Sattva Knowledge Institute SKI perspective

STRENGTHENING MILLET VALUE CHAINS THROUGH PRIVATE SECTOR COLLABORATION

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Acknowledgements

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Disclaimer

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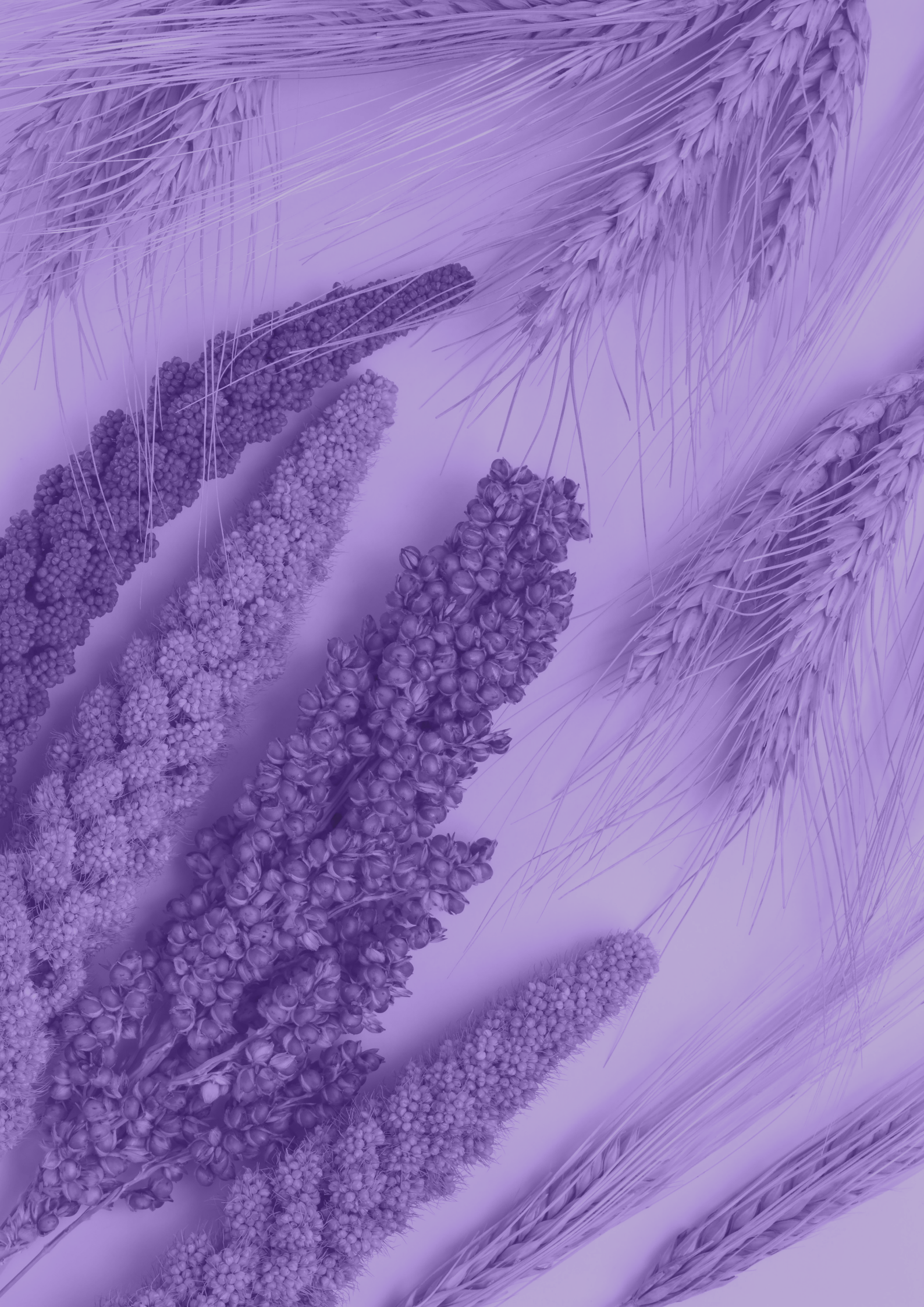

