

Designing a strategy model to cope with the industrial crises caused by outbreaks of common viruses with an emphasis on coronavirus; A mathematical approach

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Abstract

The Covid-19 outbreak has created a situation in which most businesses now think of survival as a return. With the end of this crisis, they will not necessarily return to the pre-crisis period. The present study designs a strategy model to cope with industrial crises caused by the outbreak of common viruses. The meta-synthesis method was used to obtain a comprehensive combination of the factors of the strategy model to cope with the industrial crises caused by the outbreak of common viruses. To use this research method, Sandelowski, and Barroso's seven-step method was used. The primary question of the present study is "What are the criteria of the strategy model to cope with the industrial crises caused by the outbreak of common viruses?" Also, based on the previous studies, the present study performs an in-depth analysis of these factors in the international and national spaces and presents a classification of them. The research process is implemented as follows. The tests were categorized and coded using MAXQDA software. According to the literature and the background of the study and the results obtained, the factors of the strategy model to cope with the industrial crises caused by the outbreak of common viruses include organizational environmental factors, organizational crisis management, organizational resource management, organizational marketing, and customer-related strategies, organizational business model, organizational capabilities, organization human resource management, and organizational information management. In this regard, the category of environmental factors was ranked first, the category of organizational crisis management was ranked second, and the category of marketing was ranked third.

Keywords: Covid-19, Business Model, Business Strategy, Crisis Management
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1 Introduction

Covid-19 was first seen in Wuhan, China in December 2019 and was spread to other parts of the world rapidly. The countries restricted their borders and occupations and implemented full or partial quarantine. Decisions made at national levels resulted in the questioning of unions (e.g. the European Union) and globalization. Many countries

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lost their trust in international institutions such as the WHO [4]. With the intensification of this pandemic, countries began to feel economic collapse. Consumers in different countries are mostly pessimistic about the economic conditions [44]. This pandemic affected international trade ([4, 12, 40]), tourism ([39]), and other sectors. Capitalism and neoliberal policies encourage more consumption, especially among the middle classes. However, this pandemic led to unsustainable consumption, which is related to market vulnerability [35]. Hence, Cutler (2020) states that capitalism will evolve based on social justice and democracy after the pandemic, which will lead to a post-consumerism era ([31]). People tend to save more of their income and avoid spending it during Corona. This issue harmed the economy of the companies and reduced the economic growth of the country. Many factories were closed worldwide owing to a reduction in demand and people staying at home following the outbreak of the coronavirus. The businesses that have had good profits and sales during the Corona crisis have little risk and do not require fundamental changes in their business model. Thus, the business development model is less significant for these businesses. However, some businesses suffered from the Corona crisis. Thus, they require business development and appropriate strategies to improve production during the Corona outbreak. During the Corona outbreak, citizens are asked to observe social distancing and stay at home [25]. Isolation may harm society and businesses [15]. It causes depression, the loss of many businesses, increased violence in the family, disputes between neighbors, etc. [16].

Mackenzie and Company (2020) have divided the Coronavirus crisis management process into five stages [45]. These stages are: 1) problem-solving and healthcare, 2) resilience, 3) recovery, 4) post-corona imaging, and 5) reform. In the first stage, society needs to reduce mental pressure and relaxation. Also, remote work and social distancing were also considered to reduce the disease chain. After observing these health protocols, communication in society gradually increased and people's communication increased by observing these health issues. In the second stage, some goods sold more and some goods sold less. Sales of food, health products, and the like increased. However, sales of travel services, outdoor entertainment, and clothing declined. The use of social networks increased as people stayed at home. Resilience means the ability to withstand crises and risks. Thus, at this stage, resilience was necessary for businesses to overcome this crisis. In the third stage, after changing and passing through resilience, businesses entered the recovery stage. Recovery strategies include improving the organization's performance and operations, innovation in the business model, and business development according to the current crisis and conditions. In the fourth stage, it was expected that Corona would change the expectations and priorities, and lifestyle of the people in the society. The Covid-19 outbreak has created a situation in which most businesses now think of survival as a return. Thus, entrepreneurs and senior managers need a strategy to reduce threats and increase the possibility of survival and take advantage of future opportunities after the outbreak of coronavirus disease. The limited studies conducted in this area suggest that disease outbreaks in the past were mainly associated with low returns on assets after the outbreak [37]. People have a lower tendency to consume and invest during its outbreak and after it. They tend to save more than before. Thus, economic growth will decrease during the Coronavirus outbreak. Eger et al. (2021) showed that the outbreak of pandemic diseases such as Corona has led to the formation of an online sales strategy [26]. Hao et al. (2020) also indicated that the coronavirus outbreak has caused changes in product design, investment, digital transformation, and market changes [33]. No domestic study has been conducted to investigate the country's industries in the form of presenting strategies to cope with this crisis. Thus, the theoretical significance of this study is highlighted. Thus, conducting this study is necessary practically and theoretically. The results of this study can adopt strategies to cope with the coronavirus crises faced by industries. Also, from the future research viewpoint, it is possible to identify the problems that will affect industries in the future due to the coronavirus outbreak and take action to solve them. Therefore, the present study investigates the design of a strategy model to cope with industrial crises caused by the outbreak of common viruses.

2 Research literature

Previous studies have investigated the behavioral responses during pandemic outbreaks such as Ebola, SARS, MERS, swine flu, and dengue ([9]). These changes were observed during pandemics and outbreaks such as SARS due to motivated individuals and government policies ([14]). The areas affected by pandemics generally experience unemployment, uncertainty, and economic recession. Due to uncertainty and unpredictability, people take safety measures to reduce perceived risk during pandemics [14]. In the first phase of the coronavirus lockdown in India, citizens experienced unprecedented conditions resulting in an unprecedented shift in priorities among consumers. The goods were classified into two categories, including essential and non-essential tools. Only essential goods were available to citizens and there was no demand for lifestyle products. Also, people all over the world expressed their feelings against China because they believed that China did not take enough preventive measures to prevent the spread of the pandemic to other parts of the world. Additionally, China reopened its businesses while other regions of the world, including India, had to follow quarantines, which negatively affected the economy [60].

3 Covid-19 and the industrial crisis

Companies respond to unfavorable business conditions during a crisis by trying to preserve resources such as financial capital, employees, and supply chain, and by minimizing the damages caused [64]. In this regard, the literature reviews the strategic responses of companies to crises, and factors such as timing, level of damage, and interaction institutions are significant in crisis management [13]. The Covid-19 crisis has created an increasing crisis. It has drawn attention to the problems of many health systems worldwide [65]. The quarantines that occur during the pandemic create a new and unique atmosphere in entrepreneurship literature. However, a great number of studies can be found on entrepreneurship and crisis management, such as [47] and [17]. Also, there are many other types of studies that provide two solutions that are instructive in the pandemic. The first solution can show entrepreneurial crisis management and how businesses cope with the crisis. The second solution suggests policies that can be used for the survival of the organization during crises and existing barriers. The second stream can help policymakers develop appropriate interventions to strengthen and support businesses ([41]). Several studies have been conducted in a very short period to evaluate the effect of the COVID-19 pandemic on entrepreneurs in many countries to find ways to overcome the crisis with the least possible damage. Most studies agreed that the coronavirus has a severe negative effect on all industries [65].

The first study was conducted by the International Trade Center (2020). It showed that the pandemic has been very challenging for the entire world and leads to major health crises and serious impacts on all aspects of life and business. In this regard, the study showed that small and medium-sized enterprises have been at the forefront. Customers stayed at home, supply chains were shut down, and small industries that provide 70% of job opportunities in countries were under severe pressure. [58] examined the impact of changes in consumer purchase behavior on the design of the business model of consumer service companies during Covid-19. They showed that changes in consumer purchase behavior significantly affect the design of business models of consumer service companies. Changes in consumers' purchase intention, motivation, and time frame lead to a new business model design, while changes in the purchase method inspire a return-oriented design. [65] investigated the Egyptian SMEs' reaction to the Covid-19 pandemic. They showed that entrepreneurs should always be flexible and seek to invest in innovation. However, there is a difference between the opinions of the participants regarding the measures taken by the Egyptian government after the pandemic. [8] investigated the challenges caused by Covid-19 in international customer relationship management in the industrial communications of high-tech Finnish industrial companies. They showed that the companies quickly adapted to "new procedures" and used several technology resources, including online meetings and 3D displays.

In [23] author examined the factors and challenges of business management during the Corona crisis. They showed that human resource managers can achieve their goals at all organizational levels using special strategies such as training and empowering human resources, identifying financing ways and reducing costs and using management systems, and obtaining the government's support at all organizational levels. Accordingly, they can moderate the negative impact of this crisis on the performance of human resources management in different sectors. Author in [10] identified the factors and challenges of business management in the field of supply of raw materials during the Corona crisis (case study: Tasha Machinery Company). They showed that the Covid-19 pandemic affects the fields of economy, society, politics, religion, children, women, and the environment. They showed that it plays a significant role in the business environment worldwide.

