# Corporate Social Responsibility as a tool for healthtech startups: Modelling enablers of healthcare and social support system to fight Coronavirus Pandemic

Kuldeep Singh,

*Department of Management Studies*

*Indian Institute of Information Technology*

Allahabad, India

Mailto: rsm2017001@iiita.ac.in

Madhvendra Misra

*Department of Management Studies*

*Indian Institute of Information Technology*

Allahabad, India

Mailto: madhvendra@iiita.ac.in

*Abstract*— The coronavirus pandemic (*COVID-19*), which emerged in late 2019, has become a severe threat to the whole world, having killed several thousands of people within a time span of two to three months, and thus prompt actions to fight this pandemic are required. To deal with this situation, many healthtech startups have stepped forward to provide potential treatment options. However, these startups do not have as many resources as large organizations have; therefore, corporate social responsibility (CSR) can play a significant role by providing support to these healthtech startups to aid in improving their actions. This study contains the crucial enablers of healthcare and social support systems which can help these startups to improve their services and healthcare solutions that provide treatment to patients with *coronavirus*. The enablers were extracted by performing an extensive literature review in the field of health and social care so as to analyze their importance and hierarchical relationship; the study has used expert mining and ISM-MICMAC methodology. The results of the hierarchical relationship model show that CSR support with frontline workforce engagement and treatment chain management plays an essential role in the fight against the coronavirus pandemic.

*Keywords— Corporate Social Responsibility, Coronavirus, ISM-MICMAC*

## I. INTRODUCTION

The emergence and spread of COVID-19, first identified in Wuhan, China, has become a major global health concern [1]. This virus has spread throughout the world since December 2019, with virtually every country in the world reporting imported cases among those who had a travel history to and from China. The World Health Organization (WHO) subsequently announced COVID-19 to be a public health emergency of global concern [2] [3]. By March 27, 2020, a total of 5,98,173 cases had been reported, while the death toll from the novel coronavirus has reached well over 28,163 worldwide [4]. To date, there is no specific vaccine to prevent the coronavirus disease. The WHO and governments of each nation have issued various preventive measures to tackle the spread of the coronavirus [5]. As the problem still affects every nation and governments are overloaded in their efforts to deal with the virus, large and small business organizations should come forward to support the world through this pandemic [6].

In the Indian context, the central government has allowed Indian corporations to use their CSR funds for measures to fight the spread and manage the treatment of the coronavirus disease. Through these CSR funds, organizations can support those healthcare startups that aim to fight and treat the coronavirus [7]. These healthcare startups could use the CSR funds for various activities related to COVID-19, such as the promotion of healthcare, including preventive measures and disaster management. There are 4892 healthcare startups in the Indian healthtech space [8]. These healthtech startups are able to support the entire healthcare system by providing various services such as online pharmacies, personal health management, telemedicine, fitness and wellness initiatives, home healthcare, biotech R&D, diagnostics, healthcare IT, medical devices, biopharma, genomics, etc. These healthtech startups also use artificial intelligence and machine learning in order to improve accessibility, affordability, and quality of health-care measures [9]. Owing to limited resources and India's high population density, the Indian Government alone cannot control the risk of this pandemic disease. Therefore, at this time it should be the highest priority of everyone and anyone who can aid in the control of the spread of this disease, and healthtech startups can play a considerable role in the solution. Earlier studies make mention of factors that work as a barrier to the provision of healthcare services [10]. However, no study has been found which speaks of enablers that support healthcare organizations in the fight against such pandemic diseases. Therefore, with this study, the researchers endeavor to assess those enablers which are important to enable healthtech startups to deal with attempts to control and treat the coronavirus disease.

