ADDRESSING THE FOOD INSECURITY OF INDIA THROUGH AGRICULTURAL TRADITIONAL KNOWLEDGE

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ABSTRACT

India has been grappling with the complex issue of food security for many years. Despite being one of the world's largest producers of food, millions of people in India still struggle to access enough nutritious food to meet their daily needs. One of the main reasons for food insecurity in India is poverty, inequality and low agricultural output. This article attempts to understand the various dimensions of food security. It discusses the Indian Government's past policy of a highly controlled economy and the increase in agricultural output post 'green revolution', as well as its current approach through various initiatives and legislative enactments to address the food shortage. The Indian government has also realised that to tackle the challenges of food security, Agricultural Traditional Knowledge is an indispensable tool. Therefore, various initiatives and projects have been undertaken by the government of India. The article briefly touches upon the enabling role of Intellectual Property Rights.

Keywords**:** *Traditional Knowledge, Food Security, Intellectual Property Rights, NFSA.*

I. Introduction

THE GLOBAL South is grappling with the serious issue of food security. It involves not just the fundamental issue of ensuring that each person's human right to food is met, but also a broader issue of achieving food security, which entails "producing enough food and making it accessible to everyone throughout the year and on a sustainable basis from year to year".[1] Thus, the concept of food security implies the absence of hunger and malnutrition.

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[1] Shabd S. Acharya, Food Security and Indian Agriculture: Policies, Production Performance and Marketing, Environment, 22 *Agricultural Economics Research Review* 1 (2009).

Like other developing countries, food security in India is a complex issue that has been a concern for many years. Despite being one of the world's largest producers of food, millions of Indians still struggle to access enough nutritious food to meet their daily needs. One of the main reasons for food insecurity in India is poverty. According to the World Bank, approximately 21.9% of the population in India lives below the poverty line.[2] This means that one in five Indians cannot afford to buy enough food to meet their daily needs. [3]

The seriousness of the matter can be assessed through other global research reports as well which have undertaken the task of studying the issues of food security and global hunger. Given the current population growth patterns, a report published by FAO[4], predicts that the total global population is likely to rise by 35% by the year 2050 and such occurrence will mostly be in developing countries. As a result, enormous pressure will be placed on affected countries to expand their agricultural production capacity by nearly 70%. Resultant of this, food will become a matter of national security issue in those regions.

The International Food Policy Research Institute (IFPRI) further concretes these findings. The study published by the IFPRI, under its 2022 Global Hunger Index (GHI) finds "that current progress against hunger has mostly halted".[5] The situation has gotten worse in numerous nations and regions. One of the GHI's primary indicators, the prevalence of undernourishment, shows that the number of people who are not getting enough to eat is on the rise, and could reach 828 million by 2021.[6] As per the predictions, by 2030, around 46 countries will have even lower levels of hunger as determined by the GHI. There are currently serious or worrying

[2] Establishing the exact poverty rate is difficult because there are many parameters to be considered. Poverty in rural and urban areas also vary and the numbers may have changed greatly after Covid-19. The researcher has considered the data available and published in the year 2016. (270,000,000 people out of the total population of 127.5crs people); World Bank Group, "India's Poverty Profile," *available at:* https://www.worldbank.org/en/news/infographic/2016/05/27/india-s-poverty-profile (last visited on December 5, 2023)

[3] *Ibid.*

[4] Food and Agriculture Organization of the United Nations, Report: *How to Feed the World in 2050* (June 2009), *available at:* http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf (Last visited on November 24, 2023).

[5] The International Food Policy Research Institute (IFPRI) is in charge of making the index. The GHI gives each country a score out of 100. The best score is 0 (no hunger), and the worst is 100. A lower GHI score means that people are eating better and that the country is ranked higher. The GHI shows what worked and what didn't work in reducing hunger and gives information about what causes hunger. To show how complex hunger is, the GHI combines three indicators with the same amount of weight: undernourishment, underweight children, and child mortality.

[6] Global Hunger Index *available at*: https://www.globalhungerindex.org/pdf/en/2022.pdf (Last visited on January 25, 2023)

levels of hunger in 44 nations. At least twenty countries in 2022 have moderate, serious, or alarmingly high GHI ratings compared to 2014. These countries are located in the world's most food-insecure regions. [7]

It goes on to mention that conflicts, climate change, and the economic ramifications of the COVID-19 epidemic, all of which are key causes of hunger, are currently colliding and are projected to only get worse. All three of these factors contribute significantly to the problem. Food shortages in 2023 and beyond may result from the war in Ukraine, which has driven up the cost of gasoline, food, and fertiliser globally. These crises increase the underlying causes of chronic hunger and vulnerability, such as low agricultural productivity and high rates of poverty and inequality. Current global food systems are inadequate to solve these problems and alleviate hunger in many countries and regions anytime soon.

