# Technological Transformation and Relevance of Gandhi in Modern India

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Since the beginning of planned development in India, the issue of technology has been raised at various levels and also recognised as one of the aspects of planning strategy. It appears that the process has bypassed problems related to the technology for the eradication of rural unemployment. The present exercise puts forward the basic principles of rural reconstruction as envisaged by Mahatma Gandhi who devoted all his energies in search of viable, sustainable and capital saving machines. The present article, attempts to highlight the views of Mahatma Gandhi in the sphere of technology and suggests means accordingly, so that the worker is not displaced from his/her home and hearth.

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## INTRODUCTION

The credit of various achievements in the field of technological transformation goes to the human race and at the same time, the responsibility for the countless misdeeds in disturbing the ecological balance of our planet also goes to our race. The process of rethinking on the issue of technology for social and economic transformation has made seminal contributions to the evolution of action-oriented human thought, in relation to the type of technology suited to the requirements of the unemployed millions inhabiting rural India. There may not be any controversy over the eradication of poverty and improvement in the quality of life of the millions of people living in Indian villages. This has been the main concern of India's planned development. Moreover, it is strange that most of the country's development plans, envisaged and initiated since Independence, do not reflect the consciousness of the people. It appears that most of the Five Year Plans have bypassed problems related to the people of rural India.

The life of the economically weaker sections of the society, living in villages and small towns, is becoming worse on the one hand and the traditional structure of villages are breaking up on the other hand. This trend is due to the migration of villagers, particularly the younger generation, to cities in search of employment. This has, in turn, lead to living in urban areas a misery on account of over-crowding, insanitary conditions, and so on.

The process of planned development in India has not only created a dichotomous society, but a dichotomous lifestyle also: modern and traditional. The latter is languishing due to the fact that intelligent and competent persons are forsaking their roots to join the modern rat race. The phenomenon of brain drain starts right from remote villages and ends up not just in urban cities in India but in industrialised countries like Great Britain, the United States of America, France, Germany and Japan. It is most threatening that all the best brains — intelligent scientists, technologists and intellectuals of India — are busy in promoting sophisticated and capital intensive technologies for the industrial establishments. This process is adversely affecting developing countries like India in two ways:

- highly educated and skilled persons try to migrate to western countries and all the money spent on their education and training is lost; and
- even if they do not migrate and remain at home, they are engaged in highly sophisticated research work for developing sophisticated technologies that help in promoting and developing large-scale industrial establishments in the country. Consequently, those who deserve, the fruits of planned development are deprived of the same.

Technically, development means helping people to help themselves by providing proper infrastructure and appropriate technology, developed by scientists and technologists. But the present scenario shows that they are engaged in technologies that only help those who are already rich and affluent and tend to ignore millions, who are poor and fighting for survival. Besides Gandhi's experiments of Khadi and other village industries, one of the experiments on rural development was carried out in Baroda (now known as Vadodara), where Maharaja Sayaji Rao Gaekwad III and his Prime Minister, Sir T. Madhav Rao, conducted experiments to help people and bring them out from the stagnant conditions. They felt unhappy about the disappearance of self-governing village republics from the Indian scene. The workers

engaged in the Baroda experiment realised the importance of research and infusing new technologies, which were put into action in the systematic programme of experimental farms. Rabindranath Tagore, also played a leading role by recalling that village artisans in India had, once upon a time, sent their wares far and wide and, thereby, earned immense wealth, name and fame. In the post-industrial revolution era, the Indian crafts industry was adversely affected. Continuous neglect, discouragement and disorganisation, led to faster disappearance of techniques and skills of indigenous production, already in practice since time immemorial. For transforming his dreams into reality. Tagore established a Shilp Bhavan at Sriniketan near Bolpur, in the Birbhum District of West Bengal, to revitalise cottage industries, by introducing capital saving and employment generating, simple and traditional technology. Since the beginning of planned development in the country, many experiments in the field of technology, have taken place. Unfortunately, these experiments, barring a few, have remained confined to isolated areas and have not been replicated all over the country.

The question arises as to what type of technology India needs to utilise the humanpower lying idle in abundance throughout the country. The issue of technology, has wider implications and can not be discussed in isolation. In view of the facts mentioned above, the present exercise is an attempt to look at the issue of technology in the development perspective of the country, and suggest ways and means for transforming the technology in a manner suited to India. Therefore, it is obvious that any development plan worth its name must concentrate entirely on

- the activities of the poor, helpless and needy;
- trying to revitalise dying traditional, but useful, technologies already in practice in remote villages all over the country;
- providing employment and aid the rural poor in generating income; and
- help in relieving extra pressure on agriculture.

