, information communication, tourist management, service management, and environmental management.

1. Introduction

The COVID-19 was a highly infectious disease caused by the novel coronavirus SARS-CoV-2, which became a global pandemic on March 11th, 2021. The pandemic brings great impact on the social and economic activities of coastal areas that will be felt for years to come (Zielinski and Botero, 2020). The world has entered the era of ongoing prevention and control of the COVID-19 pandemic. Coastal areas implemented strict lockdown policies, such as travel bans, closing public places, blocking traffic and enforcing social distancing, which effectively decreased the spread of COVID-19 and also had devastating effect on economy (Zielinski and Botero, 2020). Beach tourism is an important driving force for economic recovery in coastal areas. To protect the livelihoods and business, many coastal areas chose to reopen beach tourism in the new reality. Compared with closed indoor places, beaches with open space and good ventilation are likely to be considered safe. At the same time, as a public place, it also has the attributes of high flow, easy agglomeration, high frequency and management difficulty. News articles showed that tourists in huge quantities gathered on the beach in countries with serious epidemic situation, such as USA, Spain, Portugal, and England, ignoring social distance and government advice, which increased the risk of the spread of COVID-19. Consequently, how to...
realize the scientific management and safe operation of beach is a great challenge under the ongoing prevention and control of COVID-19.

The COVID-19 is still raging in many parts of the world, but the severity of the epidemic is different all over the world. China was the country with earliest large-scale outbreak of COVID-19, which used a very effective plan for pandemic combat and made the pandemic that can be prevented, controlled and stopped. As an important beach tourism destination in China, Qingdao has implemented effective management strategies and has realized the orderly recovery of beach tourism. During the Spring Festival in 2021, the number of tourists has basically returned to the same period in 2019. The anti-pandemic experience and management strategies of Qingdao can provide important references for countries and regions around the world. Consequently, we selected Qingdao in China as a case study, and the aims of the present study are to clarify: (1) What are the impacts of the COVID-19 pandemic on the beach tourism industry and tourism enterprise? (2) What are the characteristics of psychology and behavior of beach tourists under the ongoing prevention and control of COVID-19? (3) How to realize scientific management and safe operation of beaches under the ongoing prevention and control of COVID-19?

2. Literature review

2.1. Impact of the COVID-19 pandemic on tourism industry and tourism enterprises

Tourism is a highly vulnerable industry to natural disasters (e.g. earthquakes, floods, tsunami), human-made crises (e.g. terrorism, financial crises), and sudden epidemic (e.g. SARS, Ebola). Nevertheless, none of the crisis events had a long-term negative impact on the tourism industry (Gossling et al., 2020). Previous pandemics were limited to specific regions, contained in relatively shorter spans of time, and led to fewer infections and deaths compared to the COVID-19 (Miao et al., 2020). Early evidence showed that the scale and extent of the COVID-19 on tourism was larger than earlier events. The COVID-19 pandemic had devastating effect on international economic, which caused a loss of 1.2 trillion in tourism revenues and 120 million tourism jobs cuts, and the largest decline in the history (UNWTO, 2020). At the beginning of the outbreak, the fear of infection created a deep fear of social contact, which had devastating effect on beach tourism. Galvani et al. (2020) predicted a domestic tourism recovery in the short term and a recovery of international tourism in the long term as the outbreak eased. Zielinski and Botero (2020) showed that demand for international beach tourism would significantly reduce and domestic tourism can offset this reduction to some extent.

The pandemic had unprecedented impact on tourism enterprise, such as business operations reduction and massive job loss. Thus, the issues on how to cope with the impacts of COVID-19 for tourism enterprise became the focus. Duarte Alonso et al. (2020) argued that most managers of tourism enterprises would endeavor to discuss how to adjust and modify the manner by which they conduct business in the context of COVID-19. Hao et al. (2020) proposed service provision strategies, indicating that hotels need to take strict hygiene measures to secure customer’s accommodation environments, such as conducting complete disinfection, detecting the health of customers and employees. Kim et al. (2021) explored consumer’s preference for robot service in hotel, and demonstrated that consumer had a more positive attitude toward robot-staffed hotels when COVID-19 was salient. Shin and Kang (2020) also showed that technology plays a key role in the hotel industry’s recovery from the pandemic and is an essential way to reduce risk.