South Asian and African nations have the greatest hunger rates and are the most at risk from future catastrophes. It is deeply troubling that these regions, like many others around the world, have not made any significant progress in the fight against hunger. The incidence of hunger and malnutrition varies widely even within countries. There are still hotspots of food and nutrition insecurity even in countries with strong economic performance, calling for increased and targeted efforts. Within-country data and the accomplishments of current hunger-reduction efforts can help guide policies and programs toward helping the most vulnerable populations.

India has shown negligible changes as compared to its recent past performance in addressing the food security issue. The Global Hunger Index (GHI) placed India at position 80 out of 104 in 2015. According to the 2022 GHI, it ranks 107th out of 122 countries.[8] The lack of availability of healthy food is a major factor in India's problem with hunger. Farmers in many rural parts of India have a hard time getting their goods to market because of a lack of reliable transportation options and a general lack of investment in these areas.

The subject of food sovereignty is frequently brought up while talking about food security. The right of the people to a nutritious diet that is suited for their culture and produced using ethical ecological and sustainable practises is known as food sovereignty.

[7] *Ibid*.
[8] *Ibid.*

Both food security and food sovereignty contain the basic right to food, but the latter also includes the producers' rights to livelihood and dignity. Additionally, it emphasises on giving locals the authority over land, grazing, farming, etc. Any genetic engineering or technology that impairs the ability of food providers to transmit and control knowledge of the food system is rejected within the discussions of food sovereignty. Thus, it generally opposes a corporate-driven agricultural system that focuses on environment-friendly and sustainable production methods and focuses on the states that have complete sovereignty over them.

II. Understanding the Dimensions of Food Security

Food security is a dynamic concept and it is still evolving. The evidence of its conceptual growth can be traced by looking at the discussion on food security at various international food conferences. Its earliest references were in terms of simple "hunger," which later morphed into a much broader understanding as a part of "food sovereignty." Initially, the development of this idea was seen at its first worldwide use at the World Food Conference in 1974.[9] Food security was defined as the capacity of a nation or region to guarantee an adequate food supply for both its existing population and its anticipated population in the future. Thus, the old understanding revolved around two dimensions, that is, increasing food production, and reducing or managing the population of the nation.

Eventually, in more recent iterations, such as the definition approved at the First and Subsequent World Food Summits a change in the definition was seen, as more and more layers were added to it.[10] First, the goal of national self-sufficiency in food production was added to the dimension and later, the definition also came to include aspects that centred on homes and individuals having access to food. International food trade was also acknowledged as a crucial component of ensuring food security in its more recent incarnation, which is substantially different from its earlier meaning.[11]

[9]Hector Maletta, "From Hunger to Food Security: A Conceptual History", DOI: 10.2139/ssrn.2484166, SSRN Electronic Journal (January 2014), *available at:* https://www.researchgate.net/publication/272300426_From_Hunger_to_Food_Security_A_Conceptual_History. (Last visited on November 24, 2022).

[10] Edward Clay, "Expert Consultation on Trade and Food Security: Conceptualizing the Linkages" *FAO* Rome, July 11–12, 2002, *available at*: http://www.fao.org/docrep/005/y4671e/y4671e06.htm#fn21 (Last visited on November 24, 2022).

[11] *Ibid.*

The new definition of food security is "when all people at all times have physical and economic access to food that is sufficient to meet dietary needs for a healthy and productive life". [12] The current understanding of the term entails four dimensions: food availability, access to food, food utilization/ use and stability of these elements:[13]

1) The first dimension, ***food availability***, refers to the physical existence of food grains. The term "*availability*" refers to the actual existence of food grains in a given country or region. Domestic food production as well as food imports are factored together for this. For the majority of the world's population, crop production is the principal means through which food security is ensured. But the supply of food can be increased in other ways also. For countries or regions that are experiencing food shortages, they may benefit from food aid received from other countries. Additionally, the availability of food during times of crisis or natural disaster can be ensured by maintaining domestic food supply through various government-run food storage programmes. Food imports can also be an effective way to complement domestic production and improve the availability of nutritious foods.

   However, food security depends on more than just having availability of food grain. Even though there is food availability, at times people may not be able to acquire the food ration they require due to a lack of resources such as money, infrastructure, or access to markets. In addition, factors such as climate change and natural catastrophes have the potential to impair crop production, which in turn can affect the availability of food.

