

Executive Decisions in Emergencies and Innovation in Supply Chain: A Suggested Model

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Abstract

Covid-19 was very impactful on all USA States, with increased deaths and escalated trends every day, strong hit in various states on the top of them comes New York., New Jersey, and Michigan, during difficult times (April 20). That is why the authors have chosen the General Motors (G.M.) initiative to study and analyze. The crisis of medical supplies and ventilators shortage at the beginning of the pandemic deserved to be studied and synthesized as an inspiring experience and adds value to the discipline of social responsibility, crisis management, disaster management, strategic decision making and emergency management. The major objective of this study is designing a model that represents a Road Map for Emergency Management for CEOs and Executives. Content analysis was used to analyze the Covid-19 crisis and events' sequences in relation to Manitoba Health Disaster Management Model, and the fast decisions and actions made. This research will conclude with a top-level management implication: a designed road map that can be used for making future decisions in emergency management.

Keywords: Covid-19, general motors, emergency management, crisis management, Manitoba health disaster management model, executive decisions, US auto industry

1. Introduction

There is no doubt that the start of Covid-19 (JHCRC, 2020) represented a crisis not only at the level of shortage of medical equipment and supplies but also at the economic status for many countries in the world. COVID-19 crisis is a multifaceted challenge that affected the basic principles of corporate sustainability, that called for a balanced approach towards social, economic, and environmental concerns (Suriyankietkaew, & Nimsai, 2021, Eldem et al., 2022).

Covid-19 has brought fundamental changes to our world. The epidemic threatened social relations, caused health systems changes, and the collapse of the health, social, educational, family, economic, and recreational systems (Kandula, & Wake, 2022). It also led to stopping life such as closing schools - closing places of worship, filling hospitals and clinics, closing clubs, public places, and some government departments (Al Eid & Arnout, 2020; James et al., 2022)

Accordingly, many decision-makers in several countries have taken many radical measures, including infection control measures such as social distancing (Lupu & Tiganasu, 2022, Glass et al., 2006). Infection control measures were taken to slow the spread of Covid-19, as most activities in societies, especially economic ones, were primarily closed. These decisions were a great shock to many financial entities, which incurred huge losses. The Covid-19 crisis has suddenly damaged economies around the world through global countermeasures (Sheng, 2022). Some crisis had a specific impact and linked to a specific region (e.g., hurricanes like Ian in 2022 and Katrina in 2005), and other crises and disasters that extended their impact to many regions in the world (e.g., the 2008 financial crisis) (Kuckertz et al., 2020).

One of the significant impacts of the Covid-19 pandemic was the disruption of global supply chains (Eldem et al., 2022; Raj et al., 2022). The dependence of companies all over the world on their inputs from China has led to production fluctuations and halt in some cases. The Covid-19 pandemic also impacted the limited and restricted

transport between countries, which led to a slowdown in global economic activities (Baldwin & Mauro, 2020; Raj, et al., 2022). Zhang's et al. (2006) study indicated that the impact of disasters extended to include the economic problems of countries and institutions, and human losses represented in the number of people affected by disasters in terms of the number of injuries and deaths. According to international statistics for disasters, the economic costs amounted to \$ 235 billion and lost 425,000 people between 1996 and 2000. In a recent report for the human cost of disaster, 2000 to 2019, there were 7,348 major recorded disaster events claiming 1.23 million lives, affecting 4.2 billion people resulting in US\$2.97 trillion in global economic losses.

The Auto/Mobility industry is the largest in the United States, as it is the largest generator of more businesses across many industry sectors. The boom in the auto industry growth means the continued growth of many other supporting industries. In 2018, the American auto industry contributed about 2.7% of the gross domestic product, or about \$ 545.4 billion. The auto industry also employs approximately 17.9 million people (U.S. Bureau of Economic Analysis). Car manufacturing in the United States economy annually pays about \$ 953 billion through sales, auto services. These huge revenues flow through the economy to the suppliers of parts and, by extension, and to the assembly plant workers. (autoalliance.org).

General Motors focused on delivering safety, more sustainable ways for people to get around. General Motors, its auxiliaries, and its partners in global market sell vehicles under the Chevrolet, Buick, GMC, Cadillac, Holden, Baojun, and Wuling and brands. (<http://www.gm.com>).

This research analyzed the GM case studied including strategy & process to manage Covid-19 situation at the micro and macro levels and related it to an emergency management model. The mitigation of risk and sequence of strategic, operations & logistics decisions at G. M. during the Covid-19 most critical times can guide executives on how to assess and mitigate risks and make their future decisions in a similar or different emergency. The major objective is designing a model/roadmap for actual and future C.E.O.s/executives & decision-makers.

2. Literature Review

The importance of emergency and crisis management is to provide the scientific ability to identify and forecast current and potential threat sources, improve the resources and capabilities available to reduce the effects of a crisis, add to the discipline as there is a gap in the literature and research of real business situations and how decisions were made very fast trying to bring back everyday life through a set of well-planned decisions and measures (Sharma, et al., 2022). Crises are faced by tackling the problem and mitigating the risk effectively to decrease its adverse effects and develop a preventive approach and coping strategies if that happens again (Al Eid, & Arnout, 2020).

Some studies have been conducted in crisis management during the last two decades. There is a lack of integration and coordination when dealing with crisis across functions and making strategic and operational decisions. Psychological, social-political, technological, structural issues act as powers in crisis formation and management. Therefore, these forces must be considered when studying and managing organizational crises (Pearson & Clair, 1998). Moreover, the crisis involves social, political, and cultural variables (Roux-Dufort, 2016).

An organizational crisis is defined as an event that threatens the organization's survival, has a major impact on it, has a low probability of occurrence, and requires quick decisions (Pearson, & Clair, 1998). Johnstone, & Turale (2014) also defined the health care disaster as the disaster that overwhelms the healthcare system's resources, whether locally or regionally, whose effects continue for more than 96 hours. Pearson, & Clair (1998) define organizational crisis management as members of the organization trying to engage external stakeholders to manage then develop preventive and/or tolerance approach. The problem is addressed effectively when the organization can restore basic operations directed at serving key customers and reducing the organization's losses. The effectiveness of organizational crisis management occurs when key stakeholders believe that the successful outcomes of short and long-term impacts outweigh risks (Pearson, & Clair, 1998). This indicates that crisis management's goal is to restore order to alignment, which is what happens after any harmful event (Williams et al., 2017) and reacts to bring things back into equilibrium as soon as possible (Lalonde&Roux-Dufort,2010). With Covid-19's impact on the US economy, there was an urgent need to save the community from this pandemic and bring business back to normal.