2.2. Impact of the COVID-19 pandemic on tourists’ psychology and behavior

The impact of COVID-19 on tourism is reflected not only on the supply side but also on the demand side. In fact, tourism demand affects tourism supply, and tourists’ psychology and behavior determine the direction, content, mode and effect of tourism supply partly. More studies on tourist psychology and behavior are thus needed under the new reality. Risk perception plays an important role in predicting tourism demand and formulating tourism recovery strategies (Ritti-chainuwat and Chakraborty, 2009). Dryhurst et al. (2020) proposed that the more risk people perceived the less likely they were to visit public places such as beaches and the more likely they were to cooperate with government recommendations and to take self-protection measures. Zenker and Kock (2020) found that COVID-19 affected tourist risk perception and changed travelling mode of tourists in the future. Zielinski and Botero (2020) concluded that besides the cultural factors, tourists may underestimate the risk of tourism after the pandemic due to voluntary nature to taking the risk, optimistic bias, social amplification effect, lack of reliable information, and lack of relevant experience. Pereira et al. (2021) identified beach tourists’ perception on health regulations of the COVID-19 in two beaches on Brazilian Amazon. Carvache-Franco et al. (2021) analyzed the tourism labels on Twitter about coastal tourism and marine tourism during the pandemic, and pointed out that “escape” and “sunshine and beach” were the main travel motivations. Roy and Sharma (2020) indicated that travelers prefer “day use hotel”, “clean beaches” and “home picnic” environment with “proper hygiene”.

Li et al. (2021) revealed that tourists’ destination preferences changed and they avoided going to that with more confirmed cases. Renaud (2020) showed that people preferred to reduce mobility and chose local environments that can meet their needs. Donaire et al. (2021) showed that tourists preferred natural area and charming coastal cities. Brooks et al. (2020) revealed that people chose to travel independently or in small groups to recovered from self-isolation. Wen et al. (2020) showed that tourists also avoided crowded places. Hall et al. (2020) indicated that visitors have chosen to forgo more distant destination, preferring to visit national or regional areas. Shamshiripour et al. (2020) investigated how and what extent people’s mobility habitual travel behavior have changed during the pandemic and whether these changes will bounce back to the pre-pandemic situation. Kane et al. (2021) analyzed beach video data and collected unmanned aerial vehicle image at the beach in Virginia Beach, USA, and explored spatial and temporal analysis of beach tourists’ behavior.

2.3. Research on beach management under the COVID-19 pandemic

At the beginning of the outbreak of COVID-19, beach tourism was at a standstill, which had positive results for beaches in the short term, causing beach environment recovered from human pressure. Soto et al. (2021) examined the effects of human absence in urban tourist beach environment before and during the lockdown. The pandemic also posed serious threats to beach environment in the long term. Ardusso et al. (2021) indicated that the use and mismanagement of personal protective equipment (PPE) represented an environment problem and the increase in the use of single-use plastic aggravated plastic pollution on beaches. Thiel et al. (2021) examined the distribution and densities of masks on some tourist beaches in Chile, and promoted to provide enough PPE-related signs and waste bins and set up strict waste rules. Alfonso et al. (2021) assessed regulations and strategies to abate the problem of plastic pollution in beaches during the COVID-19 pandemic.

The virus can spread through the environment condition, which aggravated the complexity of beach management. Quilliam et al. (2020) explored the environment implications of SARS-CoV-2 in human faces, and emphasized that SARS-CoV-2 may be spread by the facial-oral route. Kitajima et al. (2020) showed that the virus not only in faces of infected individuals but also in wastewater, suggesting the need to detect SARS-CoV-2 in wastewater as potential sources of human health risk. However, there is no plan to detect the presence of SARS-CoV-2 in the beach environment. Efstratiou and Tzoraki (2021) thought that the
disinfecting properties of sun (heat and UV radiation) were adequate to rid beach sand of coronavirus particles in warm sunny regions. Besides, Zielinski and Botero (2020) proposed that beach management department should focus on the impact of the chemicals of the disinfection on beach environment. Armenio et al. (2021) combined physical and socio-economic aspects, distinguished the risk level of the COVID-19 pandemic in different coastal areas, and provided a basis for proposing risk management strategies. Khosravi (2020) proposed that it was crucial to obtain information from the government and media, because personal perceived risk was affected by social amplification effect. It is necessary for beach destination to work closely with the media to share knowledge and build confidence to reduce fear. Wise et al. (2020) indicated clear risk communication could help form accurate risk perception and promote tourists to take self-protection actions. Zielinski and Botero (2020) believed that the provision on the information about the virus itself and the measures taken by beach destination to ensure safety were strategies to restore tourists’ confidence. González et al. (2021) proposed that it was essential to analyze the opinions of users, and explored the perception of the level of environment quality of beach users in three sectors. Bustos et al. (2021) evaluated the optimal use of the beaches according to its tides, the characteristics of the aspects of socio-environment, and the perception of the interested parties during the COVID-19 pandemic. Epelde et al. (2021) determined the maximum carrying capacity of the beaches by means of automated coastal videometry. Dragani et al. (2021) described a simple formulation to analyze the variation of population density on the beach. Perillo et al. (2021) showed that new technologies and social media can improve beach safety, such as real-time video controls and APP. Milanes et al. (2021) put forward suggestions on beach management in Caribbean island countries during the pandemic, mainly involving facilities and equipment, health protection, entrance management, technology application, sign setting and so on.