2) ***Access to food*** is the second component of food security, and it relates to the economic and physical means by which people have to employ to acquire food for themselves. This factor is inextricably linked to the accessibility of food because people lack the resources necessary to obtain food even when it is readily available. Here, infrastructure, including roads and modes of transportation, has a role in determining

[12]Lucy Jarosz, "The Political Economy of Global Governance and the World Food Crisis: The Case of the FAO" 32-1, *Political Economic Perspectives On the World Food Crisis* 37-60, (2009).
[13] United Nations Economic and Social Council, Commission on Science and Technology for Development Report, *The Role of Science, Technology and Innovation in ensuring Food Security by 2030*, E/CN.16/2017/3; *available at:* https://unctad.org/meetings/en/SessionalDocuments/ecn162017d3_en.pdf (last visited on March 12, 2019).

physical access to food. These are required in order to move food from the places where it is produced to the places where it is required. People may not be able to access the food they need when there is no sound infrastructure. This becomes especially troublesome in remote areas like hilly regions or villages that do not have proper road or rail connections as well as during times of natural disaster where such roads and rails may be destroyed.

For example, North Bihar often faces severe flooding during certain times of the year and it becomes challenging to distribute food to people who are stuck there for days at end. Many such rural areas in India even when there is no disaster, have a lack of basic infrastructure and transportation, as a result of which it becomes very difficult for Indian farmers to bring their produce to market. Similarly, it is difficult for people living in these areas also to access food that is both fresh and healthy because they cannot reach the market where it is available.

Then, the cost of food and the capacity of people and/or households to purchase it at that price are the primary economic factors that influence access to food. When food prices are high, it can be difficult for people with low incomes to afford to buy enough food to fulfil their requirements. People who do not have enough money to buy food or pay for transportation to get to locations where they can get food may not be able to get their hands on any food at all. This is another factor that might make it difficult for people to obtain food.

In addition to the above factors, poverty, lack of education and/or awareness, and discrimination are a few other variables that impact one's capability to access food. So even if there is food availability in the region, these additional variables often make it more difficult for people to access it. As a result, it becomes essential to take into account every aspect of what we have to tackle the issue of food insecurity so that the efforts to enhance both the availability of food and its accessibility become fruitful.

3) ***Food utilization***, is the third dimension, which covers the cultural and social factors that affect a household's ability to ensure that their food and nutritional needs are met. This encompasses all the knowledge and practices of households relating to the preparation of food, how the food prepared is consumed, and the distribution of the

prepared food within the family. It also includes the habits of individuals inside households determined by their cultural and social background. So, even when nutritious food is available and accessible, households or individuals still have to determine and decide what food to buy and how to prepare it, which can be impacted by both social and cultural variables. So when a household does not have proper information or awareness about nutrition or how to make nutritious meals, they may not be able to use the food that is available to them in ways that ensure that they are receiving an appropriate amount of nutrition.

A food item that is not a staple in an area may not be properly prepared or consumed even when made available to a household, even though it might contain more nutritious value than locally or indigenously available staple food. Similarly, if a household has limited financial resources, they may not be able to acquire or have access to a variety of nutritious foods because they are out of their price range. Socially or culturally inappropriate food may also be rejected by people even at times of scarcity. So, food preferences and ways of preparing meals could be influenced by cultural traditions and traditional diets and may often cause hindrances in proper food utilization.

It is essential to keep in mind that even though the availability of food and the ability to access it are prerequisites that must be met for food security, this does not ensure that food will be utilized to obtain optimum nutrition. Even in situations where nutritious food is easily accessible and readily available, households still have the responsibility of deciding what foods to buy and how to prepare them.

4) Long-term food security relies on the fourth dimension, the ***stability*** of the three factors throughout time. This element refers to the capacity to ensure the availability, accessibility, and usage of food across time in a truly sustainable way. A natural calamity such as a drought or a flood can damage crops and interrupt food supplies. On the other hand, an economic slump can make food more expensive and difficult to acquire. Without stability, access to food can be affected by causes like the above. Political instability can also hinder food distribution and access for households.

Having measures in place to reduce the consequences of disruptions like India's monsoon season can have a huge influence on crop production and food availability.

The government can take steps to ensure that food is available in times of crisis by enacting policies that support crop variety, promote sustainable agriculture methods, and set up a food reserve system.

Maintaining the three components throughout time requires a flexible food system that can respond to changing conditions. Natural disasters, economic downturns, and political instability can be lessened by investments in infrastructure, R&D, and public policies. Further, it is essential to implement a thorough system for monitoring and evaluating performance to monitor development and pinpoint problem areas.

Food security, as is evident, is multifaceted, involving not just the availability of food but also its accessibility, utilisation, and stability through time. It is crucial to establish policies and programmes that target the underlying problems that contribute to food insecurity from every angle if we are to successfully combat this problem.