Crises are conceived as an event and a process. As the crisis consists of many sequentially linked events, each of which sets the stage for the next event. Shrivastava (1995) added that crises are protracted processes.

Studies reduced crises to major events such as the Challenger explosion (Starbuck & Milliken, 1988), natural

disasters (Hurricane Katrina), the collapse of financial empires, and unprecedented diseases (Asian influenza) (Roux-Dufort, 2007) terrorist attacks (Rosenthal, 2003) oil spills (Pauchant & Mitroff, 1992). This has led to an increased theorization of the crisis as an event (Williams et al., 2017). No one can plan the crisis as an event because they are unexpected and not scheduled (Topper & Lagadec, 2013). The event approach focuses on the concept of accidents as a unit of analysis. One of the main characteristics of the event presentation is the sudden and unexpected effect (Roux-Dufort, 2016). The event approach is useful for understanding the dynamics of a crisis to know how to interact with it and reduce its impact (Lalonde, & Roux-Dufort, 2010).

That major events are traditionally perceived as exceptional situations. Research in crisis management derived part of their legitimacy from the strength of the event in which they are investigated. The more important the event, the more it appears to legitimize scientific examination. This makes the study of crisis management of these exceptional situations carried out in isolation from the organization's theory. Here the question arises, why is workflow not directly related to a large body of theory and research on organizational effectiveness or with the growing work group in organizational learning? Perhaps these organizations are too private, too special, and too 'distant' to be compared to the typical world of everyday organizations. (Roux-Dufort, 2007).

Looking at the crisis from the incident perspective does not help in concluding the organizational mechanisms that led to the crisis, such as the Herald-Free Enterprise crisis. It is important to consider the organizational causes and forces that led to the disaster by conducting an in-depth analysis of several preconditions (Roux-Dufort, 2007). Although the Perrow (1984) study dealt with very exceptional or very strange systems, he provided researchers with a robust conceptual framework, and their findings were extracted from non-traditional fields. The model's primary purpose was to understand the impact of environmental disasters and the political views expressed in the written and verbal statements of governments, industries, and businesses.

Recently, crisis management scholars suggested moving from a study of crisis management from an exceptional event to the standpoint of verification of processes (Roux-Dufort, 2007, 2009). The process approach in the crisis differs from that of the event, as the process approach is a complementary perspective since the crisis appears in stages (Pearson, & Clair, 1998). The crisis management process model includes many elements of the process that are constantly advancing through a set of steps, as shown in figure (1). Acceptance of this approach is driven by recognition of the continuing crisis's effects, as the continuation of any crisis for a few days can cause severe financial losses and sometimes threaten the survival of the entity (Preble, 1997).

The process approach sees the crisis as a series of crises long before the acute phase. The crisis is a continuous cumulative process of organizational failures (Roux-Dufort, 2009, 2016), so the full context of the crisis must be absorbed from preconditions to consequences, characterized by ambiguous causes and effects (Pearson, & Clair, 1998). Although dealing with the crisis as processes affects the analysis of results, innovation in dealing with crisis and emergency management processes differ according to the case, situation, company, and time (Roux-Dufort, 2016).

The systematic study of crises could reveal certain factors that might have remained hidden within the organization if the crisis had not occurred. Hence, the process approach reveals the dynamics of the crisis that already existed. Sometimes managers and decision-makers may wonder whether any action could have been taken to avoid the crisis before it occurred. Therefore, the process approach requires that we understand the accumulated organizational conditions for the crisis (Roux-Dufort, 2016).

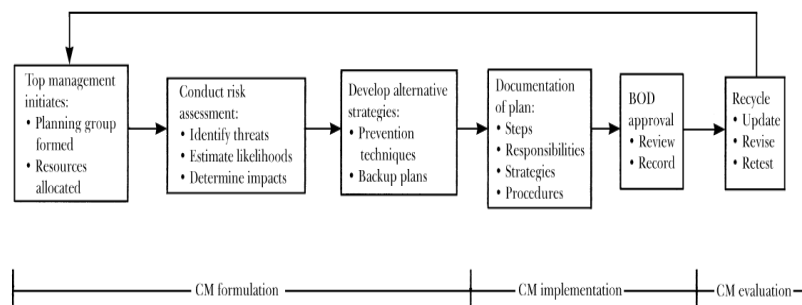


Figure 1. A normative crisis management process model (Preble, 1997)

The normative crisis management process model is comprised of three phases: Crisis Management formulation, crisis management implementation and crises management evaluation. This study focuses on how the Covid 19

crisis was managed at the government and industry levels particularly GM and how the strategic and operational decisions were made during the pandemic time, aiming at understanding how crisis management strategies were formulated, implemented, and evaluated.

In this section, the research focused on the normative aspects of crisis management. One of the themes related to crisis management is to treat crisis management as an activity to restore balance. The government or organization is the central entity for decision-making through sequential stages, in which coordination, planning, and mitigation of risk impacts are carried out. Disturbance and disruption to the routine and capabilities of the organization may occur. Therefore, efforts must be made to develop emergency management policies and procedures that allow for an effective response to disasters. The response's effectiveness may be due to the quality of the event interpretation, the response strategies employed, or the quality of decision-making in light of the uncertainty (Preble, 1997, Manitoba Health Disaster Management, 2002).

The role of effective leadership is important for managing the crisis effectively. The leadership role during the crisis recovery phase is focused on communicating with stakeholders and maintaining the stability of the organization and moving away from the stage of chaos. In addition, the leadership's role is to share information correctly, and plan and prepare to respond to crises, thereby improving the decision-making process and phases (Manitoba Health Disaster Management, 2002)

An important factor that helps in managing the crisis effectively is the crisis management team. The crisis management team must be taken care of in terms of its formation and considering the homogeneity and synergy among its members. In addition to developing the team's role and reorganizing resources, flexibility and quick decision-making can help reduce pressure on the system during a crisis. Some teams failed to manage the crisis and identify the root causes to improve chances for recovering from the crisis (Roux-Dufort, & Vidaillet, 2003). It is important to benefit from stakeholders and decision-makers' views and actions to understand how to overcome organizational difficulties and barriers and make decisive right decisions particularly in emergencies (Roux-Dufort, 2009).