4 Methods

Since the studies related to the concept of commercialization and related models are primarily qualitative studies with little quantitative data and based on the examination of different cases, the meta-synthesis method was used as a suitable method to obtain a comprehensive combination of the factors of the coping strategy to cope with industrial crises caused by the outbreak of common viruses. To use this research method, Sandelowski, and Barroso's seven-step method was used. The primary question of the present study is "What are the criteria of the strategy model to cope with the industrial crises caused by the outbreak of common viruses?" Also, based on the previous studies, the present study performs an in-depth analysis of these factors in the international and national spaces and presents a classification of them. The research process is implemented as follows. The tests were categorized and coded using MAXQDA software. Using the keywords of the research, a systematic search was conducted in this stage for the published materials in various reliable scientific journals and public sources and websites of reliable foreign and domestic organizations to determine valid and relevant documents in the appropriate time frame. The statistical population of the study included the articles published in the information sources of reliable domestic magazines and journals and foreign online information sources. Critical appraisal skills program CASP was used to assess the quality of qualitative research. Based on the CASP index, research objectives, logic, design, sampling, data collection,

reflectivity, ethical considerations, precision in analysis, clear expression of results, and research value are examined. In the present study, 55 articles were finally obtained after filtering the articles through the CASP tool and based on reaching theoretical saturation.

The thematic analysis method was used for the analysis and the presentation of the final findings of the meta-synthesis. Table 1 presents the results of the primary codes of the qualitative data extracted from the reviewed articles. It can be seen that 48 primary codes were identified among 130 data from the articles.

$$F = \frac{(RRSS-URSS)/N-1}{URSS/NT-N-K} \quad (4.1)$$

$$COEPS_{i,t+1}^1 = \alpha + \beta_1 RATEPR_{i,t} + \beta_2 COEPS_{i,t} + \sum_{j=1}^{10} \gamma_{ij} othersignals_{ij,t} + \varepsilon_{i,t+1} \quad (4.2)$$

$$\begin{aligned} h_t &= \alpha_0 + \sum \alpha_t \varepsilon_{t-i}^2 + \sum \beta_t h_{t-i}^2 \\ i_t &= f(i_{t-1}, X_t, \sigma_t) + u_t \end{aligned} \quad (4.3)$$

$$\begin{aligned} \log INV &= \alpha + \beta_0 INV_{t-1} + \beta_1 \log GDP_t + \beta_2 \log RL_t + \beta_3 \sigma GI_t \\ &+ \beta_4 \sigma CPI_t + \beta_5 \sigma OIL_t + \beta_6 \sigma EXCH_t + u_t \end{aligned} \quad (4.4)$$

$$\begin{aligned} \Delta LCPI &= 0.04 + 0.51AR(1) + 0.31MA(1) \\ t - stat : & \quad (3.9) \quad (2.10) \\ R^2 &= 0.49 \quad D - W = 1.95 \end{aligned} \quad (4.5)$$

$$\begin{aligned} \Delta LOIL &= -0.02 - 0.72AR(1) - 0.58AR(2) - 0.23AR(3) \\ t - stat : & \quad (-6.82) \quad (-4.93) \quad (-2.24) \\ R^2 &= 0.39 \quad D - W = 1.99 \end{aligned} \quad (4.6)$$

$$\begin{aligned} \Delta LEXCH &= 0.04 - 0.79AR(1) - 0.90AR(2) + 0.70AR(3) - 0.23AR(4) \\ t - stat : & \quad (21.8) \quad (-9.16) \quad (11.6) \quad (-3.8) \\ & - 0.21MA(1) + 0.55MA(2) + 0.3MA(3) - 0.55MA(4) \\ & \quad (-9.94) \quad (17.54) \quad (2.64) \quad (-17.02) \\ & + 0.40MA(5) - 0.28MA(6) - 0.21MA(7) + 0.40MA(8) \\ & \quad (4.88) \quad (-3.81) \quad (9.32) \quad (6.15) \\ R^2 &= 0.40 \quad D - W = 1.96 \end{aligned} \quad (4.7)$$

$$FD_t = c_0 + c_1 Y_t + c_2 Inv_t + c_3 Inf_t + c_4 EPU_t + c_5 Tr_t + e_t \quad (4.8)$$

$$\theta_i = \frac{\widehat{b}_i(L, q_i)}{1 - \widehat{\phi}(L, p)} = \frac{\widehat{b}_{i0} + \widehat{b}_{i1} + \dots + \widehat{b}_{iq}}{1 - \widehat{\phi}_1 - \widehat{\phi}_2 - \dots - \widehat{\phi}_p}, \quad i = 1, 2, \dots, k \quad (4.9)$$

$$Y_t = \alpha + \sum_{i=1}^{\rho} \widehat{\gamma}_i \Delta y_{t-i} + \sum_{i=1}^{\rho} \widehat{\beta}_i \Delta x_{t-i} + \sum_{i=1}^{\rho} \widehat{\delta}_i \Delta z_{t-i} + \mu \Delta ECM_{t-1} + u_t \quad (4.10)$$

$$t = \frac{\sum_{i=1}^s \widehat{\alpha}_i - 1}{\sum_{i=1}^s Se \widehat{\alpha}_i}$$

Table 1: Primary coding

Primary code	Conceptual codes extracted from articles	Document
Crisis communications	In a study entitled "Crisis and emergency risk communication in health areas: Using the CDC model in Pandemic Influenza", they examined the development of risk communication as a type of health communication and described the factors that led to the Centers for Disease Control (CDC) to adopt a crisis and emergency risk communication (CERC) approach. It identifies the CDC's response to the anthrax episode as a major factor that led to the emergence of CERC as a framework	[54]
	It shows how an integrated communication approach can be used in response to a global threat to public health. recommendations are also presented for how the CERC model can inform future efforts to communicate public health issues	[54]
	It shows how an integrated communication approach can be used in response to a global threat to public health. Suggestions were also provided for how the CERC model can inform future efforts to communicate about public health issues	[54]
Information strategy	This study showed that the effect of information retrieval strategies varies according to time. The evolution shows a "U" shape, which first decreases and then increases	[28]
	By considering different media and the involvement of tourists' information, the effect of the implementation of the information strategy shows significant differences	[28]
	When these two strategies are implemented simultaneously, the information strategy has an increasing effect on the difference due to the improvement of different price strategies	[28]
Marketing strategy	This guideline aims at adopting specific marketing strategies during a pandemic and subsequent shutdown and quarantine	[22]
	The results can be useful for developing marketing strategies that consider psychological factors to meet consumers' real needs and feelings.	[24]
	Investigating collaborative business marketing strategies in a COVID-19 pandemic crisis, they showed that although collaboration (and competition at the same time) positively affected the company performance, it is not clear how these marketing strategies through business are implemented on a large scale during emergencies.	[18]
The strategy of coping with a crisis	They also showed that some small businesses have a formal crisis plan and strategy before the outbreak	[5]
	Understanding these differences is crucial for designing strategy during a crisis and successfully guiding toward future	[49]
Product diversity strategy	Other common survival strategies include increasing product diversity, exploring new markets, and increasing learning.	[5]
Organization strategy	As the industrial situation worsened, airlines continue to demand government help and shifted their focus to transporting high-demand goods and medical supplies	[56]
	Industry uncertainty forced them to delay aggressive takeover opportunities	[56]
	In investigating the industrial marketing responses to the COVID-19 crisis, nine marketing responses were divided into three categories based on the primary business processes: (1) in the product development management process (stretching production lines to meet immediate needs, expanding production lines to respond to immediate needs and proactively adjust products for emerging needs), (2)) based on the supply chain management process (coordination of suppliers to meet high demand, migration to digital distribution channels and collaboration with supply chain members) and (3) relating to the process of customer relationship management (investment in advertising and promotion, extensive sales to existing customers and customer support).	[38]
	The results suggest that persistence and passion (as components of entrepreneurial tenacity) strengthen the relationship between entrepreneurial skill and business performance by established entrepreneurs.	[46]
Pricing strategy	The price strategy is relatively stable in the time dimension of the recovery process	[28]

Primary coding (*continued*)

Primary code	Conceptual codes extracted from articles	Document
Human resource strategy	They examined the crisis management for small businesses during the Coronavirus outbreak based on the strategies of survival, flexibility, and renewal of companies in Macao. They showed that all the participants use human resources strategies among the different types of response strategies	[5]
	During the Corona crisis, they showed that human resource managers can achieve their goals at all organizational levels using special strategies such as training and empowering human resources, identifying financing ways and reducing costs, and using management systems.	[23]
Industrial partnership strategies	In investigating partnership and corona based on business-to-business marketing strategies, they showed partnership in a pandemic crisis	[18]
	As the industrial deterioration deepens, airlines continue to demand government aid packages and have shifted their focus to transporting high-demand goods and medical equipment. Finally, industry uncertainty has forced them to delay aggressive opportunities.	[56]
Customer trust	In investigating crisis management strategies in intra-organizational crises, they showed that the differences extracted from different sources also provide opportunities for communication between these two areas.	[55]
	Moreover, developing trust with new customers, especially customers in emerging markets, was challenging due to the lack of physical meetings and site visits.	[7]
Organizational flexibility and resilience	In investigating crisis management for small businesses during the outbreak of the Coronavirus based on the strategies of survival, flexibility, and renewal of companies in Macau, they showed that among the different types of response strategies, all the participants have adopted acceptable human resources strategies.	[5]
	This study guarantees the vital significance of creating post-crisis recovery policies. They concluded that the resilience of SMEs depends on the great efforts of policy-makers, SME operators, and the government.	[36]
	These seven classifications will include parts of the materials of the production and industry sector, triple strikes to the production sector, providing a framework for strategic actions during a crisis, resilience strategies for manufacturing businesses, and crisis response strategies.	[52]
	We identified potential risk-related blockchain application scenarios and investigate their effect on existing resilience strategies. We investigated the effect of the most promising applications regarding resilience using an agent-based simulation model of a complex supply network affected by disruptions.	[43]
Customer awareness	By evaluating the name of a luxury brand, consumers of luxury goods obtain information about the artistic skills, industries, and preferences of consumers. At this stage, consumer support plays a significant role in the purchase decision of luxury brand customers	[10]
	Considering different media and the involvement of tourists' information, the effect of the implementation of the information strategy shows significant differences	[28]
Crisis preparedness	Respondents were asked to rate their consumption behavior, frequency of purchase, a tendency to pay a higher price, sense of moral obligation to purchase, the social impact of purchase-related to several categories of sustainable products due to the pandemic, and the extent to which the pandemic affected many other aspects, including awareness, concern, and environmental habits	[21]
	To face surprising and unexpected situations, crisis management first of all requires experience, preparation, skill, speed of action, intelligence, and creativity. Crisis management is the process of planning and performance.	[59]
	The management of a pandemic is focused on the	

