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OF SMALL & MEDIUM BUSINESSES**



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INTRODUCING SAFFOLA OODLES THE RING NOODLES



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Greetings from Advisors.....

Innovations in the Food Processing Sector

Dr. Prabodh Halde

Chairman AIFPA Western Region



I am happy to pen down my thoughts in '*Purnabrahma*' Magazine which is dedicated to the food sector. This issue is covering innovations in Food processing sector. It's been over a year, a single virus has dramatically affected the entire economy with vaccination turning out as a blessing in disguise. Still the world remain clueless, when situations will completely normalize. The COVID19 crisis has changed the way we perceive every aspect associated with human life. It has urged more innovations and inventions.

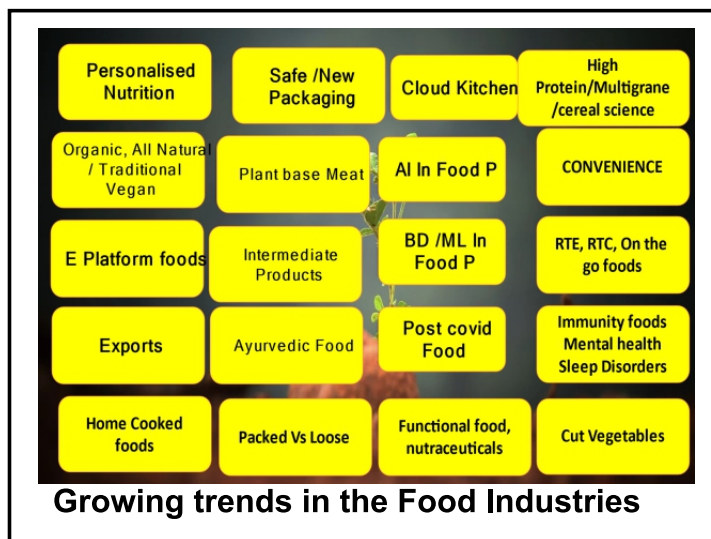
Food Processing sector In India: The growth of our country is largely dependent upon the growth of the Food Processing industry which in turn is dependent on agricultural produce. Until December 2019, the Food Processing industry was growing at a rate of 13% and the food grain production at the national level is close to 245 Million MT. Although India excels in the production of Pulses/Tea/Dairy, etc. but we are not able to add value and reach consumers due to the poor processing percentage, which is below 12%. Undoubtedly, India has a huge potential to double its processing percentage to 25% in the next 5 years, which will eventually boost the growth of Food Processing also.

1914-1918 10 million death	1941-45 60 million death
- Sanitary Towels - Sun lamps - Tea Bags - The wristwatch - Vegetarian sausages - Zip - Stainless steel - Air Lines / Pilot Navigation	- Penicillin - Concept of computers - Machine processing - Ball Pen - Photocopy - Ready to Drink Coffee - Nescafe - Carbonated Beverages - 5 Cent Cok - Jet engine - Canning technology - Process food Industry

Innovations during the World -War

geography of the world intensely. In spite of these problems we have witnessed some fine innovations during these times and are enjoying their benefits. Similarly, COVID19 pandemic has driven innovations in the area of food processing. We have witnessed that some companies are launching first time new products. Consumer preferences are also changing towards eating.

What will happen to Indian food processing sector post COVID: The food processing sector is expected to grow by leaps and bounds in the coming year. There are many strong points for India to believe in. The Indian population is around 130 crores consisting of around 33 crore families, considering 4 members per family. Even if we consider a low estimate of Rs. 3000 per family as food expenses, India still spends nearly Rs. 1 lakh crore per month on food which is Rs. 12 Lakh crore per year so we can say the size of the Indian food industry on a minimum scale is Rs. 1,200 Billion per year. Post COVID, since home consumption has increased this number might reach to 20 Lakhs crore per year in 2020-21.



What would be new trends in food processing sector? COVID19 is expected to launch new trends and we have to adopt to these trends for growth and progress. Among all these trends, **new safe packaging, Ayurveda foods, Food Export, home cooked food, Immunity foods, e-Platform foods will change the face of entire Food Industry.** We will see new start-ups in this sector and they will bring some real innovative products.

Food processing new Normal: Every company has to adopt new changes and we need to bring innovation in every aspect. This problem will certainly go if we do our basics right and adopt to new challenges. As per Ministry of Science and

Technology, Indian Food companies invest around 2 % of its revenue back in R&D. This number will increase to 4% in coming days. This means more opportunities in food research and innovation and therefore it is great opportunity for students and academicians to grab. Also industries will collaborate with academicians but the later need to speed up their research and start working on industry defined problems. I see very good scope for our Chamber to bring these two important stake holders together for growth of the sector and help India becoming ATMANIRBHAR in the area of food processing. **Only those companies will sustain in this times, who focus more on innovaiton and are eady for change. 'Innovate or evaporate' is the new Mantra.**

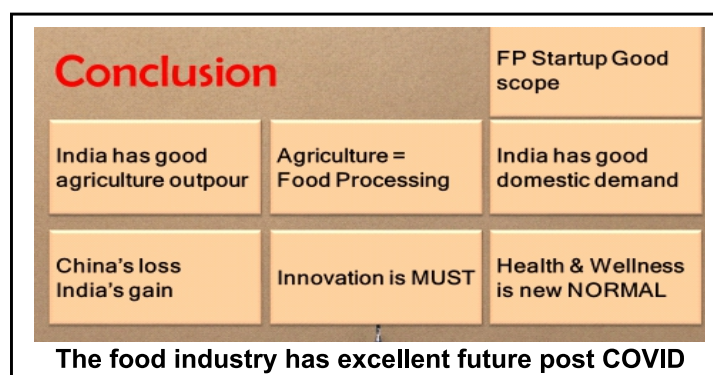
Action plan: Food processing sector is one of the largest sector which provides employment and adds value to the farmer's produce. We as team Food Processing India (Government, Association and Industry) have to adopt newer changes, bring some policy decisions and help this sector grow which will sustain farming sector of India. Some action points which will help this sector grow are:

- 1) The Government has declared food processing sector as an extension of agriculture sector and made it free of all licensing /GST requirements. We have placed some CAP on turnover below 5 crore /year which will boost the rural economy and new start-ups.
- 2) Initiate the farmers marketing organization (FMO) to add more value to farmer's produce and encourage them to go for processing. With current farmer's producer's organization (FPO) good production impact has been achieved. FMOs can connect with big retailers and

farmer's processed produce can be brought to the market directly.

- 3) Ministry can bring some incentives for R&D organization to boost the R&D activities which will change the food processing sector and consumer benefits.
- 4) For one year if we make 0% GST and no income tax for food processing sector at selected places, huge investments can be attracted in the sector. This will help farmers in a big way.
- 5) One common portal of all government schemes related to food processing at central and stake level can be initiated.
- 6) More research in Ayurveda/ herbal food can boost exports in the herbal sector.

Conclusion: Food processing sector has huge potential to come back and also support farmers. Thus with proper planning and policy interventions INDIA can became Kitchen of the world post COVID and Food Processing sector will grow with over 25% annual growth in next 2 years. This will definitely turn the saying **"Bahujan sukhaya, bahujan hitai" and Atma Nirbhar Bharat** into reality.



DECLARATION



- The contents of this issue is referred and compiled from various sources and Purnabrahma doesn't claim it's authenticity.
- The contents given in the article are the views of the respective authors.

Editor's desk

Innovation means something new or the change made to an existing product, idea or field. It is the act or process of introducing new ideas, devices or methods to fetch better results. Consumers constantly demand for new experiences, in terms of taste, food packaging, food freshness, aesthetic appeal in relation to any food product. They want to discover new things and are liked to be surprised. Technology can serve as a means to satisfy their demands. Here, innovative ideas can come to rescue and work in either of two ways from research to practice or from practice to research.

In order to develop foods with an enhanced nutritional index without compromising their properties viz., flavour, texture, appearance a wide array of food technologies must work together to achieve the goal of manufacturing healthy novel foods; they may even upgrade or reinvent traditional food too.

Innovation in food industry combines technological innovation with social and cultural innovations. It occurs throughout entire food system including production, harvesting, processing, manufacturing and distribution. Innovations makes a significant difference to a food business. Marketing is powerful tool and how food companies market new and innovative food products has the potential to influence eating pattern of consumers. If you do not change what you offer to the market, the market will leave you behind.

Smart food factories can serve as a good means for many companies to achieve transparent, sustainable and more cost effective operations. The current issue of Purnabrahma magazine explores this concept in the lead article "Smart food factory- The factory of future" by Christian Falkenstein. The article on IPR by Prof. Purshotham is very informative and helpful for MSME startups. Food product development article by Dr. Rita Patil and article by Mr. Ritesh Mathur and Amrita Das has laid emphasis on how the R & D department can shape the future growth of companies. Dr. Prakash Kondekar has highlighted the resurgence of Naturopathy as an important therapy of 21st century in his article. Mr. V. Venugopal explores innovative concept of extraction of valuable nutraceutical from the sea food processing waste.

Another innovative concept: "Evolution of synthetic meat" by Ms. Lathika G.V gives a message to society that it is possible to introduce safe and edible meat without slaughtering a single animal. Snakes and ladders article by Dr. Sagar Gokhle is an eye opening article for start-up MSMEs emphasising on importance of SWOT analysis. Student corner article of Vedant Joshi explained importance of internship in student's life.

Technology and innovation are the integral part of modern food industry. They provide opportunities for food companies to respond to the consumers demand and a changing environment.

Hope the exciting contents of this magazine, will enlighten the old and the budding startups to reinvent their successful entrepreneurial journey of thousand miles with their innovative ideas that in long run will help to build a world of sustainability and welfare.