2. Innovation in Crisis Management

The coronavirus pandemic has had a significant effect on the global supply chain, which can be viewed from three angles: supply, demand, and logistics (Mishra et al., 2021). For instance, multinational corporations encountered a supply disruption as the virus spread in India, leading to a halt in face mask exports. At the same time, some companies experienced a demand shock with an increase in demand for essential products and worries about delayed shipments, merchandise shortages, travel interruptions, and labor shortages (caused by workers returning to their hometowns). This has caused a mismatch between supply and demand. Previously, supply chain managers primarily focused on just-in-time inventory management to lower costs and enhance efficiency. Nevertheless, the COVID-19 pandemic has highlighted that this approach cannot withstand major disruptions, like the one brought on by the pandemic. As a result, risk management and mitigation strategies have become even more critical for the global supply chain. Organizations must examine their supply chain strategies, designs, and dependencies to be better prepared for future emergencies and reduce the impact of unforeseen disruptions (Raj, et al.,2022).

The impact of COVID-19 is not confined to just technology, manufacturing, and automotive companies, as it has affected several major industries (Eldem, et al.,2022). Innovation is considered one of the most effective tools for raising companies' technical and technological levels, thus increasing production and management efficiency, and enhancing the competitiveness of their products (Klodane, & Zvaigzne, 2017). Companies need to innovate in times of crisis to implement it to reach a solution to specific crisis management problems. During crises, companies think about using innovative solutions to meet the challenges of crisis management and try to recover the company from the crisis. (Gajda, & Zaplatynskyi, 2017). To save the U.S auto industry in Michigan, car manufacturing companies, particularly FORD and G.M., took serious and immediate decisions and went above the call of duty.

Crisis management innovation differs at the macro and micro levels. For example, innovations can be used for government structures, foreign policy decisions at the international level, and for business. The goal of crisis management innovation is achieved when the company returns to the pre-crisis period (recovering from the crisis). By introducing new technologies and equipment, the system interacts with the environment, improves the administrative structure, innovation in logistics, ensures energy structure, and searches for new suppliers of raw materials. When studying innovation, most researchers believe that companies resort to innovation when trying to save themselves. As a matter of fact, it is sometimes saving the nation, the industry, and the company at the same time. Still, some crises are devastating to the point of liquidating the company or declaring bankruptcy

(Gajda, & Zaplatynskyi, 2017).

The economic crisis (2008-2011) is considered one of the most important crises that posed a threat to companies, consumers, competitors, and suppliers. Strategic adaptation is an important consideration applied by European service companies in times of economic downturn, which reflects the organization's strategic ability to contain and create change. Strategic adaptation requires new operational methods and management processes. These methods include innovation investments, mergers and acquisitions, joint ventures, and portfolio management (Martin-Rios, & Pasamar, 2018). Also, one of the procedures for strategic adaptation is focusing on innovation research and employment investment. Martin-Rios, & Pasamar (2018) illustrated that Accor Hotels, Deutsche Bank, and British Sky Broadcasting are examples of rapid adaptation and service innovation.

With the spread of Covid-19 and the increasing shortage in medical equipment and supplies in hospitals all over the United States particularly in New York, New Jersey, Michigan, and Florida. There was an urgent need for producing ventilators locally with local expertise, resources, and capacities. ABCDs (Ambu bag compression devices) based on a decade-old unproven and untested device design from Massachusetts Institute of Technology (M.I.T.) became the Lego-blocks for innovators. Woolliscroft (2020) examined the effects of virtual care, hospitalization at home, advances in diagnosis and treatment, virtual learning, and virtual clinical learning as medical innovations that could help manage the Covid-19 crisis.

Moreover, investment in health data collection systems has an important role in crisis management. Health data should be accessible, transparent, reliable, and transparent because innovation often depends on the availability of reliable data. Jha (2020) found unreliable data dissemination practices from some governments, international bodies, and research laboratories. In developing countries, data were incomplete sometimes or inaccurate and do not reflect the real situation where data show little number of deaths while there is a tremendous death of Covid.

As shown in figure 2 innovation process has three stages (1) disrupt, (2) define and develop, and (3) transform.

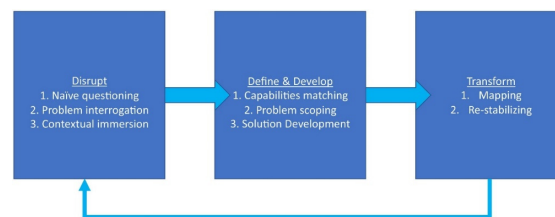


Figure 2. Three stages of design thinking

Source: Cankurtaran and Beverland, 2020.

The three stages of design thinking started with the disruption then the definition of problem and development of solutions the transformation phase that included mapping and restabilizing. When Covid strongly hit the US, it negatively affected every aspect of life at the political, social, and economic levels, it caused a huge disruption in almost every single industry where executives interrogate the problem then immerse in the context. The second phase was scoping the problem and developing innovative solutions, the last phase was the transformation to mapping and restabilizing. This model provided some guidelines for authors when developing the roadmap for this study.