Primary coding (*continued*)

Primary code	Conceptual codes extracted from articles	Document
	following goals: 1. Treatment of cases. 2. Prevention of further spread of the pandemic. Continuous monitoring of the outcomes and consequences of the control measures of the widespread pandemic, especially when the pandemic is caused by a crisis, is a simple matter. By actively monitoring the disease in a geographical area in a relatively limited time, information can be regularly collected by health workers to provide appropriate plans and necessary treatment measures to prevent the spread of the pandemic.	[27]
	Several hypotheses have been presented about this theory produced about the Islamic crisis management model. Based on the results of this study, recommendations were developed that show the necessity of training leaders in the Islamic approach to crisis management, its strategies, and scientific steps in crisis management. These results have extensive applications in the field of training leaders and also recommend future studies to confirm the theoretical assumptions derived from the data of this study in the field of crisis management in Islam (the crisis of the COVID-19 pandemic as a model).	[3]
	They conducted a study entitled "t and learning for crisis management using a simulation/virtual game environment". Recent advances in computers, networking, and telecommunications provide new opportunities to use simulations and games as methodological tools to improve crisis management.	[62]
Crisis training	Development of virtual environments to support games, having players interacting with each other on distributed workstations, and having automatic controllers provide players with exogenous events that enable players to search the online data files during the game.	[62]
	Videos can be used to provide scenario updates to players in the form of "newsletters" and provide players with pre-recorded reports from experts. Organizations responsible for crisis management currently use such technologies in building crisis management systems (CMS) to coordinate crisis response, provide decision support during a crisis, and support pre-crisis and post-crisis activities. If designed with a game, the same CMS can easily be used in a simulation mode	[62]
	Such use of the system also provides the possibility of reconsidering real crises by using the same tools that are available to them in a real crisis.	[62]
	Digital marketing	[2]
	Social media marketing and mobile phone marketing have a great impact on consumer purchasing decisions	[2]
	Digital marketing affects students' decision-making	[2]
Digital marketing	Companies should adopt strategies to use the digital world and technology, and increase brand awareness through digital platforms to continue to compete in today's business environment.	[2]
	Digital channel managers clearly understand their core strengths in the five dimensions of digital marketing strategies.	[22]
	The results of this study prove that enjoyment and perceived usefulness characteristics (price, convenience, and health aspects) positively affect online shopping attitudes along with perceived usefulness and perceived ease of use.	[57]
	However, marketing strategies are revised to deal with various consumer risks. Thus, since technological and digital formats define consumer behavior, companies should incorporate digital transformations into their processes.	[19]
Information network	Theoretical analysis indicates the promotion of supply chain flexibility strategies, especially if smart contracts are used for risk-related collaborations. The study shows increased flexibility if the underlying cooperation	[43]
recovery	is based on time-efficient processes: propagation of disturbances, network recovery time, and total costs can be significantly reduced. However, negative effects may occur if the process efficiency is insufficient, depending on the duration of the disturbance. Our study provides insights for managers interested in practical implementation.	

Primary coding (<i>continued</i>)		
Primary code	Conceptual codes extracted from articles	Document
Crisis preparedness	In response to the emerging potential of a new pandemic, national and international preparedness plans are being developed to determine the use of antivirals and vaccines. Several challenges for pandemic vaccine development, large-scale production, and distribution timing have been also highlighted.	[20]
	This report refers to the growing significance of crisis and crisis management for the tourism industry before examining the definitions and nature of crises and disasters. Then, it proposes a strategic approach to manage them using active pre-crisis planning through strategic implementation and finally evaluation and feedback.	[48]
	This study concluded that the understanding and subsequent management of such incidents can be significantly improved through the expansion and application of crisis management theory, crisis and concepts of other fields, and the development of research and specific frameworks of tourism crisis management.	[48]
Executive bonuses	Specialists must balance the risks and bonuses of compensation activities	[18]
Corporate experience	These companies have a long history, experience in dealing with the crisis, and operating in more orderly and organized sectors.	[5]
Organizational capabilities	Managers need to prepare and develop their capabilities to face the crisis properly	[59]
	They used several technological resources, including online meetings and 3D displays	[7]
	Companies should adopt strategies to use the digital world and technology and increase brand awareness through digital platforms to remain competitive in today's business environment.	[2]
	Blockchain technology has a prominent position to change the supply chain	[66]
	The primary challenge is that the tracking of border activities in the steel supply chain is not well monitored. The digital system strongly requires the development of advanced technology to manage disruptions and create a flexible supply chain. The use of blockchain technology can record the movement of goods throughout the supply chain to confirm product quality and origin.	[66]
	This study showed that blockchain technology with its transparent and stable function helps the flexible steel supply chain in reducing risks and uncertainties.	[66]
	The results confirm that perceived usefulness and enjoyment characteristics (price, convenience, and health aspects) positively affect online shopping attitudes along with perceived usefulness and perceived ease of use.	[57]
Technology development	Many technicians hardly understand it and the level of preparation is very low. However, it has a lot of potentials and is worth investing in along with other technologies such as BIM technology. In the present study, the authors sought to provide a measure of Saudi professionals' attitudes and understanding of blockchain technology solutions in the construction industry in Saudi Arabia. Moreover, the new aim of this study is to provide an understanding of the conceptual, theoretical, and fundamental features of blockchain technology in the construction industry since blockchain solutions can be useful for the global economy by increasing levels of monitoring, tracking, and trust.	[2]
	Other common survival strategies include increasing product diversity, exploring new markets, and enhancing learning	[5]
Market search	By systematically observing the crises and analyzing them, they search for a tool to reduce the effects of the crisis. Scientists agree that the highest pressure is put on the managers of the organization during a crisis.	[59]
	Since disasters negatively affect the health development of society, the health development of society reduces the risk of disasters. Therefore, it is possible to prevent pandemic diseases and reduce the quality of life during a crisis through purposeful management and the necessary predictions and appropriate measures.	[27]
	Searching crisis solutions	

Primary coding (continued)

Primary code	Conceptual codes extracted from articles	Document
	Since this crisis requires large-scale behavior change and places significant psychological burdens on individuals, social and behavioral science insights can be used to help align human behavior with the recommendations of epidemiologists and public health professionals.	[63]
Human resource support	The results revealed that the physical, emotional, and behavioral symptoms of employees' health problems have intensified during the covid-19 pandemic compared to before the covid-19 pandemic.	[50]
Damages caused by a crisis	Crises are mostly associated with financial loss of life and damage to people and property	[59]
Access to online sites	The small size of the companies is one of the key reasons for this rapid adjustment. However, lack of access to customers' sites remains a barrier since their products should comply with certain production processes, which cannot be done without a physical visit.	[7]
Social media	There are many supported digital media platforms in Jordan that affect students' behavior	[2]
	Jordanian students purchase different categories of products on digital media platforms	[2]
	The limitations of some social media services and messages	[30]
Customer satisfaction	Accordingly, measures taken by governments, technology, and social media are highlighted as external factors	[19]
	Accordingly, they adjust their plans to make decisions to increase customer satisfaction and final purchase intention.	[22]
Customer behavior	Consumers' behavioral responses to the pandemic include: changes in purchasing consumer goods, avoidance of physical stores, reduction in leisure activities, reduction in purchase frequency, planned purchase versus immediate purchase	[30]
	Changes in consumer purchasing behavior significantly affect the design of business models of consumer service companies.	[58]
	The results show that Covid-19 has caused related changes. Consumers increased the frequency of purchases and willingness to pay for sustainable products, show increasing attention to environmental issues, and behave more sustainably.	[21]
	The analysis identified more different thematic clusters among the studies. The input-process-output model of consumer behavior guided the systematic review and covered several psychological characteristics and consumer behavior.	[19]
	Recession	
Recession	Major airlines have changed their decision regarding the exponential spread of the virus, which is directly related to the level of deterioration of the airline industry. The major airlines maintained their current status when the impact was low in the early stages.	[56]
	As the industrial situation worsened, airlines continued to demand government help and shifted their focus to transporting high-demand goods and medical supplies. Finally, industry uncertainty forced them to delay aggressive takeover opportunities	[56]
	The study measured the impact of the virus on African countries, and how life has changed since the first quarter of 2020, presented the most serious global health crisis and how its negative impact continues. Investigations suggest that innovative startups are the most vulnerable groups due to the 60% drop in fuel prices, and a reduction in foreign direct investment and global demand for exports. The method used in this study was the generalized method of moments with 20 behavioral equations and 3 identities. The study recommended that African countries should strengthen their fiscal and monetary policies to improve industrial and health conditions. They should develop productive capacities to manage underlying vulnerabilities and provide better continental capabilities to manage crises.	[29]
	Marketing innovation is an essential tool for SMEs to cope with the crisis. They are recommended to adopt innovative	[32]

