**Heading to a Sustainable Future Society: What Can We Learn from the COVID-Pandemic to Move on?**

*Abstract*

The unprecedented COVID-pandemic has changed human life in all aspects, prompting us to rethink who we are, what we want, and how we do for our future. To safeguard our living, conventional wisdom has long laid its focus on the sustainability upheld by the macro-components of environment, society, and economy. Alternatively, this study offers an expanded dichotomic structure departing from the system of supply and demand to sketch a practical framework under which a sustainable society is established on and buttressed by the integration of environment and supply- and demand-economy following the principles of ecological conservation and balance, reuse, renewal, recovery, and recycling of resources, and waste reduction from both production and consumption processes, whilst relying on the promotion of public education and the inter-governmental and institutional endorsement. It aims to raise the attention of policy makers and societal stakeholders who would realize their stands and work collectively to improve for a continuously viable future.

**Introduction**

Since the outbreak of COVID-19 (Corona Virus Disease – 2019; hereafter, COVID) in early 2020, this public health crisis has incited almost all countries worldwide undergoing the ‘*five stages of grief*’ – *denial*, *anger*, *bargaining*, *depression*, and *acceptance*. As it started in China in late 2019, Chinese and many East Asians although reacting with caution, thanks to the lesson from the 2003 Severe Acute Respiratory Syndrome (SARS) regional spread, believed that it was to be a small scale and controllable, while many Western nations also took it lightly initially by *denying* its swift infectivity and disbelieving themselves the next COVID victims. Then, instead of working together to suppress the contagion, some governments with their political leaders inhospitably and mutually finger-pointed the ‘instigator’ behind the virus, *angrily* turning it to an adverse global politics. While many governments were laying out COVID strategic plans (e.g. face-masking, social distancing, social and business lockdown, and vaccine development), opponents *bargained* to keep their rights and choices of resistance despite the loss of many lives due to unwilling or careless safety compliance. Devastated citizens, especially those losing their loved ones from the disease, *depressed* and struggled to live through this unparalleled event meanwhile witnessing some of their attempting governments losing their bearing. Subsequently, after rounds of disbelief and melee, countries grudgingly *accepted* that coronavirus is real from an initial denial to finally learning to coexist with, if not successfully vanquish, it.

Commencing 2021, on account of prompt global initiative for COVID vaccine development, many countries race to research and develop desease cure aiming at calming the pandemic. As soon as the vaccination starts and continues across countries, national production and business activities are cautiously, gradually, and partly resumed following the somewhat subsiding virus spread. From some bilateral ‘travel bubbles’ (i.e. relaxed air travel arrangements agreed by partnered nations to resume commercial passenger services originally suspended due to COVID) to the widely discussed possible implementation of global ‘vaccine passport’ (with which the holder proving completion of COVID shot(s) or having negative Polymerase Chain Reaction (PCR) test is exempted from testing or quarantine when crossing country’s border) and the controversial ‘COVID green pass’ (i.e. individual presents the proof of full vaccination for attending work or certain public events), countries slowly re-gain confidence in global market re-opening, civilian travel, and other political, social, and economic re-exchanges. Even if various COVID variants continue to emerge to prolong and intensify the widespread uncertainty, many nations remain hopeful of re-attaining their pre-pandemic business momentum particularly as the increase in global vaccination stays promising and accelerated.

Nonetheless, after more than a year of dreadful lesson, what have we learned from COVID? What can be done to preserve mankind and livelihood from ravaging disease like this one? How can we sustain ourselves in the time like this and post-crisis? Of those living through and surviving from the pandemic, many started to realize and emphasize that “*After all, we are ‘one’.*” (see Sohmen, 2021). COVID simply doesn’t discriminate. Rich or poor, man or woman, young or old, domestic or foreign, public or private, or religious or atheistic, all of us are exposed to the virus with equal chance of infection. Regardless of race and ethnicity, we are ‘one’ under the same planet, breathing the same air, and facing the same destiny under COVID. Nowadays, while COVID vaccination has been given in many countries, the leader of World Health Organization (WHO, 2021) stressed that “vaccine inequity is the world’s biggest obstacle to ending this pandemic and recovering from COVID-19, … Economically, epidemiologically and morally, it is in all countries’ best interest to use the latest available data to make lifesaving vaccines available to all.” Between the ‘vaccine superpower’ (e.g. countries which develop and implement vaccination such as the U.S., U.K., and Germany) and the ‘vaccine no-power’ (e.g. lower-developed or the third-world countries which have no easy access or capacity for developing COVID vaccines), vaccine disparity is deemed ‘morally unconscionable’ leading to delayed and impaired global economic recovery. As asserted by WHO, only all-encompassing vaccine coverage which hinges on multinational collaboration could most likely ensure future global sustainability as it is also the ultimate goal facing the uncertain future.

