Six Sigma Applications for COVID-19 Global Outbreak
Nick Egli
EIE6673 – Six Sigma Processes
March 30, 2020

With COVID-19 becoming a global pandemic, there is a lot to learn from the data being gathered and the processes and procedures being followed. From looking at how the virus spread to how hospitals and businesses are handling the virus, much can be learned in regard to both short term and long term solutions.

One of six sigma's major purposes is to remove waste, decrease defects and improve variation in an organization's process. With this in mind, six sigma tools can be used in crises management situations. Crises management is used to manage emergency situations in any type of environment. While some crises cannot be managed, their impact can be minimized by future planning and quick reaction. This can help mitigate the impact of certain crises (Alharthi and Aziz 2018). For example, in our COVID-19 situation, managing the behavior of a population can have dramatic effects. The below process highlights this fact (Figure 1).
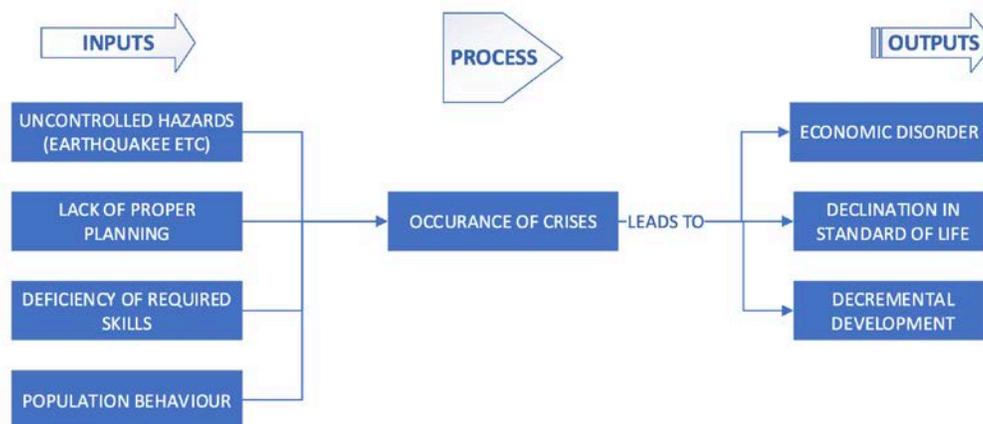

Figure 1: Process of Crises

A good example of how population behavior affects the occurrence of crises is to look at how different countries reacted to self-quarantining versus how many cases they have had and how quickly they have flattened the curve. For example, as cases began to occur and rise, countries like China and South Korea put a quarantine in place immediately that had to be followed by their citizens. You can see the effect of how population behavior and strictly following the required quarantine flattened the curve more quickly than in other countries (Figure 2).