Primary coding (*continued*)

Primary code	Conceptual codes extracted from articles	Document
Purchase methods	marketing strategies during a crisis by changing the marketing mix (product, price, place, and promotion). Studies have confirmed that marketing innovations positively affect the profitability of SMEs. The international quarantine imposed during the outbreak of the Covid-19 pandemic caused a socioeconomic shock that affected citizens and SMEs everywhere.	
	It prevented their activity and business, which is necessary for their survival and stability. The prevailing situation forces SMEs to adopt online business and online marketing strategies so they can survive in the pandemic situation and can face the post-pandemic challenges.	[32]
	Changes in the purchasing method inspire an efficiency-oriented design.	[58]
	COVID-19 was considered the dominant pandemic and its impact on the digital transformation of marketing strategies. Five dimensions of digital marketing strategies with eighteen items and three items each considered customer satisfaction and purchase intention for practical purposes. A structural equation model was used to examine 535 answers from life insurance customers	[22]
	Results suggest that SEM/SEO, display, and E-CRM methods affect customer satisfaction and purchase intention.	[22]
New organizational procedures	They showed a positive and significant relationship between corona disease and customer performance, a significant relationship between corona disease and market performance, and a positive and significant relationship between financial performance and corona disease.	[51]
	The case companies quickly adapted to the "new organizational procedures"	[7]
	Organism includes fear, boredom, and perceived risk	[30]
	Flexibility enables supply chains to reduce their tendency for disruptions and recover faster. Many existing strategies to enhance the flexibility of supply chains are facilitated by the use of digital technology. Blockchain, as one of the promising innovative technologies, enables transparent, secure, and timely data exchange and automation through smart contracts. In this study, we discuss the impact of blockchain technology on supply chain risk management and especially on supply chain flexibility.	[43]
	This study identified various insights for effective response to the COVID-19 pandemic and highlighted significant gaps that researchers should address in the coming weeks and months in the area of public emergencies such as the COVID-19 pandemic. Altruistic behaviors can be enhanced by enhancing the factors of empathy, and sense of control. These results are useful for promoting altruistic government behavior and disaster risk management.	[63]
Perceived risk	Such a simulation model enriches the existing knowledge and explains the complex dynamics of crises in SMEs in a new way. In the case of correct calibration, this model can be used as a supporting tool for making decisions in the construction of SMEs.	[61]
	By obtaining the support of the government, they can achieve their goals at all organizational levels and moderate the negative impact of this crisis on the performance of human resources management in different sectors.	[23]
	We propose a model for the development of a pandemic influenza vaccine product development based on public-private partnerships, including a push-pull mechanism to stimulate work in this therapeutic area. Also, we argue that novel vaccination strategies, combined with specific vaccine formulations that may provide cross-protection against multiple pandemic influenza strains, may prevent the worsening effects of influenza infection.	[20]
	They recommend that the government should find and implement the best policies and laws to support the industrial sector and SMEs.	[36]

supportive policies
Government

Primary coding (*continued*)

Primary code	Conceptual codes extracted from articles	Document
	Macao has been successful in managing the unfavorable effects of Covid-19, which indicates the coexistence of challenges and opportunities arising from the experience of this pandemic. Foreign tourism with China resumed in September with no cases of COVID-19 in the city. Macao relies too heavily on the gambling industry for tax revenue and employment and creates an unbalanced industrial structure. However, the governments of China and Macao, the hospitality industry, and other stakeholders have provided high levels of interaction, unity, and courses of rational action during the pandemic. This paper investigates Macao during and after the coronavirus outbreak. It was effective in the future tourism development of the city.	[42]
	The current coronavirus pandemic crisis indicates that some people are more prone to isolation than others. To better understand this dynamic, we propose an epidemiological SIR model that uses evolutionary game theory to combine in one process social strategies, individual risk perception, and viral spread. We consider a disease spreading among a population whose agents can choose between self-isolation and a pandemic-risk-free lifestyle. Adoption of the strategy is individual and depends on the perceived disease risk compared to the cost of quarantine. Game efficiency governs strategy adoption, while pandemic trend governs agent health status.	[6]
	Community	[10]
	Religion	[10]
	Owing to Iran's special conditions and global pressures and the crisis of inefficiency and identity challenges and transition of power, Corona is an opportunity for institutional reform and transition, national solidarity, acceptance of popular participation, and jurisprudence improvements.	[1]
	They conducted a study entitled "An epidemiological model with voluntary quarantine strategies governed by the dynamics of the evolutionary game". During pandemics, strategies such as social distancing can be essential to reduce co-infections and reduce the spread of disease, which is highly associated with the risk of healthcare system collapse. Although these strategies can be recommended or even imposed, their actual implementation may depend on the population's perception of the risks associated with possible infection.	[6]
Socio-cultural conditions	The present study seeks to generate a theory of data related to crisis management in Islam and to identify strategies used by leaders in the process of crisis management. The grounded theory approach, which is one of the qualitative designs, was used. The content of the verses of the Holy Quran and the hadiths of Prophet Muhammad, which dealt with the issue of crises, were analyzed.	[3]
	The results of the qualitative analysis of the verses of the Quran and the traditions of the noble Sunnah of the Prophet have led to four concepts, which form a broad conceptual theory in the field of crisis management according to the Islamic approach. These concepts include crisis management strategies in Islam, stages of crisis management, characteristics of a leader who manages crises, and the roles of a leader during the crisis management process.	[3]
	We discuss evidence from a range of research topics relevant to pandemics, including work on threats, social and cultural impacts on behavior, science communication, ethical decision-making, leadership, and stress and coping.	[63]
	Denial to acceptance in the field of economics.	[10]
Economic conditions	The COVID-19 pandemic is much more than a health crisis. It has unpredictably changed our entire way of life. The analysis of economic data on sales suggests that this dramatic scenario has also strongly affected the expenditure levels of people.	[24]
	Policy	[10]
Political conditions	If the significance of the issue is not understood, Iran will experience civilizational trauma. The research method is a qualitative-documentary with an explanatory approach to understanding historical-political transformations.	[1]

Primary coding (*continued*)

Primary code	Conceptual codes extracted from articles	Document
Financing methods	During the Corona crisis, human resource managers showed that by using special strategies such as training and empowering human resources, identifying methods of financing and reducing costs, and using the human resources management system.	[23]
	Customer satisfaction significantly affects purchase intention and is a good mediator between digital marketing practices and purchase intention.	[22]
Customer purchase intention	This study states that the purchasing pattern of consumers will change if quarantine is applied in the future. However, now consumers have developed a hoarding mentality for fear of the unavailability of essential items.	[53]
Online business	In this regard, they have used online businesses to perform corporate activities, resulting in a reduced supply chain and the use of commercial capacity.	[11]
Environmental stimuli	Environmental stimuli affecting consumer behavior during the pandemic	[30]
	Children, women, and the environment played a significant role in the business environment all over the world.	[10]
Business model	They should decide whether to continue to cooperate with their competitors or operate under individualistic business models once the pandemic is over. This study concludes with some implications for future research.	[18]
	Investigating the effect of the pandemic on the performance of SMEs in Serbia, they showed that the crisis has negatively affected the daily activities of SMEs in several aspects.	[11]
	The evidence suggests the very different effects of the coronavirus crisis on companies from one business to another business	[49]
	Using the resource-based theory and a relational perspective, this study investigated how organizations used collaboration to cope with the coronavirus pandemic (COVID-19). They should balance the risks and benefits of collaborative activities. They should decide whether to continue working with their competitors after the pandemic is over or to continue operating based on individual business models.	[18]
	In investigating the effect of entrepreneurial skills and entrepreneurial tenacity on doing business in the Covid-19 crisis based on GEM 2020 Iran data, they showed the significant and negative impact of doing business on entrepreneurial skills. However, entrepreneurial personality had a significant and positive impact on doing business. In other words, entrepreneurial competencies have a paradoxical effect (simultaneously positive and negative impact) on doing business among established Iranian entrepreneurs.	[46]
	Corporate social responsibility	They examined the effect of the COVID-19 pandemic on corporate social responsibility and marketing philosophy. In this study, we provided an initial review of how the Covid-19 pandemic has affected the development of CSR and marketing. We argue that the Covid-19 pandemic presents an excellent opportunity for businesses to turn to more genuine and authentic CSR and help address pressing global social and environmental challenges. We also discuss some of the potential ways in which consumer ethical decision-making may change due to the pandemic. In the marketing section, we describe how marketing has been affected by this pandemic and how it has changed, not only the field of marketing but also how organizations deal with their strategic marketing.
Customer participation	Customer participation moderated the relationship between content marketing and relationship with purchase intention	[22]
	Partial quarantine regulations	[30]
Quarantine regulations	The COVID-19 crisis has been one of the most destructive events in recent decades. Its great consequences have attracted the attention of many studies in various disciplines, including consumer behavior. Thus, efforts to review and systematize the literature are necessary.	[19]

