

Contribution of Artificial Intelligence in Sustainable Management of Agro Processing Industry

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Abstract

Agricultural processing and development will benefit not just for farmers, but also a huge of the rural people who are involved in agriculture or indirectly related to agriculture as consumers. In India there are huge population of small and medium sized farmers, they haven't aware about new technologies in farming as well as food processing. Most of the farmers are not involved in the food processing industry business. They only doing cultivation and harvesting which is didn't help to their economical development. This study reveals about the future farming opportunities and technologies available and adoptable in the global with the help of artificial intelligence. Basically, this study has only based on secondary data available worldwide. The developed countries are going to adopt with smart farming by the way of adopt artificial intelligence. But in India they are not to be there. Ultimately, the trends of future farming of processing of agro food products will sustain with the help of artificial intelligence used to various activities involved in the farming and also the food processing. This study is focused with the application of artificial intelligence in sustainable management of farming and food processing industry.

Keywords: Artificial Intelligence, Agriculture, Food Processing

Introduction

The crucial role of agriculture and agricultural-related activities in the economic development of emerging economies has been widely acknowledged. Even in developed countries, agriculture can be an important driver of growth, both in terms of income generation and employment opportunities. There are also some facts that agricultural productivity is directly connected with industrialization levels and the economic growth of the nation. The potential of the agricultural sector in boosting development not only resides on the economic aspects, but also the fact that it contributes to poverty reduction, food and nutrition security, and the sustainable use of natural resources. Historically, low and middle-income countries often produce and export low value-added primary agricultural commodities. A more conjugative environment in the country for the development of the economy as a whole and better agricultural revenue would be created by more efficient production methods, stabilized pricing, and higher agricultural revenue.

During the last decades, governments and organizations in emerging economies have been promoting the industrialization of the agricultural sector. Agro-industries, which comprise all the post-harvest activities like processing, packing, pre-marketing are carried out for the transformation, preservation and preparation of agricultural production for the intermediate or final products.

Agriculture provides employments for around 58% of India's population direct and indirectly. In Financial year 2020, the Gross Value Added from fishery, forestry, and agriculture was predicted to be Rs 19.48 lakh crore

Review of Literature

Mr. V. Rama Mani (2000) in this study proved that the modular approach of Computer Integrated Manufacturing (CIM) is highly economical to the small scale industries. But various software models are available in the market of stud of Computer Integrated Manufacturing. His suggestions are significant to small scale Industries.

John Kumar (2003) explained in his thesis about Knowledge representation, Fuzzy logic system, exports system, product life control, etc. all these elements being used in the field of robotics and not in production

Michael Bailey (2004) in his research topic "Flexible robotic remanufacturing using real time tooth path generation". The method used real time both path generation to employ Partially Destructive Manufacturing (PDD) in production. The only product information used by the work in cell phones was predefined surface features, which relate to keyboard connections in the product assembly. He has done only on product of cell mobiles.

Mr Ravi Kiran (2005) explained in his dissertation the application of Artificial Intelligences system evolved in Engineering Science and it can expect more challenging applications to be addressed in management.

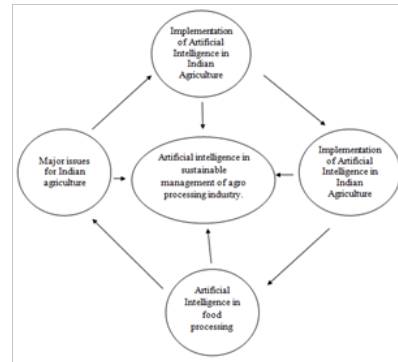
Research Design

This research model is designed from the information available in the websites, previous research papers, research articles, newspapers etc. It is made by only the secondary data.

Methodology

This paper is consisting of conceptual in nature and it only based on secondary data. The statistical information has been retrieved from the various sources that include various research papers published in related journals, magazines and related theses listed in Shodhganga and Research gate have

been used and other related websites are used to get statistical and general information.



Objectives of the Study

- To know the impact of artificial intelligence in agriculture and agro processing industry.
- Point out the criteria for sustainability of future farming and food processing.
- Reveal the applications of artificial intelligence in agro industry

Major Issues for Indian Agriculture

- Small and fragmented land-holdings
- Lack of good quality seeds, manures, fertilizers and biocides for small farmers.
- Irrigation problems and dependence on monsoon
- Lack of technology and mechanization
- Lack of proper agricultural marketing facilities

Implementation of Artificial Intelligence in Indian Agriculture

Many industries around the world have to go significant changes as a result of technological developments. Surprisingly, agriculture, while being the least computerized, has seen a rush in agricultural technology development and commercialization in India. In the empire of agriculture, artificial intelligence (AI) is a new technology. Agriculture has been elevated to a new level of implementation thanks to AI-based technologies. Crop production has improved as a result of this technology, as has real-time monitoring, quick harvesting, well processing, and perfect marketing. The latest automated system technologies, such as agricultural robots and drones, have made a huge contribution.