## PLANNED DEVELOPMENT

Unfortunately, in the planning process of India, the technology preferred in the production process for the economic and social transformation of the masses, created heavy industrial units. For setting up large-scale industrial units, millions of hectares of fertile land and forests have been encroached for paving, constructing, manufacturing

and fulfilling many other needs of humans. This process has resulted in the saturation of the assimilative capacities of the country's ecosystem. The problem before a developing society, like India, is to introduce and bring into practice an integrated and comprehensive strategy of planning, that may touch every aspect of the day to day life of every human being in society. Since the beginning of planned development in India, a huge amount has been spent in industrialising the country along the Western pattern in the pretext of eradication of unemployment, hunger, poverty, disease and illiteracy. But it is seen that we are far behind the targets, despite commendable achievements in the field of industry, agriculture, science and technology. 'Thus the process of planned development in India has resulted in the form unidimensional modernisation and single track of giantism, due to the fact that the planners had in mind that the development as and when takes place would percolate down to the bottom' (Awasthi, 1988). Surprisingly, it did not happen to the desired extent due to the fact that 'when capital intensive technology operates in country like India, where capital is scarce, it does not work' (Schumacher, 1973).

The traders of modern plants, machines and sophisticated technologies go around the developing world including India, armed with blueprints of their products including feasibility and viability studies in collaboration with consultants of respective countries, to sell their capital intensive and labour saving technology. It was Gandhiji, who, for the first time, raised the warning signal as early as in 1909 in a discourse about the Indian Home Rule published under the title Hind Swaraj, against industrial civilisation and declared that 'industrialisation, I am afraid, is going to be a curse, for mankind' (Gandhi, 1938). Unfortunately, it was not taken seriously by the builders of modern India and the process of modernisation continued unabated. Gandhiji was convinced that mass production by big industrial units was crushing human beings, for whom a better life was meant. Therefore, he pleaded for decentralised pattern of production with small and simple machines as he strongly believed that the health of an individual and the well-being of society largely depended upon the nature and type of technology used as a means of production. Gandhiji always advocated for sustainable development and was against massive industrialisation and undue exploitation of human and natural resources. Gandhiji foresaw that the future of industrialism was dark for the world and disastrous for India. Recently,- many intellectuals and thinkers from all over the earth have realised the grimness of industrialisation

and have started calling for a stop to these vagaries. Among them is Mike Cooley, an international authority on human-centred computer systems and joint winner of the Alternative Noble Prize, and author of the book *Architect or Bee: The Human Price of Technology.* He said, 'India should not slavishly repeat mistake and take technologies from multinational companies. The key competency for the 21st century will be to build upon the part time aspects of science and technology and marginalise the negative aspects. The precious asset for a country is the skill, ingenuity, imagination and its people' (Cooley, 1998).

Answering a question about the future of humanity in an industrialised world, Gandhiji stated 'It is exploitation, I will not say of weaker nations by sister nations. And the fundamental objection to machinery rests on the fact that it is machinery that has enabled these nations to exploit others' (Gandhi, 1931a). The motivating force behind industrialising India, has been the influence of western economic ideology in promoting the process of modernisation since India achieved Independence. Indiscriminate establishment of heavy industrial units has paved the way for denudation of forest cover and concentration of population in metropolitan cities and industrial towns. This process has also encouraged the influx of rural population in search of employment to the urban centres. On account of inadequate infrastructure and civic amenities, life of urban inhabitants has become miserable.

## RURAL-URBAN MIGRATION

The process of modernisation and indiscriminate establishment of heavy industrial units throughout the country, has given fillip to rural-urban migration. In this process, most of the farmland in the vicinity of urban centres have been encroached by sprawling cities. As per the 1991 census data (India, 1991), nearly 27 per cent of the population of India lives in urban India. The percentage of urban population in cities of one lakh and more, is rising while the population in cities with upto one lakh, is stagnant. This process has created disparities in socioeconomic and cultural spheres between the population of metropolises and the other cities and towns and between the rich and poor within the metropolises.

