ISSN No:-2456-2165

Industrial Revolutions and Sri Lanka

T. B. Dewanarayana, Wijithapure Wilmalarathane
National Institute of Business Management,
Sri Lanka

Abstract:- Industrial revolutions, from the first industrial revolution of 18th century to the ongoing fourth industrial revolution of 21st century, have changed the trajectory of the human civilization irreversibly all the way through. The agriculture centered dynamic economies in the west along with their extensive international trade networks transformed into industry driven global economic power houses as a result of the first industrial revolution. The heat of the industrialization process spread from the pioneering nations to the rest of the world asymmetrically according to their geopolitical and socio cultural factors. The periodical spike in technological innovations and applications, dubbed as industrial revolutions two, three and four, ushered the global production, distribution and consumption through an unprecedented higher ground in the past.

Sri Lanka, then Ceylon, was under the colonial rule either fully or partly during the first and the second industrial revolutions. The island used to cultivate plantation crops to meet the requirements of the industrialized countries rather than promoting industries. The initial manufacturing processes were carried out on spices, coffee, tea, rubber and coconut crops before being exported them to the industrialized countries. Some basic industries were initiated by the British colonial rule in Sri Lanka during the world war two due to the global supply disruptions. A certain industries were also promoted under the pretext of import substitution industrialization strategy during the post-colonial period. The promotion of the apparel industry, the key industry in post independent Sri Lanka, along with some other industries such as electrical, electronic and chemical were visible in the post liberalized period since late 1970s.

The world was experiencing industrial revolutions three and four while Sri Lanka was enjoying the political freedom after the Second World War. The country was not considerably influenced by these two industrial revolutions or the previous two industrial revolutions. The objectives of this study are to examine the factors affected the industrialization policies in the country and influence received by the country to promote its industries during the industrial revolutions. The secondary information is gathered for the study while mixed method is applied to analyze the collected information.

Findings suggest that there have not been pragmatic industrialization policies to promote the local industries before or after the political independence. This adverse situation was further strengthened by lack of natural resources, weaknesses in educational and research policies, lack of motivation among local industrialists due to the nonexistence of determined industrial policies, and unnecessarily promoting of the agriculture as the main strategy of economic development.

Keywords:- *Industrial revolutions, industrial policies, natural resources, motivation, and educational policies.*

I. INTRODUCTION

Industrial revolutions, from the first industrial revolution of 18th century to the ongoing fourth industrial revolution of 21st century, have changed the trajectory of the human civilization irreversibly all the way through. The agriculture centered dynamic economies in the west along with their extensive international trade networks transformed into industry driven global economic power houses as a result of the first industrial revolution. The heat of the industrialization process spread from the pioneering nations to the rest of the world asymmetrically according to their geopolitical and socio cultural factors. The periodical spike in technological innovations and applications, dubbed as industrial revolutions two, three and four, ushered the global production, distribution and consumption through an unprecedented higher ground in the past.

Sri Lanka, then Ceylon, was under the colonial rule either fully or partly during the first and the second industrial revolutions. The island used to cultivate plantation crops to meet the requirements of the industrialized countries rather than promoting industries. The initial manufacturing processes were carried out on spices, coffee, tea, rubber and coconut crops before being exported them to the industrialized countries. Some basic industries were initiated by the British colonial rule in Sri Lanka during the world war two due to the global supply disruptions. A certain industries were also promoted under the pretext of import substitution industrialization strategy during the post-colonial period. The promotion of the apparel industry, the key industry in post independent Sri Lanka, along with some other industries such as electrical, electronic and chemical were visible in the post liberalized period since late 1970s. The world was experiencing industrial revolutions three and four while Sri Lanka was enjoying the political freedom after the Second World War. The country was not considerably influenced by these two industrial revolutions or the previous two industrial revolutions.

II. OBJECTIVES

The objectives of this study are to examine the factors affected the industrialization policies in the country and influence received by the country to promote its industries during the industrial revolutions.

ISSN No:-2456-2165

III. METHODOLOGY

The data collection for the study is mainly focused of extensive literature based on empirical research papers and statistics presented by the Central Bank reports of Sri Lanka relating to scope of industrialization in Sri Lanka and the globe. In addition the industrial revolutions were basically focused to analyze the correlation and impact of the same on the industrialization in Sri Lanka.

