

International Series in
Operations Research & Management Science

Said Ali Hassan
Ali Wagdy Mohamed
Khalid Abdulaziz Alnowibet *Editors*

Decision Sciences for COVID-19

Learning Through Case Studies



 Springer

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Chapter 25

QOL Barometer for the Well-being of Citizens: Leverages during Critical Emergencies and Pandemic Disasters



Arindam Chakrabarty, Uday Sankar Das, and Saket Kushwaha

Abstract Improving the quality of life for its citizens has been the focal point of any governmental system across the globe. Every state is committed to providing good governance to its countrymen. Society is moving through the Fourth Industrial Revolution (4IR) where the e-governance ecosystem has become the priority need of the hour. The days of mechanistic bureaucracy have become unpopular and outdated. The modern democracies desire an organic, citizen-friendly governmental system where information needs to be collected from the people at the bottom of the pyramid so that the state could ensure delivery of improvised and augmented public goods and services effectively and efficiently keeping in view its commitments for achieving all the UN-SDGs by 2030. This chapter has devised a dedicated model based on an e-governance framework. This QOL Barometer would be designed using the 4IR ecosystem. The innovative QOL Barometer or the “CARE-Protocol” may be developed and implemented for improving the quality of life of its citizens. This protocol would be conceptualized, based on inputs and insights from secondary sources. The benefits of this model can be leveraged during critical emergencies and pandemic disasters.

Keywords e-Governance · Fourth Industrial Revolution · QOL Barometer · UN-SDGs Emergencies · Pandemic

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25.1 Introduction

Qualities of life for the citizens are the real measures in the efficacy of governance. In the era of automation and knowledge and economy, it is imperative to provide prompt and quality solutions to the countrymen. Society deserves a dedicated comprehensive and robust mechanism so that the state can render appropriate services to its target audience. The fourth industrial revolution has been strengthening E-Governance systems to energize for the superior momentum of public service and distribution framework. It is observed that the developed states have been prioritizing creating an improvised E-Governance ecosystem to fulfill the commitment toward good governance.

25.1.1 *Idea of Quality of Life*

Mankind has been on a constant quest for the betterment of his living conditions since the inception of humanity. As humans grouped themselves under the societal banners many pre-scientific philosophers, thinkers, and administrators attempted at understanding the basics of quality and how it might be applied for improving the human condition.

These frugal attempts found a base when psychiatrist Viktor Emil Frankl conceptualized “Logotherapy” inspired by the works of Sigmund Freud & Alfred Adler. The idea of “Logotherapy” was simply an inquiry into the three basic psychological philosophical pointers, i.e., (a) Freedom of Will, (b) Will to Meaning, (c) Meaning in Life (VFI/Logotherapy and Existential Analysis [n.d.](#)). These ideas were derived from the experiences of his struggle to remain hopeful for a better life while imprisoned in a German Nazi Camp; the ordeal of which later turned out to be a best seller (Frankl [1963](#)). The works of Viktor Emil Frankl silently conceptualized the idea called “Quality of Life” and cemented it in academics, literature, polity, healthcare, and global policies from the 1970s onward often without landing any credits to his works or perhaps simply denying it as an idea pulled out of thin air.

Quality of Life became the catchphrase of decision makers in determining the qualitative aspect of human life. Several symposiums derived and concluded several measurement tools to quantify the dimensions into measurable terms (Environmental Protection Agency USA [1973](#)). Quality of Life (QOL) measurement is sometimes looked upon as a means of needs satisfaction for the holistic distribution of goods and services to propagate social justice (McCall [1975](#)). Different academic streams tried to utilize the idea of QOL and formulate measurement tools for various fields like economics, healthcare, marketing, and organizational psychology (Michalos et al. [2006](#)).

QOL is often modeled around a three-dimensional aspect of an individual’s being, belonging, and becoming (Quality of Life Research Unit [n.d.](#)). Over the years QOL has turned out to be a favorite tool to assesses and quantify the qualitative

aspect of human life for both researchers and policymakers across the globe, pitching it up as a de-facto choice.

25.1.2 QOL as a Part of Holistic Development

The answer to the quest for refining the human condition is answered with improving the quality of life to achieve holistic development. Several indices and indexes are either formulated or incorporated in existing policy reports to measure the quality of life for a very long time.

One of the early attempts to measure the QOL in this direction was possibly the Physical Quality of Life Index (PQLI) that aimed at avoiding the limitations posed by Gross National Product by measuring literacy, infant mortality, and life expectancy (Morris 1978).

The “Human Development Report” produced by the United Nations Development Programme incorporated the QOL parameter in 1997 in the form of the Human Poverty Index based on figures like access to safe drinking water, and prevalent poverty (Undp 1997). The 1990s saw the indexing of countries based also known as the Human Development Index, which was later adjusted to the Inequality-adjusted Human Development Index from the year 2010 onward. The Human Development Report also measures gender gaps as Gender Development Index calculating the disparities between men and women in the health, knowledge, and living standards dimensions (Unit 2005).

Another such attempt in the same direction was attempted by the Economist Intelligence Unit of The Economist also known as “Quality of Life Index” that tracked the non-monetary social indices through its Life satisfaction survey, that quantified figures like material well-being, health, political freedom, security and stability, family and community life, climatic conditions, job security, and gender equality (International: The lottery of life | The Economist n.d.). This was later renamed as Where to be born Index as the lottery won predetermine the success of an individual based on the favorable dependent factors in a particular place (lessons from Bhutan on the pursuit of happiness above GDP | World Economic Forum n.d.).

The mountain nation of Bhutan is on a marathon run to promote QOL in the form of Gross National Happiness comprising not just the economic factors but also the moral development among its citizens. This was to be achieved riding on the back of good governance, environmental protection, cultural safeguard, sustainable and equitable economic development, and stepping into the future technologies for a holistic overall development (Interrogation 2008; World Happiness Report 2020 | The World Happiness Report n.d.). Good ideas resonate throughout the globe and it gave birth to the concept of measuring world happiness in the shape of the World Happiness Report by the United Nations Sustainable Development Solutions Network that added happiness and well-being along with the economic indicators for measuring the development vector of the country (About the HPI | Happy Planet Index n.d.). Another similar index is the “Happy Planet Index” that combines four

parameters namely well-being, life expectancy, inequality and injustice, average ecological footprint, which factors for a long happy life (WVS Database [n.d.](#)). A noteworthy mention at this stage would be of the World Values Survey (WVS) that tries to quantify and measure the intangible values like social, economic, religious, cultural, and political change in values of the global fraternity (Gender Development Index (GDI) | Human Development Reports [n.d.](#)).