Due to lack of infrastructure and housing facilities, slums, particularly in metropolitan centres, are coming up fast. According to the 1991 census data, the percentage of slum dwellers in Calcutta is reported to be 44.10, Greater Bombay 45.25, Delhi 38.30, Madras 38.88, Bangalore 15.00, Hyderabad 25.00, Kanpur 46.00, Pune 2.00, Nagpur 36.00,

Lucknow 45.00 and Jaipur 19.00 (India, 1991). These figures indicate that the population living in slums of the million-plus-cities averaged around 38 per cent. Slums undoubtedly house the urban poor, whose level of income is much lower than that of the other low income group households. A majority of these people live in absolute poverty and unhealthy living conditions.

## STATE OF THE INDIAN ECOSYSTEM

The major issue of environmental conservation is closely related with the way the cities of India are built. The problem of air pollution caused by industrial effluents and poorly maintained automobiles, in addition to land and water pollution has created catastrophic situation. These effects have not just been felt in cities but have spread to surrounding towns and hinterlands. The intensive use of fossil fuels have also contributed in polluting the air due to emission of obnoxious gases from the thermal power plants and other industrial units, tanneries and untreated sewage discharges. These facts clearly testify that the process of industrialisation, by using capital intensive technologies, is heavily drawing upon the basic life supporting system and makes the task of environmental conservation beyond control. The process of rapid urbanisation has adversely affected physical, chemical and biological characteristics of the ecosystem, on which the survival of humankind depends. As a result of over-exploitation of natural resources and other human misdeeds, water has become contaminated, the air poisoned, rivers clogged, atmosphere choked and forests dwindled away.

Scientific discoveries and technological inventions have equipped humans with unlimited powers to exploit nature. We can move on mountains, cross oceans, alter the course of rivers, bridge the gulf and change deserts into green pastures. This process has disturbed the ecological balance and structure of the earth. The use of fossil fuels have accelerated global warming, which is being experienced in the form of poisoned air. On account of the greenhouse effect, the built-up carbon dioxide is spreading fast in the atmosphere. These are the findings of scientists and environmentalists who have now started realising that there is a great danger of illnesses like cancer, blindness, and soon as a result of radiation hazards, due to depletion of the ozone layer, unabated denudation of forests, desertification and soil erosion. Humans, through their endless manifestations, have brought about crisis to the entire biosphere. Massive industrialisation has destroyed

numerous forms of life and disturbed the natural balance. The fact, that healthy mind rests on an organism, which cannot withstand all strains of remorseless destruction, has slipped from man's mind.

## MAHATMA GANDHI AND HIS MISSION

On his return from South Africa, Gandhiji widely traveled the country as suggested by Gopalkrishna Gokhale, to know the people, their culture and the problems confronted by them. He found that rural unemployment, untouchability, illiteracy and insanitary conditions were the root cause of all miseries faced by villagers throughout the country. He decided to take up the issue of saving the villages from poverty, unemployment, disease and illiteracy. Gandhiji initiated a nation-wide campaign to make each and every village self-sufficient and self-reliant. He found that the *charkha* (spinning wheel) was the only viable means to save the people from inhuman socioeconomic conditions. In due course of time, the *charkha* not only became a symbol of freedom, but an instrument of transforming the technology suited to India. Gandhiji felt that all evils were rooted in the centralised production system. Therefore, he cautioned his fellow citizens that decentralised production system should not be allowed to suffer. He believed that the western system of industrialisation was based on mass exploitation and felt that there was no need for India to become an industrialised nation in the western sense.

It was the result of Gandhi's committed efforts that *khadi* and the goods produced by cottage industries brought a revolution in the country and soon took the shape of a national movement. Kumarappa and Gadgil, were very much convinced with this ideology and elaborated Gandhi's ideas further and gave them concrete shape. Vinoba Bhave, Jayaprakash Narayan and Anna Sahab Sahasrabuddhe provided leadership for the work of village upliftment through the Sarvodaya Movement. It was in the Sarvodaya Plan that a comprehensive village plan was prepared. It emphasised improved techniques, tools and machines which would increase efficiency and culminate drudgery by providing employment to the millions of Indians, particularly in their idle hours, at their doorsteps (Dev, 1958).