Thank you!

Mrs Rupa Kanvinde
Chief editor

Subeditor's desk

Hello folks!

Following its successful inaugural launch in the month of July 2021, the wings of the Purnabrahma magazine are expanding with more of quality content and more ways to connect with, encourage and enlighten all the stake holders in the food business.

It is well said that time changes things, but it is we who have to change them ourselves; and certainly the pandemic has fuelled a positive change, provided we think so! Doing our work consistently and well is not wrong, but it does to some extent limit a person's thinking. In order to achieve our goals and expand our horizon, it is essential to think out-of-the-box, but it is also important to do different things. This prompts innovation because it is the best way to predict the future by taking care of the present.

Tapping the above need of the hour, the current issue of Purnabrahma is aimed to share stories on the theme "Innovation" and the trends driving change in the Food Industry. These include highly informative, crisp, unique and effective articles emphasizing on Food product development, extraction of nutraceutical and other valuable compounds from seafood processing waste, Naturopathy as a potential healing system of today's era, the vision of a Smart food factory, how intellectual property protection is critical to fostering innovation, SWOT analysis from experts in the field. Last but not the least we also have internship experiences shared by college students, as a stepping stone towards their entrepreneurial journey.

As the readers get attuned to the innovative contents of Purnabrahma, it is equally important for them to get geared up so as to modify or renounce the conventional approaches, to make room for innovations that are in agreement with today's consumer demands. Finally, irrespective of the age, with the sparkle in the thoughts and a go-getter attitude the medium and the small scale industries must learn to foster innovations that will not only transform their own start-up or organization, but also make a difference to the industry and society as a whole. With a strong determination and willingness to go that "innovative" and extra mile along with the awareness of intellectual property rights will definitely allow the enterprises to blaze a trail in the market.

Wishing all the readers an innovative journey into the contents of Purnabrahma!

Thank you!


Dr. Ritika Joshi

SmartFood Factory - The Factory of the Future

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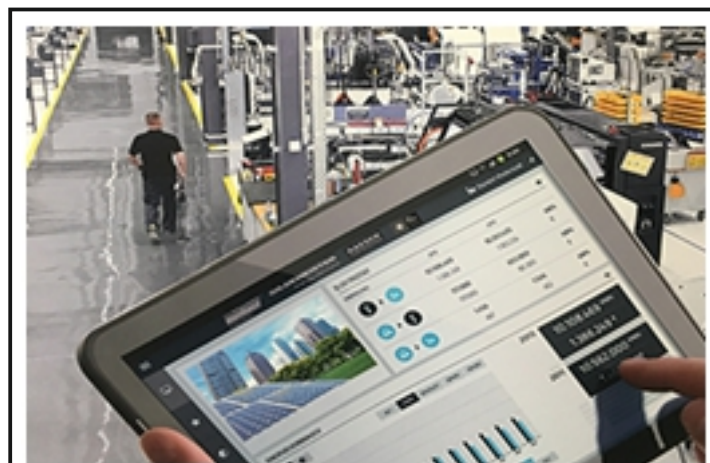


The food industry has experienced some rapid changes in recent years, due to changing markets, consumer behaviour, increasing demands on animal welfare, the shortage of skilled workers, and very recently due to the African swine fever and the COVID pandemic. The processes in the food industry are becoming more complex. Efficient, sustainable, and hygienic processes are crucial to successfully mastering the challenges in the industry in the future. As the fourth industrial revolution, Industry 4.0, continues to change and shape the way we make products, the concept of the so-called "smart factory" - the intelligent factory - is increasingly coming into focus. A smart factory is a production facility that is highly digitized and networked and operates almost completely autonomously. Smart factories can help to optimize the manufacturing processes along the food value chain and thus improve productivity, reduce safety risks, and make overall processes more efficient and cost-effective. The key factors for smart factories are skilled workers, the appropriate plant and factory planning, and artificial intelligence (AI) applications and systems that connect the digital world with the physical world of people and machines.



The Factory of the Future runs on Information

In food processing, there is a strong focus on quality, yield and throughput but there is also an increasing emphasis on data mining and the use of artificial intelligence. Advances in software are contributing significantly to automation in food processing and factories are becoming smarter. At the same time, the market demands uninterrupted traceability from origin to sale. Data management plays an increasingly important role in this context. Data is becoming increasingly valuable in today's high-tech processing environment and the ability to track and analyze information is key to the competitiveness of food processing plants. Food quality and food safety are two important issues. Systems that meet these requirements must be in place to identify, monitor and link performance indicators in the production flow. These include, for example, fat and protein analysis, pH, temperature, and quality control.



The factory of the future runs on information

Improvement is only possible with Knowledge

The collection and analysis of data results in the optimization in the areas of: Increasing efficiency, risk minimization, transparency, timely work, flawless documentation, consumer safety and company safety. Depending on the process stage, the degree of automation in the food industry is already relatively high in some cases. However, this does not automatically mean that smart factories are already a reality in the food industry, as there is often still no networking between the different production lines and therefore data cannot be used optimally, which could help to improve processes and reduce costs. Also, the variety of products, the different quality

seals and classifications in the food industry is still large, which makes standardization and thus automation in intra-logistics more difficult.

Factory planning requires precise information

Important for the planning and implementation of a smart factory are the customer's requirements and the target data for the production programme, which must be defined as precisely as possible by the customer in advance of planning. Based on this, the factory and process layout is then developed, which should take the following parameters into account: 1) Good expand ability both indoors and outdoors 2) Suitable room dimensions 3) Optimum design of the building services 4) Short distances 5) Good accessibility for cleaning and maintenance 6) Maximum flexibility 7) Use of durable materials 8) Hygienic design

The human factor is the key element for the successful planning and installation of a smart factory, as the expertise of highly qualified professionals is the foundation of any project. To complement and enhance the knowledge and planning skills of humans, technologies such as BIM (Building Information Modelling) can be used. BIM is a process tool for the planning,

design, and construction of buildings. The software is used to create an intelligent 3D model and acts as a communication tool between the different planning stakeholders. The 3D model can also be used to virtually simulate possible scenarios to predict future outcomes and events before any resources, need to be used on a real construction project. The BIM model is used not only for the design and construction phases, but also as an important tool for facility and life cycle management (cradle to cradle).

BIM encourages cooperation

1) Better basis for decision-making in the planning and construction process 2) Virtual tours in the 3D model 3) Simulation and forecast of future operating costs 4) Collision-free planning 5) Generation of cost forecasts and schedules 6) Support for sustainability certifications 7) Basis for facility and life cycle management 8) Comprehensive documentation of the project.

The basis for optimizing processes is the analysis of data from different processes and areas of a production facility. Data can be gathered at any point in a process using software, sensors, or image processing, however, due to the sheer volume of data, decisions must be made as to which data should be specifically collected and analyzed in order to improve processes. Data planning is therefore the key to automation, digitalization, and the future of process planning.

The most commonly used software system in the industry is the Enterprise Resource Planning (ERP) system. It links together a variety of business processes such as procurement, resource planning, slaughter data collection, carcass cutting, production and recipe optimization. The benefits of the ERP system vary



Meat Processing Center for CP Group in China



Controlcenter (Source: Shock)

from company to company, but the main advantages are that redundancies are decreased, accuracy is improved, and productivity is increased. In addition, complete documentation is possible, which provides security for the consumer as well as the company and facilitates traceability within the supply chain.

Digitalization can only be fully implemented with the appropriate infrastructure

Real-time networking is one of the big drivers of Industry 4.0 and smart factories in particular. The full potential of a smart factory depends heavily on successful communication. 5G can be used to connect everything within a production facility and, in combination with cloud solutions and appropriate computing power, it helps to achieve real-time communication even to otherwise hard-to-access areas. Companies with data-intensive machine applications require the high data transmission speeds and low fluctuations of a 5G network to successfully implement smart factories. The collection of data, from the farm level through food production to the consumer, can be done via cloud systems. The huge amounts of data (Big Data) are stored in the cloud and can be evaluated and analyzed and can lead to the optimization of processes.

When developing digital processes, strong attention must be devoted to cyber security. It helps in preventing, detecting, and responding to cyber-attacks. Cyber security has become particularly important in the food industry, as cyber-attacks can have a major negative impact on the affected companies and the entire supply chain due to ever-increasing digitalization. A recent case in point is the meat company JBS, whose information systems at North American and Australian locations were the target of a cyber-attack. The attack has paralyzed JBS production in Australia and severely affected production in Canada and the USA.

Artificial intelligence (AI) is one of the most important building stones of a smart factory. The main components of AI are sensors, robotics, assistance systems, image processing and predictive maintenance. Sensors are of utmost importance in the food industry, not only in processing but also in building automation. In the food industry, a variety of sensors are used to collect real-time data and continuously maintain process lines, detect any bottlenecks, and correct them at an early stage to prevent downtime. Image processing is an extremely useful tool in the food industry for example in the meat industry for quality assurance and captures data from the stable, to the animal welfare-compliant stunning of the animals, to the legally

compliant bleeding at slaughter houses and along the entire value chain. Robotics has made precision possible in the food industry. Robots and cobots (collaborative robots that assist humans) are commonly used in the placement of feed, cutting, packing, or wrapping food products, picking up and placing products in containers and sorting. This ensures that the operators of the equipment are exposed to minimal effort. In the future, humans will therefore take over increasingly, controlling and steering functions and leave the manual activity to machines and robots.

Sustainability is more than just a trend

Sustainability is one of the most important aspects to focus on in today's world. In order to create a greener and more sustainable working environment, more laws are being passed that require companies, people and governments to commit to making more sustainable decisions and investments. Germany has committed to becoming climate neutral by 2045, a major effort with big changes for all industries. The food sector as a whole is responsible for 34% of global greenhouse gas emissions, with land use and agriculture accounting for much of this, according to a 2021 study by the European Commission Joint Research Centre by Monica Crippa et al.