**Literature Review**

“*To preserve and leave a clean environment for future generations*” is a modern epigram alerting us all that our planet is facing progressing threats which damage our life at all levels, including the ongoing crisis of COVID. Such impairment is most undoubtedly avoidable but somewhat self-inflicting of human who chooses to over-develop and over-consume leaves destructive consequence to our environment. Global warming, climate change and catastrophe, and air, water, and soil pollutions, just to name a few, are the byproducts of industrialization and overdevelopment causing human and property losses through wild fire, deforestation, flood, extreme weather and natural disasters, and the unseen disease like COVID. Ironically, it only seems until this unprecedented crisis which finally strikes a ‘wake-up call’ to urge us to re-think about who we are, what we want, and how we do for our future, when there is no more time to waste and no more excuses to make.

Sustainability is not just a mission; it needs an action. Rich literature offers discussions across almost all fields regarding why sustainability is needed and how to do and improve it. Among them, studies related to climate change and its impact on nature and human life shares the most intellectual coverage including Cheng et al. (2019), Hughes et al. (2019), Ripple et al. (2021), Shindell et al. (2017), Allcott (2011), and Maniates (2001), surrounded by numerous others. Likewise, investigations stress the impact of human dietary pattern on health and disease relevant to long-term sustainability (Schiermeier, 2019; Afshin et al., 2019; Willett, 2019; White et al., 2019; Ekkel & de Vries, 2017; Shanahan et al., 2015, and Wheeler et al., 2015). Equally inclusive, research in economic and business operation centered on sustainable production and consumption can be found in Winkler, 2011; Villena & Gioia, 2020; Manavalan & Jayakrishna, 2019; Zhu & Shah, 2018; Kayikci, 2018; Wang et al., 2018; Thogersen, 1999; Werfel, 2017, and Truelove et al., 2016.

**Theoretical Framework of Sustainability – Conventional vs. Extended Model**

Theoretical depict of sustainability is conventionally founded on three mainstays, ‘environment’, ‘society’, and ‘economy’, under a nesting (i.e. ‘environment’ encircles ‘society’ which cuddles ‘economy’) or an overlapping (i.e. Venn diagram of three components) model. Branches extending from these pillars are made based on specific sustainability goals in the field such as corporate and business, justice and legality, medicine and health, or other developmental objectives (see the literature references above). Since the COVID plague affects all areas of life with theoretically no one exempted, the inspired sustainability model would hence cover all of our living but dichotomized into the supply (or resource) and demand (or user) dimensions.

The dynamics between supply and demand builds and determines how strong a foundation is to support the function of an economy and its environment, which then establishes the degree of structural sustainability. On one hand, inclusive supply chain contains the production function which transfers resource inputs into final output (i.e. goods and services) through technology, followed by product distribution logistics and management, while on the other hand, demand relies on the primary operation of product manufacturing, marketing and sales, and external customer development and service, along with the secondary support involving internal corporate infrastructural growth, product research and development, procurement, and human resource management. It is when supply and demand function by its respective self and interact and cooperate with one another following the mind of sustainability, resource use and consumption can be organic and viable via recycling, renewal, reuse, recovery, and waste-reduction.

Key architecture in the supply-demand sustainability model, as illustrated in Figure (I), is constructed on and integrated from both environment and the respective supply- and demand-economy as the fulcrum to support a sustainable society, whilst the intergovernmental and institutional efforts and sustainability promotions from public education and outreach are equally important. Of the environment, mother-nature has its lifecycle of birth and demise across all lives deserving human with due respect, while the supply and demand mechanism depends on man-made designs and systemic operations for the goods and services to be produced, distributed, and consumed. A conscientious integration of both should be mutually supportive but not conflicting and work to ensure shared governance, growth, and efficiency. To achieve the socially sustainable and steady state, continuous public education and raise of awareness on the concept and practice of sustainability are elemental, as it needs simultaneous effort and endorsement from intergovernments.