IV. LITERATURE REVIEW

A. Industrial Revolutions

The first industrial revolution transformed the countenance of the England as a country in the later 18th Century to the early 19th Century along with the invention of the steam engine by Thomas Newcomen; was also termed as "atmospheric engine". The steam engine was run by coal power and England colonies were assigned the duty of raw materials supply supported by slavery labor and the market place too. The industrial revolution was the fundamental determinant of transforming rural industries as known cities. The steam engine powered industries such as textile, steel, mines, chemical, steam powered railroads and ocean freighters. The views of Adam Smith were also remarkable during the era on specialization and division of labor in 1776 in parallel to these revolutionary effects. Persistent developments centered with steam engine, power loom and iron industry unlocked the entrance to new avenues such as banking and financial institutes with marked structural changes in the England society [5]. Electricity was the origin for the next wave of revolution in the world in between 1860 to 1914. The second industrial revolution was also termed as American Industrial Revolution backed by series of innovative technologies powered with electricity; such as combustion engine, petroleum, chemical and alloy industries, and electrical communication technologies originated in US boundary. The second industrial revolutionary wave confirmed industrialization as it covered a vast scope of the US economy while benefitted from economies of scale that made the transition for new era of economy. Electric bulb, telephone, phonograph, electric dynamo, radio, telegraph, computer, and motion picture camera were instrumental during the second industrial revolution [6]. Internet and renewable energy based forces driven the world towards a digital era with series of radical structural changes in all most all the aspects [3]. The Third industrial revolution was featured with transforming to renewable energies, electric, plug-in and hybrid technologies, buildings were switched to power plants, smart grid, and energy store technologies [3]. The analogue citizens during the Second industrial revolution were transformed towards digital citizens by the Third industrial revolution in the late 19th Century with the electricity powered computerization era. So called digital revolution made wonders in the human civilization with innovations such as semiconductors, mainframes and personal computers connected to internet while introducing degree of automation up to a certain extent influencing life patterns with massive structural changes driven socioeconomic consequences merged with electronics. The foundation laid in the digital revolution extended its scope towards perfect automation as in the form of technological revolution connected to artificial intelligence, robotics, cloud computing, internet of everything, big data analytics etc and termed it as the fourth industrial revolution while allowing machine to machine communication (M2M) marking paradigm shift at production and consumption. The fourth industrial revolution redefined national economic policies and redrawn boundaries of global competitiveness with innovation driven business models [16],[12],[10],[14].

B. Industrialization

Literature confirms that income per capita and the portion of industrial and manufacturing sector in the GDP are positively correlated where foreign direct investments (net flow) and trade openness too are positively correlated with industrial growth. In addition, the human capital has also been realized as significant in industrial growth since the investment of human capital causes to shape up scientifically and technically literate work force which enables the enhancement of returns to scale in industrialization process to reach growth and development. Government role in terms of political stability, pattern and the rationale of government spending and governance are significant in setting path for the growth in industrialization process [13]. Yunus & Ufuk, (2013)[18], mentioned that foreign direct investments are caused to increase high technology output in the economy. According to Udegbunam, (2002) [17], the trade openness was considered as the main determinant for industrialization in Nigeria. Zara, Dorbusch & Reynoso, (1989) [19], viewed that trade openness along with liberalization contributed a lot towards economic growth of South Korea in 1980. As cited; Bakht, (1998) [2], and Onafowra & Owoye, (1998) [9], confirmed that trade openness and liberalization are positively correlated with the degree of economic growth and Markusen & Venables, (1998) [8], shown that foreign direct investments are positively correlated with industrialization and the same has been thereafter confirmed by several scholars. Zara, Aman, and Usman, (n.a) [19], cited Greenwald & Stiglitz, (2006) and mentioned that exchange rate as a determinant of industrialization. More specifically lower the exchange rate promotes exports of a country (foreign exchange depreciation) and affect more positively if elasticity is favorable.