## II. LITERATURE REVIEW

The disease "coronavirus" named as per its sunray-like aspect, was discovered in the sixties [11]. However, at that time, the

structure of this virus was poorly understood. Basically, it was related to veterinary pathogens and the disease was found in several domestic species. Furthermore, it was mentioned that in humans it could cause a benign respiratory infection that later might be converted into more severe diseases, including multiple sclerosis, necrotizing enterocolitis, and lower respiratory tract infections. However, due to the lack of diagnostic techniques, it was not possible to assess and examine this endemic disease [11]. According to the WHO (2015) report on Middle East respiratory syndrome coronavirus (MERS-Cov), it was stated that between the years 2012 and 2015, 1368 confirmed cases of human coronavirus infection had been reported. Among those cases, 487 deaths were reported, and the median age for the total sample (1368) was 50 years. During that time, 26 countries had been affected by this coronavirus disease. For preventive measures, WHO provided public health recommendations in order to control future cases [12].

More recently, the WHO used the term 2019 novel coronavirus (Covid-19) to refer to the coronavirus that was diagnosed having examined the lower respiratory tract of patients in China in December 2019. Wuhan city in China was reported to be the origin of the virus. Within one month, the 2019 novel coronavirus had swiftly spread throughout China and the rest of the world. The pandemic has escalated rapidly and, as of March 27, 2020, a total of 5,98,173 cases had been reported while the death toll from the new coronavirus has reached over 28,163 worldwide [4].



Figure 1. Structural Framework of the study

In this study, the researchers discuss how healthtech startups can support the world throughout this pandemic situation. This study suggests that if corporations start to provide their CSR funds to the healthtech startups, then these startups could use the funds for various activities related to coronavirus disease such as the promotion of healthcare, including preventive measures and disaster management. Furthermore, this study assesses enablers of healthcare and the social support systems which are important for healthtech startups in their fight against the coronavirus. The structural framework of the study is given in figure 1.

To identify the earlier work related to coronavirus and enablers of healthcare and social support systems that could support healthcare mechanism to deal with such pandemic situations, the study has used the Google Scholar and Web of Science databases and searched through 6 keywords as shown in Table 1.

Table 1. Google Scholar and Web of Science (WoS) search results for all the keywords

| Sno. | Keywords | WoS | Google Scholar |
|------|----------|-----|----------------|
| 1 | Coronavirus | 4965 | 12000 |
| 2 | Corona AND Virus | 64 | 103 |
| 3 | Coronavirus AND Healthcare | 25 | 27 |
| 4 | Coronavirus AND Responsibility | 1 | 1 |
| 5 | Coronavirus AND Technology | 2 | 3 |
| 6 | Novel Coronavirus 2019 | 99 | 219 |

Note: The search was made on 28th march 2020

The search was done with the help of the Boolean search methodology (AND, OR, NOT). This methodology was used to eliminate duplicate articles and to get relevant research papers. All five keywords have been searched through the title for the time period 2000 to 2020. From the search results, it could be seen that significant earlier efforts have been made regarding the coronavirus. An interesting fact is that the search for "Novel Coronavirus 2019," revealed that numerous papers have been published within a time span of just four months. This shows the significance of this topic in current research practices. With this process, we further applied a filter among all research articles to find those which discussed important factors that support a healthcare organization in combatting such a pandemic. Thirty-two research papers were found that enabled the researchers to find those enablers which are important for any healthtech startup in its efforts to fight this disease. With this study, the researchers have made the first attempt to explore the enablers in this regard. The novelty of this work lies in the fact that the current healthcare system, with organizational social support enablers, could benefit the fight against the coronavirus pandemic –something that has thus far not been analyzed in any previous studies.

