Marketing Information Systems in the Management of COVID-19

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Abstract. During the health contingency, marketing information systems constitute one of the main areas of control in public institutions, because the environment where they carry out their activities becomes increasingly complex. The speed with which data is generated, communication and the increase in uncertainty in the environment, generate that information becomes a key element for the management of COVID-19, therefore the importance of having a system that generates reliable, timely and effective information that supports making more accurate decisions based on the objectives to be achieved.

Keywords: Marketing · Information systems · COVID-19 · Mexico · Public politics

1 Introduction

The COVID-19 virus is one of the most complex phenomena humanity has faced in recent decades. It is a virus that spreads at high speed with relatively high mortality rate. It is perfect for generating chaos in today’s globalized society, concentrated in cities, with problems to attend the health of the population Llerena [16].

According to the International Monetary Fund (IMF) [12] the COVID-19 pandemic has involved an economic shock in both supply chain and demand and, in a few months, it has become the largest economic crisis the world has experienced since 1930.

Faced with alarming levels of spread and severity, as well as inaction, on March 11, 2020, the World Health Organization (WHO) declared that COVID-19 was going from being an epidemic to a pandemic.

When on March 31, 2020, the General Health Council of Mexico declared the national health emergency as an epidemic due to coronavirus COVID-19 (Ministry of Health, 2020) the issue was left to be solved by decision makers: politicians; those who govern and carry out health and economic policies and all those required in common agreement with health personnel. Orellana [19].
In crisis situations, communication is an essential strategic element to establish actions that allow reducing the reality of the situation; the consequences, that arise and the personal and collective implications that they entail in a context such as a health pandemic, where the number of factors multiplies and required communication mechanisms to maintain reliable and timely information to influence social behavior through methods and strategies of awareness and citizen education. Almansa-Martínez; Fernández-Torres, 2011; Názaro; Crozzoli; Álvarez-Nobell [2].

Government action becomes proactive with the information of the decisions, which are communicated in press conferences of the president and his ministers, configuring, therefore, the themes based on the decisions of the executive, as well as the decisions on how to cognitively structure the Covid-19 pandemic. Castillo, Fernández & Puentes [6].

In Mexico, starting with the declaration of a health emergency due to COVID-19, the federal government implemented a series of measures and actions to inform the mexican population in an effective and timely manner, in order to prevent the exponential spread of the virus.

Among the main political actors who have been involved to personally report on the measures, progress and results of the national health government strategies were: the President of Mexico and the Federal Undersecretary of Health; have been given press conferences called mornings news, with daily frequency.

The media, which information on prevention measures and progress of the epidemic was communicated were mainly: television, radio, press, government website and recently through a mobile application.

If the basic resources traditionally analyzed were land, labor and capital, currently information appears as another fundamental input to be valued in public and private organizations. Hernández [10].

Information systems have been established in recent years as a fundamental element in organizations. They are not only a set of computer programs and equipment, which are used in the daily management of productive activity; Its perspective has broadened and evolved over time, and from being considered as simple tool that reduced bureaucracy and facilitated transactions, it has come to be considered a strategic weapon that allows achieving sustainable competitive advantages. Hernández [10].

One of the most precise definitions of information systems is the one proposed by Andreu, Ricart & Valor [3] understood as a “formal set of processes that, operating on a collection of data structured according to the needs of the organization, collects, it prepares and selectively distributes the information necessary for its operation and for the corresponding management and control activities, supporting, at least in part, the decision-making processes necessary to carry out the organization’s functions in accordance with its strategy”.

Another of the most consulted definitions is the one proposed by Laudon & Laudon [15] who define information systems as a “set of interrelated components that capture, store, process and distribute information to support decision-making, control, analysis and vision of an organization”.

Every information system uses data as raw material, which it stores, processes and transforms to obtain information as a result, which was supplied to the different users
of the system, in which there is feedback, where it is evaluated whether the information obtained, fits as expected (Fig. 1).

