

MANAGING SCOPE OF PRODUCTION SYSTEM IN FOOD INDUSTRY

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ABSTRACT

Food processing may be thought of as any method used to transform raw ingredients for human consumption into a consumable food product. Food sector, mass customization and other aspects of the industry are examined in this research. In the food processing industry, it is not unusual for a limited amount of raw ingredients to be used to make a large variety of finished commodities, depending on the unique demands of the consumer. Processes like processing and mixing are two of the most popular ones in the food processing industry. Quality control in the food sector is as important as any other area of the company. Increasing food production and developing circular food systems may be part of the answer to future food security.

Keywords:Food industry, food system, Green Food System, BMP, production system

INTRODUCTION

Food is essential to our survival as humans. The food industry is the bedrock upon which every country is formed. There are 17 major economic sectors in the country, and the oil and gas industry is one of them. Public health, food safety, food security, social development, and nutrition are all affected. Product quality, health, and sanitation are major problems in the food industry. A suitable paradigm for encouraging healthy and ecologically friendly food choices is shown by the double pyramid. [1]

The global food system encompasses food production, distribution, and sale, as well as waste, energy, and environmental management systems. The whole system may be characterised in very basic words and using relatively simple models at the local, regional, national, and global levels even if each subsystem is extremely complex in and of itself. Agriculture practises are examined in this chapter, as well as their effect on poverty alleviation and community development. There are many different aspects of the food industry. [2]

food supply and production; harvesting; processing; packaging; transportation; distribution; consumption; and disposal. In the early years of the twentieth century, the food business was born. Is a collection of several separate industries that create many different food items, not a single industry. The program's scope encompasses everything from the farm to the table. Among the food industry's several components are the following. [3]

It is the goal of production management to ensure that the most efficient use of available resources is achieved in order to generate the desired output. Production management is thus tasked with ensuring that the intended product is manufactured using the most cost-effective methods and resources, including enough people, raw materials, and manufacturing procedures. It is the responsibility of production management to ensure

that the appropriate things are delivered at the right time, in the right amount, and at the right price. We claim that we have an effective Production Management system when we fulfil the aforementioned goal. [4]

As the world's population grows, there is a pressing need to provide adequate food while lowering greenhouse gas emissions and other environmental consequences from farming. Some of the most prevalent options are to increase output by 70%, increase yields in less productive areas, eliminate waste, and reduce meat consumption. International accords such as the Paris Climate Agreement and Sustainable Development Goals may potentially benefit from these solutions (SDGs). [5]

LITERATURE REVIEW

Matthew N. O. Sadiku, Sarhan M. Musa, Tolulope J. Ashaolu (2019) The food business is made up of a wide range of operations relating to the production, distribution, consumption, and provision of food and food-related services. It has a huge impact on a country's economic growth. Economically, it's one of the most active areas in the world today. This article serves as an introduction to the food sector for those who are interested. [6]

KC KB, Dias GM, Veeramani A, Swanton CJ, Fraser D, Steinke D, et al. (2018) By comparing the diet that dietitians advocate with information on worldwide agricultural output, we investigate whether global food production is nutritionally balanced. According to the findings, the global agriculture system is now overproducing grains, fats, and sugars, while fruit and vegetable output is insufficient to fulfil the nutritional demands of the existing population.[7]

Yong He, Hongfu Huang, Dong Li, Chunming Shi, and Sarah J. Wu (2018) We conducted a literature study on food supply chain quality and operational management issues. Managing the supply chain activities in the food business requires addressing the deterioration of food quality over time. Using operations management principles to manage food supply chains not only improves the bottom line, but it also has positive effects on the environment and society.[8]

Kurt Benke, Bruce Tomkins (2017) Urban vertical farming is a good example of how technology and automation might be used to improve food production in the future. The difficulties at hand are discussed, as well as any possible benefits and drawbacks, in this article. Policymakers and economists may use the information gathered here to help them make better decisions. [9]

Magdalena Paździor (2016) The authors of this study examine the methods that assist the companies that produce primary goods in their quest to ensure the highest possible level of health. Most food primary producers have a duty to create quality assurance systems that ensure the healthiness of their products for their customers. It includes main production standards and initiatives linked to enhancing food safety. [10]

THE CONCEPT OF GREENFOOD

Food quality is critical to the general well-being of the population. Increasing numbers of people are turning to healthy food and supplements to enhance their diets. A country's prosperity may be gauged by its citizens' health. There has been an

increase in the number of individuals suffering from health issues as a consequence of lifestyle changes, dietary habits, increased consumerism, and pollution in every nation. As a result, the work of constructing a country must place a high priority on health. One of the goals of governments at the national and state levels is to encourage good health among its population in order to win the good will of the society. The federal and state governments place a high value on the food processing business.