The use of more sustainable materials, processes and production methods will help reduce the CO2 footprint. The food industry has made great efforts to make the products it offers more sustainable. New packaging technologies have made it possible to make products more environmentally friendly. Many companies use either recyclable or biodegradable materials for packaging, for example, innovative packaging has a positive effect on reducing plastic waste in the oceans and avoiding food waste. Processing and construction materials can be chosen sustainably during the planning and construction phase in order to reduce CO2 footprint in all areas of food processing.

A company's climate protection strategy should be well planned not only in case of a new building, but also in the case of a refurbishment, to ensure that limited CO2 is produced in the factory. Climate compensation can also help companies to offset the greenhouse gas emissions by contributing to climate protection projects.

The climate-neutral factory is here to stay

Energy consumption is an area where sustainable production and consumption is of prime relevance. A new concept is the climate-neutral factory, which is defined as a factory that is

powered by renewable energy sources, is energy sufficient and produces no climate-damaging emissions. Photovoltaic systems on the roofs and facades of factories, can supply a large part of the energy needed for production. Additional energy needs can be met with biogas, pellets, or geothermal energy. In the case of surplus energy and heat, these can be stored in a battery, ground, or hot water storage tank or in different media (compressed air, nitrogen, desalinated water). The surplus heat can be supplied to the neighboring factories via a local heating network. Green hydrogen (hydrogen produced on the basis of renewable energies) has emerged as a very sustainable energy source with which the goal of becoming greenhouse gas neutral can be achieved. When hydrogen is used to generate electricity, only water vapour and heat is emitted, and no carbon dioxide or other toxic gases are released. At the moment, there are still some significant drawbacks, such as the expensive process of hydrogen production, as this requires a lot of electricity, but once these obstacles are overcome, hydrogen could be used as an effective means of achieving the goal of carbon neutrality.

Outlook

In the factory of the future, digital manufacturing processes will be connected, automated and flexible. The Internet of Things, analytics and artificial intelligence will improve efficiency, downtime, maintenance, and in the best case minimize them. New relationships will emerge between people and machines. Productivity and quality will increase significantly. The smart factory is highly efficient and sustainable. The concept of the smart factory will increasingly find its way into the food industry. The process of digitalization is important for companies to remain competitive, and in the coming years the trend will continue to strengthen towards a more automated and networked production environment. The smart factory can therefore be a good means for many companies to achieve more transparent, sustainable, and also more cost-effective operations. A step-by-step approach to a smart factory is therefore the right way forward for most companies.. □



*Climate-neutral factory with photovoltaic systems
(Source: Alois Müller GmbH)*

IPR is Key for Competitiveness & Sustainability of MSMEs & Startups...

Prof. H Purushotham



In today's globalized world intellectual property rights (IPRs) are key for competitiveness & sustainability of small & medium businesses. They are emerging as strategic business tools for any business organization to enhance industrial competitiveness. However, Indian MSMEs are not fully aware of the process of securing protection for their IPs & how to leverage the benefits from them. **Prof H Purushotham (Prof. HP)** the DPIIT-IPR Chair Professor at Andhra University and former Chairman & Managing Director, National Research Development Corporation (NRDC), is an internationally known expert on IP&Technology Transfer to MSMEs/Startups & who has been making significant contributions in the domain has shared his perspectives with our CASMB Advisor and member of Editorial team of Purnabrahma Magazine **Dr. Prakash Kondekar (Dr. PR)**.

Dr. PK: Can you highlight the importance of IPR for MSMEs?

Prof HP: We are all aware that MSMEs and Startups are the backbone for any economy. If MSME or Start up protects the IP generated by it in India or overseas, MSME gets an exclusive & monopolistic right from the government on the granted IP in that country for certain period, which means other competitors cannot use the same IP without the permission of the original IP owner during the period when the IP is protected and valid. This provision of the IP Act gives the legal right to the IP owner to seek remedy from the competent courts if anyone copies the protected or granted IP. Protecting IPs by MSMEs result in competitive advantage which is crucial for their growth & sustainability. Obtaining IP protection is very crucial for technology-based startups & MSMEs as they spend substantial resources for developing their innovative products, processes & services, otherwise someone can copy them easily and can cause enormous loss to the Startup or the MSME business. **IPRs safeguard the innovations and creations of MSMEs in the present highly-competitive global economy. Even to attract investments and gain confidence of the consumers, IP protection has paramount importance.** Global e-commerce platforms like Amazon, Flipkart and even government e-market place (GeM) will not list & sell the products if the product is not protected through IPs. Like physical or tangible assets, the IP

assets or intangible assets also need to be protected, valued & maintained. Therefore, I strongly advise new generation of entrepreneurs to understand the importance of IP in their business & avail expert services of a patent agent or attorney to protect their IPs from a very early stage of their business life cycle.

Dr. PK: What are the different types of IP & Which IPs are more relevant for MSMEs?

Prof HP: There are 8 types of IP's: Patent, trademark, copyright, industrial design, trade secret, geographical indication, integrated circuit layout design & plant variety protection. Each of these is governed by the respective legislative acts. **As far as MSMEs are concerned, IPs like patent, trademark, industrial design, copyright are predominantly relevant & used. About 70% of the IPs filed across the globe are in the area of Trademarks.**

Dr PK: If IP Protection is so important, why MSMEs are not protecting their Ips?

Prof HP: According to World IP Organization Report, percent of patents granted to Indian MSME is 2.8-23.4%. The patenting intensity is higher in pharmaceutical, biotechnology and advanced manufacturing-based MSMEs. The reasons why MSMEs are not filing & protecting their IPs include (i) lack of awareness about benefits that IP protection can offer (ii) complex, lengthy, time consuming IP protection process particularly for patents (iii) high costs agent/attorney associated with patent filing, maintenance.

Dr. PK: What is the process of getting the IP Rights & how much it would cost?

Prof HP: The most commonly used IPs by MSMEs are patents, trademarks and industrial designs. MSMEs have to apply to Controller General of Patents, Designs & Trademarks (CGPDTM). Intellectual Property Offices (IPO) located in Mumbai, Delhi, Chennai and Kolkata on Form 1, Form 2 and Form 28 seeking patent rights, on Form TM-A for Trademark registration and Design Form 1 given respectively in Patent Act 1970, Trademark Act 1999, and Industrial Design Act 2000. Although MSMEs can apply directly, it is advisable to apply through an experienced registered IP Agent/ Attorney. CGPDTM after examining applications against the prescribed process grants the IP rights.

Patent filing: Filing regular patent application cost around Rs.5600 (Rs.1600 for filing + Rs.4000 for examination). It would cost Rs.16,100 if requests for early publication and expedited examination have been made. After patent is granted, has to maintain it for 20 years (starting from date of filing/priority) of

its validity & the maintenance cost would be Rs.76,800. Generally, it takes about 3-4 years to get the patent granted by IPO depending upon the field of invention. After the patent is expired, the patent comes to public domain & any one can practice it freely.

Trademark filing: Application fee is Rs.4500. Trademark is granted initially for 10 years. It can be renewed forever by paying Rs.9000 once in ten years. Generally, it takes 18-24 months to get a trademark registered in India.

Industrial design filing: Application fee is Rs.1000. Design rights are valid initially for a period of 10 years & further renewed for another 5 years with renewal fee Rs.2000. Thereafter these rights expire & come to public domain. Generally, it takes 3-6 months to obtain this right.

All IP applications can now be filed online & the fees mentioned is for e-filing which is less by 10% compared to the manual filing. To get IP rights granted, applicant has to provide enough information to establish novelty, inventive step & industrial use for patent and other information sought by the CGPDTM as per respective IP Acts.

Dr. PK: What are the measures government is taking to promote more IPs in India?

Prof HP: During last 6-7 years both Central and State governments have realized importance of IP protection in the technological and economic development of the country and have made IP & Innovation an integral part of development planning process providing all necessary policy support. The National IPR Policy was launched in 2016, and it is making significant impact across IP Value Chain, i.e. creation, protection and commercialization. Subsequently, several schemes & initiatives have been introduced to encourage MSMEs to protect their IP. In 2019, the Government introduced a relaxation in IPR filing fees by 60% for patent and 50% for design & trademark for MSMEs. The Government has also introduced Bilateral Patent Prosecution Highway Programme that would expedite patent filing processes. Most recently, on 21st Sept. 2021, DPIIT announced about 80% reduction in patent filing & maintenance fees for patents filed by academic institutions.

The "Make in India" & "Startup India" initiatives were introduced in order to heavily incentivize & encourage MSMEs and Startups. Every Ministry in the government has a scheme to promote IP & innovation by way of providing financial support for organizing awareness & capacity building programs, reimbursing the patenting costs to the inventors particularly by MSME. Agencies like NRDC and TIFAC file patents free of cost for academic institutions and Startups. The DPIIT has introduced a scheme for facilitating Startups Intellectual Property Protection (SIPP) under which startups are being given 80% fees rebate & designated patent

agent/attorney files the patent for Startup. ***MSMEs have to increase their awareness about various IPR schemes of Government for benefit of their businesses.***

Dr. PK: How IP Rights help MSMEs in improving their exports?

Prof HP: The country's MSME sector accounts for more than 40% exports & India has envisioned to increase it to 60%. But if we analyze export of products and services, only a small number of products have their IPs protected. According to a research study report on impact of IPR on international trade 2017, patent related commodities share of exports is 6.17%, copyright related commodities is 0.066% & trademark related commodities is 11.06%. To enhance our IPR-based exports there is a strong need to promote research and development intensive industry in countries like USA, China, South Korea and Israel. ***As IP-based products & services can fetch higher export revenue, an export policy framework for IPR based products & services may be launched by the government.***

Dr. PK: What percentage of Patents filed in India are filed by MSMEs and Start-ups?