A dimension of “Welfare Economics” popularly referred to as “Happiness Economics” is often vetted against traditional developmental economics as a much more inclusive and appropriate measure for a rounded development (What are the economics of happiness? | Yale Insights [n.d.](#); The Economics of Happiness | Greater Good [n.d.](#); The Economics of Well-Being [n.d.](#); Why we need to choose happiness over economics | World Economic Forum [n.d.](#)).

Quality of life is not just about holistic development and economic well-being it has a hidden aspect, the factor of disposable time. The lack of which is referred to in the popular culture as “Time Poverty” which essentially means the individual does not have enough time for the contribution to social and human capital development (Kalenkoski and Hamrick 2014). QOL is also extensively used in the health care sector to measure the success or outcome of various medical procedures. According to the World Health Organization (WHO), QOL is an individual perceptual context based on individual standards, expectations, standards centered around the cultural value systems. WHO has created an instrument known as WHOQOL (WHOQOL-100 and WHOQOL-BREF) to measure the quality of life (WHO 2014).

25.1.3 Socioeconomic Changing Roles and New Dimensions of Governance: Good Governance and E-Governance

The world has been mostly governed by a democratic setup. In a democracy, every citizen of a county can choose their representative and the government is formed with the majority of a particular representative group. The role of the government in democratic orientation was to provide goods and services to its countrymen. This system is perfectly alright when there is no such competition, complexities, or higher commitments toward achieving improvised quality of life in consonance with rapid technological development. The state-controlled machinery has an inherently limited aspiration for higher growth trajectories rather it develops conservative and status quo syndrome with the growth of population it becomes unrealistic to provide goods and services to all its citizens. The momentum of liberalization privatization and globalization (LPG) coupled with the technological revolution had mended all of us into a massively competitive world both at an individual level and in a collective manner. It has made the state untenable to act as a provider of all utility products and services there is a paradigm shift that the state has initiated the role of being facilitator so that new entrepreneurial expeditions can be improvised and innovative startups can be patronized. The notion of good governance has become the focal

point not only to maintain law and order rather enhance a vibrant economy and ensure superior quality of life for its countrymen. There are two schools of thought of any good governance ecosystem of which a section of experts advocate for a higher order of human intervention with an increased face of humanistic touch to make the governance system highly acceptable and adaptable. On the contrary, the other school conservatively believes indiscriminate human intervention in the governmental machinery necessarily makes the system biased prejudiced ambiguous, and most importantly a genesis of corruption. Human-centric governance essentially suffers from procrastination syndrome. To address all these challenges and emerging dynamics of societal aspirations good governance has become the minimum condition for gaining and retaining power in the political corridor of the country where a substantial function can be accomplished by the e-governance ecosystem.

25.1.4 Revolution in E-Governance Ecosystem across the World

The United Nations Department of Economic and Social Affairs under the banner of the Division for Public Administration and Development Management devised a tool United Nations E-Government Development Database (UNeGovDD) that tracks the global E-Readiness for the member states of the UN. This database lists Denmark (Rank 1), Republic of Korea (Rank 2), Estonia (Rank 3), Finland (Rank 4), Australia (Rank 5), Sweden (Rank 6), United Kingdom of Great Britain, and Northern Ireland (Rank 7), New Zealand (Rank 8), the United States of America (Rank 9), Netherlands (Rank 10) among the top ten performers for the year 2020 out of 193 participant nations. Countries in the Indian subcontinent is ranked in the same list in the following order Sri Lanka (Rank 85), India (Rank 100), Bhutan (Rank 103), Maldives (Rank 105), Bangladesh (Rank 119), Nepal (Rank 132), Myanmar (Rank 146), Pakistan (Rank 153), and Afghanistan (Rank 169) (UN E-Governance Knowledgebase 2020). These rankings are derived using the United Nations E-Government Development Index (EGDI) that is based on the weighted average of Telecommunications Infrastructure Index (TII) essentially measuring the data connectivity as monitored by the International Telecommunications Union (ITU), Human Capital Index (HCI) measured by the United Nations Educational, Scientific and Cultural Organization (UNESCO), and Online Service Index (OSI) which is an independent survey conducted by United Nations Department of Economic and Social Affairs (UNDESA) in the form of an Online Service Questionnaire (OSQ). Each of the three indices contributes one-third of the value for calculating EGDI of any nation along with a section of Member State Questionnaire (MSQ), all these questionnaires try to assess the online delivery of services, openness of government data, digital divides, use of ICT and implementation in the whole of government.

More countries across the globe are adopting the E-government strategy in various innovative ways to reach the entire society with the whole of government,

with formulations like e-participation, data-centric focus revolving around technologies like artificial intelligence and blockchain to reduce the digital divide through digital kiosks in far-flung areas and achieve the development of smart cities/smart villages. Approximately 65% of the member countries now are in the high or very high group of EDGI ranking while 22% have moved up the rank since the year 2018. It is noteworthy to mention that the EDGI ranking has a positive correlation with the income level of the country. In the new normal of COVID19 E-Governance is facing a massive stress test as most of the face-to-face services were disrupted due to the social distancing guideline. It was evident that countries with robust E-Government infrastructure were able to steer clear through this pandemic with much more ease than those which lacked such facilities. However, the hope notation is that around 85% of the countries globally offer at least one transactional online service. Approximately an average of 14 different services can be availed through the E-Governance platforms of the member states, some of the most common services include applying for a birth certificate, registering or applying for a new business, and paying utility bills online (United Nations E-Government Survey 2020).