C. Industrial Revolutions and Sri Lanka

Sri Lanka then Ceylon was under the colonial rule, more specifically under Dutch rule (1657-1796) during the First industrial revolution after the Portuguese (1594-1657). As per the history Dutch rule was marked as significant to the economic development of Sri Lanka due to certain measures implemented to link Sri Lankan economy towards the emerging world economy by that time. Export trade was relatively rich due to commercial crops like cinnamon, betel, pearl from fisheries and gem stones from various parts of the Sri Lanka. In addition spices, coconut oil, lacquer, ropes of coconut fibers, sea products and elephants were also in top of the export list. The strong trade and agriculture link along with the emerging world was shown by the commencement of another two commercial (cash) crops called coffee and tobacco; exported to Europe, Middle East and India subcontinent. The contribution of Dutch led to expand Sri Lanka's trade with the development of infrastructure with transport facilities. With the help of (Vereenigde Oost-

ISSN No:-2456-2165

indische Compagnie) VOC managed to open three canals systems in three provinces of Sri Lanka as Western, Southern and Eastern parts, and through with Colombo and Kalpitiya, Colombo to Bentota and another commercial center called Batticaloa, Samanturai, Matara and Veligama areas were also connected. The hydraulic engineers from VOC developed chain of ports with technologically well equipped things while recruiting local metal workers for the development of high quality guns. With the developments of others services in parallel to the First industrial revolution the major courts of justice were established in Sri Lanka in Colombo, Galle and Jaffna and later the Roman- Dutch law was introduced in other areas of Sri Lanka leading to various social consequences in the 18th century.

The Second Industrial Revolution; more specifically the Technological Revolution began in the late 18th Century to the early 20th (1850-1970) century which made industrial standardization with the innovation of electrical power, steel, oil and the telephone. According to the Sri Lankan history it was the British Rule from 1796 by replacing the Dutch and confirmed the British colony in 1815 until the Sri Lankan's independence in 1948. The British rule initiated and encouraged agriculture and other commercial crops cultivation such as pepper, cinnamon, sugarcane, coffee and cotton etc. In 1833 British rule set the foundation for economic and political hierarchy for Sri Lanka, more specifically for Ceylon by that time such as reducing autocratic powers of governors and adopting system for administration as well as judicial aspects for the whole Ceylon while introducing English as the language for government and medium of instructions in schools. Elimination of state monopolies and compulsory labor services while promoting economic liberalization by the British rule was a key feature and the beginning of many changes. The lands were under British ownership was sold relatively cheaper to cultivators with the purpose of promoting plantation agriculture at large and profit certified enterprises such as coffee. The coffee as a commercial crop was highly successful and could spearhead the economic development from 1830 to 1870 until it was ruined due to leaf disease. The massive expansion of coffee plantation opened up the opportunity to construct new roads to cater the increasing demand for coffee at the international market and labors from India were permitted to come and settle in the Ceylon as a result for the labor shortage in 1840. Tea plantation was introduced thereafter and it was successful in 1880 and it was located in upper and lower slopes of the hill country in Ceylon. In addition to tea as the next commercial crop rubber and coconut were also cultivated as in the form of commercial plantation crops. The large- scale industries with massive capital investments were established with the expansion of demand for tea and rubber with certain extension services like transportation and storage to facilitate the processors. The Colombo port and railway can be shown as massive developments during the era. The English literate employments due to English education and Ceylon entrepreneurs were given a lot of opportunities with the expanding demand for tea and rubber. These practices at large change the traditional agricultural practices and the traditional agricultural practices were confined to other areas other than urban and plantation regions. The rural sector continued with subsistence cultivation and became monitory societies due to trade enhancement facilitated with roads and railway without being isolated. The time period from 1920-1948 during the British rule was significant for the Ceylon since the same can be recognized as early industrial development era. The Industries' commission 1922 appointed by the government towards industrialization after the First World War and the final report of the commission the suggested cement, spinning and weaving, manufacturing of bricks, tiles and chests as possible manufacturing industries while recommending the development of home (cottage) industries such as carpentry, basket weaving, cloth, lace and chalk making etc. After the recommendations of the report the government commenced hydroelectricity scheme to facilitate the industrialization. Cottage industries were further encouraged to develop with certain degree of mechanization in small scale factories. Government initiated plywood, steel rolling and glass factories in 1941 and in 1942 acetic acid and paper factories were also initiated. In addition a ceramic factory in Negambo, a tannery and shoe factory in Mattakkuliya and a drug factory in Colombo were also initiated by the government during the Second World War period.

