Abstract ID: ICBMIS-2019-25

Technological Advancements of the Fourth Industrial Revolution: Concerns for Muslim Societies and Governments

Muhammad Adil Iqbal[1], Shaikh Abdul Mabud[2], Azmi Mohamad[3]

[1] Sultan Omar 'Ali Saifuddien Centre for Islamic Studies (SOASCIS), Universiti Brunei Darussalam (UBD), Brunei Darussalam. m.adiliqbal@gmail.com & 18h0636@ubd.edu.bn

[2] Sultan Omar 'Ali Saifuddien Centre for Islamic Studies (SOASCIS),Universiti Brunei Darussalam (UBD), Brunei Darussalam and shaikh.mabud@ubd.edu.bn

[3] Sultan Omar 'Ali Saifuddien Centre for Islamic Studies (SOASCIS),Universiti Brunei Darussalam (UBD), Brunei Darussalam and azmi.mohamad@ubd.edu.bn

Abstract

Technological advancement brought by Fourth Industrial Revolution is a testimony of human achievement and progress for individuals across the world at large. Advancements in artificial intelligence, mobile internet, internet of things, cloud computing, nextgeneration wireless networking technologies, virtual reality, augmented reality, block chain, edge computing, machine learning, robotic process automation, 3D Printing and many more holds a great promise of creating potential opportunities and access to knowledge. Emergence and advancement of these technologies is brought by Fourth Industrial Revolution resulting from fusion of physical, digital and biological spheres. These technological innovations may revolutionize production processes and enhance living standards, particularly in Muslim developing countries. However, as per opinions of various scholars, writers and world leaders, this globalization of Fourth Industrial Revolution appears destined to bring many challenges, transformations and instabilities for societies and governments all over the world including Muslim governments and societies in its cultural, religious and political aspects of life. This represents a major problematic issue for future of Muslim societies and governments and calls for well planned preparation without comprising on basic tenants of Islam. Their remains a need for academic and intellectual emphasis on this issue in order to enlighten Muslim masses for better understanding of emerging technological change and Fourth Industrial Revolution in a way for preparing them for a careful adaptation and participation in Fourth Industrial Revolution. This descriptive and conceptual study is an academic and scholarly effort which intends to highlight and analyze issues germinating from interaction of Muslim societies and governments with emerging technological change, Fourth Industrial Revolution and ongoing wave of globalization.

Keywords: Emerging Technologies, Muslim Societies, Muslim Government, Management, Fourth Industrial Revolution, Artificial Intelligence, Mobile Internet, the Internet of Things, Production Processes, Religious Authorities

1. **Introduction** "The pace of change has never been this fast, and yet it will never be this slow again."

Justin Trudeau
Prime Minister of Canada
Speech at the World Economic Forum 2018

Technological advancements of Fourth Industrial Revolution like Google's recent Quantum Computing achievement, are testimony of human achievement and progress for individuals across the world at large. Advancements in artificial intelligence, mobile internet, internet of things, cloud computing, next-generation wireless networking technologies, virtual reality, augmented reality, block chain, edge computing, machine learning, robotic process automation, 3D Printing and many more holds a great promise of creating potential opportunities and access to knowledge. Emergence and advancement of these technologies is brought by Fourth Industrial Revolution resulting from fusion of physical, digital and biological spheres. These technological innovations may revolutionize production processes and enhance living standards, particularly in Muslim developing countries. Fourth Industrial Revolution has effectively created economic and technological excitement in the world including a great embrace among few Muslim countries.

Inauguration of Center for Fourth Industrial Revolution in UAE ("Inauguration", 2019) in collaboration with World Economic Forum, the fifth in the world after US, China, Japan and India, remains an indication of that. UAE also has the National Artificial Intelligence Strategy 2031, maintains a post of Minister of State for Artificial Intelligence, only in an entire Muslim world and has Artificial Intelligence Ethics Board (Aisha, 2019). In January 2019, World Economic Forum recognized Saudi Arabia's Uthmaniyah Gas Plant as a "Lighthouse" manufacturing facility in application of 'Advanced Analytics and Artificial Intelligence' solutions, one of the technologies of Fourth Industrial Revolution ("Aramco", 2019). Discussion on adapting emerging technologies and Fourth Industrial Revolution, calls for updating education curriculum, improving governance (Gnanasagaran, 2018), technologically upgrading universities and Muslim government itself particularly in Malaysia, Kuwait ("Revolution", 2018), Morocco and in many more Muslim countries is quite wide spread.

Muslim world has a massive potential for actively contributing in Fourth Industrial Revolution with preservation of Islamic ideals and beliefs. As per OPEC oil reserve estimate of
2017, the Muslim world possesses 65% of the world's oil reserves particularly in Middle East, 45% - 51% of the world's natural gas reserves (Cooper, 2008) and massive mineral resources in few of Muslim African countries as per Al-Jazeera's 'Mapping Africa's natural resources' report of 2018. But today, 60% of conflicts globally, are taking place in Muslim countries (Mehmet & Rezeg, 2019) as well and it still remains very challenging for Muslim countries effectively exploit such enormous resources and benefit from technological advancements of Fourth Industrial Revolution.

Clear potential for increase in Islamic finance exists from prevailing investment worth US$260 billion in over 300 global Islamic institutions to US$6.7 trillion by 2020. Technologies like blockchain fintech or artificial intelligence can be used positively to improve halal industries with creation of new business or economic opportunities ("Islamic economy", 2018)

for Muslim countries. As per 2018 State of the Global Islamic Economy Report from Thomson Reuters supports this assertion (Ghurair, 2018). Many Muslim countries particularly Malaysia is making efforts to establish Islamic digital economy. CollabDeen (Deep Tech, AI-Powered, Muslim-Friendly App & Platform) remains one of the important technological development in the domain of Islamic Digital Economy.