3. Material and methods

3.1. Study area

Qingdao (Fig. 1) is located in the southeast of Shandong peninsula and it is approved as a coastal resort city in China. In 2019, the total number of tourists in Qingdao was 113.0284 million, and the total tourism revenue was 662.27 billion yuan, accounting for 56.40% of local GDP. Qingdao has a total coastline of 816.98 km and is distributed with many well-known beach tourism destinations, such as the first bathing beach, Shilaoren bathing beach, and Golden beach. At the beginning of the pandemic, Qingdao quickly closed bathing beaches and facilities, and dynamically adjusted beach management strategy according to the pandemic. During the Spring Festival in 2021, the number of tourists has basically returned to the same level in 2019. Its experience in epidemic combat and management strategies will help revive beach tourism in other parts of the world.

3.2. Questionnaire design

A total of 23 questions were designed in this questionnaire, which can be divided into four parts: (1) tourists’ perception of external environmental conditions, including pandemic risk perception, tourism risk perception, tourists’ attention to prevention measures, emergency measures, pandemic risk level, and service staff’s health condition of beach destination; (2) tourists’ internal psychological characteristics, including tourism motivation, tourist’s attitude of reservation system, flexible vocation system, preferential promotion and tourist’s preference for hygienic standard, free cancellation service, travel insurance and dining type; (3) tourist’s travel decision-making behavior, including travel scope, tourism mode, transportation, self-protection measures and information acquisition channels; (4) the basic information of tourists, including gender, age, income and education.

3.3. Questionnaire distribution

In order to ensure the effectiveness and credibility, a pre-survey was carried out first. From September 25th to September 26th, 2021, we
distributed 30 questionnaires around the first bathing beach in Qingdao, with an effective rate of 100%. The questionnaire was modified and improved, and the final formal questionnaire was formed. Data were collected from October 1st to October 7th and October 17th to October 22nd, 2021. Finally, a total of 413 questionnaires were collected, of which 394 were effective, with an effective rate of 95.39%. The reliability and validity were analyzed in SPSS software.

3.4. Research framework

To obtain the best scientific information of suggestions for effective management strategies under the pandemic, the methodological framework of the research was developed (Fig. 2).

4. Results

4.1. The effects of the COVID-19 pandemic on beach tourism industry and enterprise

4.1.1. Impact of COVID-19 on the beach tourism industry in Qingdao

As an industry based on tourist mobility and close interaction, beach tourism industry was the main receiver of the pandemic and was the first to be hit by the devastating effect of the COVID-19. The impact of the COVID-19 on the beach tourism industry in Qingdao changed with the development of the pandemic, which can be divided into three stages: market stagnation period, market recovery period and comprehensive revitalization period.

Market stagnation period (2020.01–03): On January 24, 2020, Qingdao launched public emergency response to against the unprecedented COVID-19 pandemic and issued a series of travel restrictions to prohibit cross-province and cross-city mobility. On January 25, 2020, the Ministry of Culture and Tourism of Qingdao asked travel agency and online tourism enterprise to suspend cross-province group tour, hotel service and airplane ticket service. Tourism service places were closed and public transportation was suspended, which caused beach tourism activities decreased rapidly and finally stopped. However, the pandemic was gradually brought under control as a result of unprecedented lockdown, and subsequently Qingdao commenced easing travel restrictions. On March 11, 2020, the Ministry of Culture and Tourism of Qingdao proposed that tourists can move around the local area within the province. At the same time, the COVID-19 spread worldwide and finally became a global pandemic, which brought great challenges to the recovery of tourism market.

Market recovery period (2020.04–09): Qingdao implemented pandemic prevention and control measures in tandem with work resumption and issued policies to support tourism enterprises. Tourism enterprises carried out promotion activities and did a good job in marketing, which presented early signs of performance recovery. For instance, Qingdao held a series of activities such as “People from Qingdao visit Qingdao” with the topic of health tourism, which boost the consumption of local residents. The Labour Day Holiday became the first peak season since the break of the pandemic. During this period, the total number of tourists and tourism revenue recovered by 29.63% and 25.29%, respectively. On July 1, 2020, Qingdao conducted a safety assessment on the bathing beach, and opened beaches with a region-specific, multi-level targeted approach according to the results of safety assessment. The beach tourism market started witnessing positive signs after the pandemic. To ensure tourist’s safety, the capacity of tourists was strictly controlled in outdoor places, changing room, catering and other public areas, and facilities and equipment were limited to open with the use of reservation system. On August 19, 2020, the Ministry of Culture and Tourism of Qingdao proposed to resume cross-province tourism, and cooperated with domestic online news media and OTA platforms, and successively launched beach concerts, beach sports events and other activities, such as Qingdao Beer Festival. Coincided with the summer, beach tourism achieved a rapid recovery with the joint action of multiple positive factors.