Referring to Figure 2, The following example demonstrates how naive questioning relies on asking straightforward questions to uncover existing assumptions and generate new alternative ideas. "In mid-March, Lennon Rodgers is the director of the Grainger Engineering Design Innovation Lab at the University of Wisconsin in Madison, fielded a plea from the university's hospital to make 1,000 face shields." Initially, I didn't take it too seriously, "he recalled. But after his wife, an anesthesiologist, told him the shields were indispensable for dealing with highly infectious patients. He scoured hardware and craft stores for parts. He teamed up with Delve, a local design firm, and Midwest Prototyping, a contract manufacturer, to design their own Badger Shield. "They expected to use 3-D printers, then concluded that wouldn't achieve the necessary scale. They uploaded the design to their website along with the necessary parts for anyone to download. A few days later, Ford Motor Co. did, and, with tweaks of its own, began turning out face shields for Detroit-area hospitals." (Cankurtaran, & Beverland, 2020)

Early in the spread of Covid-19, companies were racing to find solutions quickly, focusing on leveraging capabilities to achieve rapid results. An example is the Scottish BrewDog, who wanted to produce a hand

sanitizer for hospitals by making use of his alcohol production facilities. However, this product failed to reach the alcohol levels needed for hospital use, and production was denied. While Lennon Rodgers through sharing the design on the websites, which enabled Ford Motor Co. to help through its capabilities and equipment in the manufacture of this product, which clearly contributed to the protection of medical personnel during the crisis. (Cankurtaran, & Beverland, 2020).

3. Models of Disaster/Emergency Management

There was no consistent approach to disaster management and planning. Also, no model covers all aspects of disaster management, such as risk assessment and management. Also, there is no framework that includes the main activities of disaster management. Models of disaster management have clear differences between them because dynamic changes must be observed in the modern world, so there is a need for a review in the structure of disaster theory (Nojavan et al., 2018).

Disasters and crises are a clear challenge in the pursuit of sustainable development. Many researchers point out that disaster management is a multi-stage process, while each model is designed to serve a specific need in the specific field (Nojavan et al., 2018). Therefore, to achieve an impact that is more sustainable and efficient use of resources, a strategy must be developed that integrates knowledge systems, disciplines, and approaches (Bendito, & Barrios, 2016).

In this section, we will talk about disaster management models to learn about organizational aspects. Disaster management models are divided into logical models, integrated models, Cause models, combinatorial models, and other models (Wang, 2012; Nojavan et al., 2018). This paper will be focused on Manitoba model because it is one of the famous integrated models, which focus on six independent elements, namely strategic plan, hazard assessment, risk management, mitigation, preparedness, and monitoring and evaluation as shown in figure (3).

Asghar et al. (2005; 2006) explained some of the main activities with some disaster management decisions. The hazard assessment stage needs vulnerability analysis, frequency of hazard occurrences. Risk management consists of analysis of disaster risks, evaluating risks and treating risks. The mitigation stage needs developing a mitigation plan, analysis of measures. Preparation needs planning and resource management.

Integrated disaster management models organize specific activities and efficiently and effectively implement them to achieve the desired results. Included in the integrated models is the Manitoba model, which is one of the most famous integrated models. The Manitoba model consists of six components, which are the strategic plan, Hazard Assessment, risk management, mitigation, preparedness, and monitoring & evaluation as shown in figure (3) (Asghar, et al., 2006; Nojavan, et al., 2018).

Resources must be committed to managing the crisis in an effective and balanced way, which is represented by strategic decision making, and it is the first component of the Manitoba model. Therefore, the health sector must contribute along with local authorities' activities and others who assume disaster management responsibilities and roles. One of the advantages of an all-disaster approach is that it ensures that disaster planning achieves its goals efficiently, by collecting accurate, detailed, and up-to-date information on a full range of risks and threats and their potential impacts on society. Because different risks can lead to the same effects or consequences within a community. Another advantage of the all-disaster approach is the efficient planning of the combined effects of different risks, which sometimes leads to the application of a single solution to a set of threats. Strategic planning for the risk assessment process includes identifying the required information and assessing this information's quality. The information required for the risk assessment process is about events that may affect the community, the community's exposure to such impacts, and the community's resources to deal with the impacts (Manitoba Health Disaster Management, 2002; Nojavan et al., 2018; Asghar, et al., 2006).

Then comes the risk assessment, which aims to provide information for use in other disaster activities in the health sector. Risk information must be shared to improve the flow of information to help others with disaster management activities. The third step is risk management, which is a critical element in providing the transition between identifying the problem and appropriate treatment steps. Both internal and external factors must be considered. Poor risk management decisions can lead to implications in the healthcare sector when negative health consequences become apparent. Risk management is the process of converting qualitative information gathered about society and its resources in the context of extreme events into quantitative risks that can be measured and compared. Therefore, risk management ensures that decisions are based on evidence (Manitoba Health Disaster Management, 2002; Nojavan et al., 2018; Asghar et al., 2006).

The concept of mitigation refers to reducing risks throughout society by implementing structural and non-structural mitigation measures based on the risk management decision-making process. Measures taken to

reduce the adverse effects of preparedness and response are linked more than mitigation. If companies and businesses are not well prepared in advance with risk mitigation strategies, economic loss because of the disaster will be huge. Costs and risks can be reduced if mitigation is integrated as a core component of a strategic disaster management program (Manitoba Health Disaster Management, 2002; Asghar, et al., 2006; Nojavan, et al., 2018).

The disaster preparedness approach includes resource management, planning, training, and exercise. Preparedness helps to respond effectively and efficiently to risks and quickly recover from their effects. The final step in the Manitoba model is follow-up and evaluation. A quality improvement approach is used for disaster management. To maintain the disaster management system, economic, physical and social environments have a strong influence on the disaster situation, risk management process must be monitored and the process for evaluating program progress should be evaluated (Manitoba Health Disaster Management 2002, Asghar, et al., 2006, Nojavan, et al., 2018)

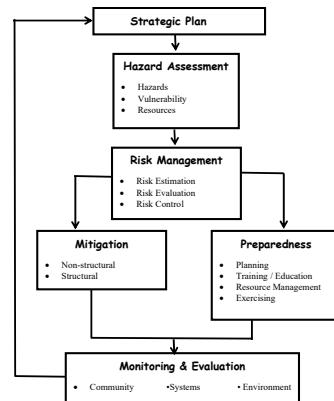


Figure 3. Integrated Disaster/Emergency Management Model (Manitoba- Health- Disaster-Management 2002)

Disaster management is the dynamic application of solutions to an uncertain and changing set of challenges. An ongoing process of evaluating the progress of programs and monitoring the physical, social and economic environments is crucial to maintain a disaster management system that is adapted to the current local conditions (Manitoba Health Disaster Management 2002, Asghar, et al., 2006, Nojavan, et al., 2018).