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Executive Summary

Millets have emerged as a promising crop of the future in India due to their significant nutritional value and climate resilience. With up to 8% protein and up to 20% dietary fibre, millets offer a healthier alternative to wheat and rice. Further, millet cultivation requires fewer resources, for instance, 8-10 times less water than rice, making it a resource-efficient and sustainable crop. As the largest producer of millets in the world, India contributes to nearly 80% of millet production in Asia. However, despite being an indigenous crop, millet production suffered heavily due to the Green Revolution, which led to a more than 50% drop in area under millet cultivation.

In the backdrop of 21 Indian states growing millets locally, 2023 has been declared by the Government of India as the International Year of Millets, as part of concentrated efforts to mainstream millet production and consumption. However, **challenges persist in the supply-side of the millet value chain,** including inefficient processing, limited shelf life, and lack of quality standards for millet products.

The private sector has a crucial role in addressing this by **bringing in innovation, investment, and market reach.** Many big private brands like Britannia Industries, ITC, Tata Soulfull, and small-scale local brands like Millets for Health, and Organic Tattva have already launched millet-based products due to policy support and growing consumer demand for healthier options. However, to address existing challenges towards building sustainable and remunerative value chains, collaborative action is needed. Through collaborative efforts, private brands, farmers, FPOs (Farmer Producer Organisations), nonprofits, research organisations, and investors can address these challenges effectively.

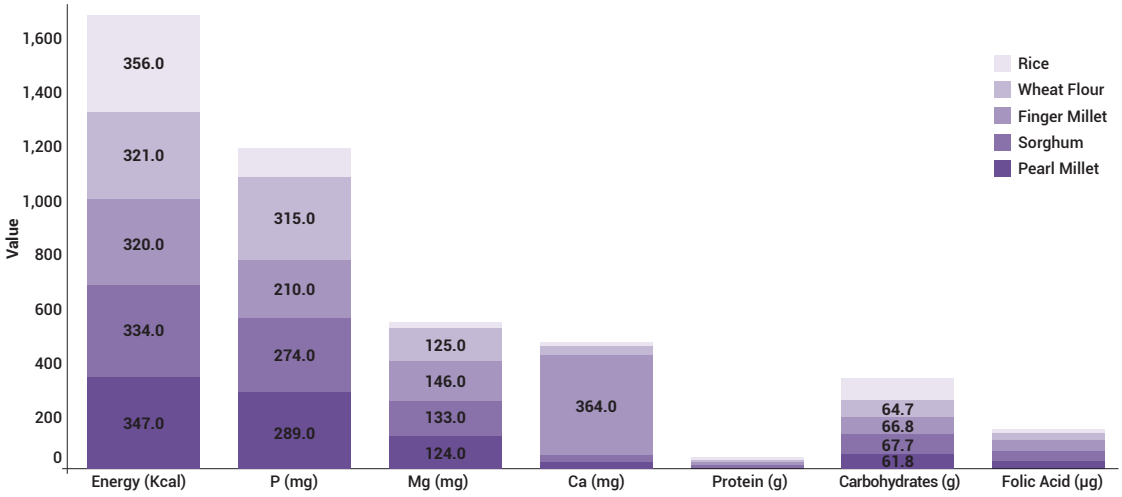
Private brands will need to **leverage their market reach to promote millets and invest in processing technologies for improved shelf life.** Farmers and FPOs need to partner with private brands to **establish direct procurement channels and receive fair prices for their crops.** Nonprofits and grassroots organisations can provide **support in storage and processing facilities, and conduct awareness campaigns.** Research organisations play a vital role in conducting **research on millet farming practices and quality improvement.** Corporate philanthropists and investors can contribute by **investing in millet-based businesses and startups, supporting the development of the millet value chain.**

Through convergence of actions, these players can address challenges in the millet value chain, reduce post-harvest losses, realize incremental value through primary processing, and capture a high-growth market of health-conscious consumers.