Quarantine regulations

Primary coding (<i>continued</i>)		
Primary code	Conceptual codes extracted from articles	Document
	The infection rate depends on the agent's strategy, while the risk of disease depends on a part of the infected agents. The results show repeated waves of infection, which are commonly seen in previous pandemic scenarios with voluntary quarantine. Risk perception is fundamental to controlling the peak infection rate, while the final infection size is primarily determined by the infection rate. Low awareness leads to a single, strong infection peak, while greater disease risk leads to shorter, albeit frequent, peaks. The proposed model spontaneously depicts the relevant aspects of a pandemic event and highlights the essential role of social strategies.	[6]
Organizational resources	They faced other problems such as reduced working hours, lack of resources, payment of wages, inefficient production, etc.	[11]
	The negative impacts of the coronavirus are high human and economic costs, including a reduction in local and global demand, lack of materials, cancellation of orders, problems in repaying debts, and lack of investment and savings.	[36]
	Changes in the goal, motivation, and time frame of consumer purchases are likely to spark innovative-based business model design.	[58]
Organizational innovation	They seek investment in innovation	[65]
	The rapid technological innovation in the steel sector includes continuous updating of skills and personnel. This study aims to investigate the role of blockchain technology in the steel supply chain industry, such as inter-organizational trust, data transparency, product type, social impact, and behavioral intention.	[66]
	Accordingly, four strategies are significant during a crisis, including retreat, persistence, innovation, and exit. Awareness of these strategies and answers will have outcomes for both managers and strategic researchers	[52]
	The rate of change is highly affected by socio-demographic variables, such as gender, age, income, and education	[21]
Constant characteristics	Women reported more change toward consumption and sustainable behavior than men	[21]

Defining and naming the primary themes: At this stage, the researcher defines and reviews the primary themes that he has presented for analysis. Then, he analyzes the data inside them using theoretical methodologies. By defining and reviewing, he determines the nature of a theme and determines which aspects of data each primary theme contains. Table 2 presents the results of axial coding. It can be seen that 48 primary codes are categorized in 9 categories.

Final review and report preparation: This stage involves reviewing, comparing, and receiving the participation of experts. It is performed after the final analysis and report writing.

4.1 Quality control (validity and reliability of the model)

This stage aims to eliminate the articles that the researcher does not trust in the presented findings. Critical Appraisal Skills Program (CASP) is a tool used commonly to assess the quality of qualitative studies. It consists of 10 main questions. This tool helps the researcher determine the accuracy, validity, and significance of qualitative research studies. These questions focus on the following cases: (1) Research objectives, (2) Logic of the method, (3) Research design, (4) Sampling method, (5) Data collection, (6) reflectivity which includes the relationship between the researcher and the participants, (7) ethical considerations, (8) accuracy of data analysis (9), clear expression of results, and (10) research value. At this stage, the researcher gives a quantitative score to each of these questions and then creates a form. The researcher proceeds with all ten CASP criteria and then tabulates the overall score. According to the overall score, the researcher decides to accept or reject the article. In this study, the total number of final articles after CASP evaluation was 51. To select suitable articles according to the algorithm presented in Figure 1, various parameters such as title, abstract, content, access, content, and quality of the research method were evaluated.

To control the extracted concepts, the researcher's opinion was compared with an expert's opinion. The designed model includes 9 primary criteria and 48 guidelines. After completing the stages of meta-synthesis methodology, the model was designed. Kappa index was used to measure the reliability of the designed model. As seen in Table 3, the researcher created 9 concepts and another person s created 8 concepts, of which 7 concepts were common.

Table 2: Axial coding

Category	Primary code	Repetition
1- Customer related strategies	1. Customer Trust	1
	2. Customer participation	1
	3. Customer satisfaction	1
	4. Individual characteristics of customers	2
	5. Customer's purchase intention	2
	6. Customer awareness	3
	7. Purchase methods	4
	8. Consumer behavior	4
2- Customer related strategies	9. Pricing strategy	1
	10. Product diversification strategy	1
	11. Market search	1
	12. Access to online sites	1
	13. Marketing strategy	3
	14. Social media	4
	15. Digital Marketing	7
3- rganizational environmental factors	16. Environmental stimuli	2
	17. Economic conditions	2
	18. Political conditions	2
	19. Quarantine regulations	3
	20. Government support policy	5
	21. Economic recession	6
	22. Social and cultural conditions	7
4- Organizational capabilities	23. Organizational capabilities	1
	24. Corporate experience	1
	25. Organizational resources	2
	26. Organizational innovation	4
5- Organizational business model	27. Corporate social responsibility	1
	28. Online business	1
	29. Industrial partnership strategies	3
	30. Organization strategy	4
6- Organizational information management	31. Business model	5
	32. Restoring the information network	1
	33. Information strategy	3
7- Organizational crisis management	34. Damages caused by the crisis	1
	35. Crisis preparedness	2
	36. Crisis management strategy	2
	37. Searching for solutions to the crisis	3
	38. Crisis communications	3
	39. Crisis preparedness programs	3
	40. Perceived risk	4
8- Organization human resources management	41. Crisis training	5
	42. Support of human resources	1
	43. Executive bonuses	1
	44. Human resources strategy	2
9- Organizational resources management	45. New organizational procedures	1
	46. Financing methods	1
	47. Organizational flexibility and resilience	5
	48. Development of technology	7

Table 3: Status of conversion of codes into concepts by the researcher and another person

		Researcher's opinion		
		Yes	No	Sum
Another person's opinion	Yes	A=7	B=1	8
	No	C=2	D=0	2
	Sum	9	1	10

$$\text{observed agreement} = \frac{A + D}{N} = \frac{7}{10} = 0.700$$

$$\text{odds agreement} = \frac{A + B}{N} \times \frac{A + C}{N} \times \frac{C + D}{N} \times \frac{B + D}{N} = \frac{8}{10} \times \frac{9}{10} \times \frac{2}{10} \times \frac{1}{10} = 0.014$$

$$\kappa = \frac{\text{observed agreement} - \text{odds agreement}}{1 - \text{odds agreement}} = \frac{0.700 - 0.014}{1 - 0.014} = 0.696$$

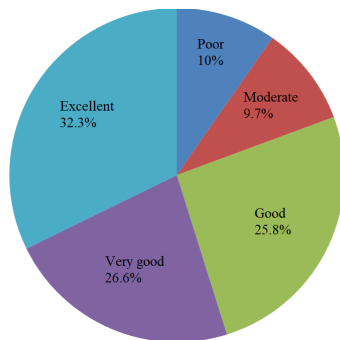


Figure 1: Proportion of final articles regarding ten indicators

Table 4: Kappa index status

Agreement status	Kappa index numerical value
poor	Less than zero
Non-significant	Between 0 and 0.2
Moderate	Between 0.21 and 0.4
Appropriate	Between 0.41 and 0.6
Valid	Between 0.61 and 0.8
Excellent	Between 0.81 and 1

As seen, the Kappa index value was calculated as 0.696. According to Table 4, it is at the level of a valid agreement.

5 Results

Table 5 and Figure 2 present the output of the software related to the frequency of the codes given to the categories separately for each of the articles.

According to the diagram and table below, the category of organizational environmental factors with 27 codes was ranked first and the category of organizational crisis management with 23 codes was ranked second. The category of organization marketing with 18 codes was ranked third.

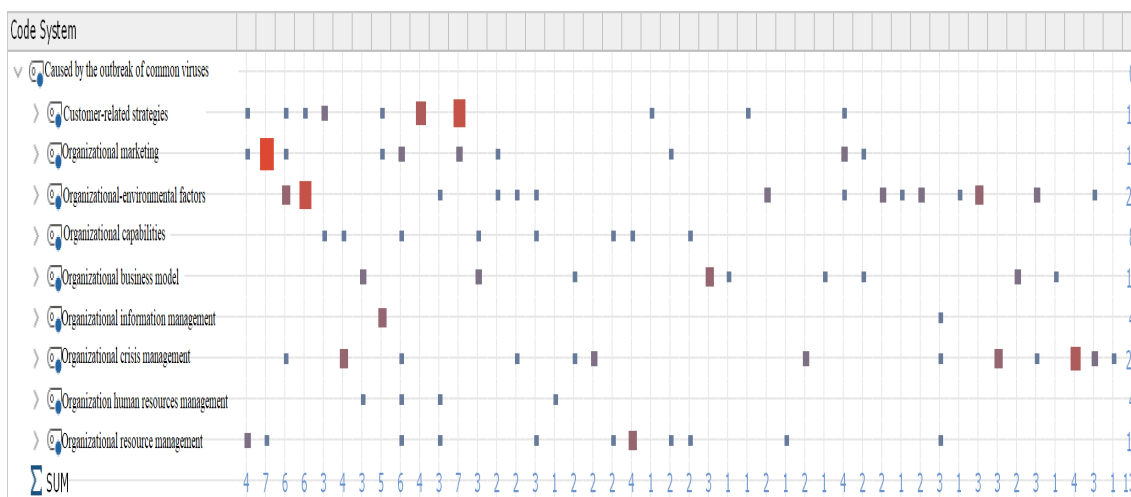


Figure 2: Coding frequency of strategy categories to cope with industrial crises caused by outbreak of common viruses

In addition to examining the number of codes for each category, the frequency of the number of articles can also be examined to obtain the generality and comprehensiveness of the mentioned category among all articles. The results of the output of the software are presented below. Out of the total number of 46 reviewed articles, 15 (32.61%)