![Fig. 1. Information system components.](image)

Information represents the basis of marketing, and has the potential to influence organizational management decisions. When marketers cannot control all the factors in a given situation, there is always the risk that they will make the wrong decisions. The task of an information system is to provide the necessary information so that those responsible for marketing decisions can make increasingly less erroneous decisions. Alba, Valencia & Mejía [1].

In addition to the need to have reliable, timely and effective information, a tool is required that allows the appropriate use and application of the information to achieve the strategic objectives set.

In this sense, marketing information systems (MIS) have at least two main functions: to assist in decision-making and to control the effectiveness of the decisions that have been made Kotler & Armstrong [14] considering several items shown in Fig. 2.

![Fig. 2. Marketing information system (MIS) model.](image)

What the MIS does is the mediation between what people want to know, what they need and what can be achieved. It also monitors the market environment and provides information that is required to make key marketing decisions.

According to the PAHO (Pan American Health Organization) [20] in coordination with the World Health Organization (WHO) to support and facilitate the effective execution of the three main functions at the level of care during the pandemic in a country (Fig. 3) it is essential to have strong health marketing information systems.
Public health in Mexico faces a historical challenge. COVID-19 represents a huge risk for the population that shows the historical deficiencies of the Mexican social and health system. This crisis has also led to questioning the definition of health and information priorities. The magnitude of the problem and the radical nature of the solutions have generated a great public debate, questions and critical positions. Barrientos, Alpuche, Lazcano, Pérez & Rivera [5].

2 Objectives

The objective of this article is focused on analyzing the role of marketing information systems in public decision making in Mexico, while facing the effects of COVID-19, in terms of prevention and control, through implemented marketing strategies, based on the data they captured and processed, as well as the information they received and generated; based on the guidelines established by the WHO and PAHO, considering the number of infections and deaths.

3 Methods

In order to achieve the objective of the research, a methodological route was used to identify the variables of input, process, output, marketing, types of decisions, beneficiaries, internal communication and feedback; to know the organizational communication in the first governmental hierarchical level in Mexico, supported by the marketing information systems.

For that purpose, the research method of scientific abstraction, deduction and induction, the method of historical unity and comparative analysis were used.

4 Results

Since COVID-19 was first reported in Wuhan – China, on December 31, 2019; WHO provides daily updated information and guidance on the current coronavirus disease
outbreak, working closely with global experts, governments and partners, to expand scientific knowledge about the new virus, track its spread and virulence, and advise countries and people, on measures to protect health and prevent the spread of the epidemic.

For this purpose, the WHO (2020) developed a strategic preparedness and response plan (SPRP) which includes three actions, as shown in Fig. 4.

![Fig. 4. Strategic preparedness and response plan. World Health Organization (WHO).](image)

Applying the information system model in the SPRP; it can be seen in Fig. 5, the input, processing and output components that the WHO uses to support decision-making.

![Fig. 5. Information system model in the SPRP of the World Health Organization (WHO).](image)
In the first action of the SPRP, the input that the WHO demands from the countries were: partner coordination, epidemiological analysis and forecasting, risk communication and managing the infodemic, laboratory and diagnostics, Technical expertise and guidance, Pandemic supply chain coordination, and Travel and trade.

In the second action, the WHO processes the inputs by: country-level coordination, risk communication and community engagement, surveillance, points of entry, rapid response teams, National laboratory system, Infection prevention and control, Case management and continuity of essential services, and logistics, procurement, and supply management.

In the third action, the WHO obtains outputs that allow it to define strategies to: Enhancing global coordination of all relevant stakeholders, support a clear and transparent global research and innovation priority setting process, and build common platforms for standardized processes, protocols and tools, as well as for sharing specimens, data, and information.

It is in the third action, where the marketing information system becomes relevant, because with the information generated, marketing strategies emanate to achieve objectives.

Since the request for data from the WHO is continuous, by sharing the outputs as information, feedback is generated that serves as input to start the cyclical process of the SPRP.

In parallel, PAHO (2020) developed a COVID-19 information system for the region of the Americas whose goal is to maintain and update COVID-19 epidemiological data, to promote international coordination and awareness of the situation in the Americas Region, and to facilitate the most updated information available to countries, in order to reinforce national surveillance systems. Data is updated as countries enter national and sub-national data.