If one is to look with the magnifying glass to inspect landmark victory for principalities in the journey of human development then perhaps the bicycle nation of Denmark would possibly beat every other candidate black and blue in every parameter with radical margin. This still stands true for E-Governance where the nation has surpassed Estonia which happens to be an early bird to catch the E-Government train. The Danish governments' official website claims that the nation is digital by default hence you can get all your official work done from the comfort zone of your computer screen within a span of 24 hours be it registering a business, reporting a bicycle theft, or even dealing with a health care issue (The key to Denmark's digital success [n.d.](#)). None the less tiny nation of Estonia is still a tough competitor in the E-Governance space with 99% of the services offered online 24 by 7 and an astounding 44% of the citizen's vote digitally using the i-voting platform. The tall claim of this nation not only stops at this, they also officially claim to have saved 844 years of working hours and becoming a hassle-free nation (EAS 2019). Some of the key measures that helped this tiny nation achieve this feat are the digitization of registers to support e-services based on a platform called X-Road, provision of digital id's and making digital signature equivalent to physical signatures. This was backed by the early success of e-banking which helped the nation accept the idea of digital governance. Estonia is experimenting with blockchain in creating a digital embassy and promoting e-residency programs (How Estonia became an e-government powerhouse—Tech Republic [n.d.](#)).

India launched the "Digital India" campaign back in the year 2015 with the vision not to miss the train of the information age, the outcome of which was to access the various strengths for this adventure. The program revolves around three pillars of digital infrastructure, i.e., (i) Digital infrastructure as utility, (ii) On-demand Services and Governance, and (iii) Citizen Empowerment through Digitization.

India is among the top three digital economies with one of the largest unique digital identification program (AADHAAR), the digital divide is also reducing day by day as mobile services are penetrating the remote hinterlands. India also aims to

digitize the healthcare services sector, education sector, and built on a robust E-Governance ecosystem for the future (India's Trillion-Dollar Digital Opportunity 2019). Although these are great ambitions for a nation, however, the base of digital society needs to be built on the backbone of digital governance as is evident in the case of Denmark, Estonia, or South Korea.

25.1.5 Recent Experience of E-Governance Protocol for Mitigating COVID Pandemic

The COVID pandemic struck the global community with shock and awe strategy paralyzing normal life, halting economic activities, even hitting very hard at the core of community life with forced social distancing, quarantining, and strict containment. The pandemic created such an atmosphere that even the most democratic governments of the world were forced to enact dictatorial practices and enforce sudden lockdowns as a choice between life and death. Several silver bullets were fired as a solution to this pandemic however least was achieved. One of the early outcomes of this pandemic was a global frenzy to trace and isolate COVID-positive cases. This phenomenon gave birth to a new trend of contact tracing apps across the world by governments as a measure to tackle COVID as a non-medical intervention in the form of basic E-Governance (Table 25.1).

Most of these applications track positive COVID cases the users' proximity to access a risk profile. Some of the applications are also able to trace the routes used by a user and alert any possible risk outcome to other users. The "Thai Chana" application possibly differs from the rest as it is designed to be a post COVID measure to step out in the world and perform day-to-day activities including commercial activities.

Even local governments used such half-baked applications as a non-medical intervention or even to disperse E-Governance services like the one launched by the Government of Delhi-NCR in India called "Delhi Corona" that was specifically designed to provide information about the availability of hospital resources and reduce the rush and run around in a massive, populated city like National Capital Region (Kejriwal launches 'Delhi Corona' app for real-time information on availability of hospital beds—The Hindu n.d.). It is not that any government could have produced a perfect application in these desperate times but a much more coordinated effort perhaps could have yielded better results.

World Summit on Information Society (WSIS) is a UN forum that keeps a track of E-Governance progress across the world. It is a forum that keeps a track of the growing digital divide in the world. Around 40% of the global population lives in poverty-prone nations, and approximately 1 billion people have no access to ICT. Poverty and the digital divide are correlated. Several solutions are proposed to overcome the digital obstacle policy solutions like easy user-friendly web services,

Table 25.1 Indicative list of contact tracing apps for COVID-19 across the world

SL. No.	Country of origin	Name of the app
1.	Australian	COVID safe (COVIDSafe n.d.)
2.	Austria	Stopp Corona (Stopp Corona n.d.)
3.	Azerbaijan	E-Tabib (Download the “E-DOCTOR” mobile application n.d.)
4.	Bahrain	BeAware Bahrain (Kingdom of Bahrain–eGovernment Apps Store: BeAware Bahrain n.d.)
5.	Bangladesh	Corona tracer BD (Corona Tracer BD–Apps on Google Play n.d.)
6.	Canada	COVID alert (Download COVID Alert today–Canada.ca n.d.)
7.	China	Close contact detector (China launches coronavirus “close contact detector” app–BBC News n.d.)
8.	Colombia	Coronapp (Coronapp n.d.)
9.	Croatia	STOPcovid19 (STOPcovid19–STOPcovid19 n.d.)
10.	Czech Republic	eRouška (eRouška–chránímsebe, chránímtebe n.d.)
11.	Denmark	Smittestop (Stop udbredelsenaf COVID-19–Smittelstop n.d.)
12.	France	StopCovid (StopCovid economie.gouv.fr n.d.)
13.	Germany	Corona-warn-app (Bundesregierung Aktuelles Veröffentlichung der Corona-Warn-App n.d.)
14.	Ghana	GH Covid-19 tracker app (Bawumia launches GH COVID-19 Tracker App n.d.)
15.	Hungary	VírusRadar (VírusRadar–a Koronavíruskövetéséreés a COVID-19 ellenívédekezésre n.d.)
16.	Iceland	Rakning c-19 app (Information about Covid-19 in Iceland n.d.)
17.	India	AarogyaSetu Mobile app (AarogyaSetu Mobile App MyGov.in n.d.)
18.	Ireland	COVID tracker app (COVID Tracker App–Ireland’s Coronavirus Contact Tracing App n.d.)
19.	Israel	HaMagen (HaMagen–The Ministry of Health App for Fighting the Spread of Coronavirus n.d.)
20.	Italy	Immuni (Immuni - Download Immuni n.d.)
21.	Japan	COVID-19 contact-confirming app (New Coronavirus Contact Confirmation Application (COCOA) COVID-19 Contact–Confirming Application!Ministry of Health, Labor and Welfare n.d.)
22.	Jordan	Aman app (Aman n.d.)
23.	Latvia	ApturiCovid (ApturiCovid n.d.)
24.	Malaysia	MyTrace (MyTrace, a Preventive Counter Measure and Contact Tracing Application for COVID-19–KementerianSains, TeknologidanInovasi (MOSTI) n.d.)
25.	Nepal	COVIRA (COVIRA n.d.)
26.	New Zealand	NZ COVID tracer app (NZ COVID Tracer app Ministry of Health NZ n.d.)
27.	North Macedonia	StopKorona (StopKorona!–tracing of Coronavirus exposure and protection from COVID-19 n.d.)
28.	Norway	Smittestopp (Smittestopp–app–helsenorge.no n.d.)
29.	Qatar	Ehteraz (Qatar makes COVID-19 app mandatory, experts question efficiency Qatar News Al Jazeera n.d.)