As per the 'Global Economic Impact of Muslim Tourism and Future Growth Projection: 2017- 2020' by Salam Standard, the GDP impact of the global Muslim travel sector is projected to reach USD 183 billion by 2020 from USD 148 billion in 2017. Muslim travel sector will offer major economic wealth, tax income, employment and many untapped opportunities across the world (Tolentino, 2018). It was Dubai Road Transport Authority and not Elon Musk that proved successful in using driverless autonomous pods in January 2019 for travelling short distances (Ahmed, 2019). Today, Fintech and Islamic Finance have also become globally emerging phenomenon. The Islamic economy is experiencing significant growth on a world scale and it can maintain pace with the technological advancements of the Fourth Industrial Revolution *("*Sustainability", 2019).

These are positive indications and can act as a much needed trend setter for entire Muslim societies especially in times when most of the Muslim countries are encompassing import driven economies with heavy dependence on international markets (Labadi, 2018) and IMF, underdeveloped technological and infrastructure development with wide rampant poverty, unemployment, population growth, poor agricultural productivity, increasing scarcity of water, climate change, inflation, expanding trade deficits, issues of public debt, budget deficits and governance including corruption, other than ongoing war and political instabilities in various parts of the Muslim world.

Today, Fourth Industrial Revolution holds a great promise of creating potential opportunities and access to knowledge through a sophisticated fusion of physical, digital and biological spheres of technological advancement. Technologies like artificial intelligence, advanced robotics, augmented reality, the internet of things, machine learning, cloud computing, mobile internet, data analytics, user behavior analytics, nano and biotechnology (Ahmed, 2019), data technology, intricate levels of data analyses and automation (Ying, 2019), 3D Printing and many more like these will mainly drive this fusion (Zugravu, 2018).

However, emerging technologies of Fourth Industrial Revolution itself still requires a deeper analysis and intellectual comprehension by Muslims countries as a way forward and for preserving Islamic ideals while experiencing Fourth Industrial Revolution and acquiring benefits from it. Fourth Industrial Revolution remains a complex issue. So far, Fourth Industrial Revolution has not achieved any global consensus (Razak, 2018).

The prospects of emerging technologies like internet of things, cloud computing and blockchain are undeniably vast but threats to privacy and security of data remains foremost s
challenge. The interception or manipulation of data can make industrial systems a likely target. Unauthorized access to a network, cloud or device by cyber criminals can cause abuse and nefarious use of blockchains or cloud services. These concerns can grow more challeng is ing as the 'industrial t-of-things' assive wave of data connecting infrastructure, finance, industry and labor to ever more superior machine learning systems. Coun-

tries and private organizations that can control artificial intelligence to industrialize learning and innovation will have a great political, economic and military influence (Araya, 2019).

At present, as per opinions of various scholars, writers and world leaders, this globalization of Fourth Industrial Revolution appears destined to bring many challenges, transformations and instabilities for almost all world civilizations including Muslim societies in its cultural, religious and political aspects of life, if followed blindly, by Muslim countries. This represents the major problematic issue for future of Muslim societies and governments. The situation calls for well planned preparation without comprising on basic tenants of Islam.

Mankind today, is on the verge of remarkable technological advancements ("Momen", 2019) which will bring accelerated changes, unpredictability and disruptions and it will not be an easy transformation for everyone. Geographical borders may not be able to restrict the impact of what Klaus Schwab, founder of World Economic Forum calls 'Fourth Industrial Revolution' (Gnanasagaran, 2018). Many countries including Muslim countries may not catch up with the coming rapid changes due to their prevalent economic structures (Ruth, 2019). Industrialization is nothing new to Islamic tradition and it's not correct to consider it westernization. However, prevailing situation of industrialization and political, social and economic conditions among most of the Muslim countries can limit them to acquire diverse benefits from emerging technologies of fourth Industrial Revolution until it fully appears (Hamid, 1993).

This descriptive and conceptual study is an academic and scholarly effort which intends to highlight and analyze issues & concerns germinating from interaction of Muslims societies and governments with technological advancements of Fourth Industrial Revolution. This study will provide a general and historical overview of Fourth Industrial Revolution. The study will also highlight contemporary concerns technological advancements of Fourth Industrial Revolution have caused for Muslims societies and governments. The study will also suggest measures to Muslim governments and to Muslim scholars & religious authorities as a way forward in the given situation.

2. Historical Background

West appears to be spearheading Fourth Industrial Revolution particular in areas of science and technology. Knowledge and technology brought by Fourth Industrial Revolution poses serious challenges to religious foundations of Muslim societies. The foundation of Western knowledge is credited to two significant historic European occurrences of Renaissance and Reformation. Both occurrences rejected religion. However, Muslim quest of knowledge kept on pursuing a different path in their endeavors of acquiring knowledge with full submission to Islam. Exploration of diverse fields of knowledge from natural to social sciences was based on compliance of Islamic principles and ideals (Yunus & Hasan, 2017). For West, to progress in science and technology, religion was considered a hurdle, hence was gradually pushed to places of worship or a private life in Western world. This can be one of the reasons for rare to no appearances of religious leaders in proceedings of World Economic Forum.