Private Sector has an Important Role to Play in Mainstreaming Millets

Owing to their many nutritional benefits, millets, also called future smart crops are gaining traction with Indian consumers. Studies have established the nutritional benefits of millets, especially the protein and dietary fibre content that exceed the benefits from conventionally consumed crops like wheat and rice (Rao et al. 2017, see *Figure 1* below). This is particularly important, since India is home to the second highest number of diabetic patients, most of whom reside in urban areas (IDF Diabetes Atlas 2021).

Figure 1: Nutrient Composition of Major Millets as compared to Wheat and Rice



- Millets have complex carbohydrates and are rich in dietary fiber.
- They are natural source of iron, zinc, calcium and other nutrients.
- They have higher content of folic acid, calcium, iron, potassium, magnesium and zinc.
- Finger millet is the richest source of calcium (300-370 mg/100 g

Source: IDI Sattva Research

Millets are also a significant part of the discourse around sustainable growth in India. These grains consume fewer natural inputs owing to their hard and resilient nature. This makes them a viable crop category to negate the adverse effects of water-guzzling crops like rice on the already deteriorating Indian water table.

Although varieties of locally grown millets have been a part of indigenous cultures since ancient times, their status as staple food grains was upset by the Green Revolution, which led to a more than 50% drop in area under millet cultivation. Consequently, the share they enjoyed in the total food basket of India also fell from 20% pre-Revolution to 4% today (MoA&FW 2022).

India, as the largest producer of millets in the world seeks to lead the mainstreaming of millets at the global level, revolutionising the consumption patterns of the Indian population,

and establishing itself as the global hub for millets. Towards this end, the Government of India has been promoting millet cultivation and consumption, its success evident with the declaration of 2023 as the International Year of Millets, proposed by the Indian Government to the United Nations. At the state level, governmental push supports traditional millet cultivation in twenty-one states (APEDA 2022).

Major millets – which comprise of the three main categories, namely jowar, bajra and ragi – account for more than 90% of millet production in India, with 100% of their cultivation majorly centred in the states of Rajasthan, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Telangana (APEDA; FSSAI). Together, these major millets have more than 120 varieties recognised by the Indian government (MoA&FW 2022). Minor millets make up the remaining 10%. While the yield estimates for millets in India have more than doubled since 1966, the area under millet cultivation has been decreasing consistently (India Data Insights 2023).