## III. EXPERT MINING

The present study has used the expert mining process for selecting the enablers and for identifying the interrelationship among each and every enabler. For this, the researchers approached healthcare staff, senior doctors, professors, and social activists. In total, 14 experts were selected and discussions had with them concerning all identified enablers, so as to
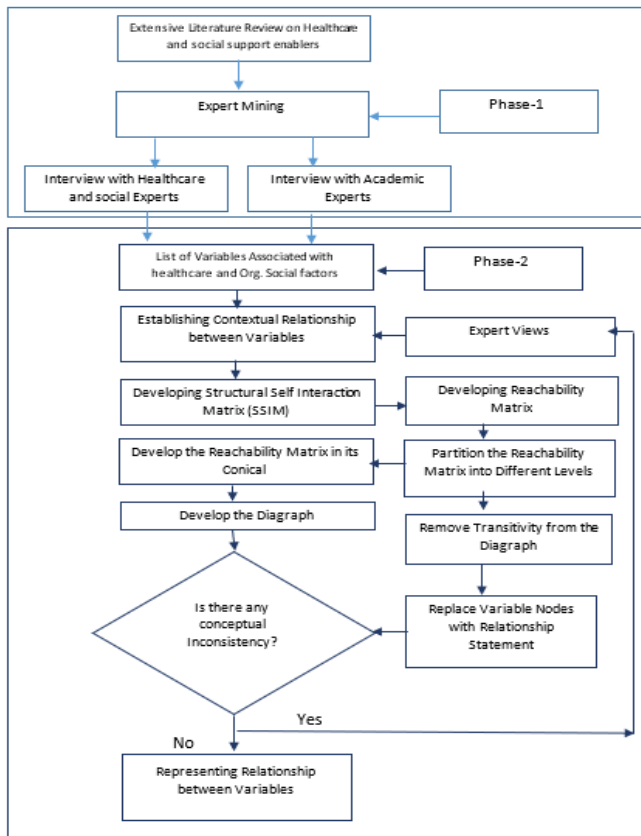
understand their responses and obtain their feedback (see Table 2). In order to test the importance of enablers, the researchers compiled a questionnaire for all enablers identified from an extensive literature review process, followed by an expert discussion.

Table 2 Profile of experts

| Sno | Domain | Profile | Experience |
|-----|--------|---------|------------|
| 1 | Healthcare enterprise | Senior Manager | 27 |
| 2 | Healthcare enterprise | Manager | 16 |
| 3 | Healthcare enterprise | Senior Manager | 24 |
| 4 | Government Hospital | Doctor | 12 |
| 5 | Government Hospital | Senior Doctor | 26 |
| 6 | Government Hospital | Doctor | 15 |
| 7 | Private Hospital | Doctor | 12 |
| 8 | Private Hospital | Doctor | 14 |
| 9 | Private Hospital | Senior Doctor | 20 |
| 10 | Healthtech startup | Manager | 12 |
| 11 | Healthtech startup | Manager | 10 |
| 12 | Healthtech Startup | Manager | 16 |
| 13 | Healthcare | Professor | 19 |
| 14 | Social work | Associate Professor | 11 |

The questionnaire was based on the Likert scale, where one relates to "strongly disagree," and five relates to "strongly agree." All the enablers were constructed in the form of a statement such as "an enabler A is essential for fighting coronavirus" etc. Although the number of experts may seem low, it should be pointed out that the same number of experts were considered in earlier studies for the same ISM-Micmac context [36] [37].

## IV. DATA AND METHODOLOGY

This study followed a two-phase approach: in phase one an extensive literature search was conducted to identify the eleven enablers, and in phase two, the ISM-MICMAC methodology was used to investigate the enablers' position in the hierarchical relationship model. For variable selections, the researchers chose only those enablers for which the experts provided a mean score of above 3.5 in terms of the importance of the enablers to fight the coronavirus disease. However, in this study, all eleven enablers were found to have a mean score above 3.5; hence all eleven enablers were considered for further analysis (see Table 3).