The First Industrial Revolution of 18th century mechanized production through use of water and steam power which escalated manufacturing across Western Europe which gradually altered their societies with waves of migrations. It also caused expansion of Great Britain's hegemonic colonization and material reserves. When railway locomotives, steam engine, type writer and telegraph communications appeared for the first time during 19th Century, it was felt a great moment of technological leap for mankind but same tools were effectively used and

gave rise to 20th Century Fascist, Nazi, communist and liberal regimes which eventually led to World War (Harari, 2016).

From 1870 till the start of First World War, Second Industrial Revolution used electrical power to ignite mass production but with it emerged many social problems such as chaotic urbanization, changes in family and kinship structures, isolation of individuals, income disparities, creation of mutually opposing social classes and various political and ideological reactionary movements. The mass production process excelled to great extent with emergence of the Third Industrial Revolution in the second half of the 20th century through employment of information and communication technologies, digitalization and micro electronics which also resulted in global connectivity, spread of knowledge and also led to rise of transitional crime or terror networks.

Earlier industrial revolutions have also caused climate change yet even till this day; it is largely the developed countries that are responsible for the carbon emissions which are causing this disaster. This mostly threatens Muslim-majority countries across Africa and Asia, from Mauritania to Malaysia.

All the earlier industrial revolutions, to some extent, brought with them amazing opportunities which truly changed the lives of people with more prosperity but it was on great irrecoverable costs of war, politics and social divisions. Recent technological and industrial advances are not only transforming economies, jobs and but civilizations itself (Yusof, 2018).

3. Concerns for Muslim Societies and Governments

Mehdi Mozaffari in his 'Globalization and Civilizations' comprehends that the supremacy of global self regulating markets and economic and political nature of capitalism promotes symbiosis between different civilizations by blurring characteristics differentiating them. To thrive, globalization requires culture standardization through technology, capitalism and world politics. Technological advancements of Fourth Industrial Revolution appears a development to contribute and achieve same standardization which may only benefit rich and powerful. Fourth Industrial Revolution is not a pursuit of high moral grounds but it's the quest to achieve optimum efficiency and profit. With its long term illusive and vague goals, they mostly appear unsustainable and only about business where 'haves' may acquire more benefits than 'haves not'. Fourth Industrial Revolution appears free from considerations about its ecological, moral, religious or ethical implications.

Directly or indirectly, capitalist led western Fourth Industrial Revolution challenges Islamic civilization as cumulative civilization which has a strong religious foundation and a powerful Islamic ideology, universality, moderation, world vision, Islamic way of governance and statecraft, historical cultural, social, ecological, educational, geographical and political formation and more. The rising situation ignites conflict between science and religion and in long run; Fourth Industrial Revolution may require or promote irrelevance of religion in human lives as religion might be considered as a hurdle in accomplishing rapid and massive technological leaps coming in garb of Fourth Industrial Revolution. Any sentiment or technological advancement with such hidden agenda will be harmful to Muslim Societies and governments.

Any technology which brings power both economic and political is welcomed by every Muslim government. Same stands true for technologies causing comfort and convenience in

daily lives of Muslims. Use of such technologies has grown massively in Muslim societies. This remains a statement of problem for under consideration study.

Today, it appears to highlight or analyze detrimental effects of such technologies have a limited convincing power over Muslim masses because usually and sometimes people simply don't care. But irrespective of such insensitivity, for creating an understanding for the future and awareness about implications involved when Muslims interact and experience such technologies, still remains crucial and one of the fundamental obligations for Muslim scholars. They must take into considerations technological advancement and challenges it is posing to Islamic civilization (Hossein, 2005). Cultural, religious and political concerns faced by Muslim societies and governments resulting from emerging technological advancements of Fourth Industrial Revolution are appended below in succeeding paras.

3.1 **Cultural Concerns**

Andrzej Szczypiorski, a Polish novelist once wrote that society's faith on science and technological advancement for creating a better world is misled. Today, technological advancements of Fourth Industrial Revolution has severely affected our consciousness, social relations, communication, privacy, and our understanding of truth. We truly have become what Henry David Thoreau called, "tools of their tools" (Hancock, 2009).

Technological advancements of Fourth Industrial Revolution will promote culture and values of materialism and secularism in Muslim societies and it may also lead to weakening of the religious authorities, moral and ethical ideals of Muslim societies (Golshani, 2003). It has brought a sick culture of 'celebrity' status through wide use of social media across globe which is causing degeneration of Muslim youth (Gqibithole, 2019). Advances in 'deep fake technology' **(**Khidhir, 2019) can cause social, cultural and political instability in Muslim societies. Misuse of social networking technologies and cyber space will eradicate the sense of personal and communal privacy within Muslim societies will cause further isolation of individuals that may also result in producing a vacuum of belongingness in traditional social relations. Prevalent economic inequality and rising unemployment due to numerous reasons like automation of jobs (Suwaidi, 2018) can create instability, anger, resentment, tensions or protests within Muslim societies.

Technological advancements of Fourth Industrial Revolution can influence fundamental ideas, values and trends within Muslim societies and can promote amplified inclination toward conflict and violence other than promoting foreign dominant culture. Negative use of technologies like artificial intelligence can cause penetration in Muslim societies at ideological or political level to influence Muslim opinions. To some extent, Muslim societies today, with neglect of science and technology, are not sufficiently informed and are in weak position due to illiteracy, uncontrolled population growth, depleting resources, less spending on human capital development and lack of development to prevent them from such a threat. This inability may contribute escalation of ethnic, nationalist or religious extremism to counter foreign cultures or to preserve identity or local cultures from disappearance.