Table 5: Frequency of coding categories separately based on articles

	Customer-related strategy	Organization marketing	Organization environmental factors	Organizational capabilities	Organizational business model	Organizational crisis management	Organizational crisis management	Organization human resource management	Human resource management	Total
Arslan (2021) [7]	1	1	0	0	0	0	0	0	2	4
Al-Azzam et al. (2021)[2]	0	6	0	0	0	0	0	0	1	7
Belbag (2021) [30]	1	1	3	0	0	0	1	0	0	6
Behdarwandi (2022) [10]	1	0	5	0	0	0	0	0	0	6
Tao (2022) [58]	2	0	0	1	0	0	0	0	0	3
Turki & Mahdavi(2012) [59]	0	0	0	1	0	0	3	0	0	4
James and Crick (2020) [18]	0	0	0	0	2	0	0	1	0	3
ChunMei et al. (2020) [28]	1	1	0	0	0	3	0	0	0	5
Jose et al. (2020) [5]	0	2	0	1	0	0	1	1	1	6
Dangelico et al. (2022) [21]	4	0	0	0	0	0	0	0	0	4
Davoudi (2021) [23]	0	0	1	0	0	0	0	1	1	3
Dash et al. (2021) [22]	5	2	0	0	0	0	0	0	0	7
Duricin and Beraha (2020) [11]	0	0	0	1	2	0	0	0	0	3
Di Crosta et al. (2021) [24]	0	1	1	0	0	0	0	0	0	2
Dimes et al. (2005) [20]	0	0	1	0	0	0	1	0	0	2
Robinson and Kengatharan (2020) [36]	0	0	1	1	0	0	0	0	1	3
Rożman et al. (2021) [50]	0	0	0	0	0	0	0	1	0	1
Rittera & Carsten (2020) [49]	0	0	0	0	1	0	1	0	0	2
Ritchie (2004) [48]	0	0	0	0	0	0	2	0	0	2
Zaazou et al. (2021) [65]	0	0	0	1	0	0	0	0	1	2
Zhang (2021) [66]	0	0	0	1	0	0	0	0	3	4
Satish (2021) [53]	1	0	0	0	0	0	0	0	0	1
Sumi & Ahmed (2022) [57]	0	1	0	0	0	0	0	0	1	2
Salimi Zawiya (2020) [52]	0	0	0	1	0	0	0	0	1	2
Suk and Kim (2021) [56]	0	0	0	0	3	0	0	0	0	3
Shekarchizadeh et al. (2014) [55]	0	0	0	0	1	0	0	0	0	1
Saebnia And Karimi (2020) [51]	1	0	0	0	0	0	0	0	0	1
Abbassi (2021) [1]	0	0	2	0	0	0	0	0	0	2
Faal et al. (2006) [27]	0	0	0	0	0	0	2	0	0	2
Kang et al. (2021) [38]	0	0	0	0	1	0	0	0	0	1
Cruz-Cardenas (2021) [19]	1	2	1	0	0	0	0	0	0	4
Crick and Crick (2020) [18]	0	1	0	0	1	0	0	0	0	2
Kim (2021) [56]	0	0	2	0	0	0	0	0	0	2
Gondwe & Adae (2021) [29]	0	0	1	0	0	0	0	0	0	1
Gustavsson and Larsson (2020) [32]	0	0	2	0	0	0	0	0	0	2
Lohmer et al. (2020) [43]	0	0	0	0	0	1	1	0	2	4
Liu et al. (2021) [42]	0	0	1	0	0	0	0	0	0	1

Frequency of coding categories separately based on articles (*continued*)

Marco et al. (2021) [6]	0	0	3	0	0	0	0	0	0	3
Matthew et al. (2010) [54]	0	0	0	0	0	0	3	0	0	3
Nasiri et al. (2021) [46]	0	0	0	0	2	0	0	0	0	2
Nawal et al. (2020) [3]	0	0	2	0	0	0	1	0	0	3
He and Harris (2020) [34]	0	0	0	0	1	0	0	0	0	1
Walker et al. (2011) [62]	0	0	0	0	0	0	4	0	0	4
Wan et al. (2020) [63]	0	0	1	0	0	0	2	0	0	3
Vojtko et al. (2019) [61]	0	0	0	0	0	0	1	0	0	1
Total	18	18	27	8	14	4	23	4	14	130

Table 6: Frequency distribution of articles based on categories

Category	Frequency	Percentage
Organizational environmental factors	15	32.61
Organizational crisis management	13	28.26
Organizational resource management	11	23.91
Marketing organization	10	21.74
Customer-related strategies	10	21.74
Organizational business model	9	19.57
Organizational capabilities	8	17.39
Organization human resource management	4	8.70
Organizational information management	2	4.35
Total	46	100.00

have referred to the category of organizational environmental factors. Therefore, the category of organizational environmental factors was prioritized regarding the frequency of codes and generality and comprehensiveness in the articles. It indicates the significance of this category. The category of organizational information management was also mentioned in 2 articles (4.35%). It has the lowest frequency percentage.

strategies to cope with industrial crises caused by outbreak of common viruses

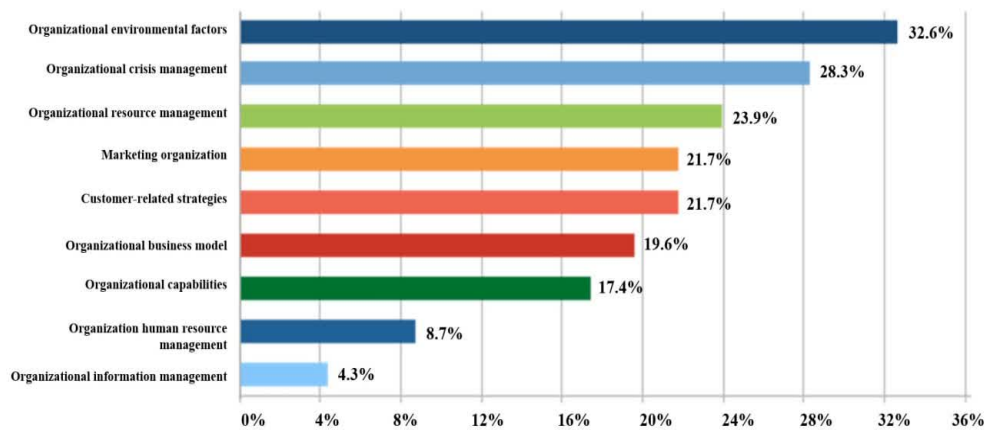


Figure 3: Frequency percentage of articles separately based on the categories identified

Figure 4 shows the tree diagram of strategy categories to cope with industrial crises caused by outbreak of common viruses.

6 Discussion and Conclusion

Given recent events in the 21st century, it is difficult to ignore the existence of wars, crises, and disasters. The political, economic, demographic, health, and environmental aspects of life, including the spread of the Corona pandemic made us call the 21st century the century of crisis. In other words, crises have created great challenges for individuals, institutions, and decision-makers. Thus, facing these crises is essential to prevent more human, material, and spiritual

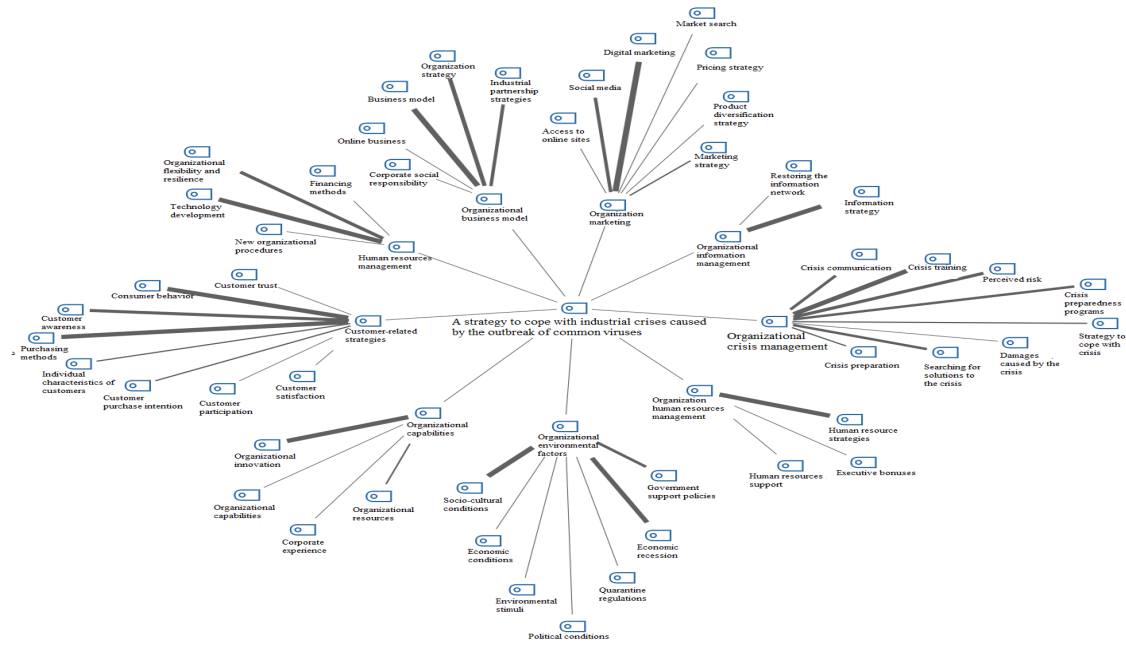


Figure 4: Tree diagram of strategy categories to cope with industrial crises caused by the outbreak of common viruses

losses. This crisis is a dangerous and unexpected threat to the goals of individuals, institutions, and countries. The evidence suggests that the life of nations and people is associated with crises that are repeated throughout the ages. People and civilizations have faced problems and adversities at different levels throughout history. Crisis management depends on smart and efficient decision-makers during these crises. The present study aims to design a strategy model to cope with industrial crises caused by the outbreak of common viruses. According to the literature and the background of the research and the results obtained, the factors of the strategy model for coping with industrial crises caused by the outbreak of common viruses include organizational environmental factors, organizational crisis management, organizational resource management, organizational marketing, customer-related strategies, organizational business model, organizational capabilities, organization human resource management, and organizational information management. In this regard, the category of environmental factors was ranked first. Organizational crisis management was ranked second. The category of marketing was ranked third. Thus, the category of organizational environmental factors has been prioritized regarding the number of repetitions of codes and the generality and comprehensiveness in the articles, indicating the significance of this category. In this regard, it can be stated that social and cultural conditions have the highest frequency among the sub-criteria. This issue suggests that the social and cultural acceptance caused by the changes of Covid-19 and the acceptance of executive policies play a decisive role. Among other sub-criteria, the economic recession was ranked second, indicating the general economic effects at the community level, which can affect the general activity of the businesses. In this regard, the government’s support policy was ranked third, which can indicate the significant role of the government in supporting business activities during the Coronavirus pandemic crisis.