Comprehensive revitalization period (after 2020.10): At present, the pandemic is still spreading around the world. To prevent foreign infected cases from importing to China, the inbound tourism market is still limited. China proposed the new development paradigm featuring dual circulation, in which domestic and overseas markets reinforce each other, with the domestic market as the mainstay. According to this, the long-term recovery of beach tourism seems to be promising relying on the huge domestic tourist market. Qingdao took “marine culture” as the core, aimed at important holidays, focused on the parent-child market and the cruise market, and promoted tourism market with Japan and South Korea as the breakthrough point of the inbound market. During the National Day in 2020, the number of tourists has recovered to 59.08% in 2019, the tourism revenue has recovered to 49.78% in 2019, and the number of tourists during the Spring Festival in 2021 has recovered to the same level in 2019.

4.1.2. Impact of COVID-19 on the tourism enterprise in Qingdao

The sudden pandemic has yielded a great impact on the travel agency, OTA platform, accommodation, catering and other tourism enterprises in Qingdao. At the beginning of the outbreak, owing to travel bans and social distancing norms, there was a decline in tourists’ willingness and access to travel, which led tourists to cancel travel plans and hotel reservations. Tourism enterprises responded positively to the national call for the implementation of free cancelation service at the first time, and travel agencies and OTA platforms were engaged in dealing with growing cancellations. Likewise, tourism accommodation and catering were closed, the operation times of transportation decreased significantly, and the cash flow of tourism enterprises was almost interrupted. Meanwhile, the basic operating costs of tourism enterprises were very high, including fixed costs such as rent, employee salary and taxes, which made tourism enterprises face huge financial pressure. Notably, tourism enterprises’ recovery will still be influenced by the global situation. Due to the economic recession, short-term vacation, and tourist’s psychological panic, the market prospect is still unclear. The effects of the COVID-19 pandemic on beach tourism industry and

![Fig. 2. The methodological framework.](image-url)
4.2. Beach tourist behavior under the “new normality”

4.2.1. Reliability and validity analysis

The calculation of the questionnaire’s reliability was based on the Cronbach’s Alpha coefficient. The α for this questionnaire was 0.837 (>0.8), which indicated a relatively high reliability. The KMO value was 0.878 (>0.7), indicating that the validity of the questionnaire was good.

4.2.2. Tourists’ profiles

Among the 394 tourists, the proportion of men was 34.36% and the proportion of women was 65.74%. The majority of tourists were in the age class of 18–45 years, accounting for 78.18%. With regard to monthly income, a lot of tourists (42.64%) reported that their income was between 2000 and 10000 yuan. Totally, most of the tourists (80.45%) had junior college degree, college degree and master’s degree or above.

4.2.3. Analysis of tourists’ perception of external environmental conditions

Under the ongoing prevention and control of the pandemic, the majority of tourists (63.95%) did not feel or slightly feel fear and anxiety about the pandemic. Most tourists (85.78%) showed that they would not go to beaches in high-risk of pandemic, the majority of tourists (83.75%) attached great importance to the emergency measures for the pandemic, and many tourists (73.60%) expressed concern about service personnel’s health (tourists who chose strongly agree and agree). Most of these tourists (67.53%) said that discounts and promotion would stimulate them to carry out beach tourism, and the bulk of the beach tourists (67.53%) believed that the beach tourism industry had not recovered from the first wave of the pandemic.

4.2.4. Analysis on the internal psychological characteristics of beach tourists

“Access to nature” was the primary motivation of beach tourists (79.18%), followed by “building relationship with family and friends” (62.18%) and “keep healthy” (44.41). Many tourists (64.21%) recognized the importance of the use beach with the reservation system, a lot of tourists (69.79%) agreed to promote the flexible vocation system, and 79.44% tourists thought it was necessary to promote separate dining system (tourists who chose strongly agree and agree). Most of tourists (84.51%) preferred to choose brand enterprises with higher hygiene standards, and 87.56% tourists were willing to choose free cancellation service (tourists who chose strongly agree and agree). Furthermore, some tourists (41.11%) would buy tourism insurance, some of the beach tourists (28.17%) were not sure, and 30.72% tourists would not buy, indicating that tourists had no obvious preference for tourism insurance. Tourist’s perceptions, attitudes and preferences are analyzed in Fig. 5.

