A Development Strategy for the Revival of Tourist Hotspots following the COVID-19 Pandemic

Hugo Bautista[1,*], Gulnara Valeeva[2], Victoria Danilevich[2] and Alfiya Zinovyeva[2]

[1]*Department of Service and Tourism, Institute of Economics, Kazan Federal University, Russian Federation*

[2]*Department of Service and Tourism, Institute of Management, Economics and Finance, Kazan Federal University, Russian Federation*

Abstract: The ongoing Covid-19 crisis has hit many sectors and industries in the hardest possible way. Travel and tourism-related activities have not been an exception. We contend that a systemic approach can be developed and implemented in order to trace and certify individuals who do not present an epidemiological risk to other people, and also to manage their close interaction. This could lead to the certification of a large proportion of the population—millions worldwide—as not representing a risk of infection to others. It can justify the implementation of a system that can speed up the reactivation of several economic sectors and industries, protecting jobs and accelerating economic recovery in many countries. People who have been ill with Covid-19 have acquired the corresponding antibodies and, therefore, have immunity to the disease, they could travel freely, thereby helping to reactivate the economy. We will explain in this paper how a number of high-tech tools can be implemented as a crowd control system to identify those who do not represent a risk to others, either because they have acquired immunity or because they can be regarded as not carriers of a communicable disease. We devise a method based on the use of a 3D-diagram that shows the existence of an inverse relation between the number of tests performed and the number of individuals that have contracted the disease. The results of the study suggest that the implementation of a new epidemiological tourist strategy in Cuba can help to reactivate tourist activities in the country while avoiding the creation of new hotbeds of infection for Covid-19.

Keywords: Covid-19, epidemiology, Cuba smart-quarantine, SARS-CoV-2 antibody test, post-epidemiological tourism.

1. INTRODUCTION

Coronaviruses are a group of pathogens that cause diseases in birds and mammals. In humans, they cause respiratory tract infections with gravity ranging from mild to deadly (Gorbalenya, 2020). SARS-CoV-2 first appeared in Hubei province in December 2019, before spreading rapidly throughout China. So, 67 803 Covid-19 cases, including 3220 deaths, have been reported (June 2020) in Hubei province, which has a population of around 58 million (Bacon, 2020).

The Covid-19 pandemic is deeply impacting tourism worldwide. It has substantially reduced the flow of people travelling to Cuba either for pleasure or for business. Tourism is the second source of income for Cuba, with 10% GDP. Just before the pandemic, the flow of tourism to the island actively increased, generating more than half a million jobs between 2018 and 2019 (Ministry of tourism, 2020).

The spread of Covid-19 may have a negative impact on Cuba's economy with adverse consequences on microeconomic, delaying or even killing medium-scale capital investment. Without a doubt, the economic impact of Covid-19 will be more serious than the Severe Acute Respiratory Syndrome (SARS) in 2003 or the Ebola epidemic in the 1980s (Richter, 2003). However, not everything is as apocalyptic as it seems.

We must also remember that Covid-19 is not nearly as deadly as Ebola (mortality rate average of about 50%) (Swapnil, 2020). The coronavirus has a lengthier incubation period, between exposure to the virus (becoming infected) and symptom onset, is on average 5-6 days, however can be up to 14 days, making it more difficult to trace and contain affected individuals (WHO, 2020).

The number of people recovering from Covid-19 infections will increase rapidly and these people would be the first travelers in the post-viral world.

In the 1990s, when international tourism began to be seriously developed in Cuba, almost all products for hotels, from floor tiles to towels, had to be imported since they were not produced by the country under the high quality standards that tourism demands (Swapnil, 2020). Today, around 60% of Cuban tourism consumption is Cuban-made, which also generates hundreds of thousands of jobs in agriculture, transportation, construction, light industry, and construction materials industry (Gorbalenya, 2020) (De Miranda M. and Vidal A.P., 2003).

*Address correspondence to this author at the Department of Service and Tourism, Institute of Economics, Kazan Federal University, Russian Federation; E-mail: HBEspinoza@kpfu.ru

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All the foregoing urges all nations to search for alternatives to alleviate unfavorable conditions and recover a significant percentage of tourist activity by adjusting to the new reality in the context of the pandemic. As long as national and international tourism is re-channeled in a safe, responsible, but above all, controlled way, the coronavirus and its accompanying disease, the Covid-19, will not spread into the population of tourist hotspots at all, nor will it endanger workers and their families and neighbors.