Prof HP: As per the annual report of IPO, out of total 50,659 patent applications only 2.8% are from MSMEs & Start-ups, 8.3%, 66.43%, 33.57% are filed by Indian residents, foreign nationals and companies, Indian residents & companies respectively. In China Patent Office about 90% of patent applications are filed by the Chinese residents & the rest are from foreign nationals and companies.

Dr. PK: What are GIs and how they help MSMEs?

Prof HP: In a broad sense, Geographical Indications (GIs) is the sign used on specific products that have specific geographical origin and possess certain qualities due to that origin. For example: Darjeeling tea, Mysore Silk, Chanderi Sarees, etc. There are about 370 products for which government has granted GI tags. So far in India ***MSMEs can start their ventures to manufacture and sell these GI tagged products as they get a good branding and the IP of product is already protected under GI.*** Granting a GI tag on a product could add to goodwill and reputation to that product which may result in profitability for an MSME that manufactures it. The MSME may also take legal actions against entities who counterfeit & sell duplicate versions of product on online or physical platforms.

Dr. PK: Is Indian IP regime harmonized with international IP regime?

Prof HP: Yes, India has Trade Related aspects of Intellectual Property Rights (TRIPS) which is robust, equitable and dynamic IPR regime. India has a well-established legislative, administrative and judicial framework to safeguard IPR which meets its international obligations while utilizing flexibilities provided in international regime to address its developmental concerns. Recently, in July 2021, Department related

Parliamentary Standing Committee Chaired by Shri Vijayasai Reddy reviewed IPR Regime in India and suggested several reforms to further improve its effectiveness.

Dr. PK: Now as a prestigious DPIIT-IPR Chair at Andhra University how are you contributing to the promotion of IPR in MSMEs?

Prof HP: DPIIT-Ministry of Commerce & Industry is responsible for the promotion & protection of IPs in India. CGPDTM which grants the IP rights is under administrative control of DPIIT-Ministry of Commerce, Govt of India. To promote IP in academia, DPIIT has launched a Scheme for Pedagogy and Research in IPRs for Holistic Education and Academia (SPRIHA) with a view to produce quality IP savvy human resources to meet the requirements of knowledge economy driven by Industry 4.0. As of now, 12 premier institutions/ universities in the country have been granted IPR Chairs under this scheme and I am one of them. The total budget for Chair and secretariat is met by DPIIT initially for a period of 5 years. The main

objective of the DPIIT-IPR Chair is to introduce and teach IPR as a mandatory credit course at UG level, create IPR awareness & culture in the university, and help the university to protect and commercialize its IPs. The state university education system is highly regulated. Required approvals were obtained to introduce & teach the IPR course at UG and PG level, an IPR Policy for university has been prepared & launched, Centre for IPR has been established, a lot of IPR awareness & training programs for students, faculty, MSMEs & start-ups are being organized & steps are being taken to facilitate filing IPRs and commercialize the IPs created by the University through start-ups & MSMEs. Considering various activities undertaken by the DPIIT-IPR Chair, Centre for IPRs, Andhra University has been designated as the AP State IPR Nodal Agency & asked to promote IP culture in State Universities & the State of Andhra Pradesh. Our vision is to establish a strong partnership between academia and industry, create a vibrant sustainable IP innovation & entrepreneurship ecosystem & thereby contribute to socio-economic development of this region.

Brief Profile of Prof H Purushottam

Prof Hanumanthu Purushotham is currently serving as a DPIIT-Ministry of Commerce & Industry IPR Chair Professor at Andhra University Visakhapatnam since 5.12.2020. Prior to the current engagement he was the CMD National Research Development Corporation (NRDC) a Central Public Sector Undertaking & served as Director General of Consultancy Development Centre both are under the Ministry of Science & Technology, GOI. He obtained his B. Tech (Chem. Engg.) from Andhra University Visakhapatnam (1982), M. Tech from IIT Kharagpur, M.B.A. from IGNOU & PhD from Osmania University. He has acquired over 37 years of diverse experience across the innovation value chain (Idea to Market) by working at different government institutions of repute mostly under Ministry of Science & Technology, Govt. of India (CSIR-NEIST&CLRI; DSTARCI & TDB; DSIR-NRDC). He is the Member Secretary of TBI-ARCI and member of several committees of government bodies (DST, DSIR, MoMSME, MCI, NITI Aayog, MHRD, AICTE, TIFAC, TDB, CSIR, APSCH, i-Hub etc.) for promoting innovations. Very recently, he was conferred with IP Academician of the year award 2021 for his noteworthy contribution in the area of IP and innovation.

Prof was trained at (i) Venture Capital Institute (VCI), Washington, USA on "Venture Capital Funding", (ii) National Business Incubation Association (NBIA), USA on setting up of "Technology Business Incubators", (iii) MDI on "How to Engage & Use Consultants" & (iv) ASCI on "Management of R&D Systems". He was invited by USPTO, AUTM USA, UN-APCTT to deliver invited lectures. Prof. is a recipient of 15 national & international awards including "Meritorious Young Consultant Award 1991" Instituted by Consultancy Development Centre, Ministry of Science & Technology. BSE-SKOCCH Award 2016, International Association of Advanced Materials Medal 2017, Sweden, ASSOCHAM & Indian Chambers of Commerce & Industry Awards 2017 for promoting R&D and innovation in the country. Under his leadership NRDC got "Best PSU Award" from current governance for bringing financial turn around. He was awarded "CEO of the Year 2017" from Indian Chambers of Commerce. Prof. has authored/ co-authored 65 project reports, 5 book chapters, one book, published/ presented 85 research papers in various journals & conferences, filed three patents and helped industry in commercializing more than 350 technologies in different sectors, like, Food & Agriculture, Healthcare, Engineering, Chemicals, IT&ITES etc. In his entire career, Dr. Purushotham has been sphere heading Commercialization of Innovative Technologies developed by various public funded R&D Labs and Universities in the country & contributing significantly to Start-up India & Make in India Missions of GOI. While working in Technology Development Board Govt of India (2004-2008) he has funded almost all the ventures in Genome valley at Hyderabad including Bharat Biotech, Shanta Biotech, Zeno Tech, Biological Evens etc.

Research and Development in Food Industry

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Food, be it a candy or a product with a specific health claim, has come a long way. Earlier foods were embraced for their convenience and shelf-life attributes. Such aspects of food items highly dominated the market, but now with increase in research and development (R&D) activities in varied sectors, the facet of the food sector and their products have witnessed improvements or alterations according to the customer's requirements.

The prime goal of Food R&D is the advancement and effective introduction of innovative products based on the market requirements. According to www.foodprocessing.com.au website's 2019 R&D trend study, 63% of firms have a suitable R&D facility, with the remaining eventually burgeoning. In recent times, the scenario has shifted the fulcrum of research towards non-GMO, vegan, added fiber and low sugar-based beverages/ food, added with vitamins, minerals, herbs, other active ingredients and so on, which has eventually lead to newer products in the market.

The process for the design, manufacture and marketing of a new product is referred to as New Product Development (NPD). Most of the newer food products introduced are based on the company-specific NPD processes which focuses more on current and varying food taste of the public.

One important trend is the ingenious revitalization of Indian food products. Regardless of how many burgers one relishes, the Indian consumer's palate remains Indian. With this in mind, aspects such as consumer health, ingredient availability and access, food supply chain resilience, sustainable ingredient development, and management of the life cycle of food products are continuously taken into account.



Although the plant-based food sector has witnessed a considerable growth in the pandemic year and after, analysts do not view its market expansion as a reality. The market for plant based food and beverages is estimated to reach 32.29 billion dollars by 2027. For instance, the escalating cases of lactose intolerance due to growing number of milk allergies has also prompted new product launches.

According to the data of www.foodprocessing.com.au website's 2021 R&D survey report, more than two-thirds of respondents stated that the pandemic caused some delays in new product launches, while 23% claimed the outbreak motivated them to develop new ones. The following are few of the new products released during the pandemic:

- Immunity-boosting cookies and candies
- Health boosting fermented drinks
- Microwave bread
- CBDs and immunological bars
- 2,3,5 and 7-day home-giving boxes and pantry boxes for remote students.

The food business is presently dominated by demand for incorporation of healthy ingredients in the food products, product transparency, and ecological awareness, sustainable sourcing which has encouraged innovations. There is an upsurge in the utilization of algae and crops by the companies. Thus, time is not that far for animal-based replacement goods market to become the "new normal" in the near future.

Quite a few foodstart-ups are benefiting from these trends. The business is known for its plant-based Burger and other vegan product, which has been dubbed "the game changer in the food sector" by some. Some burgers are produced from the heme-carrying protein of soy leghemoglobin, which mimics the flavor of meat.

In this broad context, the government's participation in food R&D varies from nation to nation, from time to time and from economy to economy depending on the prevailing situation. A

government can establish a favorable R&D environment for companies in the private sector, conduct research, and/or seek a stance between these polar views. For such initiatives, various schemes have been launched by the Ministry of Food Processing Industries (MOFPI) and the Ministry of micro, small & medium enterprises.