## GANDHI-NEHRU CONFLICT

What Mahatma Gandhi subscribed in his book, *Hind Swaraj* (Gandhi, 1938), has lost much of its efficacy in his own land, and the Indian planning has become an irksome constraint in achieving the desired goal of making India a welfare state. India's first Prime Minister,

Pandit Nehru's name is often quoted with the name of Gandhiji in connection with the industrialisation of the country. Gandhiji strongly opposed the idea of centralisation of heavy industries and modernisation, as envisaged by Nehru. According to Awasthi (1998):

> There had been conflicts between Gandhi and Nehru on the issues related to the *industrialisation and modernisation* of the country. This was due to the fact that Gandhi's outlook was shaped by the conservative and deeply religious social make. His actions were dominated by moral imperatives, while Nehru was the product of western tradition. Gandhi believed in *purity of means* and Nehru reached his conclusions through *reasoning and analysis.*

It does not mean that Gandhi was against science and technology, as he himself proclaimed that 'I would prize any invention of science for benefit of all' (Gandhi, 1935). Nehru, in support of his views, clearly states that (Gopal, 1980a):

> I am personally a believer in the development of large scale of industries, Nevertheless, I wholeheartedly support the Khadi Movement as well as other Village Industries' Movement for political, social and economic reasons. In my mind there is no essential conflict between the two, although there might be occasionally conflict in regard to the certain aspects of development of both.

For Gandhiji, the village was the primary unit and the individual a central point for economic activities and community organisation. He never approved the industrial culture as he felt that it not only dehumanised humans, but also infested village people with it's baser appetite and destroyed the self-reliant character of Indian villages. For Gandhiji, economic and social transformation were closely related to the moral and spiritual values and understanding of the individual. As a result, he never endorsed Nehru's planning based on heavy industrial establishments. For Nehru, large-scale industries and multi-purpose hydro-electric projects were the temples of modern India. In due course of time, Nehru found that his dreams were shattered, and he had to go one step backward and admit that (Gopal, 1980a):

> Gandhi has done a great service to India by his emphasis on village industries. Before he did this, we were all nearly all, thinking in a lopsided way and ignoring not only human aspect of the question but peculiar conditions prevailing in India... It is also possible that the total wealth produced by a large number of cottage industries might be greater than that of some factories producing the same kind of goods.

In other words, he was convinced with Gandhi's approach of production by the masses.

## SUSTAINABLE TECHNOLOGY

Mahatma Gandhi is regarded the world over as a great philosopher, reformer, politician and a crusader of non-violence. But very few people have tried to bring about his thinking on the issue of technology and environment, and his qualities of understanding in connection with the same. The concept of sustainable technology and survival of humankind, for which the environmentalists are embarking upon to save the planet from an ecological disaster, is inherent in the ideology of Mahatma Gandhi. He warned the people and raised many issues related to the mechanisation and industrialisation and its effect on the environment, on which the survival of humankind depended, at the time when it was not a major concern as it is today. As early as in 1927, Gandhi had warned the world about the disastrous situation with which entire humanity would be engulfed and cautioned that 'the Industrial Civilisation is a disease, because it is all evil. Let us not be deceived by catch words and phrases' (Gandhi, 1935). He further added that 'If machinery craze grows in our country, it will become an unhappy land' (Gandhi, 1935). Gandhi was well convinced that if India became heavily industrialised, it would be driven to exploit the natives as well as nature and visualised that (Gandhi, 1934):

> The future of Industrialism is dark, England has got successful competitors in America, France, Germany and Japan. It has competitors in the handful of mills in India and as there will be awakening in South Africa, with its vastly richer resources, natural, mineral and human, the western nations may cease to find a dumping ground for their wares and the future of industrialism is dark for the west, would it still be darker for India'.

One should keep in mind that Gandhi was not opposed to technological innovations. What he simply stressed, was the control and regulation of its use, so that the other values were not lost in the process of technology introduction. Sophistication in technology and huge capital investment in research and development, is the result of growing demand of luxurious consumer durables. In view of the growing consumerism, Gandhiji suggested to his fellow citizens, to limit their needs.

Prof. E.F. Schumacher, a British trained Gandhian economist, was very much influenced with the thought and vision of Mahatma Gandhi.