It is possible to revive tourist activity in certain territories as long as they possess certain characteristics and infrastructure. The ones which will be first in line to qualify for, and benefit from, any reactivation plan will have to be those who comply with at least two characteristics:

- They must already possess well-developed infrastructures and be located near airports.
- They must be located far away from highly populated cities.

Just because a hotspot has white and sandy beaches, natural reserves, archaeological ruins, golf or health facilities will not make it to the shortlisted hotspots.

1.1. Qualifying Latin American Countries

Territories such as the Galapagos Islands in Ecuador, the Rivera Maya in Mexico, Easter Island in Chile, or the tourist hotspots in the northern and southern Keys of Cuba, among others, stand out with many possibilities.

Multiple scientific disciplines can provide new ideas and innovative ways of doing things differently or more efficiently. They can provide new avenues to deal with situations that require a solution in many different fields. The field of tourism is no stranger to this. Anthropology, sociology, ecology—and without a doubt, epidemiology—are devoted to studying human interaction with its surroundings and with other human beings and can provide solutions for situations that have a direct or indirect impact in the way people travel and move around in a world which is more interconnected than ever. Epidemiology has always played a crucial role in both understanding and solving the challenges to the health of large populations. It focuses on the frequency, distribution and the determining factors of a disease viewed as a major threat to a given population—big or small. We need a recovery plan wich will enable us to:

- secure an efficient follow-up of millions of individual behaviors and
- identify patterns of conduct, commute, geographical mobility, and such amidst a virus-induced pandemic.

Any campaign focused on recovering the financial health and commercial viability of the tourism industry must be able to accurately evaluate both the risk of a traveler carrying a communicable disease and a data system that can reasonably assess the level of real risk that an individual has of being exposed to an infectious agent (be it a virus or a bacteria). This system must also be able to manage and control the comings and goings of individuals certified as being healthy. In order to allow some people to leave confinement and to protect all those individuals who cannot help but to come in contact with others, a system can be implemented to monitor individual interaction and:

- To minimize the risks of infection during interaction,
- ensure the traceability of every individual certified as no-risk,
- trace and survey every person as having the potential to infect others or be infected by others.

The purpose is to facilitate the immediate traceability of each individual's transportation, destination(s), duration of stay, purpose of travel, standards of accommodation, food hygiene and sanitation, traveler's behavior, and underlying health of the traveler. The majority of people infected with Covid-19 will recover (death rate 1.3%) and generate antibodies that help protect them from becoming infected again (herd immunity). We propose a created model with epidemiology and artificial intelligence to organize tourism flow. First, we use portable devices, mobile cloud computing, and the internet. Second, we use antibody tests to identify people with acquired immunity, i.e. pertaining to different levels: city, region, country, etc. The world of tourism requires a well-thought plan which has to be divided into several stages before it can be fully implemented. The island of Cayo Coco in Cuba could be the ideal laboratory because, unlike other tourist centers in the country, it is isolated from Cuba mainland, has an airport with international flight capabilities, as well as high-level

medical care facilities. Staff members working for tourism providers presently work in sets of a twenty-day rotas with clear shift schedules. This method is ideal as it covers the virus window stage, thereby safeguarding the health of employees and the rest of the population as well. Our main purpose is to design and quickly implement a new post-epidemiological tourist strategy while avoiding of a hotbed of infection for Covid-19.

2. METHODS AND MATERIALS

Let us consider the example of Cuba, which has several territories with potential for exploitation in times of pandemic. This country, although small, has more than a dozen international airports capable of harboring large aircrafts, and some of them are conveniently far away from highly populated centers and very close to beach destinations. Among these spots, we can mention Cayo Coco, Cayo Largo del Sur, Cayo Guillermo, Cayo Santa María, and others. The presence of airports at these places or nearby them as well their relative isolation make them ideal and allow the authorities to avoid intensive contact of tourists with the local population. At a later stage, as the system proves to be successful, after more experience has been gained, it could be extended to other less isolated Cuban tourist areas, such as Varadero, Guardalavaca, and Santa Lucía.