Some of the major initiatives taken by the Government of India to improve the food processing sector in India are as follows:

- Through the implementation of reforms like FDI (100% Foreign Direct Investment) and other national and state incentive markets, combined with a significant focus on the infrastructure of the supply chains
- The Food Safety and Standards Authority of India (FSSAI) intends to invest about Rs 482 crore to enhance India's food testing infrastructure by renovating 59 current food testing facilities and establishing 62 new mobile testing labs across the nation
- The Indian Council for Fertilizer and Nutrient Research (ICFNR) would follow worldwide best practises for fertilizer research, allowing farmers to obtain high-quality fertilizers at reasonable prices, thus achieving food security for the common man.

Adoption of food safety and quality assurance methods such as Total Quality Management (TQM) including ISO 9000, ISO 22000, Hazard Analysis and Critical Control Points (HACCP), Good Manufacturing Practices (GMP), and Good Hygienic Practices (GHP) by the food processing sector in the future provides numerous advantages. It would enable strict standards of quality and hygiene to be obeyed thereby protecting consumer health, preparing industry to compete globally, increasing product acceptability by foreign purchasers, and keeping the industry informed of worldwide guidelines.

With such advancements, small and medium-sized entrepreneurs/companies are getting into food industries and focusing on new innovative, local cuisine which would satisfy the palate of Indian customers.

In conclusion, the R&D department is primarily responsible for the future growth of companies. Its prime role is to leverage the process of product developments by upgrading existing ones as per the current needs. We do not expect rapid profit from R&D as it is aiming for a long-term horizon. R&D activities, on the other hand, may lead to patents, trademarks, or innovations that will benefit the firm in future, provided success knocks their door. □



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The Evolution of Synthetic Meat

LATHIKA G V

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The food sector has become one of the quickly progressing domains, primarily due to innovations in the food products as per the changes in the consumer habits and individual preferences. Though food culture is passed down through the generations, the importance of future food sustainability is high at both scientific and industrial level. Synthetic meat is one such product which has gained attention of the researchers over the past decades due to its possible impact on human life. Back in 1975 the use of the term "synthetic meat" was commonly used as a reference to soy protein. Today, we are witnessing significant growth due to growing vegan and flexitarian population across the world. The rising awareness about the health benefits offered by plant-based meat over animal meat, and growth in government initiatives along with significant investments are driving the global market.

In 2013, the world witnessed the first ever lab-grown burger. This was proof that it was possible to grow safe and edible meat without slaughtering a single animal. In 2015, techniques and principles of muscle tissue engineering and in vitro cultured stem cells were taken from live bovine skeletal muscle to form edible filaments. The process starts with a few stem cells, found in muscle of live animal that can turn into the different cells. When fed with a nutrient-rich serum, the cells multiply and are encouraged to form strips, much like how muscle cells form fibres in living tissue. These fibres are attached to a sponge-like scaffold that floods the fibres with nutrients and mechanically stretches them to increase their size and protein content. The resulting tissue can then be harvested, seasoned, cooked and consumed as boneless processed meat. The only matter of concern was that the burger costed them a whopping \$330,000.

For now, the race is on to make affordable cultured meat products. The need to find credible alternatives to traditional meat is urgent. Livestock farming takes up a huge expanse of land and water per calorie of food compared to

crops, and in terms of greenhouse emissions, is as bad as burning fossil fuels, according to the UN. Rising incomes in developing countries means that more people are eating meat than ever before, reducing the amount of land available for much-needed crops, and contributing to climate change. On the other hand, a vegan diet by definition, does not include consumption of meat or any form of animal products. Of course, being able to grow meat artificially can only have a positive impact on people as well as animal welfare, but lab-grown meat would not be considered vegan because the ingredients needed to produce the synthetic meat are all derived from animals.

Plant-based meat is not the same as lab-based meat. Instead, it replicates the taste and texture of actual beef, sausage, and other meats without using any animal products. The current research aims at developing edible bio materials that mimic natural fibres such as collagen and myofibrils and further studying their interaction with proteins and fats in order to come up with meat alternatives having higher consumer acceptability. Another technique uses genetically-engineered yeast to create heme, a protein that's crucial to duplicating the juiciness, flavor, and color of real meat.

In terms of commercial sales, the plant-based meat market is estimated to be valued at USD 4.3 billion in 2020 and is projected to reach USD 8.3 billion by 2025, recording a CAGR of 14.0%, in terms of value. "Impossible Foods" and "Beyond Meat" are the two biggest brands of synthetic meat available at selected supermarkets and restaurants across the US. On the other hand, with stronger research and development facilities, Europe is envisioned to emerge as the leader in synthetic meat products. The world's largest producer of jackfruit, India, is capitalising on the growing popularity of jackfruit as a "superfood" meat alternative, for its pork-like texture when unripe. The purpose of this technology is to create product with the same texture, appearance, flavour, and nutritional value of conventional meat.

Since people are always sensitive about what is served on their plates, the studies on the ethical and moral aspects of product production and consumption also emerge. In this way, the regulatory aspects of synthetic biology concerning food safety are considered along with the socio-political challenges. However, the creation of food products from biotechnological processes is justified by aspects related to food safety, population growth, social pressures, and other issues. □

Nutraceuticals, Functional and Other Valuable Compounds from Commercial Seafood Processing Waste

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Commercial processing of food including seafood generates enormous amounts of waste, which include both solid discards as well as wastewaters as effluents. The processing of seafood including shellfish results in discarding of about 50% of the total harvest as waste, which consists of skin, bones, heads, scales, shells, and others. In addition, a good amount of the harvest remains as unused by-catch due to its inherent problems such as unattractive color, smaller size, and high fat content. As shown in Table 1, these wastes are rich in valuable components including various proteins, unsaturated lipids, polysaccharides such as chitin and chitosan, and minerals (Venugopal and Lele, 2014). Traditionally seafood processing wastes find applications as animal feed or discarded as landfill. Chemical treatments have been employed to extract compounds such as chitin from shellfish processing discards. However, chemical processes are not environmentally savvy. Besides, they can have adverse effects on the bioactivities of extracted compounds. Biotechnology, on the other hand, holds promise for environmental-friendly waste treatment and resource recovery. Besides, biotechnological processes are safe, and economical, which cause minimum changes in the native functional properties of the extracted ingredients. These processes essentially depend on bioconversion reactions brought about either by fermentative actions of microorganisms or by the action of enzymes, which result in initial detachment of compounds from their food matrices. The detached components can then be recovered and purified by suitable environmentally friendly techniques. The process is shown in Figure 1. Techniques for isolation of proteins from the discards also include iso-electric precipitation, gelation and flocculation, while lipids including carotenoids can be isolated by enzymatic treatments using proteases and lipases. Shellfish wastes are rich sources of chitin, which can be recovered by

fermentation and chitinase-induced extraction, as shown in Figure 2. Mineral-based compounds can be extracted using enzymes. An interesting biotechnological process makes use of growth of algae in the seafood processing wastes or process effluents. Biomass fermentations-using microalgae are emerging as green and economical processes to recover functionally active compounds and also biofuel. Phototrophic microalgae such as chlorella, spirulina, dunaliella, diatoms, and cyanobacteria are bestowed with a high growth rate in nutrient media in presence of light and CO₂. Their digestive actions allow degradation of organic contents in the medium giving rise to algal biomass. The algal biomass is subjected to appropriate extraction procedures to isolate various compounds. The algal technology can also be used for biofuel production from seafood discards. These aspects have been recently discussed in detail (Venugopal, 2021; Venugopal and Sasidharan, 2021). The compounds isolated from algal biomass include proteins, pigments, antioxidants, n-3 fatty acids, minerals, biodiesel, bio-hydrogen and others, which have diverse food, health or industrial applications. Protein-based compounds including protein hydrolyzate and lipid-derived compounds can find uses as nutraceuticals, natural food additives, and related areas. Applications of chitin, particularly, chitosan, the deacetylated chitin, are increasing annually (Venugopal, 2021). Biotechnological approaches to treatments of seafood discards, as briefly discussed, help not address the problems of environmental pollution but also recovery of valuable ingredients that can in turn enhance seafood-related bio-economy. Genetic engineering of microorganisms, enzyme engineering, reactor designs and process optimizations are some of the future strategies that can be further beneficial for successful valorization of seafood waste towards sustainable seafood production.

*The article is based on a talk entitled 'Utilization of Commercial Seafood Processing Waste by Dr. V. Venugopal on 9th March 2021, organized by the Chamber of Advancement of Small and Medium Businesses, Mumbai.

Additional information can be had from the following articles:

Venugopal, V. (2021a), Valorization of Seafood processing discards: Bioconversion and biorefinery approaches, *Frontiers*

Sustainable Food Systems 5:611835

Venugopal, V. and Sasidharan, A (2021b), Seafood industry effluents: Environmental hazards, treatment and resource recovery, Journal of Environmental Chemical Engineering. (Elsevier) 2021, 104758

Venugopal, V. and Lele, S. S. (2014), Nutraceuticals from seafood processing waste, Handbook of Marine Biotechnology, S.K. Kim (Ed.), pp. 1405-1425.

Table 1. Classes of compounds that can be recovered from seafood processing discards

Nitrogenous compounds

- Myofibrillar proteins
- Collagen
- Gelatin
- Protein hydrolyzate
- Bioactive peptides
- Various enzymes

Lipid-based compounds

- Poly-unsaturated fatty acids (PUFA)-rich lipids

- Squalene
- Squalamine
- Carotenoids
 - Astaxanthin
 - Beta-caarotene

Polysaccharide-based

- Chitin
- Chitosan, derivatives
- Glucosamine
- Oligosaccharides
- Novel polusaccharides
- Glycosaminoglycans
 - Chondroitin
 - Dermatan sulfate
 - Hyaluronic acid

Mineral-based

- Biologicalcalcium
- Phosphopeptides
- Hydroxyapatite
- Calcium carbonate
- Calcium lactate
- Calcium acetate

Figure 1. Schematic representation of bioconversion for valorization of seafood discards and the major classes of compounds that can be extracted from seafood processing discards.