III. Indian Scenario: Lessons from the Past[14]

Agriculture has always played a significant role in India's economy, and now it employs a sizable percentage of the country's workforce. The Permanent Settlement of 1793 was just one example of a British colonial policy that made life difficult for Indian farmers by putting tax collection ahead of crop yields. As a result, a new category of landlords and sub-agents emerged whose primary motivation was profit maximisation rather than helping farmers. Food shortages and unrest ensued as a result of this, along with the elimination of traditional handicrafts, increasing demand on land, decreased productivity, and impoverished cultivators. These issues have been present since colonial rule and have caused several famines and revolts, resulting in significant loss of life.[15]

After gaining independence, India's economic policies were developed based on its prior colonial experience. Production was heavily regulated by the government, and private businesses could only operate with extreme difficulty which stunted economic progress. India

[14] D. P. K. Pillay and T. K. Manoj Kumar "Food Security in India: Evolution, Efforts and Problems", 42-6 *Strategic Analysis*," 595-611 (2018), *available at:* https://old.amu.ac.in/emp/studym/99994139.pdf (last visited on November 26, 2022).
[15] Ravinder Kumar, 'The Deccan Riots of 1875', 24(4) *The Journal of Asian Studies* 613-35 (August, 1965).

relied on foreign help and imports, to meet its domestic food needs, right up to the middle of the 1960s. India's focus ultimately shifted to self-sufficiency while changing its agricultural policies as a result of the severe droughts of 1965 and 1966.

The 'Green Revolution', which began in the states of Punjab and Haryana and dramatically increased India's overall food grain production, was brought on by this problem of food security. In actuality, things didn't start to change for the better until the introduction of HYV seed varieties for wheat and rice. The production of wheat crops, which tripled during this time, and cereals, which doubled during this time, experienced tremendous expansion during the following several decades. Due to this unexpected industry surge, food insecurity and poverty decreased by roughly 50%. Finally, in the 1990s Indian economic liberalisation enabled private companies and increased foreign investment in all fields of research and development.[16]

But during the past few decades, India's population growth has outpaced the country's overall food production growth. India currently has a population growth rate of 1.13%.[17] Contrarily, according to the 2017–18 economic survey, the agriculture sector is now growing at a rate of 2.1%.[18] According to certain surveys, the caloric requirement of people in rural regions has increased to 2400 Kcal of energy per day, whereas people in cities require 2100 Kcal.[19] As a result, by 2050, domestic food consumption will inevitably increase.[20] Increased demand from the rapidly expanding middle class, rising incomes, and ongoing food price inflation, which has rendered many food items economically inaccessible for the majority of Indians living in poverty, all contribute to the problem of increased pressure on food supply. A minimum of 3% yearly growth is required in the agricultural sector, which includes not only increased food production and a larger variety of food, but also food products that are safer, healthier, and of

[16] Dr. Deepa Kharb, and Saumya Sharma, "Role of Intellectual Property Rights in Agriculture in Ensuring Food Security: An Indian Perspective", in Varun Chhachhar (eds.), *Right to Food in South Asia* (Acumen Publisher, The Netherlands, 2020).

[17] Annual population growth data, *available at:* https://www.data.worldbank.org/indicator/SP.POP.GROW (Last visited on December 25, 2022).

[18] Government of India, Report: *Economic Survey* (Ministry of Finance, 2018), *available at:* http://www.mofapp.nic.in:8080/economicsurvey/ (Last visited on March 12, 2019).

[19] Indian Council of Agricultural Research, Report: *Tracking Transition in Dietary Energy Intake in India: Insights and Policy Implications* (NITI Aayog, 2017), *available at:* https://www.niti.gov.in/writereaddata/files/National%20Consultation_SDG_S%20K%20Srivastava.pdf, (Last visited on December 25, 2022)

[20] Agriculture sector to grow 2.1%: Can it double farm income by 2022?, *available at:* https://www.economictimes.indiatimes.com/markets/stocks/news/agriculture-sector-to-grow-2-1-can-it-double-farm-income-by-2022/articleshow/62692884.cms (Last visited on December 25, 2022).

higher quality. [21] In India, 58 million people have managed to escape the cycle of poverty. [22] However, India's path to food security is far from perfect. If India's agriculture sector is unable to keep up with the rising demand and diversification of food, a very serious scenario of starvation and food crisis can be projected.

Undoubtedly, the Green Revolution of the 1960s brought revolutionary transformation. But its main aim was to increase crop production in India quantity-wise, and it had several other drawbacks, including a focus on a few staple crops, leading to monoculture and loss of biodiversity, promotion of chemical fertilizers and pesticides causing environmental damage, and neglect of small and marginal farmers. A more sustainable approach is now needed that incorporates traditional knowledge, agro-ecological practices, and empowerment of small farmers for long-term food security in India, as well as addressing other aspects of food security like access, utilization, and stability.

