

Effects of Disruptive Technology in Agriculture, Manufacturing and Service Sector



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Disruptive Technology is one that displaces or replaces an existing technology and brings about a path breaking change in the industries involved. Has the term “DISRUPTIVE TECHNOLOGY”, used recently? The term might have been coined recently, but the usage has been for very long time even before any kind of technology came into play. For eg, initially people followed Barter System for exchange of goods, eg giving rice and getting wheat, exchanging copper for iron etc. But lately the Barter system has been replaced by the usage of currency. This was followed for long time. Then came the usage of plastic money (Debit & Credit Cards), then internet banking, mobile banking etc. All these are new technology, which replaces or even disposes the older technology or method. We have been using the new technology and disposing the older ones, but without knowing the name of the same. Even in agriculture, farmers used to use bulls for ploughing and also use the excretion of the animals as natural fertilizer, but now those has been replaced by tractors and chemical fertilizers. Again this is Disruptive Technology, at its best, but without people realising it. Now let us discuss on how this term gained its importance.

1. Introduction

In 1997, Professor Clayton M Christenson from Harvard Business School coined this term. He classified technology into two categories – Sustaining & Disruptive. Sustaining technology deals with some improvements to the existing technology. Disruptive technology lacks the improvement as it is a brand new technology. The problems arising because of it is also more, as that will be the benchmark and most importantly there will be no proven success or application for the same. We will be discussing on how successfully has this been done and implemented in various fields and industries and what are the pros and cons of the same in this article. Every country’s economy is calculated as positive or negative based on the growth or drop in Gross Domestic Product (GDP).

The components for the calculation of GDP is

- Agriculture
- Manufacturing/Industry
- Service

Our article is also based on the similar lines. First we will discuss about the implementation of technology in Agriculture sector, Manufacturing or Industry and Service sector.

2. Agriculture

Agriculture is the backbone of Indian economy and more than 54% of the population and around 70% of the land is involved in agriculture. Also the GDP of agriculture for India is around 17-18%. So, the GDP of agriculture has to be improved, for which the productivity has to be improved. One of the best technique that can be adopted is:

- Integrated Farming System (IFS)
- Effective usage of Artificial Intelligence
- Internet of Things
- Indoor Farming (Plant Factory with Artificial Lights)

3. Manufacturing/Industry

For a country to have a good progress and a faster growth, the industry sector has to contribute more. Some techniques under this will be:

- Introduction of Electric Vehicles
- Drone Taxis
- 3 D printing in medicine
- Augmented Reality

4. Service

The various techniques under services will be:

- Banking Sector
- Currency
- Mobile phones & Computers

- Hawk Eye, Hot Spot etc
- Block Chain Technology
- Cancer Treatment

The objective of this paper is to stress the importance of “Disruptive Technology” can be both a boon or bane and how the marketing will play a vital role in the success of the same.

4.1 Agriculture

Income, innovation and integration are key to new-age agriculture as opposed to input-intensive mono cropping, along with complementary and supplementary enterprises. These will ensure stability for small and marginal farmers, points out Tomio Shichiri. Here is a look at the disruptive models and how they work in India.

Agriculture is the primary source of livelihood for the majority of Indians, accounts for 46 per cent of total land use and contributes around 17 per cent of the country’s GDP. An overwhelming majority of the Indian farmers, say 80 per cent, are small and marginal farmers, with less than one hectare of farmland per family. And the fragmentation of landholding continues. Moreover, these resource-poor farmers are particularly vulnerable to the ecological and economic impact of climate change.

The focus on input intensification is obvious as food security is often strongly linked to increased food production. But it is important to recognise that increased food production does not necessarily translate into improved food and nutritional security. For instance, India is a net exporter of food grains but ranks 103 out of 119 qualifying countries on the 2018 Global Hunger Index. With a score of 31.1, the country suffers from a level of hunger that is serious and accounts for the largest absolute number of undernourished people globally – 195.9 million during 2015- 17, up from 190.7 million during 2014-16. Moreover, to increase food production, the focus has been on mono cropping of a few staples, which, in turn, has led to lower production and consumption of indigenous and traditional crops/grains, fruits and other vegetables, impacting food and nutrition security in the process.