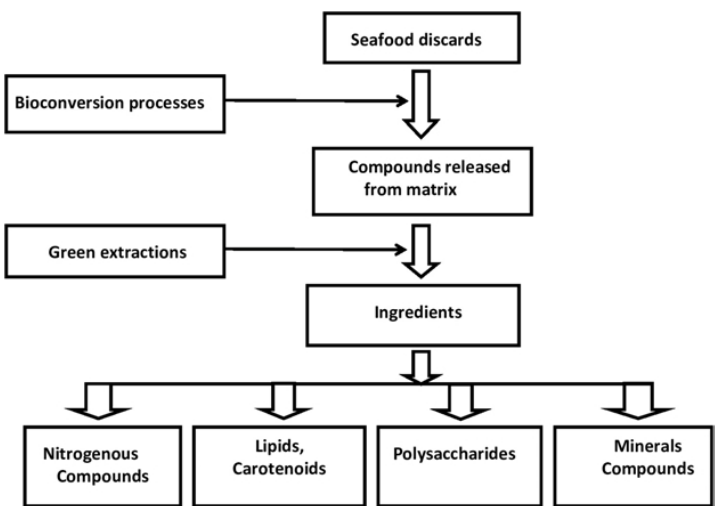
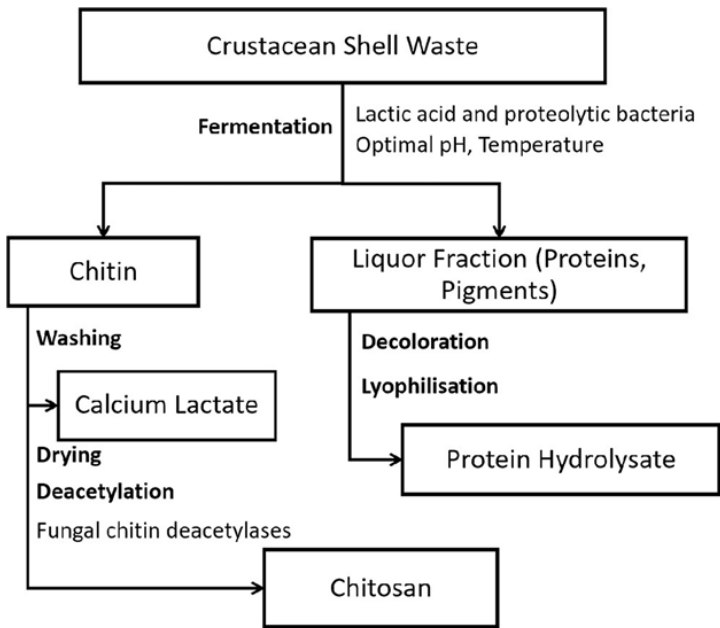


Figure 2. A typical bioprocess for the extraction of chitin, chitosan, protein hydrolyzate and biological calcium from shellfish waste.



□ □ □

Natural Healing System of 21st Century

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The Covid-19 pandemic has taught us many things about our approach towards life. Today's world is a world of controversies. When one person opines about anything the other one may not agree to him/ her. One person may like one thing another may not. This is true with health professionals also. But I am sure that everybody will agree that 'Health for all' should be the right slogan of World Health Organization (WHO).

Wellness follows the establishment and maintenance of optimum health and balance. Wellness is a state of being healthy, characterized by positive emotion, thought and action. Wellness is inherent in everyone, regardless of disease(s). If wellness is recognized and experienced by an individual, it will quickly heal a given disease than any direct treatment of the disease alone.

If we refer to Asian philosophy/cultural heritage, various holy texts (Shashtra's and Purana's), we find that there are many aspects of life such as how to live in the family, how to live in the society, how to live for the country, what are the important facts of our lives and by use of this knowledge, how to live healthy and happy life. The meaning of happiness differs from person to person. It is interesting to know and one may recollect the story of a happy common man and an unhappy king. A king of an empire was not happy in spite of lot of wealth and manpower at his disposal. He was greedy and became insomniac (sleeplessness). Many Vaidyas and Hakims tried their medicines but in-vain. Ultimately one of his Sardars brought one sage (Sadhu Maharaj) so as to make the king healthy. The Sage diagnosed the emperor's problem and told him that the only remedy is that the emperor should get a used shirt from any happy man in his kingdom. So all soldiers roamed and asked people if they are happy. But nobody was happy due to one reason or the other. Finally, they could find a young man breaking stones in the field who said that he was happy with his life. Soldiers took him to the king. The king was delighted to see the man and asked for his shirt but the poor fellow had no shirt. The emperor could understand the meaning and became happy by working hard physically. So exercising should be a part of our

daily routine, along with proper diet.

About four hundred years ago there were merely any allopathic or English medicines what we call it and still people used to live longer and better life. But then people were more close to nature. With urbanization, people started going away from the nature, food habits changed drastically with the result their immunity became weak. There was also attack on humanity from epidemics/diseases for which there was hardly any immediate answer. Thus allopathy emerged as an emergency treatment in those old days. It was an alternative treatment at that time. Scenarios have changed subsequently and allopathy became the main treatment now a days and an old treatments like Naturopathy & Ayurveda have become alternative therapies today.

Allopathy started frequent use of quinine for malaria, penicillin for syphilis and pneumonia and so on. But after the emergence of Cancer and AIDS, a subsequent drift towards alternative therapies is seen. This marks the return of Naturopathy which undoubtedly will be the healing system of 21st century. Many people have experienced this fact during last eighteen months.

In Naturopathy, emphasis is given on the improvement/enhancement of our body immune system with the help of five natural elements or PanchMahabhutas like air, water, earth, fire and space coordinated with proper diet and exercise. There are many body ailments which modern medicines cannot cure and then people are directed to alternative paths like Naturopathy. In Naturopathy since no drugs or chemicals are used, a person has to use food as his/ her medicine as per directives of Naturopath. But then one cannot assume any food as a medicine on his own.

Naturopathy confers a holistic healing approach to any bodily problems and is not taken in isolation. Here, the basic needs of body and associated systems are considered along with dietetics for Nutritional Management of patients. A manipulative treatment and massage also plays an important role in Natural cure. Naturopathy can be used more efficiently as a preventive therapy for many orthopedic problems.

When we talk about diet and nutrition with reference to Naturopathy, we may have to consider following aspects:

Health education programs to highlight the importance of nutrition during vulnerable age of the child, both preschool and school going and the vulnerable periods in a women's life like child bearing and nursing. This could be possible through pamphlets, newspaper release, Akashwani (Radio) and

television. Books and journals play a secondary role in this respect. Workshop and symposia are costly affairs and have their own limitations.

Naturopathy is a way of life and change in life style is useful in the management of certain diet-related chronic diseases (non-communicable) like cardiovascular diseases and diabetes. It is proven fact that the human body can perform any of its normal functions and maintain normal metabolism only when specific nutrients are consumed regularly in proper proportions. Overfeeding at a young age can lead to overweight and obesity.

Back-pain, asthma, eczema, acne, vitiligo, arthritis, ulcers, psoriasis, migraine etc. are some of the common body ailments for which there are hardly any medical cures but only alternative therapies like Naturopathy can have a solution for these ailments.

As mentioned earlier, Naturopathy gives more emphasis on diet. But in spite of higher living standards and higher standards of personal hygiene there are problems of food disorders and food poisoning or an illness brought about by eating harmful food. Coccus, Bacillus and Vibrio are some of the bacteria which are responsible for food poisoning. When we talk about food and nutrition we have to consider micronutrients for prevention and control of various diseases. These micronutrients are vitamins, iodine, iron, etc. Here also Akashwani should broadcast programme on national goitre prophylaxis, fortification of milk with vitamins etc. About 5-7% of preschool children indicate ocular manifestation of vitamin A deficiency. Iron deficiency is one of the most common and widely prevalent micronutrient deficiency affecting all age groups and in both sexes. Iron deficiency leads to anaemia. Iodine deficiency disorder (IDD) could be found in many people as goitre but it could also damage brain in foetus and infant resulting in irreversible retarded problems. In many cases it causes cretinism, deaf mutism, squint, spastic diplegia and other serious defects. It also affects reproductive functions leading to possible abortion, still birth and other congenital abnormalities. Other elements in microform required for the human body are Chromium, Copper, Fluoride, Magnesium, Manganese, Selenium and Zinc.

Curry Leaves known as Kadhi Patta is a vital herb. Curry leaf plants are native to India, Sri Lanka, Bangladesh and the Andaman Islands. Though they are widely cultivated, the herbs are particularly associated with Indian cuisines. Research shows that consuming curry leaves may benefit heart health in several ways. Curry leaf extract may help reduce high cholesterol and triglyceride levels.

Coriander leaves, may help lower blood sugar. High blood sugar is a risk factor for type 2 diabetes. Coriander seed extract, and

oils may all help lower blood sugar and are also rich in immune-boosting antioxidants. Coriander offers several antioxidants which prevent cellular damage caused by free radicals. Its antioxidants have been shown to fight inflammation in the body which may benefit heart health such as high blood pressure and LDL (bad) cholesterol levels, improve brain health, brain ailments including Parkinson's, Alzheimer's, and multiple sclerosis under medical guidance.

Garlic is a superfood because it has so many beneficial properties: antioxidant, antibacterial and antifungal which adds up to big benefits for the skin. Ginger contains more than 400 chemical compounds but researchers believe gingerol compounds are the ones responsible for the root's health benefits. They are also responsible for its smell and flavor. Gingerol has powerful antioxidant and anti-inflammatory properties that can help the body in a variety of different ways. Drumstick soup is an aromatic and nutritious delight which can comfort the tummy and boosts energy levels. These are some of the natural medicines.