Table 3. List of enablers with expert mean score

| Sno | Enablers | References | Expert Mean score |
|-----|----------|------------|-------------------|
| F1 | To fight Coronavirus | Juan and Michael, 2020 [13]; Ahmed et al., 2020 [14] | 4.12 |
| F2 | Government Support | Zackary D et al., 2020 [15]; Yadav et al. 2020 [16] | 4.06 |
| F3 | CSR Support | Joseph, 2012 [17]; Martha fani, 2011 [ 18]; Dima, Hallal, and Abdallah, 2010 [19] | 3.71 |
| F4 | Technological Connectivity | Sandra Festa, 2009 [20]; Alex, 2009 [21] | 4.18 |
| F5 | Services related to critical care | Marilyn, 2003 [22]; Ball et al., 2003 [23] | 3.94 |
| F6 | Treatment Chain Management | Faisal and Rahman, 2016 [24]; Azam et al., 2015 [25] | 4.18 |
| F7 | Patients' Expectations | Lim, Cheng, and Tang, 2000 [26]; Cockburn, Jill, and Pit, 1997 [27] | 4.29 |
| F8 | Staff Training | Fadden, 1997 [28]; Swales et al., 2012 [29] | 4.12 |
| F9 | Time commitment | Tengelin, 2011 [30]; Bushell, 2002 [31] | 4.29 |
| F10 | Frontline workforce engagement | Patri, Rojalin, and Suresh, 2018 [32]; Erfan, 2010 [33] | 4.24 |
| F11 | ICT infrastructure | Zakaria et al., 2010 [34]; Ruxwana et al., 2010 [35] | 3.76 |

### A. ISM and Structural self-interaction matrix

For developing the structured model, this study identified eleven enablers. First, the self-structured interaction matrix was constructed to determine the relationship between the enablers. The self-structured interaction matrix (SSIM) was created with the help of VAXO (a symbolic rule-based approach). In VAXO, there are four symbols "V," "A," "X," and "O," which is based on specific rules to show the relationship between the enablers (see Table 4). This is the first step of ISM methodology, where:

V = ith enabler helps in achieving benefits for jth enabler

A = jth enabler helps in achieving benefits for ith enabler

X = both ith and jth help each other for achieving benefits

O = both ith and jth are unrelated

This VAXO helps to construct the SSIM matrix in which all the symbols have been converted into the binary form of relationship (See Table 7). This transformation process from VAXO to the reachability matrix is based on specific rules which are given in Table 5.

Table 4 Self structured interaction matrix

| | F11 | F10 | F9 | F8 | F7 | F6 | F5 | F4 | F3 | F2 |
|------|-----|-----|----|----|----|----|----|----|----|----|
| F1 | A | A | A | A | A | A | A | A | A | A |
| F2 | V | O | O | V | O | O | V | O | V | |
| F3 | V | O | O | V | O | O | V | V | | |
| F4 | A | A | V | A | A | O | O | | | |
| F5 | A | A | O | A | O | A | | | | |
| F6 | A | A | X | A | X | | | | | |
| F7 | A | A | V | A | | | | | | |
| F8 | A | V | V | | | | | | | |
| F9 | A | A | | | | | | | | |
| F10 | A | | | | | | | | | |
| F11 | | | | | | | | | | |

Table 5 Rules for replacing SSIM into reachability matrix

| SSIM Matrix | Reachability Matrix | Reachability Matrix |
|---|---|---|
| if the i,j value in SSIM matrix is V | In the reachability matric the i,j entry become 1 | In the reachability matric the j,i entry become 0 |
| if the i,j value in SSIM matrix is A | In the reachability matric the i,j entry become 0 | In the reachability matric the j,i entry become 1 |
| if the i,j value in SSIM matrix is X | In the reachability matric the i,j entry become 1 | In the reachability matric the j,i entry become 1 |
| if the i,j value in SSIM matrix is O | In the reachability matric the i,j entry become 0 | In the reachability matric the j,i entry become 0 |

However, this replacement process could potentially mean that transitivity could occur among the enablers. Transitivity shows that if the first enabler has a connection with the second enabler and the second enabler has a relationship with the third enabler, then the first enabler should have a connection with the third enabler (see Table 8). Therefore, after considering the transitivity issue, the study analyzes in terms of the reachability matrix.