3.1 Research Questions

This paper focused on how a US Automotive company responded and innovated to face a national crisis and serve the community. How did the company use its resources and capabilities to cope with the crisis and curb its effects? What are the innovative strategies the company adopted for crisis management?

4. Research Methodology

This study focused on one of the major three US automotive companies and analyzed GM's role through content analysis. Data was collected from GM website and other websites with the objective of concluding with a suggested framework for strategic decision making and fast actions at crisis/difficult times. The research was based on information, data, and materials publicly published in GM News, VentecGM.com, media.gm.com, StopTheSpread.org, and covid.cdc.gov. The analysis included scenarios, decisions, strategies, tactics, and actions made by several U.S. industry officials and policymakers such as General Motors Chairman and CEO, Ventec CEO, the administrator and overseeing chief at General Catalyst and the previous CEO and Director of American Express, UAW. President, US Vice President, Indiana Governor, and US Secretary of Transportation pulled from the online newsroom of GM in 2020. This study uses the content analysis approach to analyze decisions, actions and scenarios designed and executed by the leaders and decision-makers to face the disaster and save lives.

5. Discussion and Analysis

The first appearance of the Corona virus was in Wuhan: The Chinese city in December 2019. The infection started to spread because of the inbound of international travel, on March 11, 2020, it was spread to more than 117 countries. On January 20, 2020, the first case was confirmed in the United States, which arrived via China (Moghadas, et al., 2020).

Figure 4 shows the average of weekly return of the infected patients from January 1 to August 8, 2020, the number of infections in the United States was unexpectedly and rapidly growing, as the total number of infections, as of August 12, 2020, reached about 5,119,711 new cases, and for deaths, it reached 163,651 cases,

according to the C.D.C. website (Note 1).

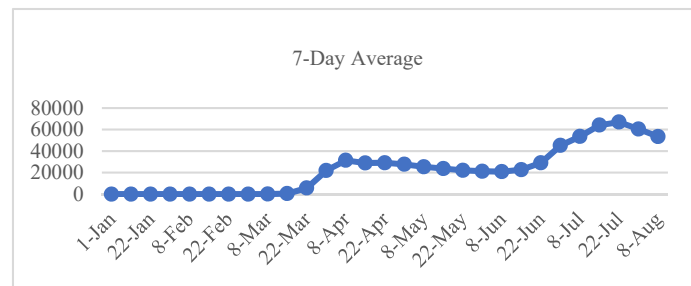


Figure 4. Covid-19 new cases in the U.S.A. – 7-day average

Source: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>

The following part focused on the analysis of General Motors decisions, actions, scenarios, and tactics implemented to face emergencies, whether at the business level or at the federal level.

5.1 Business Continuity Plan and Updating Employees

One of the principles of the integrated disaster management model (Manitoba model) is business continuity planning, that means, services remain available at appropriate levels in times of internal risk factors (Manitoba-Health-Disaster-Management, 2002).

GM was able to continue Business planning at the beginning of the crisis on March 13, 2020. GM's most important strategic goal was to keep its employees and staff healthy and safe and to make progress in their work. When the number of Covid-19 infections increased, GM announced important work policy updates: putting the remote work policy into action. Employees were also instructed to keep in contact with their line managers to obtain the required directions to ensure business continuity. Not all the teams worked remotely. Those teams were instructed to take precautions and precautionary measures to ensure GM teams stay safe. The challenge that most GM and most companies faced during the Corona disaster was to keep their employees updated with changes and developments in projects and business news, whether through daily calls, or workplace chat, or weekly stand-up, or workplace news feed (<https://media.gm.com>).

While GM customers are looking to ensure they have vehicles and spare parts, many flights have been canceled and the use of public transport has been reduced. GM has implemented strict cleaning procedures for the manufacturing departments, product development, customer service, after-sales services, and call centers in order to keep its employees safe (Note 2).

5.2 Cooperation, Coordination, and Collective Actions

The Manitoba model stated that when a community's resources are not sufficient to adapt, then a disaster occurs because its impact exceeds the resources available under normal conditions (Manitoba-Health-Disaster-Management, 2002). This is what happened in the Covid-19 disaster in the United States, where health resources were suffering from severe shortages, whether from ventilators, beds in intensive care rooms, and other medical supplies, with the increase in critical cases that lead to an increase in deaths considering insufficient resources.

One of the most important dimensions of the Manitoba model is cooperation and coordination between various parties such as business sector, government, medical sector, companies and other agencies, to ensure that the contribution in managing and supporting a disaster. The first dimension of the Manitoba disaster management model is to adopt a strategic approach for disaster/crisis management. This approach is based on designing a cross-sectional integrated plan and allocating resources for comprehensive, effective, and efficient crisis management (Manitoba-Health-Disaster-Management, 2002).

In the following part, a content analysis of a chosen US industry (Auto industry) and a case study within this industry (GM) will be analyzed in depth for the purpose of developing a suggested framework and guidelines for future managers and executives for strategic decisions and actions at any crisis.

On March 15, the United Auto Workers (UAW), GM, Ford Motor and Fiat Chrysler Automobiles (FCA) announced the formation of a Coronavirus Task Force responsible for implementing protection measures for the

manufacturing and warehouse personnel of the three companies. The aim was to maintain health and safety in the workplace, keep Covid-19 out of their organizations during an emergency. The joint work team's focus included vehicle production plans, additional social distance, rest schedules, cleaning, health education, safety, health examination, food service, and any other areas that have the potential to improve employee protection. All three companies and the UAW coordinated measures to implement safety protocols for people exposed to Covid-19. (UAW, GM, Ford and FCA to Enhance COVID-19/Coronavirus Protections for Manufacturing and Warehouse Workers, 2020) (Note 3).