The Banking Sector in Sri Lanka was also initiated during the period of the Second Industrial Revolution where the Central Bank of Sri Lanka was incorporated in 1950 and before the Currency Board was appointed for functioning. The Commercial Bank PLC of Sri Lanka established in 1920 and The Hatton National Bank PLC established in 1926 respectively. The term banking as a word and a practice was unfamiliar during the Portuguese and Dutch ruling periods but introduced and practiced during the British rule to Sri Lanka. In 1955 government declared the less degree of government participation in industrialization and encouraged the private sector participation for the same while government and private sector being the partners of the industrialization in Sri Lanka. The Finance Corporation was established in 1955 to facilitate and to encourage the formation of private enterprises. With the approval for partial privatization of certain government enterprises the private enterprises with foreign investments were also encouraged. But the 1956 government has shown high priority on industrial development while keeping control on basic industries while allowing private sector to manage consumer class related products. The import substitution policy was implemented for 1959 to 1968 as a ten year plan to prosper the economic growth with the joined contribution of public and the private sector. The small and medium scale cottage industries, textile and sugar industry were incorporated during the period. It was also revealed that 1000 small and medium scale industry establishments by private sector were granted the approval from 1960 to 1963. From 1965 onwards the export oriented policy was implemented.

The Third Industrial Revolution was reported in 1969/70 which was also known as the Digital Revolution based on information communication technology backed by computers, internet and information systems together. Sri Lanka was operating as an independent nation during the Third Industrial Revolution after the British rule. Sri Lanka was opened for main economic reforms after the

ISSN No:-2456-2165

independence and especially the time aligned with the Third Industrial Revolution. During the initial era of the Third Industrial Revolution in Sri Lanka some basic industries needed for the economy such as Iron and Steel factory in Oruwala, Tyre and Tube factory in Kelaniya, Bricks factory in Ekala and some textile plants were also established under the five year plan of 1972 -1977 by promoting import substitution further. With the appointment of new government in 1977 marked the turning point in Sri Lanka economy during the Third Industrial Revolution. The economic policy was turned to outward looking export led growth by liberalizing the import trade and exchange payments for more items, encouraging the private sector on production by attracting foreign direct investments etc. With the establishment of Greater Colombo Economic Commission (GCEC) in 1978 the Investment Promotion Zones (IPZ) were also initiated in Katunayake, Biyagama and Koggala sequentially. SrI Lanka could attract more foreign direct investments approximately Rs Million 6, 149 in Katunayake and another 21 projects in other parts of Sri Lanka as expected during 1978 to 1988. As per the literature skilled labor intensive textile – readymade garments, chemical and non metallic based firms and manufacture products were highly focused. In addition manufacturing leather and leather products, ladies wear, porcelain, marble and granite products, rubber products, surgical gloves, electronic and electrical products etc were paid special attention to support fostering the economic wellbeing. Sri Lanka diverted towards labor intensive – low cost labor industries during the period in the Asia while enjoying the same as the comparative advantage while creating many economic and social impacts at large. Computers and internet connected information technology made a revolution in Sri Lanka as a consequence of the Third Industrial Revolution. The formal use of computers in universities was documented in 1971 and 1973 by the University of Peradeniya and University of Moratuwa respectively initially for administrative purposes. In parallel State Engineering Corporation and Ceylon Census Department by that time had an opportunity to use computers. After 1983 University Grant Commission approved computer studies carried out by universities as tool of enhancing the computer literacy of undergraduates and other government institutes like National Institute of Business Management. The first internet attempt was experienced in 1989 and email history goes to 1988 with the efforts made Arthur C. Clerk Center for Modern Technologies in Sri Lanka as per the literature. But internet was formally introduced to Sri Lanka in 1992. Initially there were less number of computers were connected to internet with the Sri Lankan domain called 'lk' and internet connection was initially combined with the telephone connections and that paved the path for development of high tech industries not only for Sri Lanka but also for other countries in the world. With the developments Sri Lanka could invite foreign investors to use the land as industry bases to develop technologies with the relatively low labor cost and which made massive socio economic impact. Further developments rapidly changed postal mail to email while making many service providers and the monopoly enjoyed by Sri Lanka Telecom was also eliminated. Government institutes started web based services especially at the international trade such as the Export Development Board and the Chamber of Commerce, Central Bank of Sri Lanka, Board of Investments (BOI), Banks and Insurance and Colombo Stock Exchange etc. These changes made Sri Lankan businesses to adopt internet based business strategies quickly since World Wide Web has become a powerful tool for dissemination of information and grapping customers. The Banking, Finance and Insurance sector in Sri Lanka well understood the necessity of the same and moved towards and as a result branches could connected and sections within the same branch and head office etc with massive information systems while connecting Sri Lanka in to financial markets in the world. Banks started Automatic Teller Machines (ATM) to facilitate withdrawals of depositors initially by influencing the life pattern as a macro result of the Third (Digital) Revolution. The trade sector of Sri Lanka was also affected by the Digital Revolution with the introduction of Electronic Data Interchange (EDI) which allowed sending messages from one computer to another at the international trade scenario. The Ports Authority, Sri Lankan Airlines, Shipping lines and shipping agents and freight forwarders started using EDI which could make Sri Lanka as a commercial hub in the region. The Third Industrial Revolution could affect the legal system of Sri Lanka as well with the high volume of electronic transactions. In 1995 The Evidence (Special) Provisions Act was introduced as it was the only law applicable for dealing with electronic transaction of human and another called Computer Crimes Act was also proposed. [7].