Sustainability, pollution reduction, and environmental preservation are all part of the "green" philosophy. Eating and processing foods in an environmentally friendly and environmentally sound manner is referred to as "green food," and it is characterised by quality control, safety, and non-pollution. Additionally, green food refers to the manufacture, packing, storage, and transportation of food goods in order to limit the spread of hazardous organisms. Good nutrition and a well-balanced diet are vital for a healthy lifestyle. In order to be more health-conscious, a food pyramid is needed that specifies how much each food type should be consumed at each meal.

When it comes to human nutrition, the foods on the bottom row, which is the widest, are regarded the most fundamental and should be consumed in the greatest quantity possible. Foods near the top of the list, which are regarded non-essential, have the fewest portions and are thus not included. Foods whose serving sizes lie somewhere in the centre of the two categories may be found in the centre of the chart. In today's health-conscious society, the food pyramid serves as a guide to a healthier diet and a better lifestyle.

With the recent emphasis on green growth approach, As part of this green growth strategy, agriculture has the opportunity to play a major role in sustainable economic, social, and environmental development, and open markets help to encourage the exchange of technology and ideas.

Sustainable food production relies on efficient use of natural resources including land, water, fisheries, and biodiversity while also reducing waste throughout the food supply chain, all of which help to lower the overall output's carbon intensity. At both the microeconomic and macroeconomic levels, a green economy applies the triple bottom line of people, planet, and profit to every business. Concerns over agribusiness's environmental effect, Western society's obesity epidemic, and the plight of the world's poor and hungry have sparked a movement toward ethical eating as a fundamental component of general consumer ethics.

THE BEST MANAGEMENT PRACTICES (BMP) IN FOOD PROCESSING INDUSTRY

In agriculture, the best management practises are used to ensure that food crops develop to their full potential. Reduce the harm caused by toxic chemicals is one of the best management practises (BMPs) in agriculture. In order to safeguard soil fertility, it is necessary to assess the condition of the soil and utilisefertilisers appropriately so that food crops are not harmed and soil erosion is controlled.

Sustainable agriculture and organic farming are used to reduce the environmental effect of agribusiness. Diverse initiatives are underway at the local level to promote home gardens, urban wasteland repurposing, and local food production.

This includes crop rotation, crop diversification, integrated pest management (IPM), organic farming in order to guarantee and preserve soil fertility, to perform controlled grazing, and the eradication of weeds to safeguard the crops that are being farmed. Solar and tidal power may be harnessed by using other sources of electricity. Food production is a water-intensive sector, thus water management is essential. Non-recyclable trash must be processed into useable inputs, goods, or energy in order to meet this goal.

Anaerobic and aerobic effluent treatment plants (ETP's) are two kinds of ETP's used in the food industry for the treatment of waste water (i.e. in the absence of oxygen). Even yet, food sector waste may be reduced, and a significant source of environmental contamination can be avoided via better use of raw materials, water, and energy in the process.

A factory's technical advancements should be based on clean technologies and procedures that are already being used in the food sector. Clean technology includes:

- i. **Advanced Wastewater Treatment Practices:** Use of wastewater technologies beyond conventional secondary treatment.
- ii. **Improved Packaging:** Use of less excessive and more environmentally friendly packaging products.
- iii. **Improved Sensors and Process Control:** Use of advanced techniques to control specific portions of the manufacturing process to reduce waste and increase productivity.
- iv. **Food Irradiation:** Use of radiation to kill pathogenic microorganisms.
- v. **Water and Wastewater Reduction**

MASS CUSTOMIZATION

Mass Customization Concept

In the late 1980s, the notion of mass customization (MC) was established, followed by a rise in flexibility and optimization of cost and quality (Silveira et al., 2001). There are four types of MC applications, according to Gilmore and Pine in Silveira et al. (2001), namely: (1) collaborative (designers communicate with customers/individuals to equalise the perception of customers/individuals needs/wants); (2) adaptive (companies provide standard goods, but customization is still possible in accordance with customers' needs/wants); (3) cosmetic (companies provide standard goods, but packaged specifically for customers' needs/wants); and (4)

The use of MC does not always result in positive outcomes; there have been certain instances when MC has failed to provide what was expected. As an example, the vehicle maker Nissan has been offering 87 different steering wheel designs, but buyers don't seem to desire so many options. Amdahl, however, does not have a method that is flexible, dynamic networks, or anything that might assist the deployment of the MC in the meanwhile (Pine et al., 1993).

Since the MC strategy places the firm in a more dynamic and challenging production

environment, it will be necessary to make adjustments to the production process more often (Kakati in Huang et al., 2008). MC's commercial goals will be supported by the manufacturing process's flexibility. It's difficult to choose new technology because of the costs involved.