Table 6 Iterations for level partitioning

| F | Reachability set | Antecedent Set | Level |
|---|---|---|---|
| F1 | 1 | 1,2,3,4,5,6,7,8,9,10,11 | 1 |
| F2 | 1,2,3,4,5,6,7,8,9,10,11 | 2 | 8 |
| F3 | 1,3,4,5,6,7,8,9,10,11 | 2,3 | 7 |
| F4 | 1,4,5,6,7,9 | 2,3,4,6,7,8,9,10,11 | 3 |
| F5 | 1,5, | 2,3,4,5,6,7,8,9,10,11 | 2 |
| F6 | 1,4,5,6,7,9 | 2,3,4,6,7,8,9,10,11 | 3 |
| F7 | 1,4,5,6,7,9 | 2,3,4,6,7,8,9,10,11 | 3 |
| F8 | 1,4,5,6,7,8,9,10 | 2,3,8,11 | 5 |
| F9 | 1,4,5,6,7,9 | 2,3,4,6,7,8,9,10,11 | 3 |
| F10 | 1,4,5,6,7,9,10 | 2,3,8,10,11 | 4 |
| F11 | 1,4,5,6,7,8,9,10,11 | 2,3,11 | 6 |

Eight iterations have been made to determine the hierarchical level for each enabler (see Table 6). In the reachability matrix, these iterations were performed through the reachability set and antecedent set for every enabler. The interaction set between the reachability and the antecedent set provided the levels for enablers (See Fig 2).

Table 7 Initial Reachability Matrix

| F | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| F2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| F3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| F4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| F5 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| F6 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| F7 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| F8 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| F9 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| F10 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| F11 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Table 8 Transitivity Matrix

| F | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 | F10 | F11 | Driving Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| F2 | 1 | 1 | 1 | 1* | 1 | 1* | 1* | 1 | 1* | 1* | 1 | 6 |
| F3 | 1 | 0 | 1 | 1 | 1 | 1* | 1* | 1 | 1* | 1* | 1 | 6 |
| F4 | 1 | 0 | 0 | 1 | 1* | 1* | 1* | 0 | 1 | 0 | 0 | 3 |
| F5 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| F6 | 1 | 0 | 0 | 1* | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 5 |
| F7 | 1 | 0 | 0 | 1 | 1* | 1 | 1 | 0 | 1 | 0 | 0 | 5 |
| F8 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 8 |
| F9 | 1 | 0 | 0 | 1* | 1* | 1 | 1* | 0 | 1 | 0 | 0 | 3 |
| F10 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 7 |
| F11 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 9 |
| D.P. | 11 | 1 | 2 | 6 | 7 | 6 | 5 | 4 | 7 | 3 | 3 | 55 |

## V. FINDING AND DISCUSSION

The main objective of this study was to assess the enablers of the healthcare and social support system, which can help the healthtech startups in their efforts in the fight against the coronavirus pandemic. The outcome of this study was analyzed with the help of the MICMAC technique, which classifies factors into four quadrants, namely, autonomous criterion, dependent criterion, linkages criterion, and independent criterion (see Figure 3).
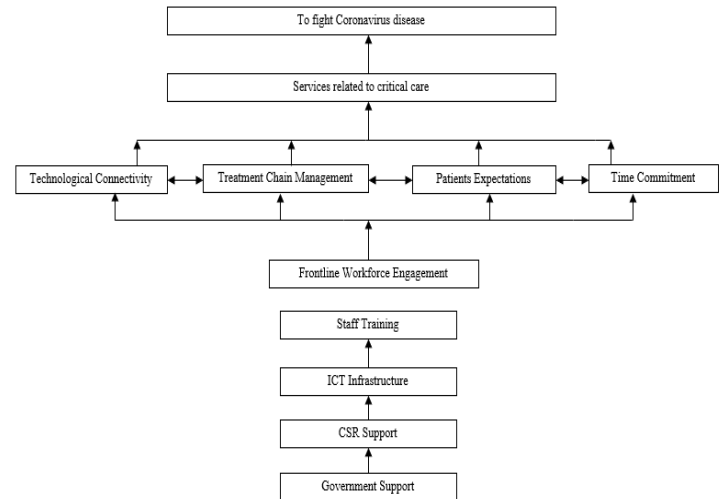