(continued)

Table 25.1 (continued)

SL. No.	Country of origin	Name of the app
30.	Singapore	TraceTogether (TraceTogether n.d.)
31.	Spain	App radar Covid (App Radar Covid, la aplicación de rastreo para España Noticias de Tecnología en Diario de Navarra n.d.)
32.	Switzerland	SwissCovid app (SwissCovid app and contact tracing n.d.)
33.	Thailand	Thai Chana quick response (Thailand wins n.d.)

installation of e-kiosks, or simplified mobile devices like “Simputer.” Some of the factors determining good e-governance are:

- Cooperation between national and international governments.
- Normalization of the legal framework.
- Reasonable costing for interoperable services.
- Holistic promotion of digital literacy, e-learning, etc.
- Preparing underprivileged society for the Tsunami of Information Society (e-Readiness).
- Increased transparency and promotion of e-participation, e-services, etc..
- Overall all citizens inclusive public administration process to address bureaucratic deadlocks.
- Access to knowledge through e-services to achieve an overall improvement in “Quality of Life” (Stoiciu 2011).

Open Government Partnership is another popular concept based on the idea of responsive, accessible, accountable, open governance with long-term benefits across a broad range of issues and citizen engagement in overseeing governmental activities using digital tools (Open Government Partnership 2020).

Some unique technology-led solutions were also innovated during this Pandemic. For example delivery of essential goods to the households in containment zones/ risk-prone areas with participation from hand card vendors and reducing footfalls in local markets, preserving social distancing. Time allocation for consumers for the purchase of particular goods from a particular shop was also a prominent e-governance feat achieved in some cities in India (Covid-19: Use of new-age technologies for e-governance, Government News, ET Government [n.d.](#)).

25.2 Literature Review

Tons of literature are present about QOL, E-governance and COVID pandemic, however, a focused approach is applied to narrow down available relevant recent literature, specifically that devise assessment models for measuring QOL relevant to the present study.

25.2.1 *Measuring Quality of Life*

A dimension of QOL is strictly related to the health of an individual, with this view the “World Health Organization” endeavored to build a tool to measure the “Health for All” with a holistic vision of prompting social, mental, and physical well-being. This tool was named WHOQOL that assessed an individual’s relative perception about his expectations, goals, and concerns in the context of his/her culture and value system. The scores are derived from a multidimensional profile of six domains and 24 subdomains (WhoQOL Group 1995). A pilot survey was eventually conducted containing 236 questions 29 dimensions of QOL divided across 6 domains. Each dimension had approximately four sets of questions of perceived and self-reported types of questions. This highly standardized questionnaire was administered after prepping the target population for about two weeks (Group 1998).

WHOQOL has been established over the years as a reliable de facto instrument to measure QOL in various cultural, language settings across the globe. An example is that “WHOQOL-100 Hindi” was found to be a suitable instrument to measure QOL and “WHOQOL-100 BREF Hindi” was found ideal for measuring results of a drug trial (Saxena et al. 1998). Similarly in the USA and UK, the standard “WHOQOL-100” was found effective in meaning QOL for medical patients (Skevington 1999; Bonomi et al. 2000). Again the “WHOQOL-100 BREF” passed its reliability test in both Korea and Brazil in the localized version. (Min et al. 2002; Berlim et al. 2005).

HRQOL is mostly administered in a pen and paper mode in a self-report, in person, or via a telephonic interview. This rudimentary technique is not just old-fashioned but also lacks the impunity ease provided by the much more responsive digital technologies like a computer or mobile-based instruments. Both the administrator and the responder showed a positive inclination to the use of technology in a survey conducted among 134 patients (Crawley et al. 2000). Several organizations both academic and non-academic are working toward developing instruments to measure HRQOL. Among them are the international society for quality of life research (ISOQOL) and the Scientific Advisory Committee (SAC). The Scientific Advisory Committee is focused on the refinement and development of HRQOL instruments reducing gaps and making them culturally inclusive, easily interpretable (Lohr 2002).

The 1960s played a significant role in highlight hidden poverty using social indicators and reporting. A proposed QOL barometer in public administration is to shift the scale of measurement from material welfare to universal common concerns of the society. This mechanism would help determine the how-to and what-to aspects of public administration through public participation in effectively resolving social issues (Johansson 2002). There stands a conflict between the established “Gold-Standard” translation norms and canonical methods in translating HRQOL instruments. This is specifically true when the barrier of language is deep between the original language of the instrument and the translated language. Alternative methods like an adaption of a dual translation pattern may prove to be efficient in such cases of need bases QOL measure (Swaine-Verdier et al. 2004). Asia may be

considered as a prominent example in such a scenario where a large chunk population speaks Mandarin followed by Hindi and other languages like Japanese, Malay, and Tamil. As most HRQOL instruments are adaptations designed in the western hemisphere major issues are incorporated in the process of translation that makes it ill fit for the Asian problem given the strict translation protocols. Asian countries are still infested with illiteracy and remoteness leaving these instruments designed to be self-completed ineffective and useless in the ocean of linguistic dialects that differs very often. The result is a biased reporting of economic developments rather than the ground-level picture of disease burden. These instruments may be designed keeping in purview the cross-cultural adaptations needed specific to Asian provinces (Cheung and Thumboo 2006).

The European Parliament made its intention clear regarding the measurement of holistic development and look beyond the GDP numbers in 2009 with five-point indicators. This was essential at a time when the world was preparing for measuring societal progress beyond economic growth only (Bache 2013). EuroQOL or EQ-5D is an inter-disciplinary EuroQOL instrument developed by the efforts of five countries composed of a three-level five-dimensional approach designed to measure the health status. The instrument ran into several issues with the initial translation in multiple languages the rectification of which further enhanced the instrument. This experience also resulted in two more versions of the instrument EQ-5D-5L and EQ-5D-Y for youth. None the less EuroQOL is also a popular instrument of choice for measuring QOL across the globe (Devlin and Brooks 2017).