IV. Government's Approach in Addressing Food Insecurity

The Indian government has undertaken a multifaceted approach in addressing the issues of food security:

Shift in approach from 'Welfare' to 'Rights' based

Although the right to food is not specifically mentioned in the Indian Constitution, it is an implicit component of the right to life, which is guaranteed by Article 21 of the Constitution. In other words, the Indian Constitution recognises the right to life, which includes the right to food. The article states that "*No person shall be deprived of his life or personal liberty except according to procedure established by law*". [23] The Supreme Court of India has held that this guarantees the right to a dignified life, which includes access to adequate food. In the case of *Olga Tellis* v. *Bombay Municipal Corporation*,[24] it was held that the right to food is an integral part of the right to life and that the government has a responsibility to guarantee citizens' access to sufficient food. This judgment has been relied upon in a various public interest litigation

[21] Indian Council of Agricultural Research, Report: *Vision 2050* (June 2013), *available at:* http://www.kiran.nic.in/pdf/reports/vision_2050.pdf (last visited on December 25, 2022).
[22] Shaleen Jain, 'Food security in India: Problems and Prospects', 9 *OIDAIJSD* 11-20 (2016).
[23] The Constitution of India, art.21.
[24] *Olga Tellis* v. *Bombay Municipal Corporation*, 986 AIR 180, (1985) SCR Supl. (2) 51.

case, and it has helped pave the way for other landmark decisions that uphold the inalienable right to food as a fundamental right.

The Directive Principles of State Policy in India's Constitution are principles that are not enforceable by law, yet, they are important for the governance of the country and are meant to direct policymaking by the State as it works to establish itself as a welfare nation. Article 39(a) is an important provision in this regard, which states that the "*State shall direct its policy towards securing that the citizens, men, and women equally, have the right to an adequate means of livelihood*".[25] This provision is also seen to be intimately linked to the right to food, as it has been generally held that having access to sufficient and nutritious food is an essential component of having a means of livelihood that is adequate for a person's survival.

Other provisions within the directive principles, such as article 47[26] also address the Right to Food by placing a duty on the State to raise the level of nutrition and standard of living of its people, and to improve public health. It is because of these affirmative constitutional provisions and judicial rulings that the Right to Food is elevated to a status of fundamental right that is enforceable by the citizens through the constitutional remedy which is provided under article 32 of the Constitution.[27]

The National Food Security Act (NFSA)[28] further cemented the Right to food as a legal right, when it was passed by the parliament in 2013. The Act aimed to provide subsidised food grains to eligible households. It is based on the established principle of the right to food, which, as discussed has become an integral part of the right to life, and clearly, the state is under constitutional obligation to ensure that its citizens have access to adequate food.

At the risk of reiterating, it is worth mentioning that even though many Supreme Court judgments have solidified the right to food as an integral part of fundamental rights, it is the enactment of the act that has tied up the government's commitment in addressing food security issues. To highlight a few key features of NFSA that are designed to ensure that all citizens have access to adequate food:

[25] The Constitution of India, art. 39 (a).
[26] The Constitution of India, art 47.
[27] The Constitution of India, art. 32.
[28] The National Food Security Act, 2013 (Act 20 of 2013).

i. *The Act creates Legal Entitlement*: The National Food Security Act (NFSA) gives around two-thirds of India's total population the legal entitlement to receive subsidised food grains. This indicates that households that meet the requirements are eligible to get food grains at heavily subsidised rates.[29]

ii. *The Act identifies Eligible Households under its provisions*: The Act contains provisions for the identification of households that are eligible for benefits.[30] Eligible households are divided into two categories: priority households and general households. Priority households are those that are seen as being in the most vulnerable position, such as those in which women are the primary breadwinners,[31] Scheduled Castes and Scheduled Tribes, and landless agricultural labourers. Households that are considered general do not meet the criteria for the priority group, but they do require support to gain access to sufficient food.

iii. *Setting up of Fair Price Shops*: The Act also includes provisions for the setting up of fair price shops, which are retail outlets where eligible households can purchase subsidised food grains.[32]

iv. *Maintenance of Records*: The Act also lays down the requirement for the maintenance of records of food grains distributed, to ensure transparency and accountability in the distribution of food grains.[33]

v. *Grievance Redressal Mechanisms*: The Act also includes provisions for transparency and accountability, such as the setting up of grievance redressal mechanisms and the appointment of state food commission and district grievance redressal officer.[34]

vi. *Focus on Nutrition*: The Act focuses not only on providing food grains but also on improving the nutritional levels of the targeted population, particularly children, pregnant women and lactating mothers.[35]

vii. *State Food Commission*: The Act also includes the provision of a state food commission to monitor and review the implementation of the Act, and to ensure that the rights of the targeted population are protected.[36]