***How does the theoretical supply-demand sustainability paradigm work?***

As summarized in Table (I), from the environmental level, the direction of working toward an ecological balance should be the eventual goal across all lives. Typically, econlogical balance rests on how we produce and consume by respecting the nature and acknowledging the scarcity of resources. From the supply dimension, resources should be effectively conserved and directed to proper use while avoiding wastes and exploitation. Alternatively, product and service demand should first be attended to ‘need-based’ subsistence while the ‘need-above’ desires are to be satisified under plausible rationale or only when excess supply is available while avoiding excessive ingestion. Under a common ground, stakeholders of supply and demand in practice should adopt and buttress the principles of recycling, renewal, reuse, recovery, and waste reduction in the process of production and consumption, whereas realizing that any irrational and ecologically unfriendly act acquiring inputs and outputs would most certainly lead to detrimental consequences such as extreme weather, climate catastrophe, and pollutions.

From the economic standpoint, the foremost goal of a modern economy normally lies on growth and sustainable development. Economic growth without sustainability would be short-lived and presumably result in resource depletion followed by undesirable shortages in supply and demand. To obviate such unwanted outcome, sustainable supply should endorse efficient and innovative production (e.g. the so-called “smart factory” using digitization process) and strategic supply-chain management and distributive logistics (e.g. the so-called “smart shipment” using Artificial Intelligence and Big-Data analytics) under the tenet of ‘fair trade’ with which the producers achieve fair (export) pricing and equitable trade to sustain their supply and support improved environmental standard (see Villena & Gioia, 2020; Manavalan & Jayakrishna, 2019; Zhu & Shah, 2018; Raynolds & Bennett, 2015). Conversely, sustainable demand should inspire a practical aim to maximize consumption welfare across all end-users, including redirecting surpluses to those economically unattained and underprivileged as ‘fair share’. With the support of institutions, public or private, suppliers (sellers) should also demonstrate ethical and justifiable pre- and post-business operations for their sales, customer services, research and development, and employee growth (see Thogersen, 1999; Werfel, 2017; Truelove et al., 2016; Morgan, 2019).

To create a sustainable society founded on validity of environment and supply-demand economy, principles upholding humanitarianism which reflects social equity and justice, communal health and development, social capital and welfare support, social responsibility by individuals and institutions, cultural appreciation and adaptation, and human and labor rights should be pivotal as the society is shaped. The definitive goal for societal sustainability should be global and all-inclusive, emphasizing altruism, benignance, and coexistence.

Finally, a sustainable system would not be attainable without the intergovernmental and institutional supports as well as the efforts from public education and outreach. Intergovernments and institutions would need to be willing to invest physical and human capitals or positively intervene in creating tangible infrastructures and intangible training and managerial talents to foster sustainability and equity assurance. Meanwhile, the campaign of creating a sustainable society relies heavily on incessant public education and outreach following a strategic and pragmatic design and implementation (see Kotchen, 2009; Bolsen et al., 2014; Fehr and Gachter, 2000; Lubell et al., 2007).

***How can the supply-demand sustainability model be practiced?***

In reality, the advocacy of sustainability has been globally adopted through public and private endeavor over the recent decades. Many countries especially in the industrialized and developed ranks and multinational entreprises with available resources and visions of a sustainable future have made this worthy undertaking a priority and taken the leadership to pursue such altruistic goal. Practice makes perfect! A sustainable act may seem theoretically natural although needing practices when the leading countries and corporations could ‘lead by example’ while their counterparts ‘learn by doing’ (or ‘learn by watching’).