He pleaded that the technology that had to be brought into practice must be related to the socioeconomic and environmental realities, so that humans can be saved from various types of miseries. Therefore, he suggested that (1973), 'The type of technology must be based on indigenous scientific research so that can draw into productive employment, the unemployed manpower of the country with the help of limited resources available. It must also bring all the sectors of economy into practice. The thinking should be diverted in terms of new pattern of technology'. In the beginning of the twentieth century, Gandhiji suggested for the implementation of the khadi programme by using *charkha*, a symbol of sustainable technology and means of achieving *swaraj* (self-rule) for the people. Gandhiji had a strong opinion and conviction that the work must be brought to the needy, to where they live and they should not be allowed to migrate. Schumacher (1973) strongly supported and advocated such a type of technology, 'which must eschew all types of violence against man, nature, environment, society and life'.

## SWADESHI AND SWARAJ

India recently celebrated the Golden Jubilee of its Independence, but the dream of eradication of poverty and unemployment is yet to be fulfilled. This state of affairs is the result of a centralised system of mass-production. Therefore, it has become imperative to take the surplus load of working force to more efficient and productive alternatives, through adoption of viable technology to ensure that the surplus humanpower is employed gainfully. Development plans should be formulated keeping in view the basic principles that, 'capital saving and environmental friendly technology', is given its due place so that, the flight of people from villages to towns and cities, contributing to the growth of dysfunctional primate megalopolises, is arrested. The ultimate goal of Gandhiji was *swaraj*. He had a clear vision that unless India became free from British rule, the dream of the swadeshi movement would remain merely a dream. He understood the importance of village craft and household industries in the economy of the country. He was sure that if villages were uplifted the country would be free from bondage. Opposing the use of sophisticated and capital intensive machines and tools, Gandhi (1924) said, 'I will rule out any machinery, even I would reject the body which is not useful to salvation and seek the absolute liberation of soul. From that point of view, I will reject all machinery'. Gandhiji admitted that 'Machines will remain, because they are like a body, they are inevitable. The body itself is a pure mechanism but if it is a hindrance to the highest flights of soul, it has to

be rejected'. Gandhiji was basically a staunch advocate of the reinstatement of human beings. He did not find machines suitable to India, where a great fleet of unemployed people were struggling for very survival though he accepted that:

> Mechanisation is good, when hands are too few for work intended to be accomplished. It is evil when there are more hands than required for the work, as is the case of India. The problem with us is not how to find leisure for the teeming millions inhabiting our villages, the problem is how to utilise idle hours, which are equal to working days of six months in a year. (Gandhi, 1924).

The ongoing trend of technology transfer not only destroys energies and resources, but also kill values, culture and institutions of the highest order, which are unavoidable to congenial atmosphere for sustainable development. Schumacher (1973) attributed that: 'Induction of sophisticated technologies displace workers from their homes and hearth and make adverse affect on environment. Ever bigger machines entailing ever bigger concentration of economic power and extending ever greater violence against the environment, and do not represent progress. They are denial of wisdom.'

Thus, for eradication of poverty and removal of unemployment, Schumacher (1973) suggested a technology called Appropriate Technology based on following principles:

1. Small in size, so that the units can be in large numbers, and dispersed all over.
2. Simple in organisation; so that it may be organised and understood easily by ordinary mortals, especially the simple village folk of the countryside.
3. Capital saving, so that it does not consume scarce capital.
4. Non-violent and non-exploitative, which means it uses replenishable energy and animal power as for as possible.

## KHADI AND VILLAGE INDUSTRIES

The Indian National Congress, in its special session of 1920, adopted a resolution regarding *khadi* as a measure of discipline and self-sacrifice for every man and woman of India. The All India Khadi Department was created, in the year 1922, for supervising the production of *khadi* carried out by provincial and subordinate committees. The Department was later substituted by All India Khadi Board in 1923. Gandhiji witnessed commendable growth in the *khadi* production activity and felt that there should be an independent organisation

for the *khadi* programme. The prompted him to create a national-level organisation, and the All India Spinners' Association was created by him in 1925.

The Directive Principles of State Policy, as enumerated in the Indian Constitution, provides the right to adequate means of livelihood (India, 1961). In pursuance of the provision, the Government of India set up an All India Khadi and Village Industries Board to organise and promote activities pertaining to the activities of *khadi* and village industries. Later, the government decided to provide more autonomy and constituted an autonomous body, the Khadi and Village Industries Commission (KVIC), by an Act of the Parliament and the KVIC came into existence on April 9, 1957.