3.2 **Religious Concerns**

In earlier industrial revolutions, humans were producing material goods unlike today, when main product humans may artificially producing will be humans themselves with their body organs hence they might become their own creator. This will certainly, what Dr Beth Singler,

researcher at the Faraday Institute for Science and Religion calls, 'affects our specialness' (Mckeown, 2019). Issues involved in embryonic stem cell research and human or therapeutic cloning are causing further divisions in Islamic scholars on the subject. Laws on embryonic stem cell research and human cloning are mostly absent in Islamic countries however Turkey, Egypt and Iran are further researching in this field. Many Islamic scholars fear that such technology and knowledge could be exploited for human organ business purposes ("Stem cell research", 2007). Technological advancements of Fourth Industrial Revolution has offered us tools to create, redesign (Golshani, 2003), upgrade ourselves or manufacture humanoid robots. This appears an interference with ability of God as a creator. From a philosophical perspective, this path may lead to creation of heaven and hell on earth (Harari, 2016) by technology czars of the world.

Few technologies of Fourth Industrial Revolution may lead to an establishment of a new religion with wide spread appeal capable of bringing cultural and technological uniformity among world populations. Recent establishment of a church in US dedicated to worship of artificial intelligence by Anthony Levandowski is an indication of that upcoming religion.

Levandowski has named this religion as a 'Way of the Future'. "What is going to be created will effectively be a god," Levandowski told Wired magazine in an interview. He further added, "It's not a god in the sense that it makes lightning or causes hurricanes. But if there is something a billion times smarter than the smartest human, what else are you going to call it?" (Mckeown, 2019). This development only gives us a view of future where faith may have to compete with material to remain relevant in human lives, this certainly will be a challenging situation for the faithful to practice and flourish their religion. By 2030, there will be 500 billion devices which will mutually communicating using the internet of things. In Fourth industrial revolution, connectivity appears as the new virtue and basis of solidarity rather than religion or faith (Khan, 2019).

3.3 **Political Concerns**

Technological advancements of Fourth Industrial Revolution promises to bring improvement for mankind but with this it will bring tools of manipulation and dominance over the weak ones (Golshani, 2003). Massive technological changes will certainly challenge prevailing mode of economic and political governance of Muslim governments in various parts of Muslim lands and will create social and political tensions with transformations of religious, ethical and moral values among Muslim societies.

It appears that technological advancements of today are politically or economically motivated and funded by rich and powerful. Technological advancements of Fourth Industrial Revolution are significantly vulnerable to misuse for economic or political benefits as they are made with a secularist-materialist worldview with least ethical considerations probably due to indifference of few scientist or economist or policy planners to consequences of their inventions, policies or separation of facts from values during quest for scientific or economic or political advances.

A 2016 report by Swiss bank UBS categorically declared that the 'richest stand to gain more from the introduction of new technology than those in poorer sections of society.' Report adds that fourth industrial revolution will impact less to developed economies while rest will suffer with emergence of artificial intelligence and robots. It further cautions about the possible expansion of inequality between developed and developing countries (Treanor, 2016).

It will be extremely challenging for Muslim governments to maintain pace with technological advancements of Fourth Industrial Revolution (Zugravu, 2018) other than regulating it to capture its benefits. On the other hand, Fourth Industrial Revolution will offer tools to authoritarian governments to initiate intense monitoring of public through unrestraint employment of artificial intelligence, quantum computing and digitization (Ünay, 2017). Shoshana Zuboff has also indicated a similar trend, which she terms, a 'surveillance capitalism' in her recent book, 'the Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power' (2019). Same apprehensions were shared by George Soros during his 2018 speech at Davos, where he said that technology groups were 'inducing people to give up their autonomy.' He further added that the alliances between authoritarian states and data-rich IT monopolies would bring together surveillance systems of corporate and state. All this and can escalate after the availability of 5G within the reach of such governments (Halpern, 2019). Halpern claims that such unthinkable surveillance potential through 5G paired with facial recognition on parts of various other governments can make life of Muslims in disputed territories like Palestine and Kashmir more miserable. Same stands equally true for Muslims residing in Xinjiang Uyghur Autonomous Region.

On 8 June 2019, Christine Lagarde, Managing Director of IMF, during G20 finance ministers meetings in Japan cautioned that the rising use of big data and artificial intelligence by technology and internet giants is causing a disruption in the global financial system ("Tech Firms' Dominance", 2019). A 2018 report titled, "Future of Jobs" by World Economic Forum has also indicated about global job loss in result of technologies appearing in Fourth Industrial Revolution ("World Economic Forum", 2016). Being part of same well connected world, Muslim countries can't escape effects of developments, as predicted in above mentioned estimates, taking place in other regions. Gradually, Fourth Industrial Revolution can create economic scene which will certainly escalate unemployment and economic inequalities within Muslim countries.

Rising fame of artificial intelligence in the world including Muslim countries remains an important issue. This can be due to numerous reasons but predominant can be emergence of artificial intelligence as most crucial factor in global power politics and today most of the world countries intend to acquire edge in this field and also in quantum computing. But such a technology driven power play will certainly ensure future weaponization of such advanced technologies like artificial intelligence. That would be too detrimental to world peace (Pandya, 2019) particularly to those Muslim lands where war is already ongoing. Their remains a possibility of artificial intelligence driven weapons being tried and tested in those parts of world.

Fourth Industrial Revolution will pose significant challenges to Muslim governments other than offering many improvements and conveniences in various sectors of statecraft. Muslim governments may struggle to uphold state sovereignty when it comes to their interaction with Amazon, Alibaba, Google, Tencent, Apple, Xiaomi, Facebook, Microsoft, Baidu and Huawei. It will be equally problematic for Muslim governments to regulate multinational corporations, use of block chain technology or Bitcoin by private firms and masses (Lye, 2017).

