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Renovation of Automation with Human Resources in Industrial Sector in Bangladesh

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Abstract

The world of micro computing known as automation is an ocean of innovation that has been broaden rapidly in the last 15 years. In recent days, many new technologies have been using in industrial and home automation. Almost 90% of industries are using automation in developed countries while this percentage in under developed countries is only 30-45%. The industries are becoming more computerized for ensuring more safety, low labor cost, better product quality with improved efficiency. The sole motto of this paper is to demonstrate the accomplishment of automation and the possibilities of combination of human resources and automation in industrial and home automation in Bangladesh. This study also shows a comparison of country's present situation of automation with the developed countries in the world. In Bangladesh, about 46% of industries are automated however, the safety is not monitored, and quality is not maintained properly.

Keywords: Automation, man power, industry, high-technology, Bangladesh.

1. Introduction

Automation is the sovereign monitoring of a task by a device or system and is considered as the prime mover of industrial success in this modern era. [1] Automation and robotics are the two sector of micro computing. Micro computing is such a technology where the device contains a processor or a microcontroller supported with multiple types of sensor and it is controlled through a program. Technological development directly affects the living standard of human being. Human life is now more comfortable than the old ages. During the last 15 years, technology has reached in a position that people did not think even in their dream however, some people make it possible.

In the 19th century, HG Wells first gave the concept of automation through his writing of science-fiction cartoons magazine named Jetsons. After that, Westinghouse Electric developed the first computer based automation system in 1966 named ECHO IV. [2] They are also the pioneer of AC electrical system. The revolutionary innovation in this sector came in 1971 when, Intel Corporation lunched 4 bit microprocessor called Intel-4004. [3] At the same time Texas instrument engineer Gary Boone and Michael Cochran created the first microcontroller named TMS1000. [4] In 1975, Pico Electronics developed X10 protocol for communication among with electronic devices used for home automation. [5] In addition to these, Microchip Corporation commercially introduced PICXXXX series Microcontrollers with their EEPROM technology in 1993. [6] The dot.com boom created a great step for communicating Pc to Pc through using FTP and HTTP protocol in 1993. During the Last few years, many automation technologies has been developed based on Microcontroller and Microprocessor such as Programmable Logic Controller (PLC), Remote Terminal Unit (RTU), Artificial neural network (ANN), Programmable automation controller (PAC), Raspberry Pi, and Arduino. This paper presents the prospect of integration of automation with human resources towards a massive industrial development in Bangladesh.

2. Present condition of automation and economic growth corresponding to the world

Almost every developed country in the world is following the policy of less labor, high production and better efficiency. High production rate with better efficiency and low labor cast is possible through only using industrial robot. Therefore, the application of industrial robot is increasing rapidly. Japan is the highest industrial robot user and has been using over 300 robots per 1000 manufacturing employees where, the global average is approximately 50 as illustrated in Figure 1 [7]. The developed countries in the world are using almost 149 robots against 1000 employee and contributing about 50% global manufacturing outputs as depicted in Figure 2 [7]. On the other hand, total emerging sectors holds only about 11 robots against 1000 employee with 50% of world's output. For cope space with increasing product demand, we are expecting about 1.5 million Robots driven job including the new industrial activity and expanding the existing industries in next two years.

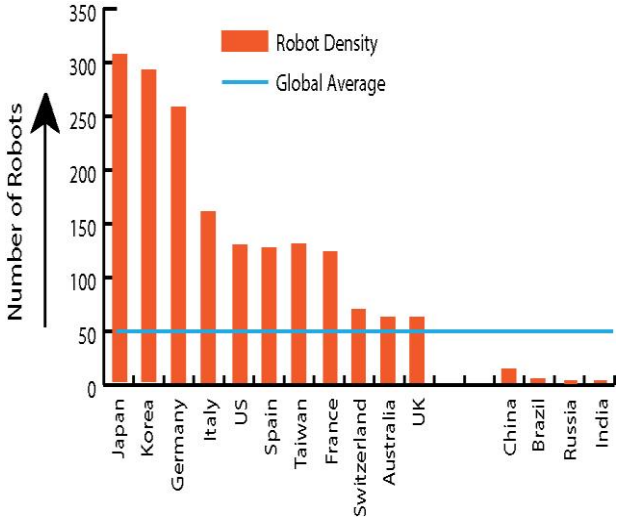

Fig. 1. Robot density of some selected countries [7]