It is crucial for the country to rethink its agricultural paradigm and design one that suits small and marginal holders. One such disruptive approach could be the ‘small farmers, large field’ (SFLF) model, which was initially conceptualised in Vietnam and has spread rapidly from eight hectares to 1,96,000 hectares between 2011 and 2015. It can also strengthen backward and forward integration along the supply chain.

Another disruptive model is the integrated farming systems (IFS), offering potential solutions to nutritional and livelihood security. Its adoption could enhance the sustainability of agricultural production systems as a whole while strengthening the resilience of small and marginal holders. More specifically, the IFS involves several sub-systems, including crops, orchards, livestock, fisheries, and their synergistic interactions.

The model promotes sustainable systems such as recycling of farm waste for productive purposes, community-led local systems for water conservation and agro-ecological practices. In fact, alongside growing crops, a judicious mix of other income-generating activities such as dairy, poultry, fishery, goat rearing, vermicomposting and beekeeping will enhance livelihood resilience and ensure steady incomes.

IFS also improves small and marginal holders’ access to diversified nutrient-dense foods from all food groups – vegetables, fruits, animal-source foods, legumes, nuts, oilseeds and fats. Hence, it contributes to the 2030 Sustainable Development Goal of Zero Hunger, which requires agriculture and food systems to be more, sustainable, climate-smart and nutrition-sensitive.

Models based on IFS and focussed on crop-livestock-aquaculture have been tested across Indian villages. For instance, Annamalai University demonstrated an integrated rice-fish-poultry farming system on 430 farm holdings in 12 villages of Cuddalore, Viluppuram, Nagapattinam and Tiruvannamalai districts of Tamil Nadu. The results indicated an annual increase in net returns per household by Rs 33,000 - Rs 50,500 per hectare for two and three crops, respectively. Besides, poultry manure from poultry dropping was 11.4-19.6 tonnes per hectare and pest suppression ranged from 17-27 per cent.

An integrated rice-fish-vegetable farming model, utilising the residual moisture and nutrients from fish activities, was promoted by Assam Agricultural University across 160 hectares. The system used trenches, dug on the sides of the rice fields (followed by vegetable cultivation) to accommodate the fish species. And the net economic benefit per household per annum was Rs 29,000. While rice production rose from 2.97 tonnes per hectare (baseline value) to 4.6 tonnes, the beneficiary farmers got an average of 41 kg of fish and 1.7 tonnes of vegetable from rice fields measuring 2,800 sq. m.

IFS involves meaningful combinations of complementary and supplementary enterprises leading to optimal and sustainable use of natural resources, effective utilisation of available by products and profitable employment to farming households throughout the year. These, in turn, lead to higher combined farm income generation coupled with a high degree of stability and prosperity. It can be a powerful tool to double farmers’ incomes and improve their lives. Furthermore, interventions in the IFS mode have resulted in increased percolation, reduced evaporation due to subsurface storage, low risk of breaching/damage during heavy rains, controlled run-off movements and lower costs compared to check dams. Then again, it presents a simpler technology, which is easily understood by farmers. Therefore, the IFS-led ‘disruption’ can set the course towards a more sustainable agro ecological farming and improved ecosystem services, which are essential for immediate and long-term agricultural success.

4.2 Artificial Intelligence

Tartan-Sense founded in 2015, has introduced a hump backed two legged bot called BrijBot. It is a weed killer and is targeted to benefit small cotton farmers. Presently, removing weeds, which compete for nutrients with the crop and bring down the

yield, is a tedious and manual process. Besides the cost of labour increasing, tractors with a wide maw are incapable of targeting the interlopers. BrijBot on the other hand captures images from the field, runs an algorithm on the photographs to detect a weed and releases killer chemicals on the target. Clearly this can be seen as an example for the case of 'niche positioning'.

4.3 Internet Of Things (IoT)

Skymet, founded by Jatin Singh has 6,500 weather stations across the country and uses IoT and sensors to predict weather, air quality, lightening and climate change. The start-up makes money from data subscription and ads on its app and website. Working with tens of thousands of farmers the company has saved lives by predicting cyclones and droughts. Skymet, like Tartan Sense is a player in the 'niche positioning' segment.

4.4 Manufacturing/Industry

Manufacturing and Industry plays a major role in the development of the country. Also, it is the second highest contributor for the GDP, comprising almost 24-26%. The vision of our honourable Prime Minister is to make this sector contribute around 35% by 2022. Make in India is the primary step towards the same. There are some major innovations happening in this field. Some are:

4.4.1 3D Printing

This is going to be the future, as already this technology has become prevalent in many industries such as Architecture, Surgery, Music etc.