Fourth industrial revolution is causing shift in state's sovereignty and power within Muslim countries not only in form of Muslim states inability to assert control and regulate Western or Chinese mega organizations operating within those countries but also in form of rapid urbanization with smart city governance taking place within Muslim countries as well.

Urbanization has created an entirely new way of living within Muslin societies. Sometimes, Muslim states appear powerless in front of international influence on major cities of Islamic world due to federation structures or international partnerships. Today, cities are core of power and governance within Muslim countries (Khan, 2019). Today, 10% of Pakistan's population lives in Karachi which contributes 20% of its GDP. 10% of Morocco's population lives in Casablanca which contributes 32% of its GDP. Tehran, with 10% of Iran's population, has a 30% share in its GDP. Istanbul now has 20% of Turkey's population and it contributes 31% of Turkey's GDP. Only 35 countries have a bigger GDP than Istanbul at $350 billion, and this city appears on par with Israel and Malaysia. It can be deduced from the given data that control and governance of major cities is significant as such cities are shaping politics, culture and economy more than the state themselves (Khan, 2019). Governance, itself appears dependent on technology, big data, internet of things and innovation for provision of services to people.

4. Literature Review

Many economists and writers have highlighted the challenges of the Fourth Industrial Revolution but concerns Muslim societies and governments are experiencing due to emerging radical innovations are not sufficiently explored yet. Their also exists a dearth of literature on the subject. Most of the literature studied so far indicates that most of the writers and thinkers including the ones from World Economic Forum are blindly in favour of Fourth Industrial Revolution. They appear exaggerating the benefits and understate the costs of emerging technologies of Fourth Industrial Revolution that developing or under developed countries may pay in future.

In 'the Globotics Upheaval: Globalization, Robotics, and the Future of Work' (2019) by Richard Baldwin, author considers radical changes in world economy responsible for many social and economic ills prevailing today. He has called combination of computer and robotics, a globotics upheaval which threatens foundation of welfare states ("Globalization 4.0", 2019).

Mordecai Kurz from Stanford University, in his June 2017 paper titled, 'On the Formation of Capital and Wealth: IT, Monopoly Power and Rising Inequality' highlighted that IT revolution will cause social losses and rising inequality that threatens the foundation of democratic society. He further added that IT revolution improved living standards and its great technical achievements enjoy a high level of consumer and political support.

Klaus Schwab in January 11, 2016 article titled, 'Shaping the Fourth Industrial Revolution' has cautioned that irrespective of great outcomes of Fourth Industrial Revolution, it still can cause marginalization and inequality for few, create security and political risks and can undermine human relationships and identity (Schwab, 2016). In the same article, Klaus Schwab has called for putting an end to elite supremacy (Awar, 2017).

In the book, 'Thank you for being late – An optimist's guide to thriving in the age of Accelerations' (2016) by Thomas Friedman, the author has argued that changes brought by Fourth Industrial Revolution like movement of production houses and employment opportunities from the West to the East Asia, arrival of unemployed immigrants to the industrialized West, have caused annoyance, fear and resentment among the white middle classes and resultantly they turned to leaders like US President Donald Trump, who effectively exploited their plight in last US elections Author considers Brexit, one such destabilizing development as well. The author adds that due to slow pace of adjustment with rapid technological advancements of recent years, like emergence of tech giants including Google,

Facebook, Amazon, and Apple, is causing social instability or undermining of democratic institutions even within European societies (Efrat, 2019).

5. Suggestions for Muslim Governments

Muslim governments should never jump on the bandwagon of Fourth Industrial Revolution or notions of Society 5.0 without a thought process and they should be developing fully informed opinions about possible implications (Razak, 2019) of wide-reaching applications (Damodharan & Afsa, 2019) appearing with Fourth Industrial Revolution. A smooth ethical transition is required where human element is kept superior and not machines or algorithms. This way, an upcoming chaos can be prevented. It is crucial to devise a long-term plan for effectively preparing future Muslim generation and particularly Muslim governments to accommodate and face challenges of changing technological landscape (Ahmed, 2019).

Muslim governments have the most crucial role to play in the coming age of disruption. They must devise regulatory framework to prevent emerging technologies from misuse. Regulatory framework will assist Muslim governments to promote fairness, accountability and transparency when it comes to use of artificial intelligence or machine learning. Data-driven revolution is not just transforming the conditions of global trade but it is also transforming the nature and distribution of wealth. Muslim governments should promote a need for a new global regulatory system which can ensure issues between trade and national sovereignty are addressed well (Araya, 2019).

Today, companies are accepting artificial intelligence for automating decision-making and generate new business opportunities. Muslim government should also use these technologies to generate economic opportunities for Muslim societies. Muslim governments must also prepare and train youth in their respective countries on effective and positive use of modern technology in order to manage and counter challenges rising from upcoming digital technologies (Norfadhilah n.d.).

An effective and modern education system can play a very vital role in maintaining the pace of Muslim governments with disruptive changes (Kasraoui, 2017). To overcome concerns, mentioned earlier, germinating from Fourth Industrial Revolution, modernization of education system across Muslim countries (Roth, 2019) on the lines of Islamic teachings, modern educational standards, higher order thinking skills (Kasraoui, 2017), increased, what Klaus Schwab calls, inspired, contextual, physical and emotional intelligence (Schwab, 2016), open-mindedness, creativity, innovation, analytical thinking, sustainability and love for peace and humanity (Norfadhilah n.d.) is the one of the most pressing need of the hour.