In Mexico, the epidemiological surveillance of COVID-19 is based on two information systems: hospital surveillance and sentinel surveillance. Hospital surveillance provides information on seriously ill people, monitoring their outcome and facilitating the analysis of the use of health services. The sentinel surveillance system allows seeing a little further, approximating the prevalence of COVID-19 in mild cases that go to the respiratory disease monitoring units. The sentinel system, nested in clinics, is not designed to capture asymptomatic people or those who do not seek medical attention, which for many diseases can be uninformative, but for COVID-19 they are relevant Barrientos et al. [5].

The main marketing strategies that the Mexican government has developed and implemented are presented below, based on the information generated by its marketing information systems, which have as main inputs: hospital surveillance and sentinel surveillance.

Following recommendations of the WHO, on March 9, 2020, through a press conference, the federal undersecretary of health released data on the Coronavirus in the country, reporting a total of 164 confirmed cases since February 28, 2020, with 448 suspects and 921 negatives. It was reported that there was a person in the status of a suspected case of COVID-19 who died and confirmation was pending. Government of Mexico [9].
At that time, some contagion prevention recommendations were issued, based on the provisions of the WHO (Fig. 6) recommending staying home as much as possible, keeping a safe distance, and wearing face masks; It was reported that, according to scientific estimates from the country - which were not detailed at the time - the first cycle of the coronavirus epidemic could come to an end in the Valley of Mexico, on June 25, 2020.

![Recommendations for the prevention of COVID-19 infections in its initial stage.](image)

Before the health emergency in Mexico was officially declared by COVID-19, on March 16, 2020, the Federal Secretary of Public Education announced the suspension of face-to-face classes at all educational levels in the country, as a preventive measure to reduce the impact of the spread of COVID-19 in the national territory. Ministry of the Interior [17].

For his part, the president of Mexico, on March 23, 2020, asked citizens not to stop leaving their homes due to the coronavirus pandemic, because he would inform when not to go out, and if they could do it and had economic possibilities, continue taking their families to eat in restaurants; message that he transmitted in various media without wearing a mask, in a restaurant in southern Mexico.

When on March 31, 2020, the General Health Council of Mexico declared the national health emergency as a COVID-19 epidemic with 29 deaths from coronavirus (Ministry of Health, 2020), complementary health measures were announced at the national level, to control and stop the spread of the virus; determining, in addition, to offer daily press conferences on the specific topic of the pandemic in the country.

In order to support decisions at the federal and state level, the Mexican government designed an epidemiological risk semaphore to move towards a new normal, through a monitoring system for the regulation of the use of public space according to the risk of contagion of COVID-19, called the weekly traffic light by regions (Fig. 7) starting its application on June 1, 2020 and considering four colors: red, orange, yellow and green; with five categories: public and occupational health measures, essential/non-essential work, open/closed public space, vulnerable people, schoolchildren. Instituto Belisario Domínguez [11].

The Mexican government, in coordination with the federal Ministry of Health, designed an advertising campaign aimed initially to children; however, it was well received by the general population, whose objective is to promote healthy distance as a measure to prevent the contagion of COVID-19 (Fig. 8). The character is a female
Only essential economic activities are allowed and people can go for a walk around their homes during the day.

Non-essential economic activities companies can work with 30% of their staff and it is allowed to operate open public spaces with a reduced number of people.

All work activity is allowed, caring for people with a higher risk of COVID-19. Open and closed public spaces are allowed with reduced capacity.

All activities are allowed, including school ones.

**Fig. 7.** Weekly traffic light by COVID-19 regions in Mexico.

superhero named *Susana Distancia* (Healthy Distance but used as super hero name) whose defense weapon to avoid contagion, is to extend his arms to measure the healthy distance.