Figure 2. ISM Model

The MICMAC diagram was constructed with the help of driving and dependence power achieved from the ISM final transitivity table (Table 8). As per the MICMAC diagram, only one enabler "Patients' expectations" came into the first cluster, that being Autonomous Criterion. When factors fall under this cluster, it indicates that they belong to very low or dependence power and very low driving power, and hence they can be cut from the system. The second cluster, i.e. the dependent criterion, contains those factors which have strong dependence but very low driving force; hence, they are placed at the top level of the model.
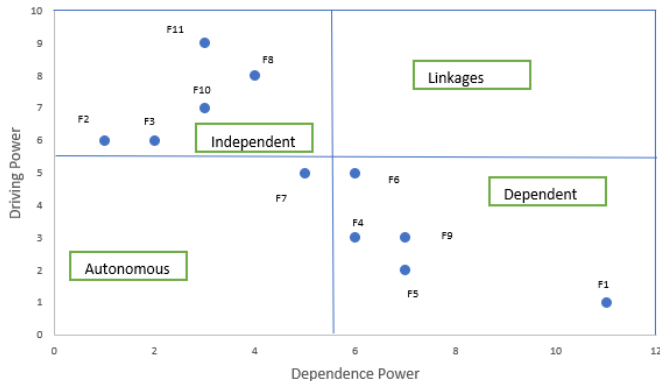


Figure 3. MICMAC Diagram

In this study, five enablers were identified: "To fight coronavirus", "Technological connectivity", "Services related to critical care", "Treatment chain management", and "Time commitment". Our main variable, "To fight coronavirus," was shown to have the maximum dependence power among all the enablers meaning that this factor depends very highly on all the rest of enablers shown in the model. In the third cluster, no single factor was identified, which means there is no enabler, which creates any linkages among the others. Basically, this cluster contains those factors which have a very high driving power and also have a very high dependence power. In the fourth cluster, five factors were identified, namely, "Government support", "CSR support", "Staff training", "Frontline workforce engagement", and "ICT infrastructure". These enablers have very low or no dependence but have a high driving power. These enablers lie primarily at the bottom of the model. The lower level enablers show that CSR support with government support could play an important role for healthtech startups in the fight against the coronavirus disease pandemic.

## VI. CONCLUSION

This study was conducted to assess the enablers of the healthcare and social support system, which can aid healthtech startups in their efforts to fight the coronavirus pandemic. The study has found that CSR support provided by corporates to these healthtech startups can synergize the latters' efforts in the fight against such pandemic diseases.

It bears mention, however, the Indian Government has already announced in this regard that donations by business organizations to the PM CARES fund, which is dedicated to the primary objective of dealing with any kind of emergency or distress situation such as COVID-19, will qualify as CSR. So, in this way both the Government and the corporates can help those who are working towards fighting the coronavirus disease. This study is not without limitation, as we considered only eleven enablers for the ISM model. Future researchers could add more variables to these for a better prediction.

## REFERENCES

[1] J. A. Backer, D. Klinkenberg, and J. Wallinga, "Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020," *Eurosurveillance*, vol. 25, no. 5, Jun. 2020.

[2] D. Fox, "What you need to know about the novel coronavirus," *Nature*, 2020.

[3] Mahase, Elisabeth. "China Coronavirus: WHO Declares International Emergency as Death Toll Exceeds 200." *Bmj*, 2020, p. m408., doi:10.1136/bmj.m408.