Knowledge and expertise are essential to the company's success in implementing MC. It takes time and effort for organisations to modify and adapt (Huang et al., 2008).

It is also necessary to determine the Customer Order Decoupling Point (CODP) before MC can be implemented (Jian-hua et al., 2007). The corporation must be able to exactly decide how items are created using the idea of Make to Stock (MTO) and Make to Order due to the process of properly defining market demand forecasts (MTO). The customer's ever-increasing demands will need a more complicated manufacturing method.

The computer sector is one of the industries that has effectively used MC (Pollard, D., et al., 2008). Dell and HP are pioneers in the use of MC in manufacturing systems. Supplier relationship management (SRM), supply chain management (SCM), and customer chain management all play important roles in Dell's successful MC implementation (DCM).

Mass Customization Application in Food Industry

The desire for a wider range of items will rise as client expectations do as well. A transition from mass production to mass customisation is one of the reasons behind this. Mass customisation (MC) has not been substantially examined in the food business. There have been studies published that discuss the possibilities of applying the MC concept to the food industry, such as Boland (2006), Fisher, et al. (2005), Matthews, et al. (2006), and McKinney, et al. (2007), all of which discussed the design of food processing systems to improve corporate responsibility in light of product variations.

In the food sector, there is still a shortage of research on the use of MC because of the variations in production processes between food and other manufacturing industries. Packaging is regarded the most step that allows the notion of MC to be used in connection to the concept of delay. Chemical change, food product decay and deterioration, maturing cycles/delays, mixing product and assembling products and recycling/recovery are just a few of the 13 key factors that separate the food industry from other manufacturing industries, according to McIntosh, et al. (2010). Packaging, (8) Simplifying product design for MC, (9) Access, (10) delicate foodstuffs, (11), legal provisions such as sell-by dates and others, (12) the economics of the food industry.

Mass customization may be applied to this design (MC). For the purposes of meeting individual demand for goods or services, MC is a manufacturing method that employs mass production while also taking into account factors like cost and speed (Xu, 2007). Flexibility in providing a product or service is linked to MC, according to Silveira et al. (2001). The goal of MC is to build a product or service that is tailored to the specific requirements and desires of each consumer by integrating and adapting to their unique circumstances (Duray et al. 2000 Frutos and Borenstein, 2004) To use the MC, it may be necessary to make changes to the manufacturing process.

Mass customization isn't always a good idea for businesses; it's all about the product and the target audience. Some items, such as petroleum, natural gas, and grain, don't need any customisation, according to Pine et al. (1993). Such is the case when it comes to items or

services provided by the government or public institutions. However, as demand grows for a wider range of items, so does the number of options available to consumers. Customers' demands for flour-based food items have led to the development of process technology for flour-based food goods. In today's market, there are a wide variety of wheat protein content in flour products (ranging from high to moderate) as well as a variety of packaging options tailored to the demands of the consumer.

High-quality goods and low manufacturing costs are prioritised above client happiness in mass customisation. There should be no increase in manufacturing costs as a result of the use of MC. Because of this, a firm that plans to deploy the MC should establish the production system design to match these requirements. If you're looking to improve your company's cash flow and provide a wide range of goods and services at a lesser cost than you were previously able to do, MC could be a good option for you.

Manufacturing flexibility, modularization, and delay are three key MC methods, according to Matthews et al. Table 1 shows the categories of food items for which MC could be appropriate based on these various strategy options.

Table 1 Potential for application of MC technique

Strategy	Yoghurt Production*	Potato crisp production*	Batter based puddings**
Modularization	P	Y	P
Manufacturing postponement	N	P	N
Assembly postponement	P	P	P
Packaging postponement	Y	P	-
Labelling postponement	P	P	P
Time postponement	N	Y	-
Place postponement	N	Y	N

P: possibility of application; Y: definite potential for application; N: no potential for application; -: no information.

Several factors, such as the nature of the raw materials, processing, and final product qualities, will determine whether or not the present approach can be put to use. The fermentation process involved in yoghurt processing cannot be postponed, hence no manufacturing delay technique may be used. Yogurt is a good example of a food that has a limited shelf life. As opposed to potato crisp goods, the process of creating potato crisps may be put off till later. It's also worth noting that the crisped potatoes have a lengthy storage life. All food production systems use the labelling delaying technique the most.

CONCLUSION

In order to satisfy consumer demands, the food sector must choose an acceptable

production system approach. It's time to go further into how mass customisation is being used in the food sector. In order for the food sector to cope with a rise in product variance, it must establish proper production processes and planning. Good Agricultural Practices (GAP) and Best Management Practices (BMP) should be taught to our farmers, and the government should vigorously enforce these practises (BMP).

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