Naturopathy takes care of most of these problems while prescribing the diet for the person. Thus proper use of preventive diet along-with yoga, could be the drugless solution with minimum expenses. This could be the remedy for better health for all, in 21st century. Complimentary to Naturopathy there are other methods like acupressure, Spiritual Healing, Bach flower remedies, Reiki, Chromotherapy, Mechanotherapy, Aromatherapy and Bowen therapy, which will be the methods in near future for solving human health problems.

In short when we talk about health for all, one should not keep aside Naturopathy which will be the important therapy taking care of curative and preventive aspects of human health. Education on Akashwani (Radio) and other media will have to play a vital role for reaching the masses in better way for conveying the message of health.

**कुपोषण छोड़ पोषण की ओर
थामे क्षेत्रीय भोजन की ओर**



Food Product Development

DR RITA PATIL

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Life-styles have changed, so have the consumer demands. The effect of globalization is visible in the food industry. A wide range of fast-food chains and a variety of snacks have become a part of Indian cuisine. Today, most of them are easily available and consumed by all. This has impacted food choices of people. This particular trend started in 1995 with the entry of KFC in Bengaluru and Dominos in Delhi. Subsequently, many others were also launched in the Indian markets. Today, consumers are often bored with food products and constantly seek new foods. Companies now devote large budgets to developing new products in order to stay competitive and satisfy consumer demand.

Food product development has become an ever growing need. So what exactly is it? The process may have an entirely new concept for the type of food, or it could be a new flavour to be introduced in the existing product. Food companies go through this type of product development and experience varying degrees of success. In any such methods, customer feedback is extremely important; in order to modify the product for best acceptability. Such product development experiments are now imperative for home based food entrepreneurs or even small scale food businesses.

Some basic steps in food product development are mentioned below. However, the actual steps may be many and will depend on the food product too.

The first step in this will be answering questions. Who are the consumers? What may be their affordability? How much will be the added cost for a new product? What type of marketing will be required? What will be the time frame to try making a new food product?

The second step will be to decide, procure equipment, plan kitchen trials, standardise the product and lastly start scaling up to the decided quantity.

Step three will be testing the product. Make sure it fits in the regulations defined for the type of product. Plan the introduction of the food product. Tasting by consumers can also

be scheduled in small and diverse groups so that finalisation of the product would be easy.

The fourth step will be introducing to the market and testing the food product. This is the stage where it will be inspected and tasted by consumers. It involves analysis of taste, flavour, appearance, packaging etc. This step is when you can try to understand the psychology of consumers choosing specific brands. Here it is necessary to get suggestions from employees and consumers. Also the need to re-evaluate may arise. The suggestions that are easy to accept and those that fit in the regulatory should be implemented.

Step five will include preparation for product launch and launching it. Advertising the product prior to launch may also be needed. Actually launching and having enough to sell is important. Add strategies to increase sales and plan for more.

The last step is evaluating the final launch. This step is equally important as this analysis will give an estimation of acceptability and sales. Additionally, it may lead to identification of new food products to be developed later. This is also the time when you will review packaging material. Evaluation at this stage should continue for a long time as sometimes consumer responses may come later which needs to be considered.

Entrepreneur should understand that there is no fixed timeline for above processes. Some may find it easy to complete and others may require more time. It is better not to rush and let all steps be properly done. Irrespective of how long each process takes, one must remember that for the overall development and success of the product each stage is important. Some unexpected situations in product development may arise and should be dealt appropriately. For example, the consumer demands may increase making it difficult to satisfy them; some new products may not be able to match the marketing tactics of others. In spite of good quality, if any regulation is missed and the product gets tested in the market, problems may arise.

The future of new food products is immense. The Indian food processing industry is constantly growing. The government is also encouraging and has promoted entrepreneurship. The food industry has seen a rise even in the pandemic. More and more home based entrepreneurs took up food orders and sold food items to earn a living. Food entrepreneurship is a lucrative business for those who are determined to succeed.

Today health issues have multiplied and there is a need to maintain good health of all. Each disorder needs special diets. A plethora of food products can be created for each of these health disorders. Dietetic foods can also expand the food market as it still remains unexplored. Low sugar, low salt, low fat, high fibre, low carbohydrate, high calcium, iron rich, vitamin A fortified are just a few examples. India has a rich variety of indigenous vegetables and fruits which can be modified into processed and healthy food products. Lastly, I would say that sky is the limit for new food development. ❑

Snakes And Ladders

DR. SAGAR V. GOKHALE

Co-founder and Partner,
Ojman Foodbio



*If you are not ready to be uncomfortable...
You are not ready to be entrepreneur!*

Being ready to give up your comfort zone and ready to be uncomfortable is first step towards the entrepreneur! And I feel, both me and my friend Ameya were ready to be uncomfortable by giving up the well-paid job, leaving our daily schedule of 9 to 5 and were ready to work 24 h a day round the year just to pursue our passion. Yes! The spark was ignited in our mind in 2004-2006 when we were perusing M.Tech. from Institute of Chemical Technology, Mumbai (ICT; formerly known as UDCT). My best friend, Ameya and I were thinking on same page of starting something of our own in next few years after having some industrial experience. After our Master's, Ameya took a job and I decided to pursue Ph.D.; but we used to keep on discussing some ideas whenever we meet. We continued to brainstorm and few years later we formed a company, named, Ojman Foodbio. Ojman is a Sanskrit word for Sun with 'Oj' meaning energy and 'man' meaning source. So, whenever you start anything new, then first question we need to ask to ourselves is why are we starting a business? Some people are entrepreneurs because they love to work, and even if they formally retire from their job, they always need something to work on. They probably never retire until their doctor makes them to one day. Some business owners are into it to set up a brand, sell it to a bigger company, make money and live rest of the life luxuriously. Few start their venture because they have innovative ideas and want to bring them to reality and make it big themselves. Thus, answer to this question will help you to sense your financial and business goals.

The next question comes is 'in which sector do you want to start a business?'. In our case, Ameya and I, both are chemical engineers and did M.Tech. in bioprocess technology after which Ameya worked in bio-pharma industry for fifteen years, and I did Ph.D. in Food Technology and worked in food industry for

five years. So, both of us had varied collective experience from our education and job. And after much brainstorming, we felt that considering our strengths and opportunities, food processing sector is a best sector in which we can start in. Here the SWOT analysis came for our help. It is one of the keys to success. Identifying our strengths, weaknesses, market opportunities and threats guide you in selecting proper sector in the business. Analyse whether you have expertise in production or sales and marketing etc. and then accordingly you can choose whether to start a production unit or get your product contract manufactured and you focus on marketing. This is very important and will lead you to next level in your profession.



The entrepreneurs are always full of ideas before starting the actual business and many times it's difficult to figure out which one to zero-in and concentrate on. Every entrepreneur has gone through this at least once. As you evaluate your options, it is advisable to consult experts and business persons about opportunities in the area of your interest. Coordinating your background with the local market aspects will increase your likelihood of success. We also had brainstorming on many ideas and then an opportunity came to us. One of our acquaintances were thinking of closing their business and wanted to retire. So we just rented his small scale food processing unit at Pune and started operations of Ojman Foodbio on September 1, 2017. Today, when I am writing this article, we have completed four successful years of our firm and we would like to thank Purnabrahma team for giving me this opportunity to write an article about our journey. Both of us are first generation entrepreneurs and decided to take some experience through this opportunity. We started with beverages, dehydrated

vegetables and some dry mixes. Through the ups and downs of running the business we obviously made some mistakes. When you first start a business, you are going to make blunders. It is inescapable. The fewer mistakes that you make, though, the better. What the important is 'to identify your mistakes early, come out of the situation, take leanings and avoid them in future'. The best way to discover out about some of these avoidable mistakes is to talk to entrepreneurs around you. In our case, the major mistake that we did in the initial phase is, we entered into retail market without any experience in sales and marketing and without much budget allocation for the same. Also giving lesser time for packaging development, incorrect launch time, incorrect positioning of product and tie ups with third party marketing firms were few more mistakes which we did in our initial phase. Thus, after making much losses in the retail beverage line, we closed it. We learnt that R&D and production is our strength at this point and let's concentrate on same. We then focused on B2B, contract manufacturing and export. Learning from the mistakes and avoiding it in future is important. And most importantly continuous learning from your routine and making decision accordingly is the key to the success.

*You have to see failure as a beginning and middle...
but never entertain it as end!*

- Jessica Herrin

Many people ask me that we want to export our product, how

to go about it? Answer to this question is 'Reliable and strong contacts is the only key to export'. As a small business owner, you cannot afford to stay in another country and establish your distribution channel. So you need a reliable partner there who will sell your products. We were fortunate to get such partners in couple of countries through our contacts. We then started small and now organically growing our export business. The key in export business is consistent quality in terms of taste/ texture/ microbial safety etc. and documentation.

The next important aspect is innovation which is also a focus of this issue of Purnabrahma. If you wish to start small and grow, then innovation is the only key to grow big. Come up with an original idea, and don't copy. Because if you are just copying, then there will be no passion. You need that otherworldly passion to grow. If you are just making a one more product, you will not stand out. You have to brainstorm what you can do differently. It may be innovative product; but may not just limit to it. It can be also: how you present it through innovative packaging, small twists in traditional products, innovative ways of distribution, etc. The best example can be Paper boat. Traditional beverages in different packaging.

So, the take away message is do the SWOT analysis before you start, make mistakes-take learnings, identify the trends and have innovative ideas for success.

Don't worry about failure...You only have to be right once!!!