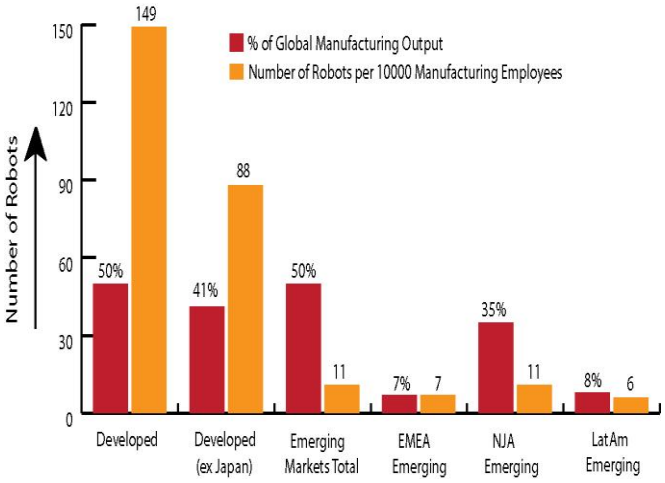

Fig. 2. Global output and robots per employee [7]

The market of automation is increasing very fast has reached to approximately 62%. Robotics demand with respect to the market in Japan has increased to 18%, in China to 17%, in Western Europe to 17%, in Noth America to 15%, in Other Asia to 24% and in other to 8%. The Market of Industrial Automation is about USD 152 billion globally while, the market of Factory Automation and Process Automation are USD 72 billion and USD 83 billion respectively as presented in Figure 3 [7]. The yearly shipment of multipurpose industrial robots in Japan, China, USA, Korea and Germany are 25110 units, 36560 units, 23679 units, 21307 units, and 18297 units respectively. Recently, PLM, DSC, SCADA, and ERP contribute the most of the revenue in automation market.

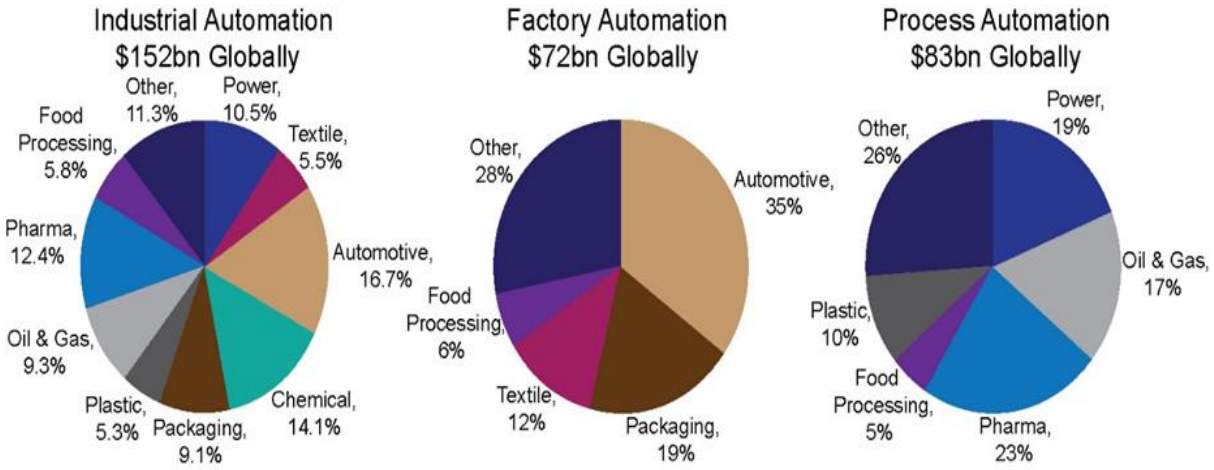

Fig. 3. Automation markets by revenue [7]

3. Present condition of industry in Bangladesh

Bangladesh is developing country and the economy is dominated by a diversified private sector, alongside state-owned enterprises. However, over the last 15 years the country has made a revolutionary change in its industrial sector. The contribution of manufacturing sector in GDP growth has increased to USD 28.4904 Billion in year 2014 from USD 7.4906 Billion in year 2000. On the other hand, in case of industrial sector, the amount of contribution in GDP has increased to USD 46.1249 Billion in year 2014 from USD 11.8905 Billion in year 2000. Table 1 [8] shows that, the share of industry in percentage of GDP growth increased over the past years and expected to increase to a value 37% in year 2021.