[29] *Id.,* s. 3
[30] *Id.,* s. 11
[31] *Id.,* s. 4
[32] *Id.,* ss. 22(d), 24(2)(a), 24(5)(C).
[33] *Id.,* s. 27-29.
[34] *Id.,* s. 14.
[35] *Id.,* schedule II (ss. 4 (a), 5(1) & 6).
[36] *Id.,* s. 24

viii. *Targeted Public Distribution System* (hereinafter referred to as 'TPDS'): The Act also lays down the criteria for the identification of households as eligible for receiving food grains under the Targeted Public Distribution System.[37]

Thus, the NFSA gives statutory backing to the TPDS. With this legislation, the right to food goes from being a general right to being a legal right. The Act divides the population into three groups: those who are excluded (meaning they have no right), those who are given priority (meaning they have a right), and those who are part of the Antyodaya Anna Yojana (AAY; higher entitlement). It, therefore, sets a grievance redressal process to address the non-delivery of entitlements and defines duties for both the central government and the individual states.

Agricultural Traditional Knowledge: A viable solution

Throughout the years, agriculture and traditional knowledge have shared a strong relationship. The knowledge that has been handed down from one generation to the next, known as traditional knowledge, has been an essential component in the growth and upkeep of environmentally sustainable farming methods. Utilizing indigenous plant breeds and crop varieties is one of the most important components of agricultural practice that is rooted in traditional knowledge. Over time, many different types and breeds have been produced to better suit the particular circumstances of the local area, such as the particular type of soil and the particular climate. Because of this, they are better able to withstand attacks from pests and diseases and to adjust to shifting patterns of climate.

Traditional agricultural knowledge also includes the usage of natural fertilisers and many methods of managing pests which have been practiced over centuries. What this effectively does is that it reduces the requirement of chemical inputs, while promoting more sustainable agricultural practice. Intercropping and crop rotation are two contemporary examples that have been rooted in traditional knowledge and to date practised in many areas.[38] Another example is the utilisation of traditional irrigation methods, such as the collection of rainwater and the

[37] *Id.*, s. 12

[38] Farmers who practice mixed cropping, sometimes called intercropping, plant more than two different types of seeds at once. Farmers may get the most out of their land by planting a diversity of crops and lowering their vulnerability to crop failure. To reduce pest populations, intercropping can improve soil organic matter, fumigate the soil, and restrict weed growth by attracting a wide variety of beneficial and predatory insects.

use of drip irrigation as a component of traditional agricultural knowledge. Because they make use of natural resources and reduce the amount of water that is wasted, these irrigation techniques are frequently more effective and sustainable than modern methods of watering crops.

In recent years, there has been a renewed interest in traditional knowledge within agriculture. This can be attributed to the growing awareness of the significance of resilient and sustainable food systems among an increasing number of people. To improve food security, farmers' livelihoods, and the environment; researchers, non-governmental organisations (NGOs), and government agencies are all working together to document, conserve, and disseminate traditional agricultural knowledge. The perspective that agricultural traditional knowledge plays a significant part in tackling challenges of food security has been cemented by recent initiatives undertaken by the Indian government, which demonstrates that the Indian government has come to realise the significance of this role.

The National Agricultural Technology Project, also known as NATP, is a project spearheaded by the Indian government to bring about substantial shifts in the country's agricultural research and extension sectors.[39] The project is currently being carried out in a total of 28 districts across seven different states with assistance from both the World Bank and the National Institute of Agricultural Extension Management (MANAGE).[40] The goal of this endeavour is to enhance research and extension services, as well as to test novel approaches to technology transfer, new organisational arrangements, and operational procedures.

One of the key components of the NATP is the Mission Mode Project on "*Collection, Documentation, and Validation of Indigenous Technical Knowledge*."[41] This project aims to preserve and promote the traditional knowledge and practices of Indian farmers, particularly those related to crop production and management.

[39] The National Agricultural Technology Project, *available at:* https://icar.org.in/files/ar0304/14-NATIONAL%20AGRICULTURAL%20TECHNOLOGY%20PROJECT.pdf (last visited on January 10, 2023).
[40] Andhra Pradesh, Bihar, Jharkhand, Himachal Pradesh, Maharashtra, Orissa and Punjab.
[41] ICAR, Mission Mode Project on "Collection, Documentation, and Validation of Indigenous Technical Knowledge (ITK).", *available at*: https://icar.org.in/sites/default/files/Inventory%20of%20Indigenous%20Technical%20Knowledge%20in%20Agriculture%20Document%201.pdf (Last visited on December 25, 2022).

The concept of "Indigenous Technical Knowledge" (hereinafter referred to as ITK) pertains to the accumulated knowledge, skills, and practises that have been cultivated by indigenous communities over multiple generations. This knowledge is transmitted through oral tradition and is tailored to the unique ecological and social circumstances of a given region. The mentioned knowledge aligns with agricultural traditional knowledge and is often unrecorded or unacknowledged by established scientific institutions, despite its crucial role in promoting the sustainable management of natural resources and the well-being of farmers. The Mission Mode Project on Indigenous Technical Knowledge (ITK) endeavours to systematically record and authenticate this traditional knowledge, intending to leverage it to enhance agricultural methodologies, practices and policies.