Of the 2021 Green Future Index (GFI; MIT Technology Review, 2021) which signifies the initiative of creating sustainable future, top countries include Iceland, Demark, Norway, France, Ireland, Costa Rica, New Zealand, Belgium, Netherlands, and Germany (also see MIT Center for Transportation & Logistics, 2021). Their sustainability commitment falls nothing but movement to the green growth economy and sustainable development, green technology and innovation, and sustainable energy for ecological conservation and balance, among others. To name a few in Table (I), practitioners in supply-sustainability are exemplified in (1) Svalbard Global Seed Vault of Norway established in 2008 which stores over one million seed samples across 13,000 years of agriculture history, with its primary goal to ensure future food variety and sustainable supply against the undesirable food shortage and plant extinction. (2) Costa Rica, using renewable and clean energy (e.g. solar, geothermal, wind, and hydroelectricity) to cover 99% of its national electricity supply since mid-2010s while in its practical progress to become the first carbon-neutral country globally, is the first Central American country to ban sport hunting to ensure biodiversity and promote forestation. (3) Similarly, Denmark takes the global leadership in green energy generation under wind power, of which its quasi-state-owned energy producer, Orsted, ranked the world’s most sustainable energy corporation by Corporate Knights Global 100 Index between 2017 and 2020 (while ranked Number 2 in 2021), owns the world’s largest offshore wind farm producing renewable power for over 15 million people, meanwhile targeting zero carbon emissions by 2040. (4) ‘Fair trade’ is an initiative endorsed by multinational participants (e.g. governments and corporations) covering from farming produce such as cocoa, coffee, cotton, cane sugar, fruits, rice, herbs, tea, and various vegetables to precious metals (e.g. gold, silver, lithium, copper, and graphite), timber, and textile (see Fairtrade International, at <https://www.fairtrade.net/act/fairtrade-for-producers>; Overseas Development Institute, 2017). Its prime goal is to warrant the suppliers of these products to obtain fair-pricing reflecting fair product values while avoiding exploitation in the process of export.

Equivalently, the demand-sustainability is supported by various nations (or, country groups) and institutions aiming at ‘fair share’ for consumption of goods and services and post-consumption waste reduction. A few examples involve (1) United Nation World Food Programme (UNWFP; at <https://www.wfp.org/>), the world’s largest humanitarian organization providing food assistance due to geopolitical conflict, natural disasters, or climate change, covers more than 80 countries in its pursuit to fight against hunger and improve food security worldwide. Under the principle of ‘fair share’ on food consumption, importance is that the total global food supply may be sufficient however with ineffective food distribution, which creates food surplus in one place causing wastes whereas shortage in another eliciting hunger. Increase in distributive efficiency, such as creating global food banks (see The Global FoodBanking Network, at <https://www.foodbanking.org/who-we-are/>), is therefore crucial and in pressing need to close the global food gap and reduce food wates. Presently, such ‘fair share’ concept is also emphasized by WHO in the distribution of COVID vaccines, especially when increase in human survival should be prioritized before global politics. (2) Inspired by the Paris Agreement on climate change, many countries (as also top-listed on the Green Future Index) have pledged to individually or collectively work toward zero carbon footprint or net-zero carbon emission (or, carbon neutrality) to reduce greenhouse gases (see UN News, 2020), which is scientifically proved to raise global temperature to threaten lives and livelihoods of all kinds. (3) A joint sustainable effort by European Union (EU) has been voted and in effect since 2018 to ban single-use plastic items across all consumptions to decrease ocean plastic and overall pollutions. This call has earned endorsement from most of the EU members, the exit-Britian, and many non-EU participants to follow suit (Stewart, 2018).

A framework to integrated supply- and demand-sustainability is also exhibited in practice. Established in 1997, United Nations Sustainable Development Goals (UNSDG; at <https://unsdg.un.org/>) has implemented various developmental projects to improve global, regional, or national production and consumption across 162 countries and territories, under an annual project budget of more than $2.5 trillion. As stated in its mission “*A blueprint to achieve a better and more sustainable future for all people and the world by 2030.*” and in its 2030 agenda , UNSDG aims at ‘transforming our world’ for sustainable development focusing on people, planet, prosperity, peach, and partnership. Another instance features the Saudi Arabian project of “Mega City of Neom” connoting the “City of New Future” (where Neom’s “Neo” is “new” from Greek prefix and “m” is an Arabic abbreviation of “Mustaqbai” meaning “future”). In 2017, Saudi Crown Prince Mohammad bin Salman announced this project with its goal of completion by 2025, which is estimated to be $500 billion for the city development over more than 10,200 square miles (or, equivalent to 33 New York City in size) under exercises of all-inclucive sustainability. Of this ambitious endeavor, although receiving critiques concerning its feasibility, it drives to create a green and clean, and self-sustainable environment, heavily relying on green technology and innovation such as Artifical Intellence (AI) and robot automatics, making it a liveable home for many (see Scheck et al., 2019).