The First Five Year Plan treated the activities of KVIC as a conjunct to the development of agriculture. The second plan carved an independent position for the sector to meet the growing demand of commodities of common needs. The Third Five Year Plan laid emphasis on the integration of *khadi* and village industries in the rural economy and spelt out the concept of rural industrialisation. The Fourth Plan brought a significant change in the basic approach towards the promotion *of khadi* and village industries on the basis of the recommendations of the Asok Mehta Committee and fixed social, economic and other wider objectives, for creating self-reliance among the rural people and building a strong community spirit in rural areas. As a result, the programme was spread in 6,000 villages with the production of ten million square yards of *khadi*, valued at Rs. 3.4 million with 517 outlets before the KVIC came into existence. According to Mukherjee (1995):

> By the year 1994, there has been a tremendous growth in the network and thirty Khadi and Village Industries Boards at state level, 3520 directly aided institutions, 29000 co-operative societies and over half a million individual entrepreneurs with 14,113 scales outlets covering 2.3 lakh villages, came into existence. The production of *khadi* in the fiscal 1994-95 reached to the tune of Rs. 353.5 crore and Rs. 2.523 crore worth of village-industry products and provided employment to 14.45 lakh persons in Khadi and 36.05 lakh in village industries'.

Also according to Mukherjee (1995), 'There were 3.64 crore of registered unemployed at the beginning of the Eighth Plan, instead of job opportunities that could be created with the massive investment in the next two Five Year plans, a staggering figure of 10.38 crore will remain unemployed'.

The figures mentioned above clearly indicate that Gandhian alternatives, in the field of technology, for providing employment through the use of indigenous and capital saving technology in cottage and small-scale industries like production of *khadi* and manufacturing by village industries, have become more relevant today. The former Prime Minister of India, Narsimha Rao launched an intensive development programme of *khadi* and village industries in 125 community development blocks all over the country to mark the 125th birth anniversary of Mahatma Gandhi.

> Under this programme as many as 1000 persons were offered employment in each Block. The significant aspect of this programme was — where production of Khadi was flourishing, setting up of village industries was given priority and where village industries were concentrated production of Khadi was taken up. The Planning Commission also increased its allocation funds under the head Rural Development in the Eighth Plan to the tune of Rs. 30,000 crore from Rs. 7,000 crore during Seventh Plan'. (Mukherjee, 1995).

## TECHNOLOGICAL TRANSFORMATION

Since 1925, when the All India Spinners' Association came into existence under the leadership of Mahatma Gandhi, a number of tools and equipments, including small machines have been developed and introduced in the field of *khadi* and village industries production programme. For conducting experiments and field trials, the Khadi Prayog Samiti (KPS), an experimenting agency, was set up at the Sabarmati Ashram at Ahmedabad and for village industries at the Jamnalal Bajaj Institute at Wardha. In the field of spinning, experiments have reached from Takall to New Model Charkha (NMC), based on ring frame technology, prevalent in textile mills. During the lifetime of Mahatma Gandhi, a simple mill-worker, Ekambarnath Iyer developed a four spindle, all wooden frame, spinning wheel. Since then, a number of models of *charkhas* have been developed such as six and eight spindle *charkhas,* 25 and even 50 spindle *charkhas.* For spinning, coarse count of yarn, the Multi-Count Charkha (MCC) and Mudleri Charkha, for wool spinning, are also in practice. Recently a *charkha* developed by the KPS for spinning, was ready for field trials. The latest development in the field of decentralised spinnings is a Mini Spinning Mill, that can dramatically enhance the potential of employment for rural unemployed men and women. The motorised spinning wheel is modeled on the *charkha* that Gandhiji used to spin yarn to

make his own clothes. The motorised *charkha* with 12, 16 or 24 spindles can spin yarn four times faster than the traditional contraption. It has been developed by Sharmil Vikas Sanstha (SVS), an NGO headed by Sanat Mehta, a former Member of Parliament from Gujarat. The innovative *charkha* can be run by a single phase, half horse power engine to produce high quality cloth of 40 counts, that can compete well in the market. It has been manufactured with the help of Udyog Bharati, an organisation based at Gondal in Rajkot district in Gujarat.

In the pre-processing activity of the *khadi* sector, small processing machines have taken the shape of Central Sliver Making Plant. It helps to provide ready-made rovings, on a large-scale, to the spinners scattered in a cluster of villages. Besides transformation in traditional technologies, the KVIC, has also developed and promoted 'polyvastra', an amalgamation of cotton and polyester as well other blended textiles.