These research project centres on the systematic gathering, recording, and verification of ITK about crop cultivation, resource administration, and preservation of natural resources. It encompasses a range of agricultural practices, such as crop varieties, soil management, pest and disease control, water management, and other related techniques. In order to attain its objectives, the project is executing a range of activities. These include arranging training programmes for farmers, researchers, and extension workers, carrying out field surveys and interviews with farmers, and disseminating knowledge documents and brochures. All these initiatives are contributing towards the development of a more precise and exhaustive recognition of the traditional knowledge and methodologies employed by Indian agriculturists.

The Council of Scientific and Industrial Research–National Institute of Science Communication and Policy Research (*hereinafter* referred as 'CSIR–NIScPR') has launched a new national initiative called "Scientifically Validated Societal Traditional Knowledge" (*hereinafter* referred as 'SVASTIK'), which seeks to preserve traditional practices.[42] This initiative is part of the Indian government's yet other efforts to safeguard traditional knowledge. The primary objective of this project is to cultivate a scientific mindset and improve trust among members of the general public by systematically validating conventional agricultural techniques. The project aimed to establish a comprehensive database of indigenous knowledge about agriculture and its associated fields, to facilitate access to this information for researchers, policymakers, and farmers alike. The objective of this project is to compile and

[42] "CSIR-NIScPR Launches National Initiative SVASTIK", *available at:* https://csirnews.niscpr.res.in/home/article/327 (last visited on January 24, 2023).

record traditional knowledge about various aspects of agriculture, including crop cultivation, pest control, animal husbandry, and agroforestry.

The implementation of the project was carried out across various states in India, and facilitated by a network of institutions and organisations, including state agricultural universities, ICAR institutes, and non-governmental organisations (NGOs). The project team has engaged in collaborative efforts with farmers, local communities, and traditional knowledge practitioners to gather, record, and validate traditional knowledge. The project emphasizes the formulation of methodologies that facilitate the scientific validation of traditional knowledge. The integration of contemporary methodologies, such as molecular biology and biotechnology, has been employed to verify traditional practices and ascertain the bioactive constituents present in plant-based traditional commodities. The focus of the project is to distribute the verified traditional knowledge to farmers and other stakeholders via extension and training programmes. The project team implements training programmes aimed at educating farmers and extension workers on traditional practices pertaining to crop production, crop protection, livestock management, and agroforestry. [43]

These efforts represent a noteworthy stride in the direction of safeguarding, advancing, and harnessing the traditional wisdom of Indian farmers in the realm of agriculture, a crucial facet of the nation's food security. The initiatives implemented by the Indian government can be regarded as a paradigm for other nations to systematically record, authenticate, and leverage the traditional knowledge that has been amassed over generations by agriculturists, to enhance the welfare of rural societies.

Enabling Role of Intellectual Property Rights[44]

The protection and preservation of traditional knowledge in the realm of agriculture has undoubtedly been facilitated by the utilisation of intellectual property rights (*hereinafter* referred as 'IPR') as a crucial mechanism. Historically, traditional knowledge was often overlooked or inadequately safeguarded by the legal framework, thereby rendering it

[43] Dr. Charu Lata, *"Scientifically Validated Societal Traditional Knowledge (SVASTIK)"*, *available at*: https://www.csir.res.in/csirblog/scientifically-validated-societal-traditional-knowledge-svastik (last visited on January 24, 2023).
[44] *Supra* note 16

susceptible to exploitation by external entities. The implementation of IPRs has been a response to the growing appreciation of the significance of traditional knowledge in the field of agriculture. The purpose of these IPRs is to provide a protective mechanism for traditional knowledge, thereby ensuring its preservation and continuity.[45]

The utilisation of agricultural traditional knowledge (*hereinafter* referred as 'TK') and the implementation of cutting-edge technologies are proving to be pivotal in mitigating the issue of food insecurity. Recent advancements in agro-biotechnology have the potential to address the issue of food security by enhancing agricultural productivity, particularly in developing nations.

IPR can help protect traditional knowledge in many ways, one of which is through the use of patents. It is known that Patents grant exclusive rights to an inventor or discovery, which can prevent others from using the knowledge without permission. Therefore, this can be used for the protection of traditional knowledge related to new plant varieties or other agro-innovations. Then IPR can also help in protecting traditional knowledge through the application of traditional knowledge databases.[46] The utilisation of databases to document and safeguard traditional knowledge is a viable means of preventing unauthorised exploitation or patenting of such knowledge. Apart from patents and TK repositories, alternative forms of IPR can be employed to safeguard traditional knowledge also. These may include a combination of trade secrets, trademarks, and copyrights. The customization of each type of intellectual property rights can be adapted to suit the particular requirements of the traditional knowledge under consideration. Thus, the protection and conservation of traditional knowledge in agriculture can be significantly facilitated through the implementation of IPR.