Artificial Intelligence impact in Indian Agriculture

In the fiscal year 2019-20, 133 agreements raised more than \$1 billion for Indian agro-food tech start-ups. India's agricultural exports increased to \$39.4 billion in 2019, and this is expected to rise further with improvements in the supply chain, as well as better storage and packaging. All of these measures will go a long way toward ensuring farmers receive fair pricing and reducing agrarian stress. Investments in artificial intelligence technology are helping to develop agricultural output and productivity even further. Disruptive technologies such as artificial intelligence (AI) are transforming Indian agriculture, and an increasing number of agro-tech businesses are developing and implementing AI-based technologies resources. Artificial Intelligence (AI) is being used by the agriculture industry to help produce high-quality crops, monitor soil and growing conditions, organize data for farmers, reduce effort, and improve a wide range of agriculture-related operations along the food supply chain.

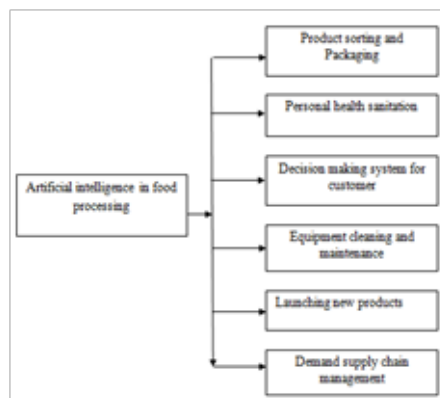
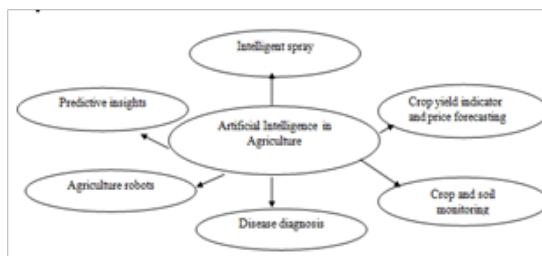


Figure 2

Application of AI in Agriculture

There are various applications of AI in agriculture which aims at providing a drastic positive impact on India's primary sector. Some of these applications are listed below –

- AI-enabled system to detect pests and weeds
- Agricultural Robotics
- Predictive Analytics and Precision Farming
- Analyzing the health of crops by drones
- Crop and Soil health monitoring system
- Use in weather forecasting to detect unpredictable weather conditions

Artificial intelligence in agriculture not only assists the Indian farmers in automating their agricultural operations, it also changes to precise cultivation for improved crop output and quality while using fewer resources. Companies that improve Artificial Intelligence-based products or services, such as agricultural training data, drones, and automated cropping technologies, climate prediction would benefit from technological development.

Artificial Intelligence in Food Processing

Product Sorting and Packaging

The first operational activity that food processing industry faced is sorting of raw materials and stock of materials. Every vegetables, every fruits, every cereals are different, and hence, it requires absolute sorting. Because, every food processing company has to maintain a certain quality of materials to stay in the competition. If not automated through AI this process requires huge amount of labor needed.

Equipment Cleaning and Maintenance

Maintaining cleanliness and personal health sanitation is a massive concern in food factories. Many companies claim to be as clean and hygienic their every process automated and untouched by human hands.

Launching New Products

The food processing industry should be in unique and its way as there are varieties of products a single company can provide. Before AI, the brand should conduct surveys and campaigns to identify what their customer's wants and needs. Using Artificial intelligence, they analyzed and identified that a

majority of customers needs and wants. It helps to make the new product launch.

Personal Health Sanitation

Safety is a most important one in the food processing industry. Even the smallest contamination is food can spoils the entire products of the factory. Factories have to implement AI-based cameras to detect whether an employee is wearing a proper sanitation costume or not. It helps them to detect any indiscipline in real-time.

Decision Making System for Customer

In Food processing companies, AI also helps its customers to make a better purchase decision.

Classifications of Artificial Intelligence

Globally, the artificial intelligence are divided into three types depends upon the stages and its process. They are

- Simple Artificial intelligence
- Strong Artificial intelligence
- Super Artificial intelligence

Simple Artificial Intelligence

Simple artificial intelligence is concentrating any one of the task or process. It has pre- programmed for that particular process only. There are no ways to proceed beyond that programmed process/ task.