4.2.5. Analysis on the travel decision-making behavior

Travelling with family (65.73%) was the most popular choice. Tourists preferred to travel in their city (66.88%) and cross-city tourism in the province (53.57%), showing that local tourism became the hotspot. For transportation, a number of tourists (70.50%) chose train or high-speed rail and 47.71% tourists chose self-driving. Most tourists (85.78%) noted that they strictly implemented self-prevention and control measures, such as wearing masks and detecting body temperature. Additionally, social media (75.38%) and short video APP (50%) were the main channels for tourists to obtain information. Behavior characteristics of beach tourists are analyzed in Table 1.

4.3. Beach management strategies under the ongoing prevention and control of the COVID-19

The COVID-19 pandemic is a major public health emergency with the fastest spread and widest range of infections and has been the most difficult to prevent and control, with prospects still far from certain. It is important for beach destination to develop strategy to meet tourists’ need and maintain beach environment health, and implement of epidemic prevention and control measures in tandem with those aimed at getting the economy back to normal. Based on the results, this paper presented major beach management strategies that should be implemented by the beach destination under ongoing prevention and control (Table 2).

4.3.1. Pandemic prevention and control strategy

Beach is the key area of large-scale population flow, and beach tourism has the characteristics of wide range, large mobility and long chain. To curb the spread of the epidemic on the beach, beach destination should establish dynamic management system and set forth appropriate strategies corresponding to different phases of the pandemic to improve the scientific, accuracy and pertinence of epidemic prevention. “Early detection, reporting, isolation and treatment” should be a definite principle put forward by beach destination for epidemic prevention and control.

- Open beach with region-specific and multi-level approach

![Fig. 3. The effects of the COVID-19 pandemic on beach tourism industry and enterprise.](image-url)
Coastal regions need to conduct a comprehensive analysis of local population and epidemic severity, and divide into low-, medium-, high-risk regions. Beach destination can adjust to dynamic strategies based on science-based classification of the virus risk and the emergency response level and take appropriate prevention and control strategies accordingly. When the epidemic is serious, coastal areas can completely close beach, facilities and equipment, and stop traffic operations to prevent the epidemic from spreading through beach activities. When the epidemic is effectively controlled, it is necessary to meet the needs of tourists and epidemic prevention requirements and open beach with region-specific and multi-level targeted approach. It would be crucial to evaluate safety risk of facilities, places and areas before opening, which focused on the facility status, use frequency and the characteristic of gathering and dispersion. Based on the evaluation results, coastal areas can better prepare for different scenarios, such as open, partially open or close beaches, facilities and places, and adjust the corresponding

Fig. 4. Tourist’s risk perception analysis.

Fig. 5. Tourists’ perceptions, attitudes and preferences.
Beach management strategies under ongoing prevention and control of COVID-19.

| Strategy | Specific measures |
|----------|------------------|
| Pandemic prevention and control strategy | - Open beach with region-specific and multi-level approaches  
- Control according to the source of tourists  
- Formulate emergency plan for pandemic prevention and control  
- The joint prevention and control mechanism  
- Timely and effective disposal of emergency situations |
| Emergency management strategy | |
| Tourist management strategy | - Entrance and exit management  
- Strictly control the capacity of tourists  
- Separate facilities and equipment |
| Service management Strategy | - Upgrade hygiene service standards  
- Strengthen employee health management  
- Promote intelligent services |
| Environmental management | - Properly dispose of personal protective equipment  
- Carry out beach disinfection  
- Beach environmental quality monitoring |
| Information communication strategy | - Timely disclosure of pandemic information  
- Popularize scientific knowledge of prevention and control  
- Publicize pandemic prevention and control measures |

Emergency plan for pandemic prevention is required to take timely and effective disposal of emergency situations. It is crucial to make overall arrangements for the leadership, organization, procedure and measure and clarify the emergency measures and disposal process for epidemic. It is also essential to implement the responsibility for epidemic prevention and control to tourism enterprises and staff. Service staffs on the beach need to acquire relevant knowledge and skills of epidemic prevention and have the ability to deal with the emergency situations.

The joint prevention and control mechanism

In all disaster situations, the first step involves the information of an efficient and responsible management team. At the beginning of the outbreak, beach destination needs to set up the management team in response to the need for epidemic combat. According to different epidemic response levels, beach destination starts the emergency plan for response and clarify the responsibilities and management measures for epidemic combat. Beach destination can implement the joint prevention and control measures to cooperate with health department and master the contact information in advance, which breaks down the boundaries of different departments and achieve coordination with high efficiency. It is significant to carry out registration for tourists and share the results with the health department, which can avoid the potential infection risk in advance. The COVID-19 scenario calls for innovative communication that can facilitate smooth and responsive exchange of information.