Several sociodemographic variables play a vital role in determining the health and happiness of the community. This was evident in the case of the community residing in Juarez, Mexico (Molina-Herrera et al. 2019). To determine the impact of the multifactorial problem on the quality of life of its citizens a multivariable analysis is needed for understanding community-oriented problems (Callejo et al. 2019).

25.2.2 Governance and E-Governance

The United Nations have initiated e-Government measurement initiatives among 178 member states under the “e-Government Readiness Index” and “e-Participation Index” also known as e-PI and e-GRI using an e-Government Readiness Assessment survey based on Innovation Management Measurement Framework. The IMMF is built on Input, Knowledge Management, Innovation Strategy, organization and culture, portfolio Management, project management, and commercialization headers. These 7 constructs and 19 sub-constructs try to measure and promote e-Governance across the globe (Potnis 2010). An evaluation of three countries India, Ethiopia, and Fiji showed positive results that can help reduce corruption in government administration. Limited usage of e-governance in developing countries has deprived those countries of the benefits of e-governance mechanisms. However, an important point is that ICT technologies need to be revamped to effectively incorporate governmental plans and reduce the digital divide (Singh et al. 2010).

The single project, single governance, and single jurisdiction model is not efficient and hampers the applicability of administration and researches in continuation. e-Governance is a probable solution to solve this crisis and improve upon the existing mechanisms (Kaye 2011). Cloud computing as technology has significant application in the e-governance space as it frees the local governments which are often underfunded and has an infrastructure bottleneck for implementing successful online portals or governance sites. This also makes the portals much more reliable and available as the downtime is almost reduced to zero (Tripathi and Parihar 2011).

The Indian e-governance space is still nascent and there is tremendous scope for improvement and it needs to go through several phases of change management before it can achieve a self-sustainable model. Policy gaps exist in every facet of the e-government aspect as ICT is not completely incorporated into the system. The implementation framework is also not as robust and immense opportunities exist for improvement in the sector (Singh and Kiran 2013).

E-governance of e-commerce is still an under-investigated area. Research in a similar direction between government, business, and civil society highlighted severe lacuna and compromise in the system. E-consumer protection needs to be looked at from the angle of all the three dimensions as mentioned earlier rather than just from a marketing perspective. E-consumer protection will ensure the voice of the consumer is protected by the implementation of e-governance in this era of e-retail (Ha and McGregor 2013).

The early 1990s gave rise to the concept of New Public Management and E-Governance. Increased consumer expectations have left have pressurized local governments across the world to improve upon the governance mechanism and promote good governance. Information and communication technology lead governance is much more transparent and accountable and successful implementation of e-governance requires injection of finances, human resource, administrative, and citizen-oriented changes to be effective. India can achieve this feat by developing well-directed leadership intended to achieve these goals (Sapru and Sapru 2014).

The popular blockchain technology is found to be reliable, safe, and anonymous for building e-governance applications and when coupled with technologies like the Internet of Things will help the creation of e-democracy tools powered by automation and minimizing the security risk of exposed or open systems. This blockchain technology is a decentralized information exchange, used by millions across the globe as it shields the common user from the risks of the world wide web by default, which is unprecedented in historical terms (Qi et al. 2017).

Digital technologies have made citizen participation in the arena of public policymaking by reducing the cost of public participation to a minimum level. However, people would still need encouragement for deliberate participation in these processes. The scope of influence digital technologies can exert from lobbying to e-governance, e-participation, citizen budget, etc. (Baxter 2017). E-governance website has the probability to enhance the democratic nature of government (Lee-Geiller and Lee 2019).

It is a known fact that e-governance has improved the government machinery across the globe making it transparent and accountable. Investigations in the

literature show a major contribution of information system management, social networks, and open data in building such governments robust and resilient (Bindu et al. 2019).

25.2.3 Changing Scenarios of E-Governance and Digital Divide in COVID Pandemic

One thing that is already clear in this COVID world is no one will come out of this without something or the other. The lessons of COVID-19 will be a renewed struggle among the fittest in postmodernity testing both the strengths and skills of an individual and the nations as well. This is the new reality social freedom will no longer mean the same things that we once perceived. Old world order will have to stand the test of time against the rising powers. Information technology, e-governance, commerce, health, and artificial intelligence will play a much more potent role than earlier. There is a possibility of human rights conflict with extensive technology-driven monitoring systems for the citizens (Sharfuddin 2020). Taiwan is approximately 200 kilometers far away from the COVID-19 epicenter in China. The collaborative model of governance in Taiwan is often hailed for the early success against COVID as cooperation helped mobilize the essentials at a very early stage (Huang 2020).

COVID-19 pandemic quickly shifted hotspot from China to Europe and other Asian countries depending on the sociocultural context and soon hospitals were overwhelmed with resulting tragic stories. However, based on the responses East Asian countries were able to counter and manage this pandemic in a much effective manner, and an exaggerating amount of similarities exists between the responses of these countries (Shaw et al. 2020).

COVID-19 has pushed the digital agenda to the forefront of the society where normal functioning of day-to-day activities was only possible safely in the digital space. Also, governments across the world were using digital tracking and tracing systems (DTTS) or contact tracing apps to trace individual's locations and behavior patterns for risk analysis. This is where the question gets complicated and twisted as it directly hinders the agenda of cyber-surveillance and is perhaps a step closer than what we expect. The question of digital ethics is an unfinished agenda in this pandemic. While digital is the only answer to function as a normal society without interacting with the risks of COVID (Taddeo 2020).

COVID-19 has exposed many of the drawbacks of our public infrastructure and the lack of attention it has been facing for ages. New normal came with reinvented old terms like social distancing and quarantine soon enough the medical community and the medical systems also switched over to technology-infused solutions to safeguard their personal life. This exposed another dimension of our society the existing digital divide in our rural and remote communities where most of the vulnerable and poor people lived. This switchover left these communities deprived

of the so-called digital medicine due to accessibility issues. The telemedicine expansion also was gravely hampered by this digital divide (Ramsetty and Adams 2020; Bakhtiar et al. 2020).