Transformation of governance from rigid, slow and ineffective to active, consistent and experiential in Muslim countries is need of the hour (Gnanasagaran, 2018). More active participation of women in industrial development should be encouraged with promotion of entrepreneurial culture among Muslims and connectivity in form Muslim business community networking.

Muslim governments should be enabler of change, regulators of markets and must preserve social cohesion in Muslim societies today. They should not be carried away with the advent of Fourth Industrial Revolution as this has created a significant pressure for Muslim governments to immediately adapt to a technological change (Lye, 2017).

6. Suggestions for Muslim Scholars and Religious Authorities

Muslim scholars and religious authorities should contribute in devising a moral framework of the fourth industrial revolution and must explore new forms of modernity (Schwab, 2016). They should play constructive role in promoting thoughtful commentary on emerging technologies of Fourth Industrial Revolution and making their governments sense the future (Roth, 2019) and understand the coming change and its positive and negative implications with suggestions for brighter future.

Muslim religious authorities should resist calls of what Yuval Harari terms 'Techno-Religions and Silicon Prophets' and must be prepared to look into and provide Sharia compliance perspective, if any, on artificial intelligence outperformance of human's cognitive tasks, on issues involving genetic engineering, gene editing, nanotechnology, regenerative medicine, assisted reproductive technologies or use of biotechnology for having designer babies.

Emerging technologies of Fourth Industrial Revolution may push Muslim societies and governments on various levels but success of Fourth Industrial Revolution in Muslim countries will depend on how technological advancement interacts and compliments religion. It will be religion which can give intellectual direction to Muslim masses on the question of Fourth Industrial Revolution. In this perspective, Fourth Industrial Revolution itself will be dependent on religion but it is also incumbent upon Muslim government and masses to be ready with a well thought out plan for effectively navigating in a storm of Fourth Industrial Revolution. But unfortunately, it appears that importance of religion in this context has not been realized by global capitalist elite propagating Fourth Industrial Revolution as this revolution with its unprecedented access to knowledge has started to define and enforce limits of religion (Harari, 2016).

7. Recommendation

Given the situation, what Thomas Friedman calls 'age of accelerations,' it is strongly suggested that 'Future Studies' should be promoted in Muslim lands. Establishment of department of 'Future Studies' in Universiti Brunei Darussalam and Universiti Teknologi Brunei can also serve as inspiration for other leading universities of Muslim countries. With this, special emphasis should be laid on Islamic business education and social entrepreneurism which should be made part of the education curriculum in Muslim countries.

8. Conclusion

Today, to some extent, less skilled humans and religion itself are being considered by few as a hurdle or irrelevant in course of technological advancement in the paradigm of Fourth Industrial Revolution. Previously, in all three industrial revolutions, this was not the case and this should not be the case today. Earlier, machines started competing with humans and but they effectively removed domesticated animals which were used anywhere in production processes. In course of time, humans had to adapt by either competing with machines or by finding other jobs (Fursman & King, 2019). Today, as many fear, autonomous systems, hall marks of Fourth Industrial revolution, may remove humans from productions processes other than causing technological and societal change everywhere and particularly in Muslim societies.

Emerging technologies of Fourth Industrial Revolution must contribute in empowerment of human resources both cultural and ethical, knowledge revolution, in revival of our collective consciousness and sense of belonging to the community. Fourth Industrial Revolution must adhere to standards of justice, sustainability and social stability. It should effectively contribute in resolving critical issues facing mankind and addressing most pressing issues rather than developing material instruments (Awar, 2017).

In Fourth Industrial Revolution, Muslim countries will mostly remain consumer and not contributor of change. Destiny of Muslim societies will be decided, not by them but by others unless Muslim governments and masses prepare themselves. It's highly important for Muslim scholars to give rational attention to social implications of the Fourth Industrial Revolution at technological and economic level as it may affect identity, values and social security within Muslim societies which can impact national security of every Muslim country.

Exploration and advancement in fields of science and technology is a testimony to God's greatness. Not accepting this is arrogance. Human excel in quantum physics to some extent has assisted in our understanding of universe, time, space and life. This can act as a common ground between science and God-consciousness which Fourth Industrial Revolution appears devoid of. For Muslims, the path forward to face upcoming transformations is contained in Maqasid al-Shariah (Norfadhilah n.d.).

It is the time Muslims societies and governments should start perceiving technological advancements in a different light for not giving a blind embrace for emerging technologies and radical innovations of Fourth Industrial Revolution but with care, caution and strategy (Norfadhilah n.d.) with a view of deploying technology not as a barrier but as a source of happiness for everyone (Nair, 2019).

References

Ahmed, F. (2019, February 18). 4th Industrial Revolution poses human development challenges. *The Express Tribune*, Retrieved from https://tribune.com.pk/story/1912769/2-4thindustrial-revolution-poses-human-development-challenges/

Aisha, D. (2019, 9 May). As the world tiptoes towards the Fourth Industrial Revolution, Dubai is embracing AI. *The National*. Retrieved from https://www.thenational.ae/opinion/comment/as-the-world-tiptoes-towards-the-fourthindustrial-revolution-dubai-is-embracing-ai-1.859574

Al Suwaidi, J. S. (2018, October 2). World braces for a major social transformation. *Gulf News.* Retrieved from https://gulfnews.com/opinion/op-eds/world-braces-for-a-majorsocial-transformation-1.2285515

Al Awar, A, M. (2017, October 7). The Fourth Industrial Revolution from Islamic Economy's Perspective, *HuffPost*. Retrieved from https://www.huffingtonpost.com/abdullamohammed-al-awar/the-fourth-industrial-rev_2_b_12189838.html