Timely and effective disposal of emergency situations

If suspected cases are found, beach destination need to stop tourism activities immediately, report to the health department in time and cooperate with health departments in epidemic investigation and prevention measures. Once a confirmed case occurs, it is urgent to immediately start the emergency plan, establish an epidemiological investigation team, and accurately track and cut off the route of virus transmission. These measures help to accurately and rapidly find close contacts and isolate them without delay and effectively identify and block the infection source. Relying on big data and information system,
it is possible to improve the accuracy and efficiency of epidemiological investigation, realize early, rapid and complete case discovery, and conduct medical observation on asymptomatic infected persons and close contacts to reduce the risk of infection. Comprehensively check out all confirmed and suspected patients and their close contacts to cut off the route of virus transmission as soon as possible.

4.3.3. Information communication strategy

Concerning communication, the COVID-19 pandemic scenarios call for innovative communication that can facilitate smooth and promote tourists to form a correct cognition and guide tourists to take conscious action. The epidemic information should be released in an open, transparent and responsible manner, so that tourists can timely and comprehensively understand the measures taken by beach destinations to deal with the epidemic, and take ‘tourists fully informed’ as an important prerequisite for building good communication and interaction between beach destinations and tourists.

- Timely disclosure of pandemic information

It is necessary to launch the daily pandemic data reporting system, provide timely and comprehensive accurate information, and report all kinds of data such as newly confirmed cases, existing suspected cases and close contacts every day. Beach destinations could make use of big data technology to innovate and update the “pandemic map” in time, indicate the specific location, distance and number of people of the pandemic spread through the community name, address and location, and timely publish traffic control measures, which provides reference for tourists before they go to the beach.

- Popularize scientific knowledge of epidemic combat

Beach destinations need to adhere to popularize scientific knowledge of epidemic combat to tourists to help to carry out correct epidemic prevention. Signs, posters, publicity videos can be set at entrance and exit and key regions to popularize scientific epidemic combat knowledge, guide tourists to consciously comply with the requirements such as checking body temperature and wearing masks, and remind them to practice social distance.

- Publicize pandemic prevention and control measures

Beach destinations should deeply publicize the measures taken to ensure the safety of tourists and fully report the effectiveness of beach destination epidemic prevention and control to restore tourists’ confidence. It is significant to publicize the safety image of beach destination, make tourists fully informed, and establish a good information communication mechanism between tourists and beach destinations.

4.3.4. Tourist management strategy

Tourist management is the top priority for the safe operation of the beach under the new reality. Because virus carrier may develop symptoms such as fever and cough or asymptomatic carrier, tourist management strategies can be proposed by avoiding contact and preventing agglomeration as the core.

- Entrance and exit management

Entrance and exit are the primary node of tourist management and the key part to control the capacity of tourists and prevent the virus carrier from entering to the beach. At the entrance of the beach, deploying tight inspection measures such as checking identification code, investigating travel information and checking the body temperature can effectively cut off the infection source. For the elderly who cannot operate smart phones, alternative measures such as registration can be taken. Also, remind of tourists to wear masks correctly and refuse those who do not wear masks or have abnormal body temperature to enter. During the pandemic, necessary personnel at entrance and exit are considered necessary to guide tourists to abide by order and avoid close communication and physical contact.

- Strictly control the capacity of tourists

Tourist capacity control is an effective means to prevent agglomeration and reduce close contact. The capacity of beach tourists during the epidemic should be scientifically predicted and reasonably limited, which can be dynamically adjusted according to the risk level of the epidemic. The beach can be managed by zoning system and divided into different areas, such as activity area, rest area, and swimming area. Tourists can book specific time and area of the beach through the reservation system, which can guide tourists go to the beach at intervals. It is useful to ensure more tourists have the opportunity to enjoy the beach, and change the passive on-site diversion management into active pre-trip reservation management. Technology is a tool to monitor the distribution and density of tourists, which is helpful to evacuate tourists to avoid the risk of congestion and infection.

- Separate facilities and equipment

As it is easy for tourists to gather in areas with facilities and equipment, facilities and equipment are required to scatter to maintain safe social distance. The changing room can use the reservation system to control tourist capacity and keep tourists at safe distance during dressing and flushing. Lounge chairs, umbrellas, tents and other facilities on the beach are required to set up separately to enforce social distance and clean and disinfect after each use. Separate dining space and tables, or provide takeout service are necessary measures. Also, it is critical to close the toilet or keep the toilet disinfected regularly every day. One “entrance and exit” can be provided on the beach to limit face-to-face contact between tourists moving in the opposite direction.

4.3.5. Service management strategy

Under the ongoing prevention and control of the COVID-19, tourists put forward higher requirements for beach tourism service quality, restoring tourists’ confidence is critical to tide through the pandemic. Tourists attach great importance to hygiene, so that hygiene standards are facing the challenge of upgrading, and the psychological resistance to close contact requires digital and non-contact service.