D. Industrialization after Post Liberalization Policy in 1977 in Sri Lanka

The history discloses determinants of industrialization in Sri Lanka.Sriyani,.D,(1987) [15], mentioned four periods of development in Sri Lanka as; Early industrial development (1920-1948), Post independence period (1948-1959), import substitution industrialization (1959-1965) and export oriented industrialization (1965-1989) based on the characteristics of the industrial policy in terms of four determinants named as initiatives, promotional measures, ownership and location.

According to Rajapakshe, W, (2018)[11], the industrial policy was introduced to Sri Lanka in 1977 with the aim of reinforcing private sector investments towards export oriented process of industrialization while recognizing private sector as the engine of growth. Sri Lanka has become the first country in the Asian region for economic liberalization in 1977 with significant reforms including introduction of incentives for export led and foreign investments seek, free trade zones, revised tariff structure on imports, interest rate adjustments for inflation, exchange rate realignment and connecting local banks with global banking sector etc. However the second liberation policy reforms were released in 1990s since the expected results were missed due to various reasons. The second wave included reduction of tariff further and removals of exchange rate controls on current account transactions with the key aim of promoting outward oriented economic practices.

ISSN No:-2456-2165

Table 1: Gross National Product (GNP) (Sector shares in percent)

Year	Agriculture, Forestry and Fishing	Mining and Querying	Manufacturing	Construction	Services
1970-77	53.8	0	9.1	1.2	44.7
1978	28.7	2.5	15.3	8.3	45.3
1987	23.6	2.7	16.2	7.2	50.3
1997	17.8	2.5	17.8	6.8	51.4
2008	12.1	2	17.5	6.5	59.5
2017	6.9	2.5	15.7	7.1	56.8

Source: Athukorala & Jayasuriya, 1994; Central Bank of Sri Lanka (CBSL), 1997; CBSL 2008; CBSL 2017

The figure above illustrates the inclusive portrait of the sector contribution to GNP in Sri Lanka from 1970-77 to 2017. Sri Lanka with a well-built agricultural based has declined its contribution over the period but the same has not incorporated with the increase of the industrial sector. Instead the service sector has been enlarged for more than the 50% of the GNP from 1987 to 2017. The increased performance of the industrial sector in Sri Lanka was confined to labor-intensive, low-tech initiations such as textile industry, indicating the deviation from the fourth industrial revolutionary based high tech industries compared to the trends in global industrialization (Rajapakshe, W.,2018) [11]. Recent updates of the Sri Lanka industrial sector depict a movement in the direction of being high-tech. Very few number of investments on automobile assembling and airbag sensor manufacturing are in the process to cater demand created due to fourth industrial revolution at both local and global markets. Service sector especially banks and financial institutes have adopted advanced technological techniques connected with internet of things, artificial intelligence, big data analytics and cloud computing not only for the survival but also for the experiencing the benefits of being innovative.