Alternatively and in addition, the conditioning of provisional facilities could be considered around unexploited beaches, but near airports that are not prepared to receive international flights, such as those of Baracoa, in western Havana, and San Julián, in the province of Pinar del Río. It would be necessary to create the necessary conditions to operate international flights, such as customs and control towers. It would have to be evaluated whether the characteristics of the runway can support large aircrafts and the feasibility of increasing the possibilities of the runway (its length, the weight of aircrafts, fuel supply capacity, etc.).

To gain insight into the problem, we rely on a 3D phase diagram similar to the one used in natural sciences. A 3D phase diagram is plotted along the Cartesian axes. The 3D diagrams are a type of graph in which three different conditions (such as Pressure, Volume and Temperature). It shows the conditions at which different parameters occur, coexist and have relationships between them (Predel B. *et al*., 2004). The 3D phase diagram method assess helped assessing how the implementation of the tracking system can affect the number of infected persons. As the diagram indicates, the more tests are performed, the less the number of deaths due to Covid-19.

2.1. Hotspot: Cayo Coco

It is an island located near the central part of Cuba, well known for its all-inclusive resorts. It lies within the Ciego de Ávila province and is part of a chain of islands called King's Gardens (Jardines del Rey). Cayo Coco is administered by the municipality of Morón, has a surface area of 370 km^2 and is named after the white ibis, locally called coco (coconut) birds (Ministry of tourism, 2020). The island is known for its long beaches and many resort hotels. Cayo Coco and the neighboring Cayo Guillermo provided settings for Ernest Hemingway's Islands in the Stream (Salinas, 2018) and The Old Man and the Sea. The island has its own international airport, the Jardines del Rey Airport (Aeropuerto Jardines del Rey; airport codes IATA: CCC, ICAO: MUCC). Since 2005, tourists can fly directly in to the airport on Cayo Coco. An earlier airport, the Cayo Coco Airport has been reclaimed as a small natural park called Parque Natural El Baga (Figure **1**).

2.2. Hotspot Staff

The entire tourism system must be prepared to isolate workers from tourism facilities for a period of several weeks residing in the tourist area, in addition to a post-work quarantine period, before a rest period in their homes. In other words, we are proposing to alternate several teams of staff, so that they work in the facilities, for example, 50% of the time, while 25% are quarantined remain in quarantine for 25%, and rest in their homes for the remaining time (25%) (WHO, 2020). The impact on workers' family life must be assessed carefully.

In the case of the Cuban tourist spot Cayo Largo del Sur, since it is located on a small island quite far from the main island of the Cuban archipelago (the island of Cuba), as the workforce alternates between a period of several weeks of work on the field, and a rest period outside the said hotspot, at home. A quarantine period should be added to this system. However, by now the strategy is different from the one implemented at of Cayo Coco, Cayo Guillermo, and Cayo Santa María spots, since most of the staff travels daily by road from home to the facilities, through the so-called "pedraplenes", embankments built on the sea to connect these small islands with the main island.

Figure 1: The hotspot study area: Cayo Coco, Cuba (22.5090° N, 78.4070° W).

2.3. Ongoing Tourist Tracking

Smart quarantine and tracking are already used in various cities worldwide to contain the spread of Covid-19. Upon arrival in Macao and Hong Kong, returnees receive a quarantine tracking bracelet (Salinas, 2018).

Using a smartphone application, the whereabouts of the quarantined person are monitored and the violations are reported to the authorities.

Technologies like this have been driven by strategic alliances between *weechat* (Chinese variant of whatsapp), *Alipay*, and the government. These applications help determine the person's state of health by means of algorithms. Mainly, three codes are handled. The code can vary from green (risk-free person), yellow (moderate risk with the need for temporary isolation) and red (indicates the mandatory isolation for 15 days).

2.4. Control Measures

Thermosensing devices. For guest's health care, is necessary to install a thermal imaging control-body temperature, especially inside airports.