In addition to understanding the overall cases, business and hospitals can use six sigma to become more efficient. For example, a hospital may want to use a process flow or value stream map to lay out a process to effectively handle patients that come in the door. By utilizing and laying out a plan, the hospital can monitor throughput time of their process, analyze the data daily and make small changes to improve throughput. They could also use a Pareto chart for types of hospital visits to understand how many cases are due to coronavirus versus other medical emergencies. This will help them also decide which processes in their flow chart or value stream map should be focused on first.
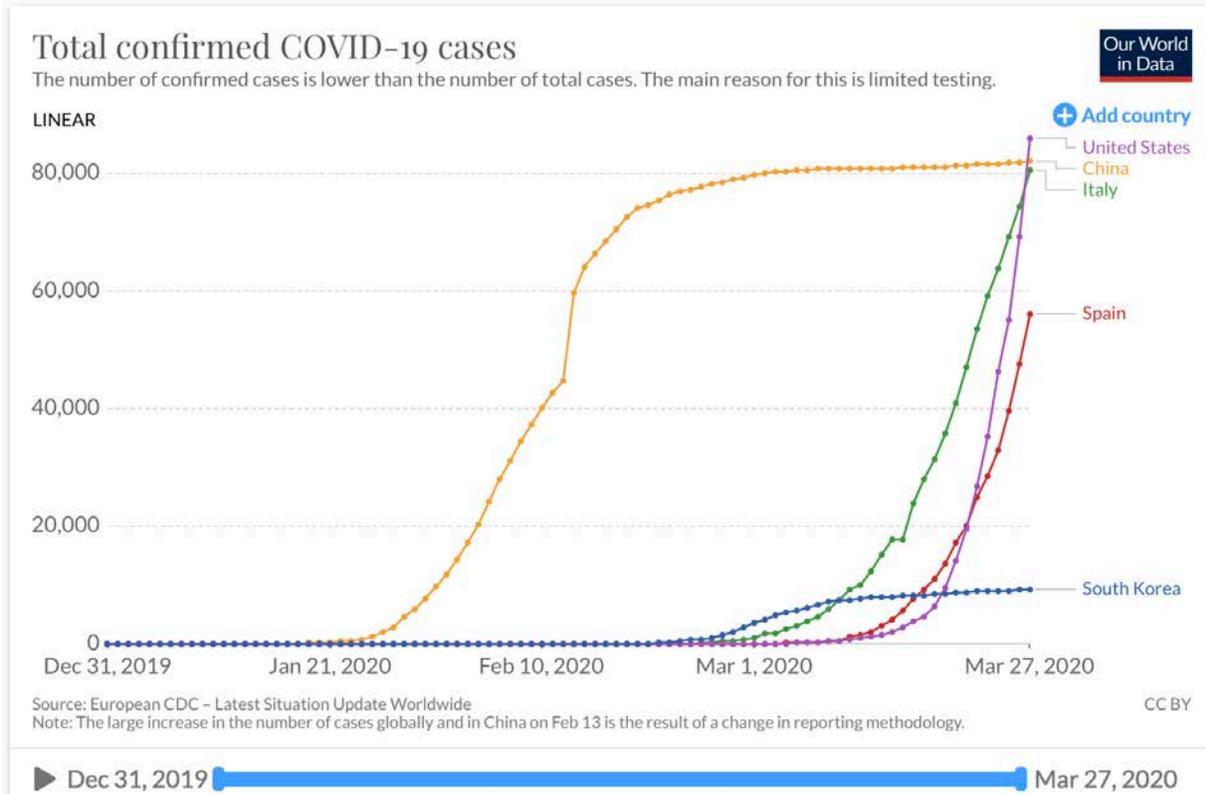
Figure 2: Cases by Country (ourworldindata.org)

Businesses on the other hand have also had to adapt. A local brewery in Novi, Michigan has gone from being fully open, to allowing carryout and finally switching to next day delivery. The ability to adapt and change shows the understanding of defining a problem and quickly delivering a solution. In their case, I have seen a mini DMAIC approach to how they are handling it. First, they defined the problem and made changes based on the data they had. They then quickly analyzed the proposed data/solution and have already begun to improve that solution by making modifications to their original proposal of next day delivery. Noticing that they were delivering a small order (one 4 pack of beer) to someone 15 to 20 miles away and were likely losing money in gas/delivery, they improved their process and added minimum order requirements based on delivery radius (i.e. minimum of four 4 packs of beer for someone over 10 miles away).

Data is such a key to resolving problems and six sigma is heavily data based. The countries and companies that properly measure and analyze the data and use it to drive decisions will most likely be more successful in containing or dealing with this current virus. When this is all over, it could change how certain businesses are run or how we handle a future pandemic. The goal is to understand the data and properly implement better procedures and lessons learned for the future.

References
Alharthi, A. and Aziz, T., Lean Six Sigma, Crises Management and Innovation: A Theoretical Framework, Proceedings of the 3rd North American International Conference on Industrial Engineering and Operations Management, Washington, DC, USA, September 27-29, 2018, IEOM Society International, pp. 209-223, 2018, http://ieomsociety.org/dc2018/papers/106.pdf.

Roser, M., Ritchie, H. and Ortiz-Ospina, E., Coronavirus Disease (COVID-19) – Statistics and Research, 2020, Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/coronavirus/.

Prepared by: Nick Egli is a student of Master of Engineering Management at LTU.
Course Instructor: Dr. Ahad Ali is an associate professor and director of industrial engineering program at LTU