For this purpose, it is necessary to implement appropriate programs to manage the crisis caused by Covid-19. According to the studies conducted, the sub-criterion of crisis training obtained the highest frequency. It can indicate that enough attention should be paid to education and preparation at the micro and macro levels before a crisis occurs. According to the sub-criteria, after the crisis training, it is necessary to create a proper understanding of the risks caused by the crisis. For this purpose, it is necessary to explain the proper communication in the event of a crisis and the preparation plans to face the crisis. Owing to the changes in business conditions, it is essential to use appropriate marketing strategies. In this study, according to the studies, digital marketing has the highest repetition among the organization’s marketing sub-criteria, indicating a change in marketing activities during the Coronavirus pandemic. During this period, businesses have used digital marketing channels to maintain market share and customers, so they can offer their goods and services to customers. Based on the results, changes in the purpose of purchase, purchase motivation, and purchase time frame have a greater impact on the design of an innovative-based business model.

This issue indicates that during the pandemic companies that provide services and products to consumers should take quick response measures and innovate in the business model according to the characteristics of the outbreak

of Covid-19 and changes in purchasing behavior such as online transfer of the sales model, target market expansion, socialization and marketing model changes, direct retail, contactless services, and integration of social media platforms. This issue indicates that consumers now expect companies providing services and products to consumers to reduce their selection costs, logistics costs, and payment costs as much as possible to ensure that they can purchase products or obtain needed services more effectively. Pandemics have occurred worldwide at irregular and unpredictable intervals. They have been associated with significant morbidity, mortality, and economic cost. Given the significant and negative impacts of pandemics, countries have made increasing efforts to cope with pandemics and put plans to manage this crisis to face severe economic, health, educational, and social consequences. For this reason, public institutions are willing to use different strategies that emphasize the participation of workers in these institutions and all members of society and collective leadership in thinking and implementation. These strategies are activated through the formation of committees, and work teams, organizing data about crises, preparing and training people to cope with this pandemic, and reducing its destructive effects. Recent evidence suggests that modern theories of crisis management have focused on models that include the stages of crisis management, including identifying crises and collecting data about them, determining alternatives and selecting among them, finding solutions, and evaluating their results.

Based on the results, the following management concepts are presented. First, businesses should reduce their costs as much as possible based on new technologies and provide products or services efficiently. This company should make full use of new infrastructures such as artificial intelligence, industrial internet, and the internet of things, and make innovations in this regard. To develop their activities, they should create a deep and efficient combination of online and offline activities in the future. Thus, a dynamic consumer-oriented management model can be realized and business models can be flexibly adjusted to respond to the changes in the external environment. Companies should extensively examine the consumers' consumption preferences and establish a target market. The consumer market is unstable. Companies should pay attention to improving quality and service models and extensively investigate the consumption preferences of different consumers. Accordingly, companies should continuously improve business models and stabilize the consumer market and carefully introduce different business models, services, and new products. Live streaming, communication, and short video marketing models emerged rapidly during the outbreak of the pandemic. During this time, various e-commerce platforms adopted this marketing model. Also, some brand retailers developed live streaming into their marketing activities. Based on the results, consumers are willing to use these emerging marketing models. Also, they have shown an interest in using a non-intermediated retail model, and smart retail products and services are being exploited. The rapid development of these two types of models is affected by the pandemic environment. Managers should also consider the resources and capabilities of their company while innovating and quickly introducing new models. Moreover, companies should maintain a feeling of crisis, introduce unfamiliar industries cautiously, and adopt different business models rationally.

References

- [1] E. Abbassi, *Pandemics and politics: The post-pandemic opportunities and threats in Iran*, Political Quart. **51** (2021), no. 1, 233–260.
- [2] A.F. Al-Azzam and K. Al-Mizeed, *The effect of digital marketing on purchasing decisions: A case study in Jordan*, J. Asian Finance Econ. Bus. **8** (2021), no. 5, 455–463.
- [3] N.A. Al Eid and B.A. Arnout, *Crisis and disaster management in the light of the Islamic approach: COVID-19 pandemic crisis as a model (a qualitative study using the grounded theory)*, J. Public Affairs **20** (2020), no. 4, e2217.
- [4] I. Alon, *COVID-19 and international business: A viewpoint*, FIIB Bus. Rev. **9** (2020), no. 2, 75–77.
- [5] J.C. Alves, T.C. Lok, Y.B. Luo, and W. Hao, *Crisis management for small business during the COVID-19 outbreak: Survival, resilience and renewal strategies of firms in Macau*, (2020).
- [6] M.A. Amaral, M.M. de Oliveira, and M.A. Javarone, *An epidemiological model with voluntary quarantine strategies governed by evolutionary game dynamics*, Chaos Solitons Fractals **143** (2021), 110616.
- [7] A. Arslan, I. Gölgeci, and J. Larimo, *Expatriates, rise of telecommuting and implications for international business: Change of era*, Marinov, M.A. and Marinova, S.T. (Eds), Covid-19 and International Business, Routledge, New York, 2021, pp. 156–166.
- [8] A. Arslan, S. Kamara, N. Zahoor, P. Rani, and Z. Khan, *Survival strategies adopted by microbusinesses during*

- COVID-19: An exploration of ethnic minority restaurants in northern Finland*, *Int. J. Entrepren. Behav. Res.* **28** (2022), no. 9, 448–465.
- [9] M. Balinska and C. Rizzo, *Behavioural responses to influenza pandemics: what do we know?*, *PLoS Currents* **1** (2009).
- [10] S. Behdarwandi Askar, *Identifying the factors and challenges of business management in the field of supply of raw materials during the Corona crisis (Case study: Tasha Machinery Company)*, 7th Conf. Econ. Manag. Industry-oriented Account. Stud., 2022.
- [11] I. Beraha and S. Duričin, *The impact of COVID-19 crisis on medium-sized enterprises in Serbia*, *Economic Analysis* **53** (2020), no. 1, 14–27.
- [12] V.P.G. Bretas and I. Alon, *The impact of COVID-19 on franchising in emerging markets: An example from Brazil*, *Glob. Bus. Organ. Excell.* **39** (2020), no. 6, 6–16.
- [13] R.S. Brown and W.A. Kline, *Exogenous shocks and managerial preparedness: A study of US airlines' environmental scanning before the onset of the COVID-19 pandemic*, *J. Air Transport Manag.* **89** (2020), 101899.
- [14] J. Brug, A.R. Aro, and J.H. Richardus, *Risk perceptions and behaviour: towards pandemic control of emerging infectious diseases: International research on risk perception in the control of emerging infectious diseases*, 2009, pp. 3–6.
- [15] J.T. Cacioppo and L.C. Hawkey, *Perceived social isolation and cognition*, *Trends Cogn. Sci.* **13** (2009), no. 10, 447–454.
- [16] A.M. Campbell, *An increasing risk of family violence during the Covid-19 pandemic: Strengthening community collaborations to save lives*, *Forensic Sci. Int.: Rep.* **2** (2020), 100089.
- [17] M. Cowling, W. Liu, and A. Ledger, *Small business financing in the UK before and during the current financial crisis*, *Int. Small Bus. J.* **30** (2012), no. 7, 778–800.
- [18] J.M. Crick and D. Crick, *Coopetition and COVID-19: Collaborative business-to-business marketing strategies in a pandemic crisis*, *Ind. Market. Manag.* **88** (2020), 206–213.
- [19] J. Cruz-Cárdenas, E. Zabelina, J. Guadalupe-Lanas, A. Palacio-Fierro, and C. Ramos-Galarza, *COVID-19, consumer behavior, technology, and society: A literature review and bibliometric analysis*, *Technol. Forecast. Soc. Change* **173** (2021), 121179.
- [20] R. Daems, G. Del Giudice, and R. Rappuoli, *Anticipating crisis: Towards a pandemic flu vaccination strategy through alignment of public health and industrial policy*, *Vaccine* **23** (2005), no. 50, 5732–5742.
- [21] R.M. Dangelico, V. Schiaroli, and L. Fraccascia, *Is Covid-19 changing sustainable consumer behavior? A survey of Italian consumers*, *Sustain. Dev.* **30** (2022), no. 6, 1477–1496.
- [22] G. Dash and D. Chakraborty, *Digital transformation of marketing strategies during a pandemic: Evidence from an emerging economy during COVID-19*, *Sustainability* **13** (2021), no. 12, 6735.
- [23] Zohra Davoudi Manjezi, *A review of business management factors and challenges during the corona crisis*, 12th Nat. Conf. New Approach. Manag. Econ. Account., 2021.
- [24] A. Di Crosta, I. Ceccato, D. Marchetti, P. La Malva, R. Maiella, L. Cannito, M. Cipi, N. Mammarella, R. Palumbo, M. Cristina Verrocchio, and R. Palumbo, *Psychological factors and consumer behavior during the COVID-19 pandemic*, *PloS one* **16** (2021), no. 8, e0256095.
- [25] N. Donthu and A. Gustafsson, *Effects of COVID-19 on business and research*, 2020, pp. 284–289.
- [26] L. Eger, L. Komárková, D. Egerová, and M. Mičík, *The effect of COVID-19 on consumer shopping behaviour: Generational cohort perspective*, *J. Retail. Consumer Serv.* **61** (2021), 102542.
- [27] E. Faal, M. Ahmad Shearbaifi, H. Tendro, and S. Rezapour, *Crisis and management in the control of epidemic diseases*, Third Int. Cong. Health Treatment Crisis Manag. Unexpected Events, 2006.
- [28] C.M. Fan, X.X. Wu, and Y. Yuan, *Assessing tourism crisis management strategy based on an agent-based model: Case study of market recovery after overcharging tourists*, *Tourism Tribune* **35** (2020), no. 8, 48–60.