Figure 2: Growing Market Potential for Major Millets

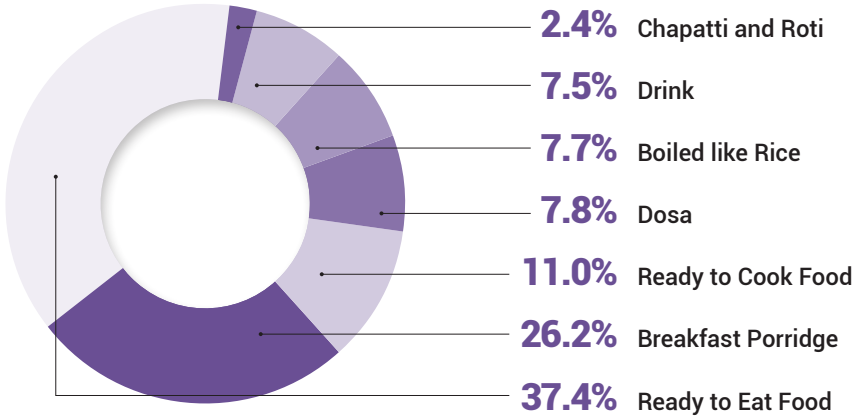
			
Name	**Sorghum (Jowar)**	**Pearl Millet (Bajra)**	**Finger Millet (Ragi)**
Recognised Varieties	**43**	**52**	**11**
Proportion of Total Indian Millet Production	**27%**	**60%**	**11%**
Production CAGR	**4-5%**	**3%**	**6.48%**
Top Regions of Production	Maharashtra, Karnataka, MP, Tamil Nadu, Rajasthan, & Andhra Pradesh	Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Maharashtra, Karnataka, & Tamil Nadu	Karnataka, Uttarakhand, Tamil Nadu, Andhra Pradesh, Orissa, Jharkhand, & Maharashtra
Types of Products Available in Market	Baked Products, Flour, Cereals, Snacks, Food Bars	Flour, Whole grains, Ready-to-eat foods like upma, idli, dosa, etc.	Flour, Ready-to-eat products like laddoos, idli, halwa, etc.

Source: SKI Research

However, the revival of this almost-forgotten food category in the Indian food basket needs continued collaborative efforts to achieve and sustain scale. The change expected is huge, and it cannot be brought about by government action alone. **The private sector can bring in the much-needed vigour and innovation to this space**, especially since the problem originates from a need for systemic revival of demand for millet and millet products.

Many private sector brands are already aiming to expand their product baskets, leveraging tailwinds like the rigorous policy push to millets, consumer demand for healthier alternatives, and prioritisation of sustainable food options among agribusiness corporations. Food brands like ITC, Nestle, TATA Soulfull and MTR Foods among others have already launched millet-based products, mainly incorporating sorghum (jowar), pearl millet (bajra) and finger millet (ragi). For over a decade, small-scale, locally based startups like Slurrp Farm and Millet AMMA and others have also been working with local level stakeholders to productise millets. The inclusion of millets is prominent in innovative recipes and food items like flour, flakes, cookies, and so on, launched by emerging food brands.

Figure 3: Forms in which Millets are consumed across Indian cities



Source: Joanna et al. 2021

Table 1: FMCG Participation (big and small scale) across major millet value chains

Private Sector Food Corporation/ Startup	Name of Millet Brand/ Range	Year of Action	Type of Millets being procured	Type of Investment on Millets	Existing Millet Product Basket
Britannia Industries	NutriChoice	2022	Ragi	• R&D on millets, incorporating millets in products to make them healthier and tastier.	Nutri Choice Range -Nutrichoice Ragi Biscuits
ITC	Aashirvaad Nature Superfoods	2018	Sorghum, Bajra, Ragi	• ITC Mission Millets • Developing nutri-rich products. • Connecting and partnering with FPOs to promote supply of nutri-cereals in plan. • The Agri Business Division of ITC has implemented two PPP projects, one each in Maharashtra and Andhra Pradesh in partnership with Indian Institute of Millets Research (IIMR), Hyderabad and Government of Andhra Pradesh respectively.	Multi-millet Mix, Ragi Flour, Millet-based noodles and pasta, Idli Mix, Ragi Vermicelli