Ali, N. (n.d.). Facing the 4th Industrial Revolution our way. *Universiti Sains Islam Malaysia* , Retrieved from https://www.usim.edu.my/news/in-our-words/facing-4th-industrialrevolution-way/

Araya. D. (2019, March 19). Governing The Fourth Industrial Revolution. *Forbes.* Retrieved from https://www.forbes.com/sites/danielaraya/2019/03/12/governing-the-fourthindustrial-revolution/#19ab9f754b33

Cooper, W.W. (2008). *Challenges of the Muslim World*. International Symposia in Economic Theory and Econometrics, Volume 19. Bingley, UK: Emerald Group Publishing Limited, pp.29 – 67

Damodharan, R & Afsal, M. (2018, December 24). AI is not for me... think again, *The Star Online*. Retrieved from https://www.thestar.com.my/business/smebiz/2018/12/24/ai-isnot-for-me-think-again/

Davos 2019 is all about 'Globalization 4.0.' So what is that? (2019, January 2019). *Business Standard News*. Retrieved from https://www.business-standard.com/article/currentaffairs/davos-2019-is-all-about-globalization-4-0-so-what-is-that-119012201455_1.html

Efrat, Y. B. (2019, March 24). Thomas Friedman and the one-state solution. *Challenge*. Retrieved from www.challenge-mag.com/thomas-friedman-and-the-one-state-solution/

Focus on Fourth Industrial Revolution. (2018, November 26). *Arab Times Kuwait*. Retrieved from http://www.arabtimesonline.com/news/focus-on-fourth-industrial-revolution/ 'Fourth Industrial Revolution' will impact jobs, says Foreign Minister Momen. (2019, March 9). *bdnews24.com*. Retrieved from https://bdnews24.com/bangladesh/2019/03/09/fourthindustrial-revolution-will-impact-jobs-says-foreign-minister-momen

Fursman, A. & King, G. F. (2019, January 29). The fourth industrial revolution is not what you think. *Quartz*. Retrieved from https://qz.com/1515869/were-thinking-about-thefourth-industrial-revolution-all-wrong/

Gnanasagaran, A. (2018, September 27). Industry 4.0 and a people-centric ASEAN, *The ASEAN Post*. Retrieved from https://theaseanpost.com/article/industry-40-and-peoplecentric-asean

Ghurair, M. S. (2018, October 30). Global Islamic economy enters new phase of growth. *Khaleej Times*. Retrieved from https://www.khaleejtimes.com/global-islamic-economyenters-new-phase-of-growth

Golshani, M. (2003). Values and Ethical Issues in Science and Technology: A Muslim Perspective, *Islamic Studies*, Vol. 42, No. 2, pp. 317-330, Retrieved from https://www.jstor.org/stable/20837273?seq=1#page_scan_tab_contents

Growing Muslim population drives Islamic economy (2018, April 5). *New Straits Times.* Retrieved from https://www.nst.com.my/business/2018/04/353401/growing-muslimpopulation-drives-islamic-economy

Gqibithole, K. (2019, April 14,). Issues at Stake: Deliberate online posting of negative behaviours must be curbed, *Zululand Observer*. Retrieved from https://zululandobserver.co.za/188543/issues-stake-deliberate-online-posting-negativebehaviours-must-curbed/

Harari , Y. (2016, April 11).Yuval Harari talk at Google on his book, 'Sapiens: A Brief History of Humankind,' Retrieved from https://www.youtube.com/watch?v=QEgO19VJMBg

Harari , Y. (2016, September 9). Salvation by algorithm: God, technology and the new 21stcentury religions. *New Statesman*. Retrieved from https://www.newstatesman.com/politics/uk/2016/09/salvation-algorithm-god-technologyand-new-21st-century-religions

Halpern, S. (2019, April 26). The Terrifying Potential of the 5G Network. *The New Yorker*. Retrieved from https://www.newyorker.com/news/annals-of-communications/theterrifying-potential-of-the-5g-network

Hancock, P. A. (2009). *Mind, Machine and Morality: Toward a Philosophy of HumanTechnology Symbiosis*. Florida, US: CRC Press.

Hossein, N. S. (2005). Islam, Muslims, and Modern Technology, *Questia*. Retrieved from https://www.questia.com/library/journal/1G1-139516230/islam-muslims-and-moderntechnology

IMF warns of giant tech firms' dominance (2019, June 8). *BBC*. Retrieved from https://www.bbc.com/news/business-48566024

Kasraoui, S. (2017, November 21), Muslim World Should Embrace the Changes of the Digital Industrial Revolution: Malaysia PM. *Morocco World News.* Retrieved from https://www.moroccoworldnews.com/2017/11/234375/muslim-world-digital-industrialrevolution-malaysia-datuk-seri-najib-razak-wief/

Khan**,** M. (2019, May 1). Rethinking collective identity through the lenses of Al Farabi, Ibn Khaldun, *Daily Sabah.* Retrieved from https://www.dailysabah.com/op-ed/2019/05/01/rethinking-collective-identity-through-the-lenses-of-al-farabi-ibn-khaldun

Khidhir, S. (2019, February 13). The Sinister World of Deepfake. *The Asean Post*. Retrieved from https://theaseanpost.com/article/sinister-world-deepfake

Labadi, T. (2018, November 21). Counting the cost of Neoliberalism in the Arab world. *The New Arab*. Retrieved from https://www.alaraby.co.uk/english/comment/2018/11/29/counting-the-cost-ofneoliberalism-in-the-arab-world

Lye, D. (2017, February 2). The Fourth Industrial Revolution and Challenges for Government. *Brink – The Edge of Risk*. Retrieved from https://www.brinknews.com/the-fourthindustrial-revolution-and-challenges-for-government/