5.3 Executive Leadership Changes and Organizational Restructure

At the beginning of Covid, there was an urgent need to make fast data driven strategic decisions to mitigate and manage risks. GM, one of the three major US auto companies based in Michigan in the US, has begun a temporary suspension of manufacturing operations in North America to continue to protect people, and this suspension is systematic and structured to help combat Covid-19. This decision was made through a coordination between local GM leadership and UAW President and UAW Vice President. On March 18, 2020, GM announced executive leadership changes that took effect on April 1, 2020. The following were among these changes (Note 4):

- Chief Technology Officer
- Senior Vice President, Global Communications
- Senior Vice President, International Operations appointed to Executive Vice President and President, GM China
 - senior vice president and president, GM International assumed the day-to-day international markets.
- Senior Vice President, International Operations named to New or Expanded Roles
- Former Chief Communications Officer and Former Executive Vice President and Chief Technology Officer to Retire

A brief qualification of the leaders, who were chosen to lead the company at this critical time is presented:

Executive vice president and president, GM China, was appointed to the Executive Vice President and Chief Technology Officer; He reported to the GM President. He led GM's operations in China since 2014. Under his leadership, GM achieved unprecedented growth in the business. He adopted technologies in electrification and connectivity (Note 5).

Chief communications officer, Procter & Gamble, joined GM as Senior Vice President, Global Communications, replacing the former chief communications officer, who was elected to retire effective July 1, 2020. The recently appointed chief communication officer reported to GM Chairman and CEO. He has extensive experience in managing complex communications environments in multi-brand organizations and led P&G communications through a variety of challenging product and corporate issues for six years. Before P&G, he went through 20 years in the drug world working in both organization and professional workplaces, including Merck, Johnson & Johnson, and Pfizer, where he held multiple corporate, inner, and chief interchanges. He has a law degree from Drexel University and four-year college education in Journalism and Public Relations from Temple University (Note 6).

Senior vice president, International Operations, was designated Executive Vice President and President, GM China, succeeding the former one. In his new job, He will report to GM President (Note 7).

Senior V.P. and president, GM International, continued in his current role and assumed the day-to-day operations of GM's international markets handled by the senior vice president of international operations, continued to report to the president.

GM expressed gratitude toward Former chief communications officer and Former Executive Vice President and Chief Technology Officer for their long-term administration to GM, and for the extraordinary commitments they have made to the organization. GM announced they both assumed critical parts in situating the organization for long haul achievement and wish them to enjoy all that life has to offer in retirement. Those changes were believed to strengthen the strategic positioning and value of the organization, accelerate innovation, partnerships, and sustainability of the business (<https://media.gm.com>).

The process of collecting data for a risk assessment program about the community's infrastructure, the available community resources are essential (Manitoba-Health-Disaster-Management, 2002). The dynamic application of solutions to an uncertain and changing set of challenges requires an ongoing process of reviewing and updating

data for a continuous evaluation of implemented programs. In addition, monitoring the physical, social, and economic environments is crucial to maintain a disaster management responsive system. It must be adapted to current local conditions and be used in the strategic plan of the risk assessment process including risk management, mitigation, preparedness, and resources.

With the escalation of the Covid-19 endangering the lives of countless Americans, StopTheSpread.org was established by the administrator and overseeing chief at General Catalyst, previous CEO and director of American Express, and the C.E.O. and fellow benefactor of Guild Education. This site aims at uniting the business community around a threat to the US economy and way of life. Urgent cooperation and coordination between the public and private sectors were necessary to overcome this crisis; in addition to uniting business leaders across the country to combine resources, complement, and support government efforts (<https://media.gm.com>).

After the risk assessment process reaches the risk management stage, the process of understanding risks and determining how to properly control takes occurs. It starts with providing relief to the health care system that suffers from a severe deficit in respiratory care equipment. The matter gets worse as the number of deaths increases, especially among the elderly and those with chronic diseases. The idea of producing ventilators began with a suggestion from Stopthespread.org that GM teams up with Ventec Life Systems. There was a phone call on March 17, 2020, between GM Chairman and CEO and representatives of Stopthespread.org followed by the first conference call between GM executives and Ventec on March 18, 2020, to discuss how GM could help boost ventilators' production. The next day a GM team traveled to Seattle to meet the Ventec team to begin planning (<https://media.gm.com>) (Note 8).

The CEO of Ventec Life Systems believed in the exceptional association consolidating Ventec's respiratory consideration aptitude with GM's assembling may create advanced and top-notch basic consideration ventilators. The pandemic is uncommon, as is this reaction, with amazing help from GM and their suppliers. Medical services experts on the cutting edges merit the best apparatuses to treat patients, and accurate basic consideration ventilators like VOCSN are essential to save lives.

The aspects of GM and Ventec partnership were multiple. Ventec announced on March 27 that GM would manufacture VOCSN critical care fans at GM's FDA-approved manufacturing facility in Kokomo, Indiana. Ventec Life Systems reclassifies respiratory consideration to improve persistent results and lessen parental figure difficulties from the clinic to home. Ventec's driving item, VOCSN, was the sole Multi-Function Ventilator that flawlessly incorporates five separate devices including a ventilator, oxygen concentrator, cough assist, suction, and nebulizer into one unified respiratory system. VOCSN was entirely adjustable to address persistent issues for pediatric and adult patients. This exertion was notwithstanding Ventec finding a way to increase creation at their assembling office in Bothell, Washington. GM likewise started producing FDA-cleared Level 1 care covers at its Warren, Michigan fabricating office. The invention began one week later and in fourteen days production increased to 50,000 ventilators every day, with the possibility to increase to 100,000 every day (<https://media.gm.com>).

On March 20, GM launched a rapid response to face masks' production, after a severe shortage of face masks needed by workers in basic services across the country. A team of 30 engineers, designers, and members of the manufacturing team started the work, sourcing materials and equipment and planning for the production process. The team's goal was to have the production line ready for operation within a week. The goal was achieved with unimaginable efficiency through the partnership and optimal use of resources (<https://media.gm.com>).

With GM's assistance, Ventec will build ventilator creation and by tapping their aptitude, GM was empowering Ventec to get more ventilators to more clinics a lot quicker. Ventec CEO believed this association would help save lives.

GM was working with Ventec to quickly scale up creation of their fundamentally significant respiratory items to help our nation's battle against the Covid-19 pandemic, and they will keep on investigating approaches to help in this season of emergency (Joint Statement on Collaboration to Increase Ventilator Production, 2020) (Note 9).