V. CONCLUSION

Sri Lanka was under colonial rule either fully or partially during the first two industrial revolutions. Therefore Sri Lanka was a cultivated land for plantation crops introduced as in the form of cash crops for local with the aim of fulfilling the requirements of industrialized countries by that time and did not promote industries based on the inventions of industrial revolutions. However basic manufacturing processors were introduced for the purpose of promoting spices during first two industrial revolutions. The experience of the British colonial rule was relatively differed from Portuguese and Dutch due to interruptions of supply chain during World War II. Initially coffee and then tea were introduced at massive volume and followed by rubber and coconut plantation while establishing intended extensive infrastructure such as railway, water supply, postal, telephone, radio and telegraph as a result of the Second Industrial Revolution. Those infrastructure initiations were later became fundamental determinants for promoting primary industries in Sri Lanka. Third Industrial Revolution was aligned with the post British colonial period in Sri Lanka. Import substitution industrial policy was promoted with the introduction of local industries after independence and was diverted to export oriented thereafter. The promotion of the apparel industry was a substantial in Sri Lanka after liberalization reforms due to socio cultural and economic consequences. In addition electronic, chemical and electrical industries were also promoted during the same period. Relatively few industries in line with the fourth industrial revolution are visible with respect to automobile assembling and related accessories such as airbag sensors. Service sector is updated with key technologies such as internet of things, artificial intelligence, cloud computing and big data etc being the highest contributor to the GDP in Sri Lanka. The last two industrial revolutions were not extensively reflected within the industrial sector due to various reasons. The absence of pragmatic industrial polices in line with Sri Lankan context as seen as the major while strengthening lack of foreign direct investments, reluctance of local industrialists to appear, weaknesses of educational and research policies, lack of natural resources and ultimately nonexistence of industrial culture at large.

REFERENCES

[1.] Albert van den Belt., Jan Kok & Kees Mandemakers. (2011) Digital Thombos: A new source for 18th century Sri Lankan family history, Research Note, The History of the Family, 16:4, 481-489, DOI: 10.1016/j.hisfam.2011.08.006

[2.] Bakht, Z. (1998) Trade Liberalization, Exports and Growth of Manufacturing Industries in Bangladesh, Bangladesh Institute of Development Studies

[3.] Brian H Roberts. (2015) The Third Industrial Revolution: Implications for Planning Cities and Regions, Urban Frontiers Working Paper.

[4.] Dorbusch, .R, and Reynoso, .A (1989). Financial Factors in Economic Development, The American Economic Review, 204–209.

[5.] Haradhan Kumar Mohajan. (2019). The First Industrial Revolution: Creation of a New Global Human Era, Journal of Social Sciences and Humanities, Vol. 5, No. 4, 2019, pp. 377-387.

[6.] Haradhan Kumar Mohajan. (2020).The Second Industrial revolution has Brought Modern Social Economic Developments, Journal of Social Sciences and Humanities, Vol. 6, No. 1, 2020, pp. 1-14

[7.] Induruwa, .A .S. (1999). Information Technology Developments in Sri Lanka, J. Natn, Sci. Foundation, 1999, 27 (3): 209-254.

[8.] Markusen, J. R., & Venables, A. J. (1998). Multinational Firms and the New Trade Theory, Journal of International Economics, 183–203.

[9.] Onafowra, O. A., &Owoye, O. (1998). Can Trade Liberalization Stimulate Economic Growth in Africa? World Development, 497–506.
[10.] PWC. (2016). "Industry 4.0: Building the digital enterprises", Retrieved from https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf
[11.] Rajapakshe, W. (2018). An Evaluation of Four-Decade Experience of Industrial Policy in Sri Lanka: 1977-2017. International Journal of Academic Research in Business and Social Sciences, 8(12), 969–986.
[12.] Roblek, V., Mesko, M., & Krapez, A. (2016). "A complex view of Industry 4.0", SAGE Open, April-June 2016, pp. 1-11
[13.] Samouel Beji & Aram Belhadj. (2016). The Determinants Of Industrialization: Empirical Evidence From Africa, European Scientific Journal April 2016 /SPECIAL/ edition ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431
[14.] Schwab, K. (2015). The fourth industrial revolution: What it means and how to respond. Foreign Affairs, Retrieved on June 6, 2017 from https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution
[15.] Sriyani Dias. (1987). Industrialization Strategy in Sri Lanka, Recent Changes on Policy and Promotional Measures, Sri Lanka, J.S.S, 1987 10 (1 & 2)
[16.] Turel, M., Akis, E. (2019). Industry 4.0 and competitiveness, Research Journal of Business and Management (RJBM), V.6 (3),p.204-212
[17.] Udegbunam, R. (2002). Openness, Stock Market Development, and Industrial growth in Nigeria, Pakistan Institute of Development Economics, 69–92
[18.] Ufuk Turen, & Yunus Gokmen. (2013). The Determinants of High Technology Exports Volume: A Panel Data Analysis of EU-15 Countries, International Journal of Management, Economics and Social Sciences 2013, Vol. 2(3), pp. 217 –232, ISSN 2304 – 1366.
[19.] Zara Ejaz., Aman Ullah, M. & Muhammad Usman Khan, (n.a), Determinants of Industrial Growth in South Asia.