- [29] G. Gondwe and E.K. Aday, *Media campaign strategies in communicating HIV/AIDS in Zambia: comparing risk and crisis communication strategies in mitigating behavior change among sex workers*, Int. J. Commun. **15** (2021), 20.
- [30] A. Güngördü Belbağ, *Diversity and consumer dispositions towards foreign countries in an emerging market*, Int. J. Emerg. Markets (2021).
- [31] ———, *Impacts of Covid-19 pandemic on consumer behavior in Turkey: A qualitative study*, J. Consumer Affairs **56** (2022), no. 1, 339–358.
- [32] S. Gustavsson and S. Larsson, *Marketing innovation for SMEs during COVID-19 pandemic: A case study of the hospitality industry in Norrbotten*, 2020.
- [33] F. Hao, Q. Xiao, and K. Chon, *COVID-19 and China's hotel industry: Impacts, a disaster management framework, and post-pandemic agenda*, Int. J. Hospital. Manag. **90** (2020), 102636.
- [34] H. He and L. Harris, *The impact of covid-19 pandemic on corporate social responsibility and marketing philosophy*, J. Bus. Res. **116** (2020), 176–182.
- [35] R.P. Hill, *Pandemic 101*, J. Consumer Affairs (2020), 393–394.
- [36] R. James and N. Kengatharan, *Exploring the effect of Covid-19 on small and medium enterprises: Early evidence from Sri Lanka*, J. Appl. Econ. Bus. Res. **10** (2020), no. 2, 115–125.
- [37] O. Jorda, S.R. Singh, and A.M. Taylor, *National bureau of economic research; Longer-run economic consequences of pandemics*, Report no. w26934 (2020).
- [38] J. Kang, Z. Diao, and M.T. Zanini, *Business-to-business marketing responses to COVID-19 crisis: A business process perspective*, Market. Intell. Plann. **39** (2021), no. 3, 454–468.
- [39] V. Kaushal and S. Srivastava, *Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India*, Int. J. Hospital. Manag. **92** (2021), 102707.
- [40] William A Kerr, *The COVID-19 pandemic and agriculture: Short-and long-run implications for international trade relations*, Canad. J. Agric. Econ./Revue Canad. Agroecon. **68** (2020), no. 2, 225–229.
- [41] A. Kuckertz, L. Brändle, A. Gaudig, S. Hinderer, C.A.M. Reyes, A. Prochotta, K.M. Steinbrink, and E.S.C. Berger, *Startups in times of crisis—A rapid response to the COVID-19 pandemic*, J. Bus. Ventur. Insights **13** (2020), e00169.
- [42] S. Liu and Y. Su, *The impact of the COVID-19 pandemic on the demand for density: Evidence from the US housing market*, Econ. Lett. **207** (2021), 110010.
- [43] J. Lohmer, N. Bugert, and R. Lasch, *Analysis of resilience strategies and ripple effect in blockchain-coordinated supply chains: An agent-based simulation study*, Int. J. Prod. Econ. **228** (2020), 107882.
- [44] McKinsey, *Consumer sentiment and behavior continue to reflect the uncertainty of the COVID-19 crisis*, McKinsey. Available from: <https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/a-global-view-of-how-consumer-behavior-is-changing-amid-covid-19> (2020).
- [45] McKinsey and Company, *How marketing leaders can both manage the coronavirus crisis and plan for the future*, McKinsey. Available online at: <https://www.mckinsey.com/businessfunctions/marketing-and-sales/our-insights/how-marketing-leaders-canboth-manage-the-coronavirus-crisis-and-plan-for-the-future>(accessed February 1, 2021) (2020).
- [46] H. Nasiri, M. Zali, and J. Yadollahi Farsi, *The effect of entrepreneurial skills and entrepreneurial tenacity on doing business in the Covid-19 crisis; Evidence based on GEM 2020 Iran data*, 18th Int. Manag. Conf., 2021.
- [47] S.C. Parker, E. Congregado, and A.A. Golpe, *Is entrepreneurship a leading or lagging indicator of the business cycle? Evidence from UK self-employment data*, Int. Small Bus. J. **30** (2012), no. 7, 736–753.
- [48] B.W. Ritchie, *Chaos, crises and disasters: A strategic approach to crisis management in the tourism industry*, Tourism Manag. **25** (2004), no. 6, 669–683.
- [49] T. Ritter and C.L. Pedersen, *Analyzing the impact of the coronavirus crisis on business models*, Ind. Market. Manag. **88** (2020), 214–224.

- [50] M. Rožman and P. Tominc, *The physical, emotional and behavioral symptoms of health problems among employees before and during the COVID-19 epidemic*, *Employee Relat.* **44** (2022), no. 7, 19–45.
- [51] S. Saebnia and F. Karimi, *A survey the impact of corona disease (Covid-19) on business performance of small and medium businesses of Ardabil Province*, *J. Account. Manag. Vision* **3** (2020), no. 24, 83–93.
- [52] S.G. Salimi Zawiya, *Strategies to respond to the crisis during the crisis of the corona virus (Covid-19) in the production and industry sector*, *Ind. Technol. Dev. Quart.* (2020), no. 39, 63–76.
- [53] K. Satish, A. Venkatesh, and A.S.R. Manivannan, *Covid-19 is driving fear and greed in consumer behaviour and purchase pattern*, *South Asian J. Market.* **2** (2021), no. 2, 113–129.
- [54] M.W. Seeger, B. Reynolds, and T.L. Sellnow, *Crisis and emergency risk communication in health contexts: Applying the CDC model to pandemic influenza*, *Handbook of Risk and Crisis Communication*, Routledge, 2010, pp. 493–506.
- [55] A. Shekarchizadeh, K. Khodadadinejad, A. Sasan, and F. Moradi, *Crisis management strategies in intra-organizational crises*, *First Nat. Conf. Ccivil Engin. Urban Plan. Urban Dev.*, 2014.
- [56] M. Suk and W. Kim, *COVID-19 and the airline industry: Crisis management and resilience*, *Tourism Rev.* **76** (2021), no. 4, 984–998.
- [57] R.S. Sumi and M. Ahmed, *Investigating young consumers' online buying behavior in COVID-19 pandemic: Perspective of Bangladesh*, *IIM Ranchi J. Manag. Stud.* **1** (2022), no. 2, 108–123.
- [58] H. Tao, X. Sun, X. Liu, J. Tian, and D. Zhang, *The impact of consumer purchase behavior changes on the business model design of consumer services companies over the course of COVID-19*, *Front. Psycho.* **13** (2022), 818845.
- [59] H. Turki and M. Mahdavi, *Crisis management in industrial units*, *Second Nat. Conf. Health Safety Environment (HSE)*, 2012.
- [60] M. Verma and B.R. Naveen, *COVID-19 impact on buying behaviour*, *Vikalpa* **46** (2021), no. 1, 27–40.
- [61] V. Vojtko, L. Rolínek, and M. Plevný, *System dynamics model of crises in small and medium enterprises*, *Econ. Res.-Ekon. Istraživanja* **32** (2019), no. 1, 168–186.
- [62] W.E. Walker, J. Giddings, and S. Armstrong, *Training and learning for crisis management using a virtual simulation/gaming environment*, *Cogn. Technol. Work* **13** (2011), 163–173.
- [63] L.C. Wan, E.K. Chan, and X. Luo, *Robots come to rescue: How to reduce perceived risk of infectious disease in Covid19-stricken consumers?*, *Annals of Tourism Research* (2020), 103069.
- [64] M. Wenzel, S. Stanske, and M.B. Lieberman, *Strategic responses to crisis*, *Strategic Manag. J.* **41** (2020), no. 7/18, 3161.
- [65] Z.A. Zaazou and D. Salman Abdou, *Egyptian small and medium sized enterprises' battle against COVID-19 pandemic: March–July 2020*, *J. Human. Appl. Soc. Sci.* **4** (2022), no. 2, 94–112.
- [66] X. Zhang, Z. Ruan, M. Zheng, B. Barzel, and S. Boccaletti, *Epidemic spreading under infection-reduced-recovery*, *Chaos Solitons Fractals* **140** (2020), 110130.