It is very difficult to exact time period when the use of automation had been started in Bangladesh. After the British period, the East Pakistan had almost 1930 industries comprising 660 small scale industries and 1270 large scale industries until 1971. The modernization of these industries had been started probably at the end of 19th centuries. Although most of the largest industries in Bangladesh are using industrial robot for manufacturing and production, it is a very little amount.

Table 1. Projection of growth and shares of different sectors in GDP [8]

	FY2011	FY2012	FY2013	FY2014	FY2015	FY2021
	Growth Rate(%)					
Agriculture	5.0	4.5	4.4	4.3	4.3	4.5
Industry	9.2	9.6	9.9	10.5	11.5	12.0
Of which Manufacture	9.5	9.8	10.1	10.7	11.7	14.0
Services	6.6	6.8	7.1	7.3	7.8	8.0
GDP	6.7	7.0	7.2	7.6	8.0	10.0
	Share as % of GDP					
Agriculture	18.4	17.7	16.9	16.2	15.5	15.0
Industry	28.7	28.9	30.4	31.3	32.0	37.0
Of which Manufacture	18.2	18.7	19.6	20.4	21.1	28.0
Services	52.9	52.9	52.7	52.5	52.5	48.0

4. Human resources in Bangladesh

Bangladesh is a densely populated country in South Asia. The population density in the country increased to 1217.74 in the year 2014 with a growth rate of 1.22%. Up to July 1, 2015, total population is estimated about 160411249 of which about 56.8% is young and energetic and expected to increase 201947716 in year 2050. Therefore, we have a great opportunity to make use of these huge human resources.

However, it is not easy to use these resources appropriately with a handsome salary. Although the workers of Bangladesh engage with hard and dangerous work yet they get the lowest wage among the world. A worker working in garment sectors gets about BDT 17000 in China, about BDT 8000 in Cambodia, whereas BDT 5300 in Bangladesh. In addition, the minimum wage for a 19 years old worker is BDT 2596. Still the owners of the garment sectors in Bangladesh are not willing to increase the wages of worker in an excuse of loss. This problem can be solved through industrial automation. At the same time it will secure the valuable lives of people.

Labor force is of a country is considered as similar to the paddle of cycle. The economic development of a country fully depends on its labor force. Bangladesh has a large population and comparatively less skill labor force as estimated about 77.6097 Million of which 41.8 million between 29 to 15 ages. The demographic statistics of the worker is presented in Figure 4 [9]. The most interesting fact is that industrial labor is increasing and agriculture labor is decreasing. As of World Bank report, industrial labor has increased by 4.2% and agriculture labor has decreased by 14% in the year 2005. In recent days, developed countries are using automation for production. Therefore, have to install automation as well as we have to be skilled our human resource. In Bangladeshi least number of worker are high skilled and professional. Therefore, this affects the product quality as well as the production rate. It can be possible to increase the product quality and production with a less risk by simulating the labor force with automation. Through the vision of 2021, Government of Bangladesh is focusing on education sector for making a skilled man power but the benefit of the program will start a few years later. The solution of this problem can be industrial automation.

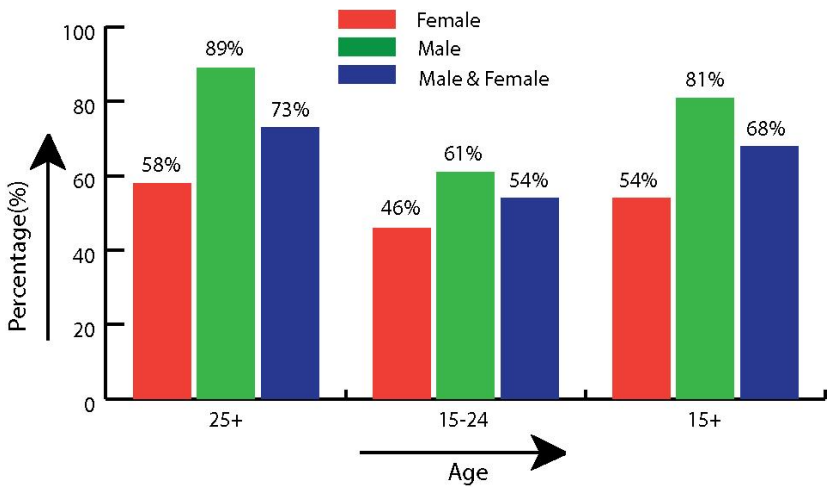

Fig. 4. Workforce data according to age and sex distribution [9]