Mapping Africa's natural resources. (2018, February 20). *Al Jazeera*. Retrieved from https://www.aljazeera.com/indepth/interactive/2016/10/mapping-africa-natural-resources161020075811145.html

Marinetti, F.T. (1909). *The Futurist Manifesto*. Retrieved from https://www.societyforasianart.org/sites/default/files/manifesto_futurista.pdf

Mckeown, S. (2019, February 28). A church dedicated to worshiping artificial intelligence? *Financial Mail*. Retrieved from https://www.businesslive.co.za/fm/fmfox/digital/2019-02-28-a-church-dedicated-to-worshiping-artificial-intelligence/

Mehmet, F.H, & and Rezeg, A.A. (2019, August 2). 60 percent of conflicts are in Muslim Countries. *Anadolu Agency*. Retrieved from https://www.aa.com.tr/en/politics/60-percentof-conflicts-are-in-muslim-countries/1387472

Nair, V. (2019, March 11). It's time for financial services to embrace the Fourth Industrial Revolution. Here's why. *World Economic Forum*. Retrieved from https://www.weforum.org/agenda/2019/03/its-time-for-financial-services-to-embrace-thefourth-industrial-revolution-heres-why/

Pandya, J. (2019, January 14). The Weaponization Of Artificial Intelligence. *Cognitive World*. Retrieved from https://www.forbes.com/sites/cognitiveworld/2019/01/14/theweaponization-of-artificial-intelligence/#12a682d63686

Razak, D, A. (2019, February 16). Bringing Islamic forum to next level, *New Strait Time Press (M), Bhd*. Retrieved from https://www.nst.com.my/opinion/columnists/2019/02/460806/bringing-islamic-forumnext-level

Razak, D. A. (2018, October 8). 4IR, panacea of the future? *New Strait Time Press (M), Bhd*. Retrieved from https://www.nst.com.my/opinion/columnists/2018/10/419219/4irpanacea-future

Religions - Islam: Stem cell research. (2009, July 9). *BBC*, Retrieved from http://www.bbc.co.uk/religion/religions/islam/islamethics/stemcells.shtml

Roth, S. (2019, April 30). Futuristic studies and foresight for better strategic decisions, *Devdiscourse.* Retrieved from https://www.devdiscourse.com/article/agencywire/494587-futuristic-studies-and-foresight-for-better-strategic-decisions

Saudi Aramco Recognized as Leader in the Fourth Industrial Revolution. (2019, January 22). *Asharq Al-Awsat.* Retrieved from https://aawsat.com/english/home/article/1557066/saudiaramco-recognized-leader-fourth-industrial-revolution

Sarji, Ahmad. (1993, January 22). Speech delivered in the Conference on 'Islam and Industrialization' in Malaysia. Retrieved from http://www.pmo.gov.my/ucapan/?m=p&p=ahmadsarji&id=2630

Schwab, K. (2016, January 11). Shaping the Fourth Industrial Revolution. *Project Syndicate*. Retrieved from https://www.project-syndicate.org/commentary/fourth-industrialrevolution-human-development-by-klaus-schwab-2016-01?barrier=accesspaylog

Schwab, K. (2016, June 21). Welcoming Faith in the Fourth Industrial Revolution, *Berkley Forum*. Retrieved from https://berkleycenter.georgetown.edu/responses/welcoming-faithin-the-fourth-industrial-revolution

Tolentino, C. (2018, November 7). Christian, Muslim travel sector to contribute USD 183 billion to global GDP by 2020, Travel Daily Media. Retrieved from https://www.traveldailymedia.com/muslim-travel-sector-to-contribute-usd-183-billion-toglobal-gdp-by-2020/

Treanor, J. (2016, January19). Fourth industrial revolution set to benefit richest, UBS report says. *The Guardian.* Retrieved from https://www.theguardian.com/business/2016/jan/19/fourth-industrial-revolution-set-tobenefit-richest-ubs-report-says

UAE Inaugurates Center for Fourth Industrial Revolution. (2019, April 30). *Asharq AlAwsat*. Retrieved from https://aawsat.com/english/home/article/1701376/uae-inauguratescenter-fourth-industrial-revolution

Ünay, S. (2017, February 26). Industrial Revolution 4.0 and Social Values. *The New Turkey*. Retrieved from https://thenewturkey.org/industrial-revolution-4-0-and-social-values

World Economic Forum. (2016). The Future of Jobs, Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

Ying, L.J. (2019, January 2). The time for change is now. *New Strait Time Press (M), Bhd*. Retrieved from https://www.nst.com.my/opinion/letters/2019/01/446425/time-changenow

Yunus, R. M., & Hasan, M.M. (2017, August 4). Muslim Women & Knowledge: Facing the 'Fourth Industrial Revolution'. *About Islam*. Retrieved from http://aboutislam.net/familysociety/gender-society/muslim-women-and-knowledge-are-we-ready-to-face-the-fourthindustrial-revolution/

Yusof, A. (2018, April 5). Growing Muslim population drives Islamic economy, *New Straits Times*. Retrieved from https://www.nst.com.my/business/2018/04/353401/growingmuslim-population-drives-islamic-economy

Zugravu. A. (2018, August 11). Fourth Industrial Revolution 'an incredible accelerator for Saudi Arabia to achieve Vision 2030'. *Saudi Gazette*. Retrieved from http://saudigazette.com.sa/article/540938/BUSINESS/Fourth-Industrial-Revolution-anincredible-accelerator-for-Saudi-Arabia-to-achieve-Vision-2030