GM CEO and executives were proud of this partnership with Ventec as they work together to address urgent, and lifesaving needs. This association consolidated worldwide mastery in assembling quality and a joint pledge to wellbeing to give clinical experts and patients admittance to life-sparing innovation as quickly as could be expected under these circumstances (<https://media.gm.com>).

5.4 Innovation in Supply Chain

Covid-19 has created a state of uncertainty and disruptions in the global supply chain (Eldem, et al.,2022, Raj, et

al.,2022). The global supply chain faces a significant challenge to maintain supplies of materials, especially medical tools, including ventilators, masks, and medicines that are badly needed to treat, prevent, and control the pandemic (Raj, et al.,2022).

Global supply chain scholars studied the impact of rapid innovations in business models and the use of technologies, particularly for companies with limited experience in manufacturing hospital beds, ventilators, and personal protective equipment (P.P.E.). Several companies developed business models supported by mobile apps used in service logistics providing test samples, personal protective equipment, medicines and food supplies, and the emergence of "contactless" delivery solutions.

Ventec leveraged G.M.'s logistical, purchasing, and manufacturing expertise to build even more critically essential ventilation fans. G.M. as a socially responsible company contributed its resources at cost price. Through its global supply base, G.M. and Ventec had also developed plans to supply 700 individual parts required to construct up to 200,000 VOCSN ventilators (Note 10).

The exertion included sourcing many parts and gatherings from providers, the plan of another assembling cycle, G.M.'s Kokomo plant; the continuous employment of more than 1,000 assembling colleagues; and the usage of general wellbeing and security conventions in the work environment.

Throughout those efforts, G.M. had strong support from the leadership of the United Auto Workers, including the UAW-GM Department and U.A.W. Local 292, community groups and elected officials in Kokomo, the U.S. Food and Drug Administration, the U.S. Department of Health and Human Services, and the White House Office of Trade and Manufacturing Policy (<https://media.gm.com>).

The first intensive care fans from GM-Fintech were delivered on April 17 to Olympia Health Fields Franciscan Hospitals in Illinois, and Weiss Memorial Hospitals in Chicago shipped directly by U.P.S. (<https://media.gm.com>).

Through FEMA's consistent coordination, these life-saving gadgets are similarly quickly being conveyed to emergency clinics in Chicago and Gary. An energetic White House salute to the full intensity of private venture holding hands with the government's full power to battle the undetectable adversary (<https://media.gm.com>).

U.P.S believed patients merit admittance to the best innovation to keep them in the battle as their bodies battle the infection. Basic consideration ventilators convey exact wind current to secure the lungs, incorporate precise screens to evaluate persistent prosperity. They incorporate progressed controls that help respiratory advisors and doctors wean patients off ventilators as quick as could be expected under the circumstances. U.P.S. executives mentioned that UPS consistently stands prepared to meet the American public's earnest needs, and they were glad to be chosen to make this memorable critical role. This great exertion is a demonstration of the unbridled inventiveness and advancement of American organizations. UPS organizer's expressions and individuals decided cooperating can achieve anything. GM, Ventec, and U.P.S. have achieved this along with the speed, quality, and responsiveness that the world anticipates from America's private segment.

The U.S Vice President, Indiana Governor, and the U.S. Transportation Secretary on April 30 traveled to General Motors' Kokomo plant to inspect work and meet G.M. and Ventec heroes of employees involved in the production of life-saving intensive care fans (Note 11).

5.5 Partner with Big Players & Set Protocols

The mitigation phase necessitates that all parties and players aim at eliminating or reducing risks to the community, particularly the vulnerable ones. Once the disaster hits, even if it is still in its early stages, decisions made, and actions taken to reduce adverse impacts are the results of preparedness and response strategies and plans. The risk mitigation decision is made through the risk management process. Effective decisions are influenced by costs, political perspectives, past experiences, and other issues that contribute to risk management (Manitoba-Health-Disaster-Management 2002).

Following the presidential directions to the business sector, G.M. started to protect its employees by allowing them to work remotely while providing means of communication, and it suspended car assembly lines in factories to protect employees and reduce the spread of infection among them and their families in addition to its innovation in venturing into ventilators. G.M. partnered with Ventec to manufacture ventilators and surgical masks to protect hospital first responders. This partnership combined Ventec's expertise in the respiratory care industry with the tremendous manufacturing capabilities of G.M.

G.M. and Ventec tried to save lives and promote local resilience and responsibility at the time of crisis. The support of G.M. and its suppliers was remarkable to produce the best possible equipment for treating patients

from this pandemic as a trial to save lives and alleviate the crisis.

The Manitoba model stated that an effective preparedness program should include planning, training, resource management and implementation, and is directed to the entire community. Every component of the program has an important role. In the case of Covid-19, the US health sector had a major role in preparing the local community to deal with the crisis through awareness of individuals, taking precautionary measures, social distancing, and hygiene. Health sector resources will also be more in demand during the response phase. By helping the community to prepare better, the health sector will increase its effectiveness service delivery in the disaster/pandemic time to patients particularly critical cases (Manitoba-Health-Disaster-Management 2002).

There were many programs necessary to reduce the impact of disasters such as programs to provide the necessary knowledge and skills, public education about responsibilities and possible mitigation measures, training, and education programs.

G.M. trained its employees on comprehensive examination protocols, cleaning and other procedures recommended by the C.D.C. Examples of these procedures include (Note 12):

5.6 Appearance for Work

- Everybody showing up for work will need to purify their hands quickly upon appearance also, have their temperature checked with a non-contact thermometer before entering the place of work.
- Everybody shows up on their day of work wearing clinically proven defensive covers, including covers delivered at G.M.'s Warren, Michigan office.

5.6.1 At Work

- There was a 30-minute stretch between movements to permit representatives to clean their workstations when they show up and again before they leave.
- There were signals all through the offices reminding colleagues to rehearse social removing.
- One individual monitored every workstation, and every workstation was divided in any event six feet separated.
- Cleaning teams cleaned and disinfected normal touch surfaces, for example, entryway handles.

5.6.2 Between Shifts

- Shift creation started with one move, with second and third moves included maintaining social distances and wearing masks.
- Each move entering and exiting should be through an alternate way to limit social contact.