Private Sector Food Corporation/ Startup	Name of Millet Brand/ Range	Year of Action	Type of Millets being procured	Type of Investment on Millets	Existing Millet Product Basket
Tata Consumer Products	TATA Soulfull	2012	Ragi	• Involved in branding for millet-based products to enhance consumer awareness. • Building a wide product range to introduce millets-based products in the market. • 'Better For You' campaign to enhance branding.	Ragi Bites, Tata Muesli, Millet Smoothix, Masala Oats
Nestle	NESPLUS	2016	Jowar	• Launch of NESPLUS - a range of nutritious and delicious breakfast cereals for the entire family. • Product combination of whole grains and multigrains.	Nestle Cerelac, Millet-based Maggi, Vegetable Multigrains Noodles, Kokos, Choco- Burst Fillows, Strawberry-Burst Fillows and Nutty Honey Granola
Wholsum Foods	Slurrp Farm	2016	Ragi	• Expanding millet-based offerings in their product basket. • Using influential figures (like actor Anushka Sharma) as promoters.	Little Millet Noodles, Dosa Millet Mix, Oats and Millet Pancake mix, Khichdi with Cereals, Baby Foods
Locally led Millet-based startups	Millets for Health	2016	Ragi, Jowar, Bajra	• Involved in branding for millet-based products to enhance consumer awareness. • Representing millet startups in different conclaves, conferences all over India.	• Jowar, bajra and ragi poha • Bajra/Ragi flour • Whole Jowar • Sprouted Finger Millet (Ragi) Flour • Sprouted Jowar (Sorghum) Flour • Little Millet Idli Rava
	Millet Amma	2017	Ragi, Jowar, Bajra	• Communication to establish the value of millets as not only healthy, but also beneficial to the environment and economy of the farmer community • Millet product line currently comprises nearly 40 stock keeping units (SKUs)	• Bajra Methi Khakhra • Jowar millet flour • Ragi millet dosa idli • Ragi grains • Bajra Flour • Pizza Base
	Nourish You	2023	Ragi, Jowar, Bajra	• Introduced a certification that is only given to farmland that has been pesticide-free for at least three years.	• Recently, they have introduced alternative food options like Millet Milk, a non-dairy option made from ragi, jowar, bajra and oats.
	Manna	2000	Ragi	• Inclusion of millets in the product basket • Introduced many processed minor millets in their product basket.	• Multi Millet Atta • Sprouted Ragi Flour • Ragi Flour

Private Sector Food Corporation/ Startup	Name of Millet Brand/ Range	Year of Action	Type of Millets being procured	Type of Investment on Millets	Existing Millet Product Basket
Locally led Millet-based startups	Timbaktu Organic	2006	Ragi	• Aiming to break through the mono-cropping of groundnut, which has severely depleted the soil, with promotion of millets and pulses through organic farming methods. • In addition, millet food promotion exercises have been organised in all the organic farming villages and local towns. • A local millet hotel is being set up, and trials have been initiated with local bakers on millet-based baked food.	• Finger Flour (Ragi Flour) • Sprouted Ragi Malt • Finger Millet (Ragi)
	Organic Tattva	2013	Ragi, Jowar, Bajra	• Involved in branding millet-based products to enhance consumer awareness.	• Organic Tattva • Ragi Flour • Bajra flour • Jowar flour

Source: SKI Research

Most private players are optimistic of the growing demand for millets, and expect the consumers to show increased interest as the awareness and accessibility of millets and millet-based products in the market increase. Indian urban consumers today are willing to pay almost 10% more in premium to buy health and nutrition focused products, and millet products have the ability to play a significant role here (Ali et al. 2020). The global millets market is projected to reach $14.14 billion in 2028, growing at a CAGR of 4.5% from 2021 to 2028 (ANIC 2023). Revenue projections from sales are promising as well (APEDA Market Intelligence n.d.).

Existing supply chains need strengthening for the private sector, specifically fast-moving consumer goods (FMCG) brands to unlock this value.

Millet value chains are small in scale, but have immense growth potential. Millet value chains will undergo a scale-up with time, as procurement from big and small private food brands increases. However, this also means that these chains should be prepared and strengthened in response.

Despite the high growth potential in this space that private sector brands are trying to leverage, there are issues of quality and availability of supply of desirable nature of millet produce that persist. The question then is – how can the quality constraints of millets value chain be addressed well ahead of time to enable brands to expand in the millets category?

FMCG Brands: Participation and Procurement Challenges

With the resurgence of interest in millets, FMCG brands have been involved in direct and indirect procurement of millets from farmers, traders and processors at farm levels, to manufacture and sell millets and millet-based products to consumers. Along with big brands like ITC and Unilever, this market is also populated by over 400 millet startups incubated and accelerated by Nutrihub, the Technology Business Incubator powered by the Indian Council of Agricultural Research - Indian Institute of Millets Research (ICAR-IIMR) (Rao et al. 2021). Investment estimates in millets amount to nearly INR 2,000 crores, with a positive growth potential (IIMR).