25.3 Objectives

1. To explore and devise QOL Barometer as an integral part of the e-governance initiative by a state for achieving the holistic development of the citizens.
2. To leverage the QOL barometer and IoT ecosystem for combating humanitarian crises due to critical emergencies and pandemic disasters.

25.4 Research Methodology

The present study is designed to harness the appropriate e-Governance ecosystem for holistic development for citizens. The paper floats an idea of creating a dedicated Quality of Life Barometer, especially designed mobile application (Web-Enabled as well) which could become instrumental for enhancing QOL of its fellow users. The paper is developed using secondary information like relevant literature, reports, and recent experiments and experiences undertaken by various governments to handle this COVID pandemic. The exploratory model—QOL Barometer app or CARE protocol has been described with appropriate diagrams and algorithms. These recent experiences of the COVID-19 pandemic exhibit that the global communities have adopted a mobile-based app for exploring real-life databases to mitigate the vulnerability of COVID-19 infection. This has improvised the authors to conceptualize an innovative framework of mobile app-based comprehensive mechanisms for enhancing QOL of its citizens on a broader perspective rather than being confined to mitigating disaster or pandemic situations.

25.4.1 Analysis I

The *Comprehensive Automated Result-oriented E-Governance (CARE)* Protocol is illustrated in Fig. 25.1. This would function through the following indicative sequence. A nationwide mobile app “*CARE App*” (web enabled) will be developed which needs to be installed by the citizens of India. This app may be made compulsory for mobile *Original Equipment manufacturers (OEM)* operating in India. The app would be supported by state-controlled dedicated “*Expert Monitoring Team (EMT)*” for its operation, up-gradation, and e-governance manifestations in India. The EMT group would cover various dimensions of governance by providing relevant information asking for citizen’s expectations, impediments, aspirations,

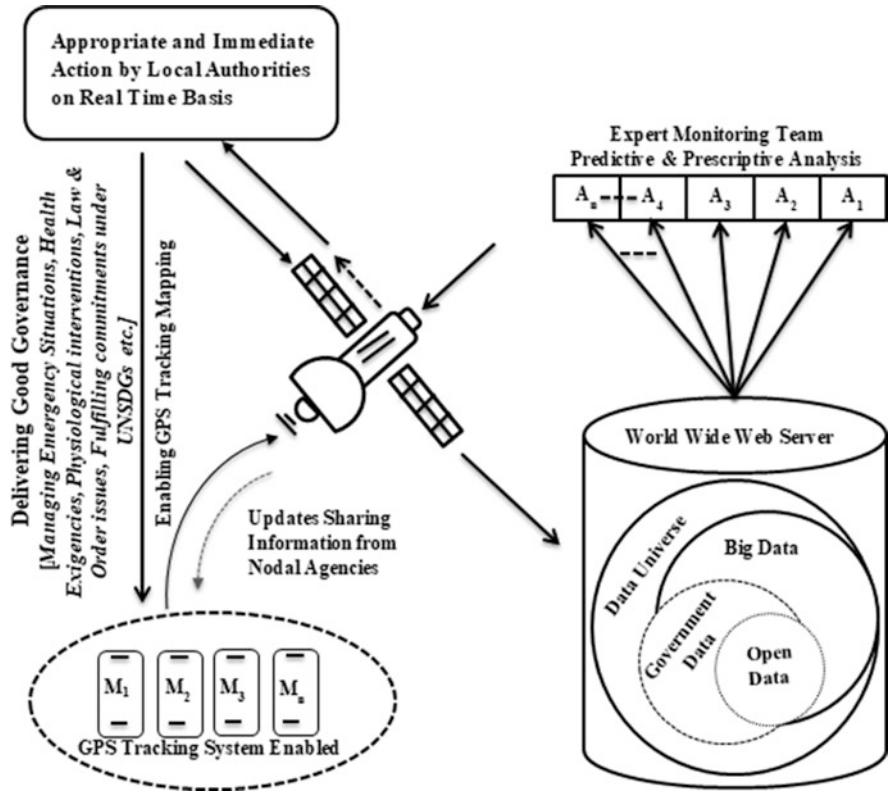


Fig. 25.1 QOL barometer for E-Governance—CARE protocol

quizzes, test batteries, and psychometric analysis so that the state of mind of every citizen can be mapped for predictive and prescriptive analytics along with indicators of holistic development matrix. The indicative list of dimensions may be as follows:

- Real-time information on localized emergency or vulnerability issues (landslide, forest fire, epidemic, endemic, pandemic, etc.)
- Individualized severe ill Health information for providing appropriate and immediate support facilities.
- Various law and order issues.
- Local-level information and feedback on community service on the functioning of respective public health engineer/municipality/Panchayati Raj intuitions.
- Individualized information for household activities, income, and participation in other developmental vectors.
- Various dimensions are covered under UNSDGs, etc.
- Appropriate information from all the citizens of India would be transmitted and stored in World Wide Web servers through dedicated satellites.

- From the server extreme cases in terms of life threats, livelihoods or socioeconomic critical factors both for the individual as well as collective modes would get automatically transferred to the respective expert domain for an appropriate recommendation, advisory, or instructions using Big Data analytics (BDA—Preventative, Predictive and Prescriptive Analytics) or intensive case studies.
- The appropriate recommendation, advisory, or instructions would be communicated to the respective, responsible local authorities (DM/DC, SP, SDO, BDO, etc.) through satellite system for immediate action and successful implementation of e-governance ecosystem using GIS/GPS-based tracking system.
- The local administration would identify the user and provide need-based support available within the jurisdiction of the authorities concerned on a real-time basis so that every citizen of India could be provided improvised good governance system by rendering immediate and need-based support facilities both for an individual level or collective purposes.
- The concerned local authority may also record the action taken report (ATR) they have taken against the corresponding advisory or instructions which would be communicated to all concerned through satellite.
- Through the entire process, the aspirations of data privacy and protection would be maintained until and unless the individualized score on a certain parameter or domain appears to be absurd, exceeding critical ranges. In that case, a GPS tracking system would be operationalized to provide instant/immediate support for the individual or group. Otherwise, the commitment of the state to good governance would be defeated. In general deplorable health hazards accidents emergencies, acute distress threats to life, extreme poverty, absolute hunger, etc. would have to identify for administering instant support by the concerned local authority. However appropriate data privacy and protection protocol as well as ethical practices would be followed without any deviations.