- Upgrade hygiene service standards

It is interesting to note that service places should be equipped with sufficient protective goods. For instance, masks, temperature monitoring equipment, disposable gloves, hand sanitizer, and disinfectant are needed. Public areas should take strict hygiene and sanitary measures to secure tourists’ safety. These measures include conducting complete disinfection, specifying the scope and frequency and recording the disinfection time and responsible person. There is an emerging trend to update their cleanliness procedures and adopt cleaning technologies for enhanced disinfection to meet tourist’s need. Tourism enterprise can also take advantage of health certificates certified by the health expert association, launch specific cleaning standards for COVID-19, and establish standardized disinfection procedures covering all contact points. They should explain about their protective measures to tourists,
and thus invite them to supervise the whole process of cleaning on site, and release relevant processes on platforms to restore their confidence. Catering services are also facing the upgrading requirements. We recommended that hotels should provide separate dining habit to reduce the cross infection of the virus. At the same time, control food hygiene and ensure its information can be queried and tracked.

- Strengthen employee health management

Employee’s health and safety is the basic guarantee for normal operation and an important embodiment of beach epidemic prevention ability. Tourists have close contact with service staff during tourism, strict health monitoring and personnel management need to be taken to firmly prevent the spread of the virus. Register the health status of employees every day, check their identification code, travel information, and body temperature before working. Employees are required to wear masks when working and enforce social distance during work to avoid agglomeration.

- Promote intelligent services

Service places should implement technological solutions to provide contactless service and assure tourists of service safety, such as providing self-check-in, remote check-in system, face-scanning, robot delivery service, robot cleaning system, and mobile payment system, which could improve tourism service quality and optimize tourists’ experience. These services aimed at avoiding tourist contact and minimizing tourist stay in public areas, and thereby contributed to reducing the risk of pandemic transmission and cross-infection. Based on the big data, artificial intelligence and mobile communication, tourism enterprises can collaborate with the social media such as WeChat, short video APP and live broadcast to conduct smart marketing and preferential data, artificial intelligence and mobile communication, tourism enterprises can collaborate with the social media such as WeChat, short video APP and live broadcast to conduct smart marketing and preferential activities, which will realize the transformation from tourist demand to consumption. With the gradual stabilization of the epidemic, tourist may pay more attention to the measures to avoid economic losses, and free cancellation service can be provided to meet their needs.

4.3.6. Environmental management strategy

In the long run, the epidemic has brought new threats to the beach environment. Beach environment strategies will be crucial for beach destination to ensure tourist safe, keep beach healthy, avoid beach environmental pollution and realize beach sustainable development.

- Properly dispose of personal protective equipment

During the pandemic, the number of personal protective equipment increased rapidly, resulting in a large number of waste masks, disposable gloves and other wastes. It is important to set up special garbage collection containers and classify the garbage according to its type. It is also crucial to guide tourists to put waste masks, disinfectant wipes into the special containers to avoid cross infection. Also, sufficient cleaning personnel can be allocated to clean the garbage every day.

- Carry out beach disinfection

Sanitation and disinfection management is a basic measure to prevent virus transmission. In the early stage of the pandemic, in order to effectively deal with the pandemic, a large number of chemical disinfectants are used for disinfection at beach destinations. By providing natural disinfectants, many beaches are available to avoid chemical contamination.

- Beach environment virus detection scheme

SARS-CoV-2 may be spread through seawater or sand, so virus detection plan should be set up at beach destinations and measures should be taken to ensure the safety of tourists. As the virus may spread through feces, sewage discharge into the sea should be prohibited without monitoring, and an effective scheme to detect whether the wastewater contains virus can be formulated.

- Beach environmental quality monitoring

Various wastes generated by tourists will cause serious pollution to sea water, beach and air, and affect local plants and biodiversity. It is important to control the discharge of various wastes, use scientific methods to record the changes of the beach environment, closely monitor the beach morphology, physical, chemical and biological variables, and scientifically evaluate the impact of the epidemic on the beach environment.

5. Discussion

5.1. Theoretical implications

(1) This study makes a comprehensive analysis of tourists’ psychology and behavior under the ongoing prevention and control of the pandemic with the help of tourism psychology and tourism behavior theory, which analyzes tourists’ perception of the external environment conditions, tourists’ internal psychological features and tourists’ travel behavior decision-making. The results provide an important reference for the research on tourists’ behavior under the pandemic in the future.

(2) This study explores the beach management strategy under the new reality, and uses an interdisciplinary method to explore the beach management strategy with related issues, involving tourism, psychology, health science, environmental science and so on, which provide important references for research on beach management.

5.2. Practical implications

(1) The uncertainty of the pandemic brings a lasting impact on global beach tourism. This study combined with the effective strategies of COVID-19 combat, including open beach with region-specific and multi-level approach, the strict control of the source of tourists, the emergency plan of pandemic combat, and the epidemiological investigation. The anti-pandemic experience and strategies of Qingdao’s beach tourism would respectively help the beach tourism in other parts of the world to undertake effective anti-pandemic actions.