[4] Worldometer. "COVID-19 CORONAVIRUS PANDEMIC, "https://www.worldometers.info/coronavirus/", Accessed on 21 March 2020.

[5] Naspro, Richard, and Luigi F. Da Pozzo. "Urology in the Time of Corona." *Nature Reviews Urology*, 2020, doi:10.1038/s41585-020-0312-1.

[6] Mcgee, Robert W. "Is the Corona Virus More Serious Than Seasonal Influenza?: A Look at the Data." *SSRN Electronic Journal*, 2020, doi:10.2139/ssrn.3558751.

[7] Tomaselli, Gianpaolo, et al. "Corporate Social Responsibility Application in the Healthcare Sector." *International Journal of Information Systems and Social Change*, vol. 11, no. 1, 2020, pp. 11–23., doi:10.4018/ijissc.2020010102.

[8] Renjitha, T. "Digital Confluence in Healthcare Sector: Rise of Healthtech Start-ups and Models in India." *Our Heritage* 68, no. 16, 2020.

[9] Putrino, David. "The Small Startup." In *Hacking Health*, pp. 59-64. Springer, Cham, 2018.

[10] Patri, Rojalin, and M. Suresh. "Factors influencing lean implementation in healthcare organizations: an ISM approach." *International Journal of Healthcare Management* 11, no. 1, 2018.

[11] Vabret, A., J. Brouard, J. Petitjean, G. Eugene-Ruellan, and F. Freymuth. "Human coronavirus infections: importance and diagnosis." *Presse medicale (Paris, France: 1983)* 27, no. 35,1998.

[12] Pereyaslov, D., P. Rosin, D. Palm, H. Zeller, D. Gross, C. S. Brown, and M. J. Struelens. "Laboratory capability and surveillance testing for Middle East respiratory syndrome coronavirus infection in the WHO European Region, June 2013." *Eurosurveillance* 19, no. 40, 2014.

[13] San Juan, David Michael. "Responding to COVID-19 Through Socialist (ic) Measures: A Preliminary Review." *Available at SSRN 3559398*, 2020.

[14] Al-Mandhari, Ahmed, Dalia Samhouri, Abdinasir Abubakar, and Richard Brennan. "Coronavirus Disease 2019 outbreak: preparedness and readiness of countries in the Eastern Mediterranean Region." *Eastern Mediterranean Health Journal= La Revue de Sante de la Mediterranee Orientale= Al-majallah Al-sihhiyah Li-sharq Al-mutawassit* 26, no. 2, 2020.

[15] Berger, Zackary D., Nicholas G. Evans, Alexandra L. Phelan, and Ross D. Silverman. "Covid-19: control measures must be equitable and inclusive.", 2020.

[16] Yadav, Mahendra Pal, Raj Kumar Singh, and Yashpal Singh Malik. "Emerging and Transboundary Animal Viral Diseases: Perspectives and Preparedness." In *Emerging and Transboundary Animal Viruses*, pp. 1-25. Springer, Singapore, 2020.

[17] Antoun, Joseph. "CSR to Increase Access to Medicines: Lessons and Opportunities for the Middle East." In *CSR in the Middle East*, pp. 49-71. Palgrave Macmillan, London, 2012.

[18] Cahyandito, Martha Fani. Accelerating the achievement of Millennium Development Goals (MDGs) through Corporate Social Responsibility (CSR): An actual discussion in Indonesia and Germany. No. 57-2011. Arbeitsbericht, Albert-Ludwigs-Universität Freiburg, Institut für Forstökonomie, 2011.

[19] Jamali, Dima, Mohammad Hallal, and Hanin Abdallah. "Corporate governance and corporate social responsibility: evidence from the healthcare sector." *Corporate Governance: The international journal of business in society*, 2010.

[20] Ryan, Sandra Festa. "Breaking down barriers part of healthcare reform." *The Nurse Practitioner* 34, no. 12, 2009.