5. How the automation can be developed in industrial sector of Bangladesh?

Currently, automation is a key of industrial success. If we want be a competitor in world market, we have to produce quality product comparatively with low production cost. We have a large number of labor forces. However, they are not professionally skilled for better production with less time consumption. In the country, almost 52% of the total workers are less-skilled and only 32% are skilled. This huge un-skilled worker reduces the remittance of the country. Although we hire technology from the other developed country but the problem is that no skill man power for operate such machines. Therefore, Government has to concern about this sector. Government should increase training sector, though some private institutes such as Bangladesh automation technologies, PLC Bangladesh are also working to develop skilled man force. As the market of automation is increasing, so the government should establish robotics industries. Robot has already rolling the manufacturing sector as well as production sector. The use of robots in developed countries in manufacturing technology is shown in Figure 5 [10].

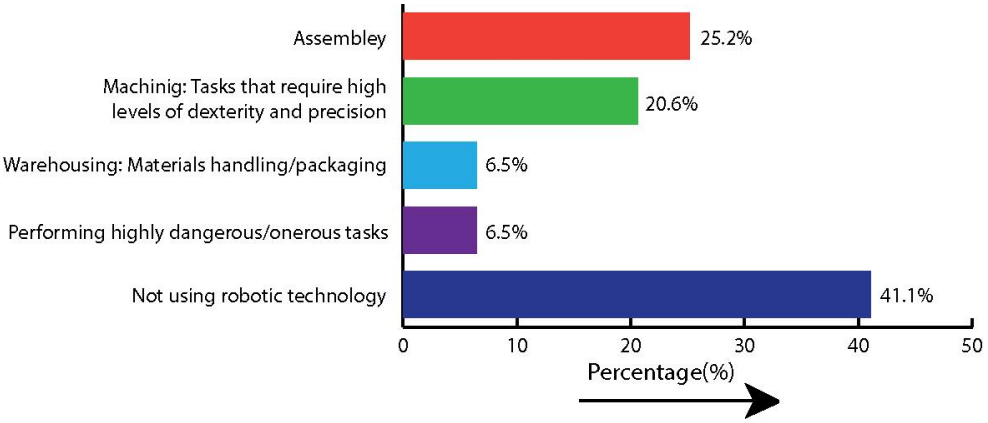

Fig. 5. The road map of using robots in industrial sector [10]

6. Lewis turning point

The model was developed by the famous economist Arthur Lewis from the dual aspects of developing economy consisting of agricultural sector and industrial sector. The industrial sectors are the driving force of economic growth that is supported by human force mainly drawn from agricultural sectors. The low wage of these migrant labors is the reason of increase savings in industrial sector and for expansion. However, a situation will be raised when the labors are no more interested to migrate from the underdeveloped and agricultural sector to modern industrial sector with this low wage. This is known as the Lewis turning point.

Almost all the developed and developing countries like China, India, and Bangladesh are facing Lewis turning point crisis. The effect of Lewis turning point has already affected the product value. The value of product is increasing rapidly and the inflation is also increasing proportionally. China has the world's largest job market and hence the effect of Lewis turning point is affecting China job market. The increased wages of the labor and the labor shortest problem have already stricken in china GDP growth. Because of the technical education the

labor are becoming more skilled and they are demanding high salary which affect the country's job market. The recent industrial occupation category and their hourly wage are illustrated in Figure 6 [10].