In less than 24 hours, a 400-square-foot house was constructed in a suburb of Moscow with 3D printing technology. The possibilities for quickly erecting houses and other structures with 3D printing are intriguing when time is critical such as to create emergency shelters for areas after a natural disaster. Additionally, the potential for new architectural visions to be realized, that weren't previously possible with current manufacturing methods will lead to design innovations. An entire two-story house was 3D printed from concrete in Beijing in just 45 days from start to finish. Researchers from Germany even 3D-printed a house of glass—currently only available in miniature size—but they were the first to figure out how to 3D print with glass. It's slowly gaining its prominence.

4.4.2 Drone Taxis

Boeing has been very active in the drone space. Most of their efforts in the military space. Some spin-offs have seen civilian work, like the fire-fighting efforts of Institute, again here in Oregon. The Aurora purchase brings autonomy smarts more than drone smarts.

But in India, it's going to be very difficult for Drones to become a success. Major reason will be contributed to the traffic.

4.4.3 Internet of Things (IoT)

Manufacturers are increasingly leveraging the Internet of Things (IoT), which entails the interconnection of unique devices within an existing Internet infrastructure, to achieve a variety of goals including cost reduction, increased efficiency, improved safety, meeting compliance requirements, and product innovation. IoT's existence is primarily due to three factors: widely available Internet access, smaller sensors, and cloud computing.

Roughly 63% of manufacturers believe that applying IoT to products will increase profitability over the next five years and are set to invest \$267 billion in IoT by 2020. They understand that IoT empowers them to make informed strategic decisions by providing crucial, real-time information. Nearly a third (31%) of production processes and equipment and non-production processes and equipment (30%) already incorporate smart device/embedded intelligence according to The MPI Group. Similar percentages of manufacturers have a company strategy implemented or in place to apply IoT technologies to their processes (34%) or to embed IoT technologies into products (32%).

Since lot of new technologies arrive regularly, the human effort and the job done by them becomes minimal. Hence, lot of people are losing jobs. If we can find a solution for this, then Disruptive Technology will be one of the best way to move forward.

4.4.4 Service

India's major contribution towards GDP comes from this sector. Service sector contributes almost 57% of the GDP of India. So, the technologies that comes under this sector will be very important.

4.4.5 Banking

The usage of banking sector in the initial days was only to save money. But later on the banks included Credits, Loans (Business, Education, Farmers etc), Debit & Credit cards. So everyday, in banks disruptive technology plays its part. Also, as and when the banks started updating themselves with new technologies, the people who were working in the system for long time, were not able to update themselves. So, lot of people were given Voluntary Retirement Scheme.

4.4.6 Currency

From currency of every country, there came a time where plastic money or online transaction was used. But now Block chain technology, Bitcoins are gaining predominance.

4.4.7 Social Media

ORKUT was a classical example on how disruptive technology will actually make a technology or a product obsolete. Before 12-14 years, even before Facebook, Orkut was the social media platform for those days youngsters. But now it's Facebook,

Instagram, Twitter etc. So technology will keep on coming in and moving out. So the success or failure of these medias will be dependent on the longevity.

Also according to Mr Vishal Sikka, Managing Director of Infosys, the biggest disruption is the tidal wave of automation and AI that can easily replace technical jobs. The major reason being the pace at which the technology is being developed, is not being coped up by the humans.

All these technologies can be made a success or failure by effectively reaching it to the audiences. This can be done by proper marketing strategies. Unless, a product or a technology is properly marketed. For example IFS got its importance and gained value after many people from software quit their jobs and started telling the importance of the same. Like-wise every new technology is being marketed or sold using the effective marketing channels.

5. Conclusion

The technology has grown or even outgrown humans in such a way that even the Election Results are being influenced by Social Media - Twitter, Facebook, Instagram. Everybody has a chance to voice out their opinion and this forms a major reason. Now people are trying to get married to Robots.

Whatever technology the humans invent, it would be of no use, if people can't live according and with the nature. What's the use of 4G technology, if we don't have water/proper air for the upcoming generation? What's the use of mobile phones, when small living creatures are dying because of it.

6. Reference

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