***Final thoughts on sustainability facing the ongoing COVID-challenges and moving toward the post-pandemic era – Turing dangers into opportunities***

As warned by many environmental scientists, global warming and climate change are rather a reality and should never be neglected. Such intrusion to our living is for the most part created by the mankind of our own. And yet, ‘*let one who ties the bell on the tiger takes it off.*’ As we are the ones who create the disfavorable and unsustainable condition, it is our liability to work togher to revert it. Certainly, most of us want growth and development, but along the developing process, what could we do to sustain ourselves and protect our environment, leaving a livable future for our offspring? As convetional wisdom teaches us ‘*not to take things for granted*’, when we learn to respect and protect the ‘mother nature’, our mankind will most likely be rewarded with longer generation-living in return.

Although unprecedented and widely devastating, COVID pandemic is a true lessen awaking us to rethink who we are, what we want, and how we do for our future. Of various medical debates, origin of the mutating disease may be uncertain but could be directly or indirectly linked to the environmental alteration emerging novel viruses. To preclude any uncontrollable future public-health crisis like COVID-19, we need to act promptly and proactively to restore our living circles with renewable and clean energy and by recycling, renewing, reusing, and recovering resources, and reducing wastes in production and consumption to foster a green and sustainable society.

As said in a Chinese proverb: “*to turn dangers into opportunities*”, behind every challenge, there are potential opportunities. It is our mindset and determination as how to take the challenge, learn from it, and turn it into an overcomable event. As also said in the Western idiom, “*it is never too late to learn*” to do the right things and do them right(ly). Creating a sustainable society supported by the equilibrium in ecology and of the supply- and demand-economy, along with intergovernmental efforts and pragmatic public education, is not only a mission but also a vision, which most importantly needs collective and timely actions.

Figure (I): Extended Sustainability Model: The Dichotomy of Supply- and Demand-Sustainability

Supply or Source Dimension

Demand or User Dimension

Inter-governmental

Effort

Public Education for Sustainability

Table (I): Conceptual Synopsis – Supply- and Demand-Sustainability with Practitioner Examples

|  |  |  |
| --- | --- | --- |
| **Sustainability Model** | **Supply or Source Dimension** | **Demand or User Dimension** |
| Environmental goal – Ecological balance | * Respecting ‘mother nature’ by conserving resources * Avoiding excessive use of resources which creates potential climate catastrophe * Using green technology and innovation for resource recycling, renewal, and reuse * Averting production wastes and pollutions | * Avoiding pollutions from consumption * Adopting post-consumption reuse, recycling, and waste reduction |
| Economic goal – Sustainable development | * Producing and trading goods and services under ‘fair trade’ or ‘fair-pricing’ * Applying pragmatic production methods to reach productivity and efficiency * Exercising sustainable business planning, supply-chain management, distributive logistics | * Consuming goods and services under sustainable goals while maximizing consumer welfare * Re-directing and transferring surpluses following principles of ‘fair-share’ * Deploying sustainable pre- and post-business planning and execution |
| Empirical examples – Practitioners of sustainability | * Svalbard Global Seed Vault (Norway) * Renewable energy and sport hunting prohibition (Costa Rica) * Sustainable and green energy (Denmark) * Fair Trade (global participants) | * Food assistance and fair-share (UN World Food Programme) * Zero carbon footprint or carbon neutrality (global participants) * Single-use plastic prohibition (European Union) |
| * Sustainable Development Projects (UN Sustainable Development Group) * Mega City of Neom (Saudi Arabia) | |
| Societal goal – Global humanitarianism and coexistence | * From the humanitarian departure to promote social sustainability including social equity and justice, communal health and development, social capital and welfare support, social responsibility by individuals and businesses, cultural appreciation and adaptation, and human and labor rights. | |
| Intergovernmental efforts and public education promoting sustainability | * Intergovernmental and institutional efforts to invest resources (e.g. physical and human capitals) supporting sustainability initiatives * Continuous public education and outreach for sustainability practices | |

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