Tremendous innovations have taken place in the field of village industries. The traditional oil *ghani* (oil-crushing unit) has been replaced by portable power driven *ghani;* traditional potters' wheel by Sheller Potters' Wheel; traditional paper making units by Cylinder Mould-Van-Unit and Raspador Machines for fibre extraction. Consumer articles like toilet and washing soaps, shampoos and fancy articles from bamboo, cane and palm leaves; stationery articles and many other things are produced by village industries. The improved technology used in the manufacturing helps to provide higher wages to the workers. The eco-friendly nature of technology used in the manufacturing process, in this sector, has become an asset, and has also created competitive demand among the foreigners visiting India.

## SUMMARY AND CONCLUSIONS

The centralised production and distribution system has encouraged migration of rural people to the cities and towns in search of a living. Consequently, the cities of India are becoming unmanageable day by day, due to lack of proper civic utilities and housing accommodation and other facilities. Villages are suppliers of raw materials to the cities and buyers of consumer articles produced in large-scale industries located in metros and other large cities. This process had its beginning just after the Industrial Revolution and is continuing unabated, even today. When Gandhiji saw this trend after returning from South Africa, and had an extensive tour of the entire country at the behest of Gopal Krishna Gokhale, he realised that machine made cloth imported from Lancashire

and other cities of the United Kingdom, should be stopped forthwith. He gave a call for indigenous production by small machines like the *charkha* and suggested that the type of technology developed should be determined on the basis of the harmony of technology with nature. Renowned Gandhian economist J.C. Kumarappa, was so influenced by Gandhiji's ideology that he also opined that, 'Any action to be termed scientific should conform to the nature on all the bearings, and where we deviate from nature we are unscientific' (Kumarappa, 1948). Since the Industrial Revolution, the process of modernisation has posed a challenging task before the entire global ecosystem. As a result, humanity is engulfed with the adverse effects created by environmental pollution. This is the result of indiscriminate use of sophisticated technology. Now it has become imperative, that the technology should be devised and developed in such a it way that may fulfill minimum material needs of the people and encourage production by 'masses', as otherwise endless sophistication in technology will prove disastrous for the existence of humanity. It has now become unavoidable that the technology pressed into action should centre around each and every individual and should also be need-based, environment friendly and be able to contribute to the opening of moral, spiritual and intellectual faculty of every human being. Technological progress signifies structural change that could arrest pressure of population on urban centres and enhance the capacities of villages to cope with their problems.

Gandhiji had a dream of self-reliant and self-dependent people and self-sufficient villages so that true *swaraj* could be achieved. If the dream of Gandhiji is transformed into reality, it will certainly help to decrease the pressure of population in cities and help in creating technological advancement of the highest order.

In the light to arguments mentioned above, a few Gandhian alternatives are suggested below:

1. The process of economic activities should be geared up to make every village self-sufficient for the vital needs and supporting cities only with surplus.
2. Large-scale industrial establishments should not be allowed to produce goods that can be produced by cottage and village industries.
3. The Constitution of India (73rd Amendment) Act, 1972, on Panchayati Raj should be implemented and programme of village upliftment, as visualised by Gandhiji, should be entrusted to the newly constituted Gram Panchayats.

Suitable alternatives in the field of technology, as desired by Gandhiji, if introduced and promoted, will definitely bring about a technological revolution. For example, in the process of *khadi* production and manufacturing by other village industries, constant research and feedback is essential to scale down or upgrade the type of technology to' increase the potential of machines, tools and other modes of production, so that more employment avenues could be created.

Research and experiments in technological transformation, as suggested by Gandhiji, would definitely make a significant contribution in the eradication of rural poverty. For the implementation of proposed schemes, a coordinating agency, in each region of India, representing the Indian Institute of Technology, the Social Science Research Institute and concerned departments of respective universities should be created. These catalytic agents should be entrusted with the responsibility of gathering information on the technologies being used for manufacturing and other related processes for the use of common consumers. A few activists, who are associated with non-governmental agencies and engaged in rural development programmes, may be involved. Thereafter, each Regional Centre should produce a technology directory, and the information, thus gathered, should be exchanged with each proposed centre. This will help in exchanging and transmitting the blueprints of machines and their technical data from one centre to the other and will prove helpful in introducing a viable and efficient technology.

However, it must be borne in mind that technological revolution in India is not possible unless the government comes forward with a national technology policy.

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