[21] Faulkner, Alex. "Devising Healthcare and Society." In *Medical Technology into Healthcare and Society*, pp. 188-209. Palgrave Macmillan, London, 2009.

[22] Haupt, Marilyn T., Carolyn E. Bekes, Richard J. Brilli, Linda C. Carl, Anthony W. Gray, Michael S. Jastremski, Douglas F. Naylor, Antoinette Spevetz, Suzanne K. Wedel, and Mathilda Horst. "Guidelines on critical care services and personnel: recommendations based on a system of categorization of three levels of care." *Critical care medicine* 31, no. 11, 2003.

[23] Ball, Carol, Margaret Kirkby, and Susan Williams. "Effect of the critical care outreach team on patient survival to discharge from hospital and readmission to critical care: non-randomised population based study." *Bmj* 327, no. 7422, 2003.

[24] Talib, Faisal, and Zillur Rahman. "An interpretive structural modeling for sustainable healthcare quality dimensions in hospital services." *SSRN,* 2016.

[25] Azam, Mohammad, M. N. Qureshi, and Faisal Talib. "AHP model for identifying best health care establishment." *International Journal of Productivity Management and Assessment Technologies (IJPMAT)* 3, no. 2, 2015.

[26] Lim, Puay Cheng, and Nelson KH Tang. "A study of patients' expectations and satisfaction in Singapore hospitals." *International journal of health care quality assurance* 2000.

[27] Cockburn, Jill, and Sabrina Pit. "Prescribing behaviour in clinical practice: patients' expectations and doctors' perceptions of patients' expectations—a questionnaire study." *Bmj* 315, no. 7107, 1997.

[28] Fadden, Grainne. "Implementation of family interventions in routine clinical practice following staff training programs: a major cause for concern." *Journal of Mental Health* 6, no. 6, 599-612, 1997

[29] Swales, Michaela Anne, Beverley Taylor, and Richard AB Hibbs. "Implementing dialectical behaviour therapy: Programme survival in routine healthcare settings." *Journal of Mental Health* 21, no. 6: 548-555, 2012.

[30] Tengelin, Ellinor, Rebecka Arman, Ewa Wikström, and Lotta Dellve. "Regulating time commitments in healthcare organizations." *Journal of Health Organization and Management* 2011.

[31] Bushell, Sylvia, Joyce Mobley, and Becky Shelest. "Discovering lean thinking at progressive healthcare." *Journal for Quality and Participation*: 20-25, 2002.

[32] Patri, Rojalin, and M. Suresh. "Factors influencing lean implementation in healthcare organizations: an ISM approach." *International Journal of Healthcare Management* 11, no. 1, 25-37, 2018.

[33] Erfan, Osama M. "Application of lean manufacturing to improve the performance of health care sector in Libya." *International journal of engineering & technology* 10, no. 6, 117-128, 2010.

[34] Zakaria, Nasriah, Shafiz Affendi, and Norhayati Zakaria. "Managing ICT in healthcare organization: culture, challenges, and issues of technology adoption and implementation." In *Health Information Systems: Concepts, Methodologies, Tools, and Applications*, pp. 1357-1372. IGI Global, 2010.

[35] Ruxwana, Nkqubela L., Marlien E. Herselman, and D. Pieter Conradie. "ICT applications as e-health solutions in rural healthcare in the Eastern Cape Province of South Africa." *Health information management journal* 39, no. 1, 17-29, 2010.

[36] C. P. Kapse, A. Kumar, M. K. Dash, E. K. Zavadskas, and S. Luthra, "Developing textile entrepreneurial inclination model by integrating experts mining and ISM-MICMAC," International Journal of Production Research, vol. 56, no. 14, pp. 4709–4728, May 2018.

[37] Z. Rahman, A. K. Agrawal, and D. Kumar, "An ISM approach for modelling the enablers of sustainability in market-oriented firms," International Journal of Business Excellence, vol. 12, no. 1, p. 23, 2017.