Moreover, some brands have been participating with various organisations to work on creating awareness around the benefits of consuming millets across target segments with high potential like urban consumers (See *Figure 3*). This participation encourages the mainstreaming of millets – by increasing consumer demand, giving farmers livelihood opportunities for their produce, and promoting the production of a future smart and climate-resilient crop.

The share of millet products in the food baskets of most of the above mentioned brands comprises only 1-5% of their entire manufacturing basket. Ecosystem players face stiff competition from established staple cereal categories. In addition to this, the under-developed supply chains and the private sector's inexperience in engaging with 'traditional' millet farmers poses significant impediments to the strengthening of this market. Some prominent challenges faced by private procurers that need to be addressed are as follows.

Private brands have observed that inefficient pre-processing, cleaning and grading of major millet varieties at the farm level results in undesirable and inconsistent quality during procurement. Primary processing is an important stage to make millet grains useful for human consumption. It is relatively easier for major millets (jowar, bajra, ragi) which do not have a tough layer covering them (See *Figure 2*).

Figure 4: Primary Processing Activities and Required Infrastructure

Primary Post-harvest Processing Technologies

Activities (mostly executed at farm level) that transform the grain into better quality or more useful form

Post-harvest Activity	Infrastructure Required
Cleaning	De-stoners, Air Screen Grain/Seed Cleaners
Sorting, Grading, Drying	Screeners, Sorters, Gravity Separators
Dehulling/Dehusking	Dehullers, Shellers
Polishing	Polishers, Pearlers
Grinding	Pulveriser
Storage	Storage Equipment and Warehouses

Source: SKI Research

Most of the cleaning and sorting at pre-processing stages is traditionally done at the farm level. Primary processing machinery is often missing at this level, and the processing is mostly manual. Consequently, impurities like immature grains, mud particles, stones, and dust are present in the unprocessed batch. Local processors are mostly able to utilise equipment like de-stoners, graders and equipment for cleaning and sorting produce. Despite these processes, some brands still report that the produce is not of the desired quality. The absence of fully developed quality standards and grades for millets further adds to the inefficiency at this stage. Moreover, since India is the major production hub globally, the lack of international standards to specify quality of millets and associated processing technologies also does not help.

Private brands planning to procure material directly from farms also have to account for these irregularities in terms of financial costs, as well as intangible costs like time and other resources to convert grains to desired quality for further stages. Additionally, although major millets are identified as naked grains that do not require too much processing effort – there are still certain varieties containing glumes that need to be processed with special machinery. Experts also claim that inefficient processing could lead to a 50-60% drop in the quality of these grains. The available machinery is inefficient, with about 70-80% of grain being retained, and the remaining being un-hulled and broken grains. Moreover, due to inefficient post-harvest operations, six to eight percent of bajra is lost at farmers' level during harvesting, threshing, winnowing, transportation and storage (NABCONS 2022). Impediments such as these only make trustworthy connections between farm suppliers and brands more challenging.

> *"With respect to quality issues across millet value chains, presence of heavy metals and pesticides are prominent because of the cross-crop contamination or the previous crop residue, especially when primary processors buy this produce."*
>
> — **Ritesh Gupta**, Sustainability Lead, Nestle R&D Centre India Private Limited