However, using IPR for the protection of Agricultural TK must be done with caution so that the rights of traditional knowledge holders are not compromised. It has been proposed that implementing intellectual property rights in developing countries, such as India, could attract foreign investment and encourage the transfer of technology and research and development by

[45] Howard D. Grimes, Jane Payumo, *et al.*, "Food Security Needs Sound IP", *The Scientist*, July 20, 2011, *available at:* https://www.the-scientist.com/news-opinion/opinion-food-security-needs-sound-ip-42191 (last visited on December 12, 2022).

[46] About TKDL, *available at*: http://www.tkdl.res.in/tkdl/langdefault/common/Home.asp?GL=Eng (last visited on January 24, 2023).

foreign companies, while also spurring innovation within domestic sectors. However, it is important to evaluate the extent to which IPRs can effectively improve agricultural productivity in these countries because traditional IPRs are based on certain principles that go against the core of agricultural traditional knowledge.[47] While the former grants exclusive rights to an individual, the latter is based on community ownership.

For this many safeguards have been put in place, for instance, the Convention for Biological Diversity (CBD) [48] and Nagoya Protocol talk about the implementation of PIC and MAT within the access and benefit-sharing mechanism in domestic legislation,[49] making it possible for traditional knowledge holders to have control over their knowledge, and receive fair and equitable benefits arising out of access of such knowledge. Countries like India have *sui-generis* legislation tailored to their socio-economic needs and to counter the drawbacks of a TRIPS-based traditional IPR system, such as the Biological Diversity Act[50] or the Plant Variety Act.[51]

V. Conclusion

Food security is quite evidently a significant problem in India, and it cannot be resolved unless poverty and other factors are tackled head-on. It will take a mix of public programmes and policy-making, investment from the private sector towards R&D, infrastructure, and capacity building. And most importantly efforts have to be made at the grassroot level to accomplish this.

Sustainable agricultural strategies that boost crop yields while decreasing the environmental footprint in agriculture should be prioritised. Promoting organic farming practices, water and soil conservation techniques, and other forms of traditional agricultural knowledge is one way to achieve this goal.

[47] Vikas Kumar, Status and Challenges of Intellectual Property Rights in Agricultural Innovation in India, 20 *JIPR* 288 (2015).
[48] The Convention on Biological Diversity, 1992.
[49] Elisa Morgera, Elsa Tsioumani, *et.al*., *Unravelling the Nagoya Protocol, Compliance with Domestic Legislation or Regulatory Requirements on Access and Benefit-sharing* (Nijhoff Publishers, Netherlands, 2015).
[50] The Biological Diversity Act, 2002 (Act 18 of 2003).
[51] The Protection of Plant Varieties and Farmers Rights Act, 2001 (Act 55 of 2001).

Modern industrial agriculture is guided by different principles than traditional food systems. Traditional food production focuses on using biodiversity to produce food, while modern agriculture often employs monoculture practices. This lack of genetic diversity in the global food system poses a threat to agricultural security. The Food and Agriculture Organization of the United Nations (*hereinafter* referred as 'FAO') advocates for sustainably intensifying agricultural productivity to improve food security and farmer livelihoods. The traditional food systems rely on the knowledge and expertise of local communities, which can preserve traditional techniques and food culture, as well as genetic diversity.

The Indian government realises this and has been working continuously on bringing back the rails of the agricultural system on track using methods that are more sustainable and long-lasting to address food security concerns. Many initiatives have been undertaken towards building buffer stocks of food production; improving the public distribution system; materializing the household food security programme; food supplementation for the most vulnerable groups etc.

In addition, agricultural traditional knowledge has been considered as a workable solution to the problem of food insecurity. IPR, Agricultural TK, and Food Security can all be integrated through programmes like SVASTIK and the Mission Mode Project on "Collection, Documentation and Validation of Indigenous Technical Knowledge (ITK)"

It is not possible to adopt a singular approach to addressing the various issues within the diverse food and agricultural system of India. Every country must tailor their policies and legal frameworks to suit its specific social, political, and agricultural needs as well as meet the needs of farmers. While the government has implemented several programs to address the issue, there is still a long way to go to ensure that all Indians have access to safe and nutritious food. [52]

[52] Shabd S. Acharya, Food Security and Indian Agriculture: Policies, Production Performance and Marketing Environment, 22 *Agricultural Economics Research Review* 1 (2009).