**GP Model Essay - Science and Technology**

**Is science and technology advancing too quickly for the good of mankind?**

Science and Technology is an integral part of our human civilization, from the use of simple tools to farm and war to the use of engineering and technological marvels such as jumbo jets and genetically modified organisms. Detractors have argued constantly throughout history that science and technology is advancing too quickly for the good of mankind as it not only moves at a pace where morals and ethics are unable to follow and we are also inadequately equipped to contain and manage the inevitable consequences and cost of science and technology. However, the majority of the academic world opine that there is no reason to slow down the progression of science and technology as our adaptive nature coupled together with caution ensures that we are advancing at a pace that is comfortable to mankind. In light of these polarising views, this essay is inclined to be in the view it is not a fair comment to say that science and technology is advancing too quickly for the good of mankind.

First, morals and ethics have not kept up with the unbridled progression of science and technology. Science and technologies are progressing at a rate that has strained the ethical boundaries, creating more moral dilemmas and questions that mankind seems to be ill-prepared or not ready to answer. Since laws are based on what society decides to be moral and ethical, the falling behind of these standards will only result in subsequent lack of regulation and increase in the possibility of science and technology being misused. An illustration of such issues can be seen from the creation of autonomous killer machines and abortion teachniques which raises the question of whether machines should be given the power to make moral decisions concerning death. ‘Organic’ drones and robots also raises questions of whether it is ethical to take away the full autonomy of an animal and use it as a plaything or a tool to fulfil our selfish agendas. Such concerns are now increasingly apparent and urgent as science and technology moves towards the modification of the basic unit of life, the cell and genetics. Hence, it can be said that science and technology are progressing too fast for mankind as it has led to the degradation of traditional morals and ethical codes.

Second, we are inadequately equipped to contain and manage the effects of science and technology whose unpredictable nature will always endure. It is the nature of technology to be dynamic and unpredictable, which is both a blessing and a curse as it can bring about both a sense of awe and dread. This is seen in areas of nuclear power generation, artificial intelligence and geoengineering. Accidents are inevitable despite scientists or investors expressing confidence in their innovations and risk-management strategies. The Chernobyl nuclear disaster or the more recent Fukushima Daiichi nuclear disaster are examples of these valid concerns. In addition, true artificial intelligence, if realised, may pose a danger that exceeds every previous threat from technology, greater than nuclear weapons, and that if its development is not managed carefully, humanity risks engineering its own extinction. Lastly, in geoengineering, human modification of germline and gene drives on a planetary scale risks side effects and ramifications that escapes the imagination of the scientists themselves, leaving us ill-equipped to handle the fallout of such innovations.

Yet, there is no reason to fear the rapid advancement of science and technology as we are capable of dealing with all the possible implications eventually. Humans are naturally suspicious of advances in science given their disruptive nature and our preference for rules, regulation and order. Yet, science has always disrupted society and society has always adapted. Thus, there is no reason to expect otherwise when considering otherwise when considering the current advancements in science and technologies. This is shown in the areas of Eugenics, selective breeding and genetic modified organisms (GMO). GMO is a prime example of such adaptation where it created tons of controversy when the concept was first introduced. However, the benefits of GMO such as more bountiful and resistant crops soon won over people and such products are now widespread and people have come to accept them. It is natural instinct to fear the unknown, but the empirical nature of science and technology, coupled together with human adaptability makes such fear an overreaction and irrational.

In addition, there are sufficient checks and balances to ensure that science and technology advances at a pace that is comfortable to man. Scientists and research institutes are heavily regulated by the state to ensure that their inventions do not cross moral and ethical boundaries. Organisations such as the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) and the Bioethics Advisory Community in Singapore are great examples. Furthermore, scientists are no longer the ones bearing the full burden of responsibility when it comes to questioning the purpose of an invention. The inclusion of other professions such as social scientists, ethicists, religious groups and even the broader public are being involved in the discussion pertaining to scientific research and application are now reality with the advent of telecommunication technology. This prevents the development of science and technology from spiralling out of control. Hence, such a trend greatly negates the concerns of the detractors.

There is also a case to be made that science and technology should progress at an even faster rate as there is so much more to discover and explore about our world and ourselves. Solutions to many pertinent problems faced by man have yet to be found and science and technology need to progress at an even faster rate if we intend to flourish as a species. This is highlighted by the existential threat that climate change poses to the survival of mankind, which effects we are already experiencing such as more frequent and intense natural disasters such as hurricanes and tsunamis. Science and technology is also the best tool to sate our thirst for knowledge and innate curiosity. This is best encapsulated by the Fermi paradox where it is the manifestation of our interest in finding extraterrestrial life. It is thus not an outlandish idea that we should be more encouraging of progress made in science and technology

In conclusion, there is a strong case to be made for the stance that science and technology is progressing at a comfortable rate, and in fact we should not be satisfied with the current rate of progression as benefits of the increase in scientific progress does outweigh cost. However, this does not mean that arguments put forth by detractors are wholly without merit as the inevitable unintended consequences of scientific progress are not to be disregarded. Hence, we should encourage scientific progress with clear moral and ethical boundaries.