Serology tests and PCR have been developed and used by South Korea and Taiwan. The information collected from these antibodies tests is linked to the site coronatracker.com. There, the data received is widely administered. The site provides such options as update news, recommendations, online medical support, relaxation therapies, and even job offers for those who have undergone such tests (Leung, 2020).

In India, it has been decided to put stamps with indelible ink both in passports and in the hands of the people who enter the country. It is about controlling the movement of people, and it is also indicated until when they should remain in home isolation if necessary.

2.5. The "Ejercicio METEORO" (METEORO Exercise) and the Cuban health System

For more than four decades, Cuba has implemented a program of immediate response in cases of natural disasters. It is known as Exercise METEOR. The population performs these exercises or simulations on an annual basis. It is based on the simulation of crowd dynamics and pedestrian motion. Meteor's main objective is to educate the population by focusing on interest groups who have direct access to and influence on large audiences. It soon became clear that it does not only take "training" to raise awareness in preventing catastrophes (which also includes diseases), it also requires active participation in delivering effective and efficient healthcare services and products to the communities (Leung, 2020; Ministry of tourism, 2020). Mental and socio-cultural factors which determine good health status must also be addressed. Permanent efforts to develop

biotechnological products as the interferon Alfa2 B have allowed Cuba to collaborate at a global scale with the WHO front epidemics like the Ebola, VIH, and of course, the Covid-19 in Africa and other continents (Leussink & Swift, 2020; Ministry of tourism, 2020).

2.6. Nucleic Acid, Antigen Antibody, and Antibody Tests

There are three types of tests available: acid tests, antigen and antibody tests, and antibody tests. Tests are usually performed on blood or oral discharge samples.

Nucleic acid tests (PCR) look for the virus itself in the blood and involve drawing blood from a vein. Although nucleic acid tests can detect Covid-19 earlier than other types of tests, they are very expensive and are not routinely used as screening tests unless the person has recently had a high-risk exposure or possible exposure and present early symptoms of infection (Avraham, 2015; Tregubova, 2018).

Antigen and antibody tests look for both antigens and antibodies against Covid-19. The immune system produces antibodies when exposed to a virus. Antigens are substances foreign to the body that trigger activation of the immune system. In people with Covid-19 infection, a type of antigen called SARS-CoV-2 is produced.

Antibody tests are what we plan to use. Usually the people have a period of immunity after being exposed to a microbe and recovering from illness. Antibody tests are done with blood drawn from the finger stick; your body makes these antibodies within about a week of infection (Figure **2**). These are the potential tourists from Cayo Coco.

3. SUMMARY

The revival of tourism hotspots is a major undertaking and involves numerous technical challenges:

3.1. Provide Antibody Tests to Potential Tourists

Applicants may be tested for the presence of antibodies to know eligibility. A digital card will be issued to customers with very high probability of being non-contagious. In the absent of a vaccine, this is the best that can be offered for the time being (May 2020).

3.2. Controls at the Airports

Controls at the airports of origin and arrival, through digital platforms open to the public.

3.3. QR-Code

Implementation of bracelets with QR code for both passengers and service personnel on the island of Cayo Coco. The passenger receives the bracelet when crossing the border of departure from their country, and through the QR the body temperature (and other warning symptoms) can be recorded at the beginning of the trip, during the flight and on arrival at the island. The services and migration staff will also have bracelets to know the date of arrival and departure from the island and a daily body temperature record with news related to your health that also offer traceability.

3.4. Collection Data

We have divided in 3 main areas our Ab test, QR bracelets and Health indicators. The data will be organised into a spreadsheet to keep a historical record and generate statistical data for the WHO and it