(2) According to practical problems such as the surge of personal protective equipment and the use of a large number of disinfectants caused by the epidemic, this study contributes to practical implications by recommending beach destination to dispose of personal protective equipment properly and monitor environmental quality regularly that may help to maintain beach health. At the same time, because COVID-19 may spread through seawater or sand, we proposed to establish a virus detection plan, which can effectively reduce the risk of epidemic transmission. The proposal of beach environmental strategy is helpful to avoid beach pollution and realize the healthy and sustainable development of beach under the new reality.

(3) This study points out the direction for improving the service quality of beach destinations according to the needs of tourists for safety and health under the normalization phase. Moreover, in this study we found that ecological tourism, family tourism and health tourism became the focus of tourist’s consumption, which has important practical significance for beach destinations to focus on local tourism market and nature and health to adjust their products and services. By comprehensively grasping the psychology and behavior of beach tourists, this study is
During travelling, the majority of beachgoers would take the initiative to effect prevention measures and the ability to deal with emergencies. Telling, they paid great attention to whether beach destination had pre that most beachgoers would not go to the high-risk areas. Before travelling, the greedy to the beach destination and checked the information about the prevention and control. The local government actually released this information to the public. The beach destination and the enterprise under the government’s guidance actively released a variety of epidemic prevention and control information, and realized positive communication with tourists. Live broadcast innovated tourism marketing methods. In terms of policy, in the future, it is critical to adopt policies such as flexible vacation system, issuing coupons and upgrading service standards to provide policy support for improving tourists’ consumer confidence.

With the normalization of epidemic prevention and control, beach destinations should improve the scientific and accuracy of epidemic prevention to effectively respond to emergencies, timely release epidemic information, and realize positive communication with tourists. Effective strategies to prevent tourists from gathering and upgrade service standards to avoid contact are crucial to secure beaches managed safely during the COVID-19 pandemic. By properly disposing personal protective equipment and formulating environmental virus detection scheme, beach destinations can avoid pollution and realize the healthy and sustainable development in the long run.

5.3. Limitations and future research directions

(1) The epidemic is currently wreaking throughout the world, and the impact of the epidemic on tourists’ behavior is also evolving all the time. On the basis of this study, longitudinal in-depth research can be carried out to explore the changes of tourists’ psychology and behavior in different stages of epidemic development to further verify the conclusions. Furthermore, under the pandemic, there are differences in the demand of different types of tourists (such as leisure and business tourists, group and individual tourist). Further market segmentation is possible and necessary, and the underlying reasons for the difference in tourism demand are necessary to explain through next research. In addition, even in countries with serious epidemic, beaches still attract a large number of tourists. Therefore, it is crucial to investigate the risk perception of those and explain the underlying reasons for their risk-taking behavior, which can provide effective suggestions for beach management in the future.

(2) Taking Qingdao, China as an example, this study points forward relevant strategies for scientific management and safe operation of beaches under the pandemic prevention and control, and highlights the “China plan” of beach management under the new reality. However, there are great differences in political, economy and culture among countries all over the world, and the effectiveness of beach management strategy is worthy of further discussion.

6. Conclusion

This paper taking Qingdao as an example, analyzed the impact of the COVID-19 pandemic on beach tourism industry and tourism enterprise, and explored beach tourist’s psychology and behavior under the regular prevention of COVID-19. Combined with Qingdao’s experience of epidemic prevention and control and beach management, comprehensive strategies are proposed to secure beaches can be managed safely and scientifically, which will provide references for tourism management in other areas of the world.

At the beginning of the pandemic, the strict quarantine measures temporally blocked beach tourism consumption. However, as the pandemic was gradually brought under control, beach management implemented consumption incentive policies focusing on local tourism and provincial tourism, and these policies gradually activated the corresponding tourism market, which made beach tourism realize an orderly recovery. As an important supplier of tourism products and services, tourism enterprises encountered many problems such as the reduction of orders and the surge of cancellation under the epidemic, whose survival and development faced great challenges in the future.

Under the regular epidemic prevention and control, it is crucial to master the psychology and behavior of beach tourist. This study showed that most beachgoers would not go to the high-risk areas. Before travelling, they paid great attention to whether beach destination had pre-vention measures and the ability to deal with emergencies. During travelling, the majority of beachgoers would take the initiative to implement personal protective measures to reduce the risk of infection. Meanwhile, the effect of the pandemic on consumption behavior of beachgoers is all-round. Ecological tourism, health tourism, and family tourism became the core pursuit of beachgoers. Safety and hygiene have become the top priority for tourists. In addition, the quality of tourism services has also received special attention, especially in terms of cancellation services.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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