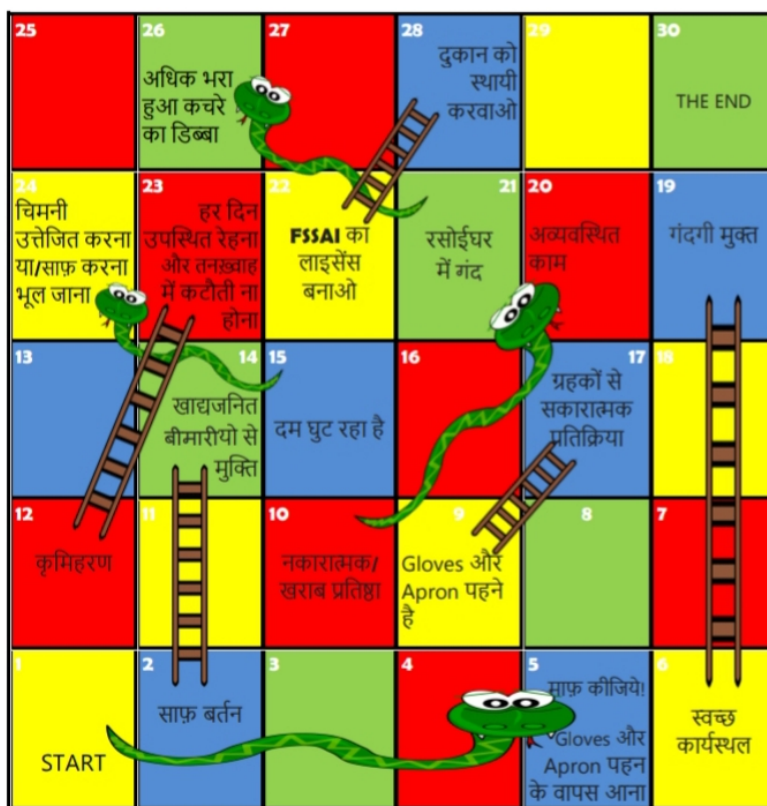
- Drew Houston

LET'S PLAY!!!

Germes & Ladder

By Students :-

Guneet Pental
Lopamudra Saha
Yuttika Shirgaonkar
Aditi Borhade
Payal Banerjee
Ayesha Chakraborty
Mentored by :
Radhika Hedao,
Assistant Professor, SIHS



Industrial Internship Experience

MR. VEDANT A. JOSHI

3rd year Integrated
M. Tech Student
Department of Chemical
Engineering, Institute of
Chemical Technology, Mumbai
Marathwada Campus Jalna



Internship plays a very vital role in every student's life as it provides an opportunity to imbibe professional aptitude, broadens the spectrum, or widens the horizon of our knowledge, getting acquainted with current trends in industry, expanding our network etc. Internships are an integral part of Integrated Masters Course in Chemical Engineering, a newly launched course by Institute of Chemical Technology, Mumbai (provided at Jalna and Bhubaneswar Campus) and first of its kind in India. Being registered for the same, I got an opportunity to do internships in food industries that in turn helped me to expand my knowledge and learning in food sector.

The first internship that I did in first year of the course was at a biscuit production industry. This industry serves as a third-party industry for various renowned names in bakery industry. Doing internship there was indeed a great experience as I got to learn about manufacturing process of different types of biscuits, working, mechanism and importance of various machineries in different sections, sampling and standard testing procedure of various raw materials and finished products, use of various chemicals, enzymes and their importance in various processes like production, testing etc.

In spite of being a well optimized and established plant, there were some loopholes in the packing and waste management section that were completely overlooked by the concerned authorities. The packaging section generated a lot of wrapper wastage and the waste generated was not properly handled and disposed. The main reason behind the waste generation was line-width variation, gauge variation, broken biscuits and inadequate number of biscuits packed in a packet. Due to all these reasons, packets usually get joined (double packing)

which causes a significant wrapper wastage. After noticing this problem and discussing with higher authorities I got an opportunity to work on this problem. The solution proposed for this problem was to install a biscuit rejection machine based on sensor mechanism which can remove the faulty biscuits by precisely measuring the gauge, diameter, line-width and weight of each biscuit. The design of the proposed machine is shown in Figure 1.

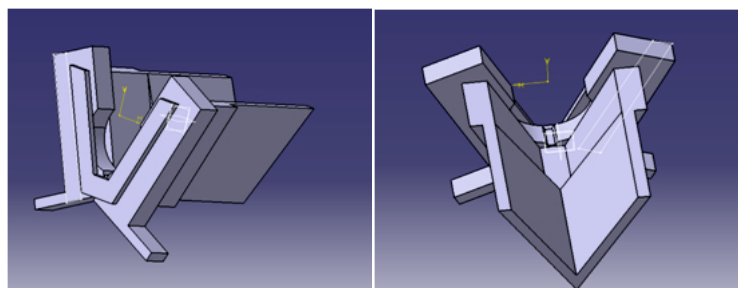


Figure 1: Design of the proposed biscuit rejection system

The second solution proposed was to install a mini-incineration or pyrolysis plant which could properly incinerate the plastic waste generated and the third solution proposed was to sell the waste generated to a plastic procuring industry, which could use this waste as their process raw material. The third solution was accepted and implemented by the industry. However, after listening to the views of industry owner about various losses associated with implementing the first two solutions in industry, I learned how to propose a solution that can be considered for implementation considering the business and economic point of view. With all these learnings and skills that I acquired during my internship tenure at this industry, I moved forward for my second internship.

The second internship that I did was at start-up industry. This industry is mainly engaged in the domain of research and production of seasonings and chocolates. The internship experience here was completely different than that of previous industry and was mainly project oriented. Being a start-up industry, I got to learn and experience about various difficulties and challenges that a budding industry has to overcome each day in order to stand out in the competitive market. In addition, I also got to learn about the raw material selection, cost reduction, process intensification, market analysis, importance of marketing and research, new product development etc. The main advantage that this industrial internship provided me was "hands-on experience" on various machineries and research activities that was completely missing in my previous industrial internship. Being provided with an opportunity to get extensively involved in various research activities carried out in

their labs, gave an additional shift to my thinking process in food research. As mentioned earlier, this industrial internship being project oriented, I got an opportunity to work on various projects related to new product development in the domain of ready to mix products, fizzy drinks, protein drinks etc. In addition to this I also got an opportunity to work on equipment designing, plant design and economics etc. After working with this start-up industry my knowledge about various unit operations involved in food industry, plant designing, research and development, market analysis, new product launch etc.

improved significantly.

On a concluding note, I would like to appeal all my colleagues as well as my juniors to get involved in an internship at a start-up industry in their respective domains as it is far beneficial in terms of knowledge and experience than a well-established industry. Also, I would like to thank Mr. Sharad Lahoti, Associate Dean Industry, Institute of Chemical Technology Mumbai Marathwada Jalna Campus, for providing me an opportunity to work in these industries. 

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www.monkfoods.in

Dated: 21st December 2019

**TO WHOM IT MAY CONCERN**

This is to certify that **Mr. Vedant Ajay Joshi** pursuing Intergrated M.Tech (2nd Year) At Institute of Chemical Technology, Mumbai, Marathwada Campus Jalna has successfully completed his internship at M/S Monk Food, from 4th September 2019- 23rd December 2019.

During his internship, he was exposed to various activities involving curating and testing of Food Ingredients for the FMCG Sector. We found him extremely inquisitive and hardworking.

His association with us was extremely fruitful and we wish him best for all his future endeavors.

For Monk Food

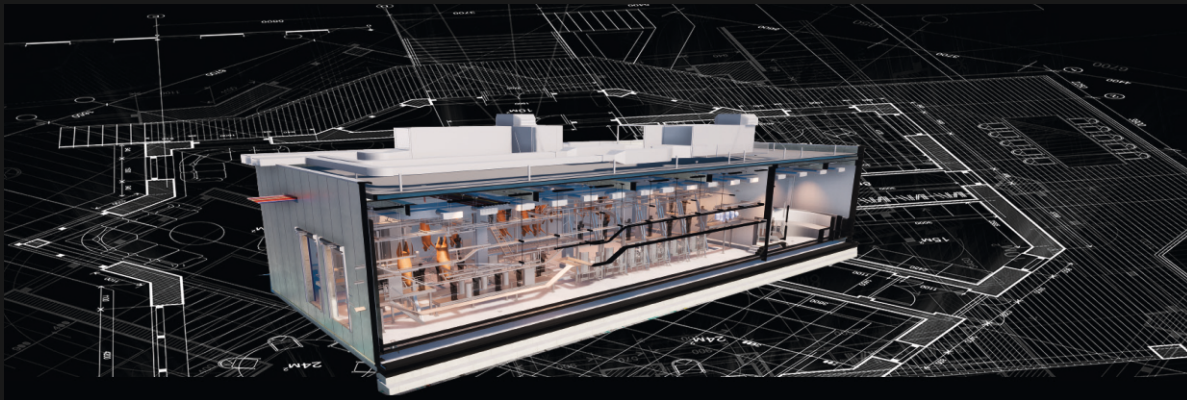
For **MONK FOOD**


Proprietor

Madhur Arora
Proprietor



INSIGHTS INTO THE FOOD FACTORY OF THE FUTURE



The Factory of the Future

In the factory of the future, digital manufacturing processes will be connected, automated and flexible. The Internet of Things, analytics and artificial intelligence will improve efficiency in many areas. Through the use of virtual reality, the design, production processes, and material flows can be optimised. New relationships will emerge between people and machines. Productivity and quality will increase significantly as a result.

Are you interested?

Our office has examined the various building blocks of the factory of the future in depth and described the state of the art and future developments in a white paper. If we have piqued your interest and you would like to know more, we can offer you the following options.



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