**Fig. 8.** Advertising campaign to promote healthy distance as a measure to prevent the spread of COVID-19.

Since the national health emergency was declared as a COVID-19 epidemic, the president of Mexico does not use a mask in his daily activities, he sporadically uses it in places where it is mandatory, because he considers that it is not scientifically proven that the mask helps prevent contagion, so he prefers to maintain a healthy distance. Domínguez [7].

Taking advantage of the health situation and as an opportunity to apply a social marketing strategy, Banco Bilbao Vizcaya Argentaria (BBVA) and Banco Santander, joined resources and knowledge to develop the Covid-19 CDMX application. (CDMX acronym of Ciudad de México) A technological tool administered by the Government of Mexico City to inform the population about the pandemic, perform self-diagnoses...
of COVID-19, help prevent infections, avoid saturation of hospitals and provide the authorities with reliable information in real time (Banco Bilbao Vizcaya Argentaria, 2020).

5 Discussion

According to the Ministry of Health of Mexico [17] the epidemiological risk traffic light that prevails in September 2020, is shown in Fig. 9.

![COVID-19 risk traffic light in Mexico.](image)

According to data from PAHO [20], Mexico ranks third in cumulative deaths in the American Continent, after the United States of America and Brazil; and fifth place in accumulated cases of infections (Fig. 10).

| Country                  | Cumulative cases | Cumulative deaths |
|--------------------------|------------------|-------------------|
| United States of America | 6,095,007        | 185,687           |
| Brazil                   | 4,041,638        | 124,614           |
| Mexico                   | 616,894          | 66,329            |
| Peru                     | 670,145          | 29,405            |
| Colombia                 | 641,574          | 20,618            |

![COVID-19 Americas’ Regional Dashboard. Geographic Distribution of Cases and Deaths. PAHO 2020.](image)
In an isolated but important event, the governor of the State of Baja California in Mexico, denied the statistics on COVID-19 released every day by the federal Ministry of Health, as he assured that they send the updated report to the authorities daily. However, the numbers released at the national level do not match, and upon review, they discover that they are from eight days earlier. UnoTV [21].

6 Conclusions

Considering that, on a global scale, no country was prepared to face a health situation of this nature, and that the responses of international organizations were not immediate, it can be concluded that the actions implemented by the Mexican government in coordination with the Ministry of Health Federal government to control the spread and care for patients infected by COVID-19, reflect the political and social will join forces to achieve it.

From an external point of view, Mexico has complied with the request to provide information required (input) by international organizations such as WHO and PAHO, to feed the global information system (processing) through which it receives feedback (output) for feed the national information system, and support health decision-making.

From the internal point of view, with the data generated around the contingency situation due to COVID-19 in Mexico, the marketing strategies implemented and the official results obtained in the control of the epidemic, reflect areas of opportunity to attend, in order to obtain better results.

Marketing information systems represent a key strategic tool for public and private decision-making. Its success or failure depends on the quantity and quality of data that is entered into the system, the periodicity with which it is processed, the type of information that is generated and the marketing strategies that are developed from that information.

On a global scale, a significant negative impact is expected on the economies of countries due to the ravages of the COVID-19 pandemic, and governments seek to reduce its effects through mechanisms that allow a speedy recovery.

World indicators place Mexico in third place in the number of deaths in the American continent, which is worrying, however, the indicator of the number of new cases of infections, place it in fifth place, which reflects that the health strategies implemented so far, compared to other countries in the American continent, they are somehow helping to control the pandemic.

However, there are areas of opportunity that need to be attended in order to obtain better results, to avoid confusing society and risk losing credibility, such as avoiding inconsistencies in the information handled on COVID-19 at the national level and state, or achieve consensus among decision makers of public health policy, to define joint actions and avoid falling into contradictions, between the presidency of the republic and the federal health ministry.

In this sense, marketing information systems represent an opportunity to add control variables of interest, which can serve as support as a strategic tool, to make more accurate decisions based on the needs of the federal government and its target market (Mexican society). For this, it is pertinent to consider as input, in addition to the variables of international interest, national variables annexed to COVID-19, which are considered a
priority, such as economic growth, social security or popularity of the president, which allow making decisions, based on national reality and according to the needs of society, within the framework of the health contingency.

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