Jugaad Culture Amidst COVID-19: A Time to Step Up for Innovation in Low-Income Countries

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More than four months have already elapsed after the world first encountered Corona virus claimed to originate from Wuhan, China. Scientifically, termed sudden acute respiratory syndrome corona virus (SARS-CoV-2), that causes Coronavirus disease of 2019 (COVID-19), this deadly pathogen has already claimed about 2.83 lakhs casualties with four million infected and 1.5 million recovered as of 11 May 2020.[1] Different preventive measures like hand washing, social distancing, nation-wide lock down from March 23 have been practised in Nepal which has definitely dwindled the number of positive cases. they have helped flatten the curve and procure time for preparation for forthcoming disaster.[2] Total documented positive cases have been 120 till date (11 May 2020) with zero mortality in Nepal. [3] However, the scenario might be out of control in coming days where claims of inadequate testing due to lack of diagnostic kits have been a major issue. Whatever be the outcome in upcoming days, for an economically poor country like Nepal, preparation seems satisfactory despite challenges to outsourcing the necessary kits like Personal Protective Equipment (PPE) and diagnostic Polymerase Chain Reaction (PCR) machines etc. When the whole world is striving for necessary commodities to combat the unseen enemy due to overwhelming stipulation, it seems obvious that the low economy must foresee that they may not be prioritized for succor.

'*Jugaad*' also known as frugal innovation; might be the only way out for indigenous clusters in developing nations. The concept of innovation is still primitive in countries like Nepal where the importation surge and declining exportation have hugely created a trade deficit and financial gains from remittance and tourism have again seen the re-route of the capital for exotic goods. Current scenario of worldwide pandemic of COVID-19 has showered a limelight for producing necessary combat armors like PPE using locally available materials which included gowns made from rubberized taffeta fabric, rain coat, shoe covers, masks, head shields etc. The project led by National Innovation Center (NIC) Nepal under the leadership of Ramon Magsaysay award winner, Dr Mahavir Pun has painted a silver lining in already compromised health care system of the country providing these artefacts to health care workers and ambulance drivers where there has been a deficit. Locally made gowns and their reuse after adequate sterilization through autoclave, though have doubts of complete translucency against Novel corona virus, they act as a boon during hardships and provide sense of reliability to health personnel, however false security could be dangerous. Yet, this is better than to be none at all.[4]

Construction of Corona booth for swab collection which has been xeroxed from South Korea model where rows of plastic booths fitted with de-pressurizer, intercom, and attached gloves for doctors outside the booth to interact with and collect samples from the patient; has been an important asset reinforced by NIC, Nepal.[5] Many hospitals in Nepal are using such cubicles which have decreased the use of PPE already in deficit and helped to stockpile for the upcoming tragedy should it happen.

Ventilators availability is another salient issue in the country where the stakeholders claim

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the availability of 360 machines among which 260 are within the capital city Kathmandu and 25% of these apparatus are broken which corresponds to one ventilator per 114,000 Nepalese population. [6] To combat this issue, again NIC Nepal initiated the repair of 85 ventilators which were crippled and succeeded making 40 ventilators reusable. *Paaila Technology*, a robotics and Artificial Intelligence based company in Nepal took the initiative of producing low-cost ventilators which have already been experimented in animals and on the verge of testing in humans once they get approval from the government, however human efficacy and safety is yet to be elucidated.[7] A nursing robot also has been developed by *Paaila* which is designed to assist health personnel reducing interaction with corona infected patients. Furthermore, it will facilitate communication between patients and medical staff using video technology. Also, it helps in delivering food and medicine to patients without manual intervention. They also announced an ultraviolet (UV) disinfection robot which is capable of sterilizing hospitals, banks, airports, and public places that will help in controlling the disease thereby mitigating the risk of exposing people to contamination.[8]

For compensation of the face mask shortage, NIC-Nepal prepared replaceable mask from fabrics of HEPA filter, N99 filter for N95 to facilitate the fight against this contagion which has been tested for the efficacy and the results were satisfactory. Development of the disinfection boxes using UVC (Ultra-violet C) light and Hydrogen Peroxide in order to facilitate reuse of N95 mask also has been one of the bricolages in the journey of fight against coronavirus. To mitigate the scarcity and fulfill the demands of services to fight the pandemic, government of Nepal established temporary COVID Hospitals with emergency beds and intensive care units along with quarantine and isolation units throughout the country. However, proper functioning of such units has always been a question among the public and health workers.

COVID-19 surveillance system and self-assessment of the suspected individual has been developed by the government that provides detailed evaluation to know the likelihood of corona infection to a person where the suspected individual entries the data regarding symptoms. Based upon the symptoms of the suspected individual, the system suggests a person for self-quarantine and asks for updating their health status continuously for 14 days.

The Geographic Information System(GIS)-based mapping capacity of the system will help service providers track the person in quarantine, delivering service at door to the person and location-based strategic planning and making decisions to address the issues.[9] Also, the government launched COVID tracing and tracking application on 10th May, based on Bluetooth technology which traces the suspected individual and real time status could be achieved.

This draft encapsulates the glorified accomplishment of the country to combat the coronavirus led by the accountable natives which definitely has painted a silver lining for the upcoming generations. Now, time has come to march into the real innovation, following footsteps of two techno giants India and China, providing the insights to the world that we are growing on to be independent financially, technically and operationally.

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