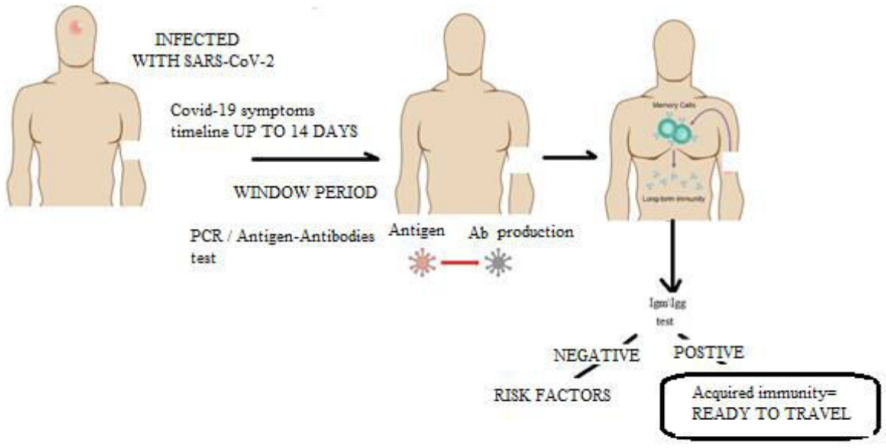

Figure 2: Immune response and how the antibody testing scheme can be carried out.

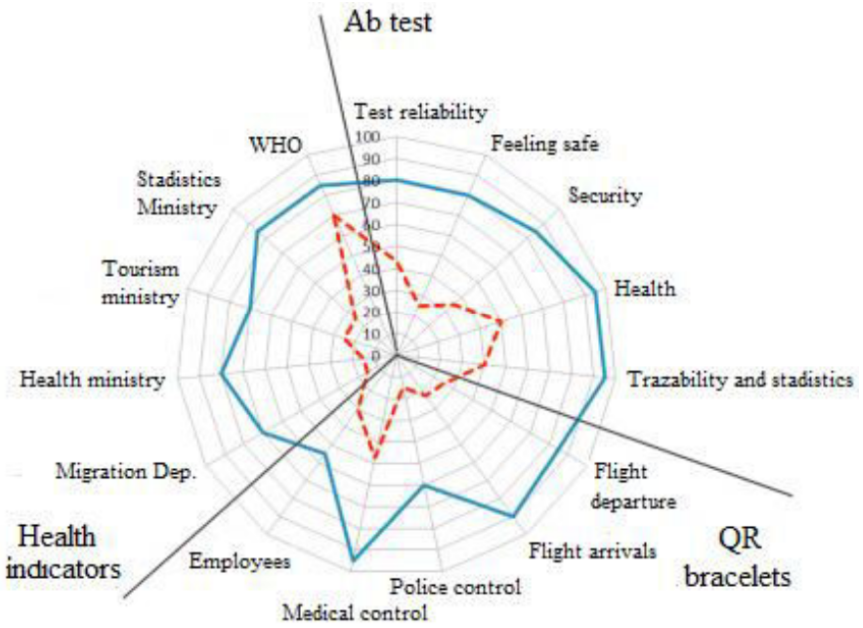

Figure 3: Integrated strategy for the revival of tourist territories post Covid-19.

could even be made available to other tourist hubs worldwide (Figure **3**).

Coronaviruses are a group of pathogens that cause disease in birds and mammals.

This pandemic is deeply impacting tourism, is reducing the flow of people to Cuba.

It is possible to revive tourist activity in certain territories as long as they qualify for having certain characteristics and infrastructure:

- hotspot staff
- tourist tracking and control measures
- post-crisis Cuban health system.

4. CONCLUSIONS

The world will recover from the Covid-19 pandemic as it always has after every disaster. It is the first time that we have seen a global epidemic at such an unprecedented scale transmitted in real-time thanks to the available mass media technologies. Therefore, it is possible to monitor the number of infected people second by second, which makes all of us vulnerable in some way. The use of Artificial Intelligence may be of interest in the creation of expert systems capable of accumulating and using the experience from regions with more capacity to react to adversities of this nature. Expert systems that implement such an approach in a short time could be helpful during pandemics in countries and regions that enjoy tourism potential but have not enough specialists to carry out the details of the change. One thing that has become obvious during this crisis is the fragility of the tourism industry. Home isolation and border closure are not a viable solution to combat the pandemic in the long term. The economic downturn could be much worse than all the adverse effects of any virus. At the same time, in the face of future threats that are similar to the Covid-19, such an updated expert system could become a globally available tool capable of assisting in the sustainable development of many territories with their consequent economic and social benefit.

We started this study in March 2020.For the time being–(October 2020), our ideas have been confirmed by the rules imposed all over the world and the strategy that has been implemented by the Cuban government in the field of tourism.

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