The CARE Protocol if implemented successfully will have several benefits that would percolate in all levels of society. In case of any unprecedented situations like COVID governments and administrative bureaucracy automatically goes to shock and are forced to implement or try policies whose benefits and losses cannot be an estimate or even speculated before the consequence of chain reactions that triggers massive public outrage and media frenzy.

The CARE protocol is a default deterrent and a mechanism to organically connect with the massive population of a country or even a region that may be dispersedly populated. Some of the hypothetical direct benefits transfers for existing situations are listed below:

- In India, approximately 10 people commit suicide every day. Out of which it was found that approximately 12% of victims were illiterate 17% are educated up to primary level, 19% up to middle level, and 23% were educated up to matriculate level (National Crime Records Bureau 2018a). This shows that there is a high degree of stress among the literate population which can be mitigated by examining the psychological status of an individual and application of CARE protocol.

- It was also seen during the same period, out of the number of cases resisted under IPC crimes against women showed that approximately 31% of women faced some kind of domestic violence 26% faced assault on modesty, 22% were kidnapped, and a staggering 10% rape victims (National Crime Records Bureau 2018b). The CARE protocol is a citizen-centric e-Governance model and thus provides direct access to the concerned authority in the virtual sphere with real outcomes. This will drastically reduce the number of attempted assaults as it may be used to trigger alarms in case of perceived threat by the potential victim.
- Out of the total cases registered under IPC Crime against Children were approximately 44% kidnapping, 34% child sexual offense, or child rape (National Crime Records Bureau 2018c). Children are indeed voiceless victims often not in a situation to either assess the attempt to assault or report abuse in case if it was already late thus saving other children from getting victimized. The CARE protocol may be designed to instruct parents and responsible adults to further train children to avoid escape or report such a situation.
- There are various forms of law and order issues (National Crime Records Bureau 2018d; United Nations Department of Economic and Social Affairs (UNDESA). 2015; Chakrabarty 2019) that may be overcome if the care protocol is effectively and efficiently administered.
- The CARE protocol has the potential to fulfill the commitments made to achieve UNSDGs by 2030. It will fulfill Goal 1 (No Poverty), Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), Goal 5 (Gender Equality), Goal 10 (Reducing Inequality), Goal 16 (Peace, Justice, and Strong Institutions), Goal 17 (Partnerships for the Goals)(El-nafaty and Bashir n.d.) directly and indirectly if it is implemented and improvised on a continuous cycle.

Hence, the CARE protocol would act as a change agent for the citizen of a country through a comprehensive e-Governance framework. It would bring transformative changes in the lives of the people by elevating QOL or minimizing the impact of social evils and menace. The CARE protocol would embrace with robust, real-time, and responsible manner to accelerate the social developmental process.

The CARE Protocol would ideally be a mobile application as it is targeted at individuals. The installation would form a recognizable flexible, reliable source. The application would be authenticated based on a primary key and two factor or multifactor security authentication mechanisms as illustrated in (Fig. 25.2). The Care Protocol is the QOL Barometer that will help identify, monitor, and fix issues that are concerned with the well-being of a Citizen.

25.4.2 Analysis II

Due to the recent COVID pandemic, it is observed that various countries have taken a digital-based platform for identifying victims. So that appropriate strategies like the social distancing quarantine process and other advisories could be implemented

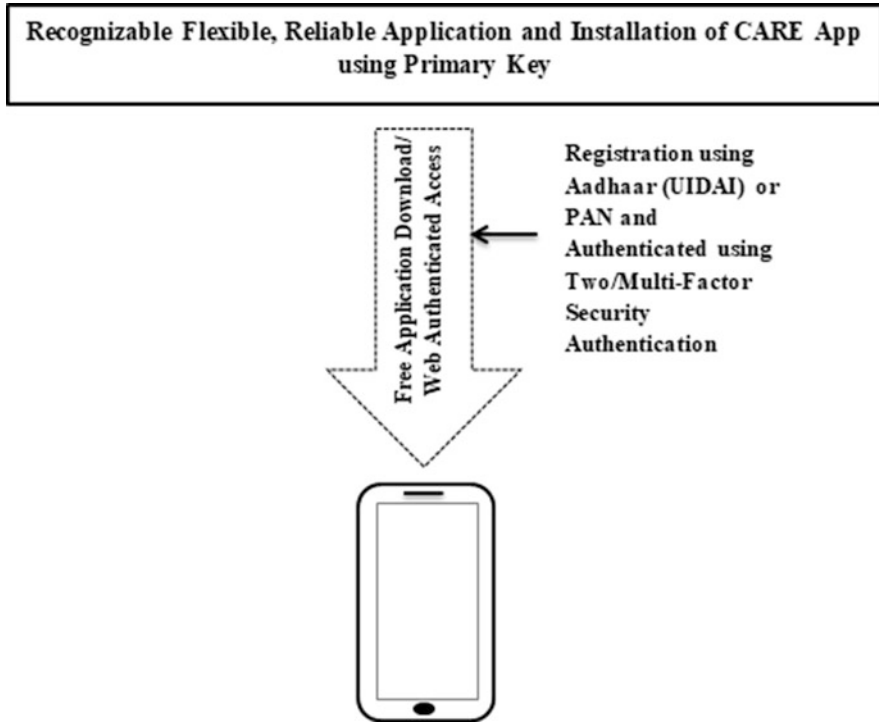


Fig. 25.2 Installation procedure of CARE app using primary key

immediately. The modus operandi of this software or mobile apps essentially have worked on Digital Tracking and Tracing Systems (DTTS). The digital platform enables the user to register their health-related information regarding the COVID pandemic. Based on this the concerned authority can take up steps to facilitate the victims for treatment. On the contrary, the noninfected citizens can get to know that the status and nature of the outbreak in the locality so that they can adopt appropriate defense mechanisms like improvising health hygiene issues and self-induced precautionary measures. However, the state needs to play a better role to improve the QOL of its citizens during pandemic disasters the world has witnessed severe economic downfall leading to loss of jobs, pay cut, struggle to maintain basic needs and amenities. It has a tantamount effect on the physiological state of individuals it has literally challenged the societal ecosystem. The entire discussions, deliberations, thought process and even media broadcasts have been overshadowed by COVID nemesis. The COVID pandemic generally doesn't differentiate in terms of wealth, gender, race, age, or geographic location but the worst victim, of this pandemic, were people belonging to the poor, and people working in the informal sector through long term collateral damage which is anti-thesis of UNSDG's. The developed nations have been supporting the unemployed youth's old age people under its social security schemes but it is a far cry from the people residing in

developing and underdeveloped nations. Vaccines, antibiotics, medicines, and other health facilities essentially help the victims to get rid of infections but the long-term effect of an economic pandemic impacts the entire society both the victims and non-victims. Under this critical juncture, the state may provide such financial support to the needy and helpless people saving them from destitution in consonance with the philosophy of Universal Basic Income (National Crime Records Bureau 2018d). The CARE protocol can function as the depth and breadth of the severity that occurred due to critical emergencies and pandemic disasters.