GM corporate clinical chief said employees innovating and assembling these ventilators lifted their hands to help spare the lives of individuals experiencing Covid-19. They will make a sheltered work environment utilizing C.D.C. rules and logical data and updated information. At that time, there was almost a press conference broadcasted daily from the White House, in most cases in coordination with FEMA & CDC.

5.7 Gm Model of Emergency Partnership Management: One Team, One Mission, One Month

The world needed to face Covid-19 to save humanity and the economies of many countries. World leaders and C.E.O.s of global companies needed a roadmap to use in times of disasters and emergency situations in general.

The decisions that G.M. made in its endeavor to participate in disaster management can be chronologically summarized as follows (Note 13):

- March 17-18, 2020 - G.M. and Ventec chiefs had their first telephone calls to investigate how G.M. could help increment ventilator creation.
- March 19, 2020 - G.M. group withdrew for Ventec Life Systems' office in Bothell, Washington.
- March 20, 2020 - G.M. drew in its worldwide flexibly base and within 72 hours, they had created plans to source 100% of the important parts.
- March 25, 2020 - Crews started setting up the Kokomo site for creation. G.M. is recruiting in excess of 1,000 colleagues from the network to join current G.M. representatives to increase ventilator creation.
- March 27, 2020 – The U.S President marked a Defense Production Act reminder.
- April 8, 2020 - The U.S. Branch of Health and Human Services granted G.M. an agreement under the Defense Production Act to manufacture 30,000 VOCSN V+Pro basic consideration ventilators.

- April 17, 2020- U.P.S. conveyed the first VOCSN V+Pro basic consideration ventilators created by G.M. and Ventec to Franciscan Health Olympia Fields in Olympia Fields, Illinois, and Weiss Memorial Hospital in Chicago. A third shipment was conveyed by U.P.S. to the Gary/Chicago International Airport on April 18 for dispersion to different areas where the need was most prominent.
- April 30, 2020 - The U.S. Vice President, Indiana Governor and The U.S. Secretary of Transportation wandered out to G.M.'s Kokomo. They plan to invite delegates from G.M. and Ventec who are busy with the formation of life-saving fundamental thought ventilators. The U.S. Vice President, Indiana Governor and the U.S. Secretary of Transportation ventured out to G.M.'s Kokomo plant to welcome representatives of G.M. and Ventec who are occupied with the creation of life-saving basic consideration ventilators (General Motors and Ventec Life Systems Welcome Vice President to Ventilator Production Plant, 2020) Olympia Fields in Olympia Fields, Illinois and Weiss Memorial Hospital in Chicago. A third shipment was conveyed by U.P.S. to the Gary/Chicago International Airport on April 18 for dispersion to different areas where the need was most noteworthy.

This study concluded with guidelines that leaders and executives can rely on to make their decisions in emergency situations when uncertainty, risk and ambiguity is significantly high. The research proposed a decision-making road map to guide executives, chairmen and CEOs making decisions in emergency situations. This roadmap includes updating your employees, taking collective actions with other organizations in your industry, Partner with big players in the market & set protocols, making necessary changes in executive leadership, and Innovating your Supply Chain & achieving results as shown in Figure 5



Figure 5. A suggested model/Road Map for Emergency Management for CEOs and Executives: Decision making & supply chain innovation (Alayis & Atteya, 2023)

6. Conclusion, Research Limitations, Future Research, and Implications for Executives

6.1 Conclusion

The US Automotive industry and its companies' responses to Covid crisis was among the most successful ones. The Auto industry collectively agreed on certain immediate protocols to be immediately put in action then every company had its strategies to contribute and leverage covid 19 effects.

At that time, the Auto industry companies accepted and dealt with the challenges through its strategic, conscious, and rational leadership in making decisions that would contribute to facing the Corona disaster. GM manufactured ventilators through its partnership with Ventec. It also manufactured surgical masks and protective gowns. It has used its network of suppliers to ship equipment to the destinations that needed it.

Organizations must have strategies and systems previously set up to oversee any emergency. A thorough arrangement covering crisis/ emergency response, keeping up coherence of tasks, and debacle recuperation must be created. The organization must be prepared to utilize the resources and arrangements. Tabletop cross-sectional activities ought to be offered at all levels. Contingency upon the size and impression of the business organization play a major role in dealing with any future emergency.

6.2 Executives' Implications

The suggested model is expected to guide executives and top-level management to make quick decisions, sustain the business and perform their social responsibility towards society. The model helps in reducing time, money and effort and create agility, resilience, and sustainability during crisis management. The model also helps directing executives and decision makers towards making quick, fact, effective and efficient decisions because of

previously prepared strategies and plans and very high and quick response strategy and contingent plan and organizational mechanism.

6.3 Research limitations

This research is limited to studying the US Auto industry response to Covid particularly one of its companies, GM, in details relying on content analysis publicized on GM news website using content analysis approach with the purpose of providing executives with a model for decision making at the time of emergencies.

6.4 Future Research

Future research might cover more topics to study and other research questions to ask such as how much time do executives have to set up a strategy and an emergency plan and a scenario for your next corporate emergency? Is it a year, a half year, or one week from now? Are executives prepared to jump into immediate partnerships to curb an emergency? Quantitative study using a questionnaire directed to executives and top-level management about their perceptions and beliefs and degree of preparation for a similar unexpected crisis. The study can be implemented at the Auto industry or other industries like the energy or the technology one

There are numerous necessary business activities and vital choices expected to create an agile organization and resilient organization and use time, innovation, and technology to decrease time expected to get back to typical normal tasks and increment your endurance possibilities.

Informed consent

Obtained.

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The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data is available.

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Notes

Note 1. For more details visit <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html> Note

Note 2. For more info. Please visit <https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2020/mar/0312-coronavirus.html>

Note 3. For more info. You can visit

<https://plants.gm.com/media/us/en/gm/news.detail.html/content/Pages/news/us/en/2020/mar/0315-coronavirus-update-2.html>

- Note 4. For more info. Please visit <https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2020/mar/0318-leadership.html>
- Note 5. For more info. Please visit <https://www.gm.com/company/leadership#Officers>
- Note 6. For more info. Please visit <https://www.gm.com/company/leadership#Officers>
- Note 7. For more info. Please visit <https://www.gm.com/company/leadership#Officers>
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