Title: SUPPORTING SPOTLIGHT SDGs WITH AN ENGINEERED OPTION

Author: Peter Kim

Submission Date: Dec 1st, 2022

Spotlight SDGs:

SDG 8 - Decent Work and Economic Growth

SDG 9 - Industry, Innovation, and Infrastructure

Sustainability Issue(s) Relevant to the Spotlight SDGs:

With rapid population growth, there is now a need for a larger global infrastructure to maintain the expanded supply chain. As a result, the relative exposure of lower-income families to physically demanding workplaces, such as the TEER 5 category jobs of the Canadian NOC system (Immigration, R. and C. C, 2022), has become more readily available. Subsequently, with the growing number of people affected by the incurred damages, there is a heightened concern for the health and safety of its workers. Furthermore, the prolonged dependency on human assembly lines introduced inconsistencies in productivity at times when physical work became limited. As well, the continuation of the conventional approach to manufacturing preserved the alarming level of greenhouse gas emissions (GHG) and toxic wastes, making the current framework unsustainable.

Sustainable development goals 8 and 9 support decent work for all, economic growth, and the engineering of resilient infrastructure. Each, including indicators such as employment rate, GDP per capita, and material footprint, is an essential part of addressing the problems of a non-adaptable, non-environmentally friendly production cycle and the widened probability of being introduced to an unhealthy workplace.

Background on Spotlight SDGs:

Approximately 6% of Canadians were estimated to be living in poverty as of 2020, which is a considerable decline from 2019's 10.4% (Gustajtis. B, 2022). The majority of the 6% are employed in low-wage industries like retail or in jobs with higher pay but greater physical labour demands. Because the majority of these jobs have low retention rates, the likelihood of leaving welfare has not been significantly affected when compared to other measures, such as GDP growth, which has averaged around 3% per year since 2008 (The World Bank, 2022). This lateral progress must be resolved to

achieve sustainable economic and social development. Moreover, the traditional approach to production has proven to be inefficient, particularly during the recent COVID-19 pandemic. While the fiscal policy elevated people from adversities, human dependency on manufacturing has given rise to issues within the supply chain, halting global activity for several months.

Building a more resilient system of operation on infrastructures around the globe will become crucial not only to those who are financially connected, but also to those who benefit from better-treated environments.

Current Global and National Status of Spotlight SDGs:

Every year, governments and large corporations strive to reduce unhealthy labour while increasing productivity, as well as to reduce overall carbon emissions in industries such as manufacturing and construction. Consequently, indicators such as global GDP and labour productivity have seen a high growth rate of approximately 3% (The World Bank, 2022) and 2% (The World Bank, 2022) per annum, respectively, reflecting the upward trend in global economic growth. However, just in Canada, the number of manufacturers that suffered raw material shortages tripled, while those that faced workforce shortages doubled, since the start of the epidemic (Government of Canada, 2022). In conjunction, the rapid spike of GHG emissions following the re-opening of the worldwide lockdown further demonstrates the current condition of manufacturing and its infrastructure. (International Energy Agency, 2021)

Moreover, even with the recent awareness of key aspects of balancing work and livelihoods, meaningful progress is yet to be made with regard to employment for people with lower earnings and for people on welfare. A recent study by World Vision has shown that there were still 1 in 10 children over the age of 5 engaged in labour as of 2020 (Dubay. A, 2022), and the global unemployment rate has climbed up to 6% as of 2021 (The World Bank, 2021). Both statistics appropriately reflect the present conditions of the workforce, which needs to be at a point of change.

Key Considerations:

The proposed engineering choice must have an impact on delivering a better workplace for lower-income families, reducing the environmental impact caused by areas such as manufacturing, and stimulating increased innovation across multiple industries. In developing a better work environment, aspects such as mental health and the amount of physical risk must be examined. In addition, economic factors like productivity must also be considered as they directly influence the growth of the economy, which in turn affects the monetary opportunities available to lower-income individuals. To do this,

strategies such as automation of jobs and lengthening the term of employment may be considered, as they provide for a better-skilled production workforce, thus making it possible to meet the need for reduced physical risk and increased productivity. Furthermore, thorough monitoring of energy, material, and time expenditure is critical in minimizing environmental impact while reducing human reliance on manufacturing. The same technology might also promote the expansion of industrial output, encouraging new advancements in the sector. As an example, the contemporary Chinese manufacturing industry is witnessing a severe makeover due to its extremely negative environmental effects. Building the world's first-ever zero-carbon factory at Ningde, Fijian, the business saves 400,000 metric tonnes of carbon emissions each year by applying sophisticated control methods that let each piece of equipment function at its lowest energy usage. (Felipe Bezamat, 2022)