In consonance with the CARE protocol, the state can use the IoT ecosystem in critical emergency and pandemic hotspots. For instance, in identified hotspots, the IoT devices would be installed along with peripheral roads and lanes in the containment zones.

Based on various inputs received from various stakeholders and real-time information received through QOL Barometer critical zones (for emergency crisis) or containment zones (during pandemic disasters) would get identified further to reach the root of the targets. The appropriate IoT ecosystem may be installed with the short vicinity of the target area. The IoT devices would be strengthened by incorporating appropriate sensors. The sensor would support for analyzing image-based analytics, temperature sensor/ heat-sensing cameras (Udgata and Suryadevara n.d.), sound pattern recognition sensors, for instance, the COVID infected patients have certain symptoms like high or mild fever, cough, and cold, and breathing distress. The image sensor would identify the movement of trace passers within and around the containment zone while the thermal sensor would enable the IoT to understand any case of unreported fever, especially at night time within its range. Sound pattern recognizers would help to understand the high frequency of coughing sounds/ nebulization sounds coming out of the containment zones. This would further enable the response team to take appropriate and immediate steps as depicted in Fig. 25.3.

Indicative algorithm of the system:

- First, the containment zone or critical zones would be identified.
- Appropriate IoT ecosystems would be installed which would be embedded with an appropriate set of sensors relevant to the nature of the emergency pandemic management.
- The IoT ecosystem would be connected to the specific portals of local authorities and the response team via satellite.
- The IoT devices would capture all information that is imagery information, sound pattern recognition, and thermal image from the targeted critical/containment zone. Entire information would be passed instantly to the assigned portals through satellite communication. It would also provide the user with approximate Lat/Long of the source location.
- Based on the inputs local authorities and response teams would identify the place, rush to the location, and take appropriate action as per the standard operating procedures.

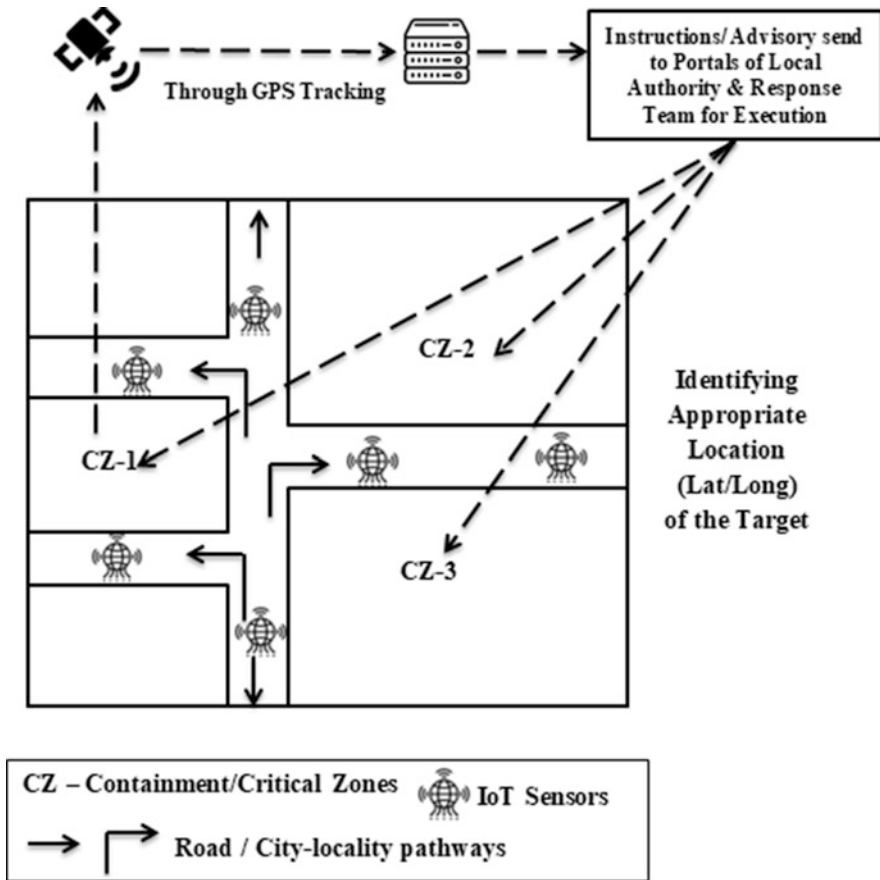


Fig. 25.3 IoT enabled emergency and pandemic management

Apart from this the local authority may also capture information, images by using appropriate unmanned aerial vehicles or drones which may be of additive value for taking a strategic decision.

25.5 Conclusion

In the era of the Fourth Industrial Revolution, it is inevitable for any government to choose an electronic medium for its long-term sustenance. During the issues like critical emergencies and pandemics, disasters are it is so important to sustain the existence of the civilization that the e-governance ecosystem has to be revamped by incorporating modern technological interfaces. This chapter has recommended devising a QOL barometer, a specially designed application known as CARE

protocol for a country like India where the system would enable the policymakers, planners as well as local authorities and response teams to act immediately on a real-time basis. There are numerous experiences where various nations adopted similar kinds of approaches during the recent COVID pandemic, but qualitatively this model is somehow different simply because it is not for mitigating only emergency or pandemic issues this can be a weapon for the state to foster holistic development and well-being of the society. Apart from the natural practice this app could be revitalized and leveraged during emergencies and pandemic disasters.

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