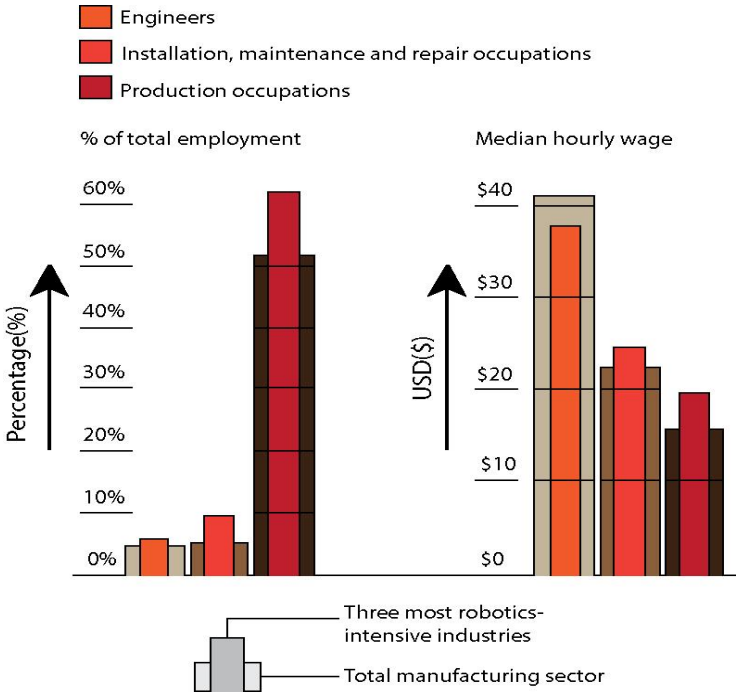

Fig. 6. Employment, robotics and wages [10]

7. Possible solution and effects of Lewis turning point in Bangladesh

The solutions will be come through the increasing use of industrial robots. Developed countries are starting to walk with the theory of installing industrial robot for keeping their market value of product comparing to the developing country. Industrial robots give better efficiency, better product quality with less of wages comparative to the human resources.

We have to consider the following factors that affect the Lewis turning point effects on Bangladesh.

- The population growth rate is decreasing in the country. It has been estimated that over the last 15 years the rate decreased from 1.84% to 1.22%.
- The poverty headcount ratio is decreasing. It decreased from 48.9 % in year 2000 to 31.51 % in year 2010 as shown in Figure 7.
- The GDP per capita based on purchasing power parity (PPP) is increasing. The amount increased from USD 1293.58 in year 2000 to USD 3135.5 in year 2014.
- The most important thing is that education growth has increased dramatically. It has increased 63.62% in year 2001 to 79.94% in year 2012.

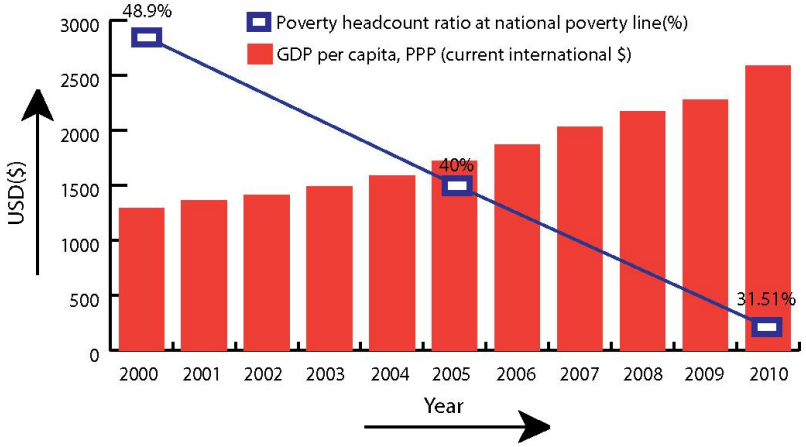

Fig. 7. Per capita GDP in Bangladesh

8. How to ensure sustainable industrial growth?

Due to the decrease of the poverty headcount ratio and the increase of GDP per capita based on purchasing power parity (PPP), people has obtained medium range of purchasing ability. As far the wages of the labor is increasing, after a short period Bangladesh will face Lewis turning point crisis as like as China. Therefore, we need to create an environment where the labor will robot and the driver will be human. So, we must think that how could we do this?

It can be perceived through making skill labor force with high technical knowledge. Without this Bangladesh will not able to be a part of world economy. We need to establish more and more technical institutions and must ensure proper training. Government should make an industrial guide line as well as a proper wages system and should care about the natural resource considering its significant effect on industrial sector. The next age will be the age of robotics; therefore we have to give much emphasis on industrial automation in Bangladesh.

9. Conclusion

The economic success and the internal development of a nation depend upon the development of industrial sector. The industrial sector of Bangladesh is upgrading rapidly. However, the industrial work is largely dependent on human workers, hence the product quality and quantity are low than expectation. The industrial robots can replace the human worker to improve the output of the industry. However, fully industrial automation in Bangladesh is quite impossible due to technical and financial barrier. The country has a massive man power and almost 60% of them are young. Therefore, the successful deployment of the combination of automation and human resource would bring a milestone result in country's industrial sector as well as textile and high-technology.

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