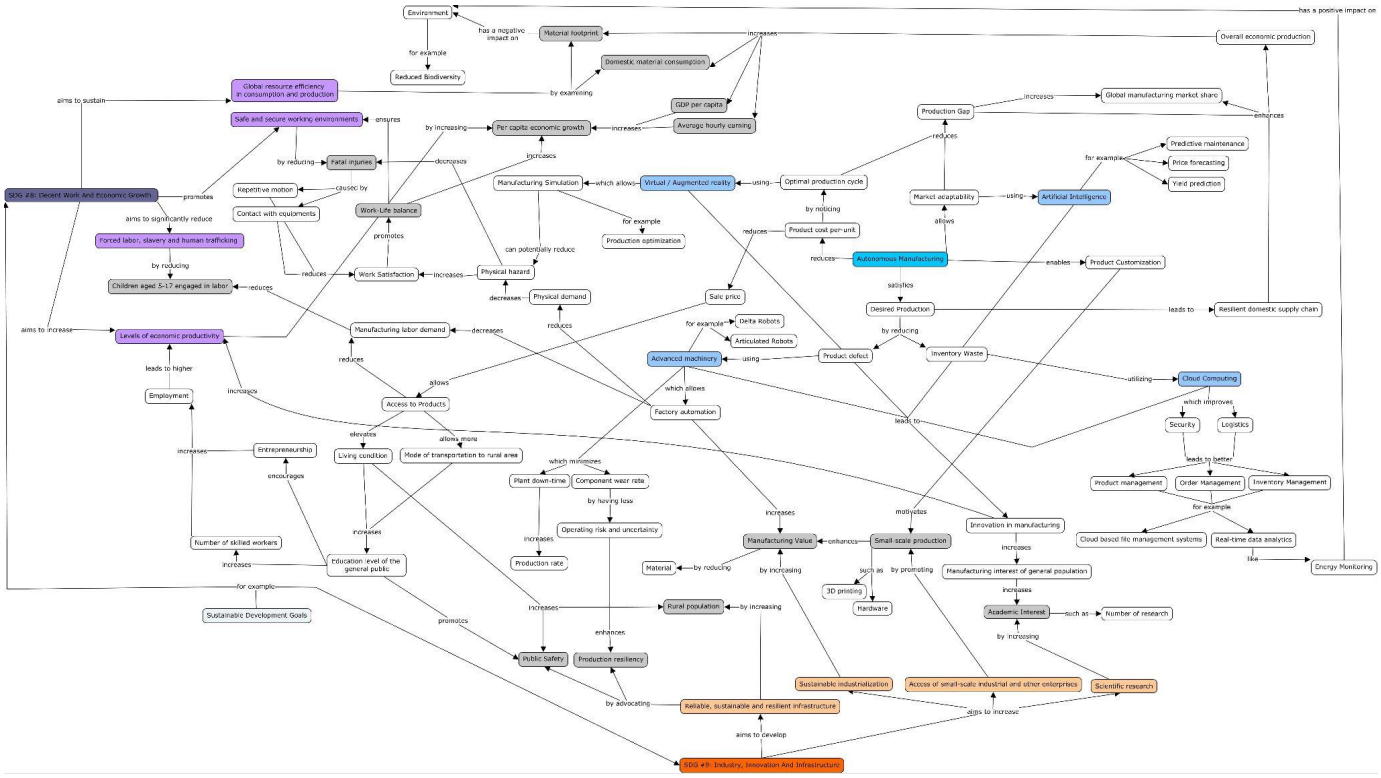
Engineered Option:

Providing a suitable workplace for lower-income families while attaining stable and ecologically sustainable economic growth demands an innovative strategy such as autonomous manufacturing to effectively meet the necessary criteria of the two SDGs.

Autonomous manufacturing is a form of manufacturing that is enabled by technologies that allow one to automate multiple components within the production stage. The use of technology offers a considerable improvement in productivity as well as a decrease in the potential risks and hazards presented to human workers. The key technologies include:

- Cloud computing. Improving the overall management systems by offering an integrated network system that allows shared storage and monitoring of critical parts of production such as material consumption.
- Virtual reality. Allowing one to model the workflow of the desired plant, which not only lowers the dangers and hazards of the work environment, but also greatly improves the development of a facility by decreasing the time invested in prototyping.
- Artificial intelligence. Allowing for the use of robots that significantly reduce the physical demand of the workforce while simultaneously limiting the margin of error for each unit produced. Also, a collection of individual data points can be further processed to enable minor changes to its current programs to optimize production accuracy and speed.

A Systems View:



Recommendation and Conclusion:

Over the past decade, economies around the world have undergone a remarkable elevation. With such demands, the need for better-integrated infrastructure is essential not just to fulfill the worldwide need for products and services, but also to ensure the process is sustainable. Moreover, with improving economic conditions, the population has also seen tremendous growth. The surge brought on a proportionally higher number of persons exposed to places where a task is of greater hazard and physically demanding, therefore, a better system must be established to ensure the damages are reduced. To do this, it is recommended that autonomous manufacturing be considered, as it not only creates a safer workplace but also facilitates greater productivity. It further enables the lessening of environmental damages by lowering the generation of GHG and toxic waste by drastically enhancing precision and efficiency, thus eliminating any unnecessary use of production consumables.

APPENDIX 1: References

Immigration, R. and C. C., (2022). Find Your National Occupation Classification, (2022, November 24). Retrieved from https://www.canada.ca/en/immigration-refugees-citizenship/services/immigrate-canada/express-entry/eligibility/find-national-occupation-code.html

Government of Canada, (2022). Statistics Canada, (2022, August 19). Retrieved from https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2022050-eng.htm

The World Bank, (n.d.). *GDP growth (annual %)*. Retrieved from https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

The World Bank, (2022). Global Productivity: Trends, Drivers, and Policies, (2022, January 27). Retrieved from https://www.worldbank.org/en/research/publication/global-productivity

International Energy Agency, (2021). Global Energy Review, (2021). Retrieved from https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2

Gustajtis. B, (2022). Canada's Official Poverty Dashboard of Indicators: Trends, (2022, March 23). Retrieved from https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2022011-eng.htm

Dubay. A, (2022). *Child labour: Facts and how to help*, (2022, July 26). World Vision Canada. Retrieved from https://www.worldvision.ca/stories/child-protection/child-labour-facts-and-how-to-help

Felipe Bezamat, (2022). These Chinese Innovations are Improving Resiliency and Sustainability in 2022, (2022). Retrieved from https://www.weforum.org/agenda/2022/05/these-chinese-innovations-are-improving-resiliency-and-sustainability-in-2022/