Strong Artificial Intelligence

Any understanding or learning task could be done by the strong artificial intelligence as a human being can do. Some of the intellectual process also can do by this type of AI. The researchers are trying to reach and develop this one.

Super Artificial Intelligence

Outstrip of the human intelligence and it can do any process or task better than any human being. (it is still in the concept, some of researcher are testing to implement this super artificial intelligence)

Advantages of Artificial Intelligence

Innovative Inventions

Artificial intelligence has helped to create innovative inventions needed for new generation

people in all domains. E.g. Humanoid robotics, Agricultural industry, Education industry etc., Recent innovations from healthcare industry, the remote medical care technologies helps to monitor the health of patient from the remote place by the specialist, and also can do the treatment automatically.

Unbiased Decisions

The massive advantages of Artificial intelligence is, there is no biased views and it ensure that a clear decision making in all aspects. Human beings are loaded with lots of emotions in their mind. A result of a task or process can be change when the person's mood swings. But Artificial intelligence is not at all in even any kind of context. It is highly practical and process oriented.

Reduce Human Error

If the Artificial intelligence programmed properly, there is no chance to getting error in the process. Artificial intelligence has Accurate and proper result for the task. In human, there will be a chance for error is common. So AI prevents the problems, losses, obstacles in advance. (E.g. AI technology helps to monitor the climate condition and prevent the over rain to the agricultural crops and leads taking prevention measures)

Riskless

An intellectual machine with metal body has highly resistant in any unusual environment and timings. Moreover, they give accurate results with immense responsibility within limited period. Any dangerous or life threatening task for human being are not advisable for human when the Artificial intelligence has available. These machines are mostly used in like. Armed defense, visiting a unknown dangerous places

Digital Assistance

Now-a-days most of the organizations are used digital assistance with the use of artificial intelligence. E.g. Chatbot – it chats to customer with machine intelligence. There is no human being involved in the chatting with plenty of customers who contact with them. This process has significantly reduced the use of manpower, and minimizes the cost and time for ever.

Availability

From the research all humans are maximum productive for only 4 hours per day. Human need to take rest or taking break or spend time to having lunch etc., So they are not available at all the time they needed. But Intelligence machines are always available with fully powered. It won't get tired in any circumstances. Also they complete the tasks with accurate results faster than the human beings.

Disadvantages of Artificial Intelligence

As the Artificial intelligence having lots of advantages and also having some disadvantages as well. The disadvantages are as follows.

Increase the Unemployment

Perhaps the important disadvantages of Artificial intelligence, significantly take the employment place of lot of the human beings. Artificial intelligence reduces needed man power of the organization. A single intelligence machine could do the work of numbers of persons work. A robotic machine does a work for 24 hours continuously without taking any break. But here, if a man doing this work, they needed 3 shift timing with some breaks.

High Cost

The small organizations are not affordable to implement the artificial intelligence to their organization. It needed plenty of resources, time and huge amount of money. The long term organization only can implement this technological concept. The operating cost also being high. Finally, the high cost of implementation is the biggest disadvantages of AI.

No Creativity

The lack of creativity is another one important drawback for artificial intelligence system. There is no chance to react the context of the process or tasks. They have to perform only what they are programmed. The artificial intelligence systems do not know what is good? Or what is bad? Also they could not think it. Whatever it may be, that is one of the machines which are doing the things programmed. They do not do the things beyond that.

No Ethics

Morality and ethics are very significant to human features that can't be expected from the artificial intelligence machines. In-case the Artificial intelligence concept developed uncontrollably, Human will be facing the extreme dangerous context in the globe.

Make Lazy Humans

If all other assistant works and tasks, process are done by artificial intelligence, the human are not aware of routine works. They forget the hard work, enthusiastic and everything. It leads to make human are getting lazy. It is not good for human society. So always be careful for any artificial intelligence technologies in the world.

Conclusion

Despite being at its initial stage, AI is reshaping the food processing and handling business. In upcoming years it is going to revolutionize the Food process & Handling sector forever. Artificial Intelligence in food processing will help these companies to increase their income or revenue by fastening the production process, reducing maintenance time & hence the production time, decreasing the chances of failure by automating. Almost each and every process and eventually delivers an excellent customer experience by predicting their likes, needs, and desires and also their dislike. For Artificial Intelligence solutions providers in the food processing sector helps those to not only stay in the competition but also to become empire of the industry.

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