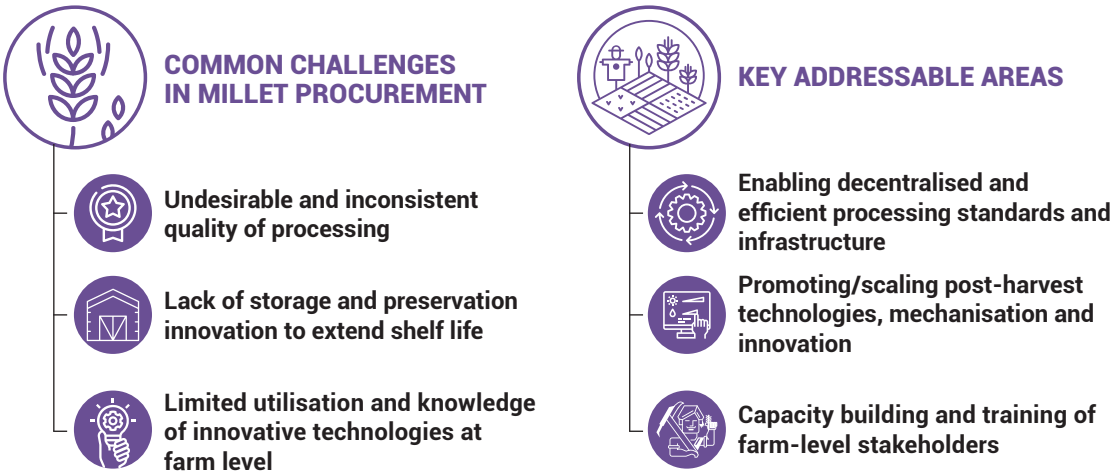
Big brands and multinational corporations may have the ability to bear these costs and have in-house pre-processing machinery. However, smaller brands (especially micro- and medium-sized enterprises) may not have the ability to overcome the lack of infrastructure on their own.

Processed millets have limited shelf life, and storage presents a problem for private players. The shelf life of any raw millet flour is about one to two months. In cases of bajra, this is further reduced to only five to seven days due to the free fats and sugars that can induce oxidative rancidity. When private players procure their produce in processed forms like flour, it reduces the window for them to work on the secondary processing and manufacturing easily consumable and/or packaged food products. Rancidity in bajra is reported as the highest priority issue that needs addressing at this stage. Quality assurance thus greatly depends on different pre-treatments and/or storage conditions.

Private players have limited scope to scale up and innovate on better varieties of major millets since farmers still lack the required technical know-how and resources to afford and access hybrid varieties of millets. Several hybrid varieties for major millets like sorghum and bajra exist today, with more research underway (*Figure 1*). However, the scaleup of these hybrid varieties is also focused on certain high yield geographies, and favourable seasons. Research on developing seed quality and productivity for the rabi season, for instance, has been limited. Given that sorghum, bajra and ragi have many varieties and preferences as per regional geography, one solution and intervention cannot fit all contexts.

There are critical gaps in understanding of the market requirements as well as high efficiency technologies that farmers can use to make their processes more efficient. On the other side of the value chain, private procurers have limited understanding of farmers' capacities. This leads to less trust and transparency in transactions, and becomes a significant hurdle to scaling up.

Figure 5: Challenges and key addressable areas faced during procurement of millets by private brands



Source: SKI Research

Based on these challenges, the need for collaborative action emerges across the following key addressable areas:

1. Enabling decentralised and efficient processing standards and infrastructure

This involves working on both the availability and affordability of good processing infrastructure at the primary processing level – especially for dehulling, separation and polishing of specific millets. Mechanising the processing activities at the farm level can maximise efficiency, and reduce grain quality losses.

A single solution will not work for the multiple varieties of millets. There is, therefore, a need to develop customised, locally available and affordable infrastructure which is easy to use for farmers, processors and FPOs at a small scale. Regional geography trials and research

need to be done to guide such customisation. Experts also suggest that basic activities like sorting and grading of millets can be done through established facilities for other staple crops like pulses, which can help brands reduce the cost of investing in new specific machinery. For example, the cost of establishing a primary processing unit for bajra can vary greatly, with a range of 3-5 lakhs to 60-70 lakhs, depending on the capacity of the machines. Various factors, such as the size of the operation, the type and quality of the machines, and the infrastructure requirements, can influence the overall cost (Roy n.d.). Using pre-existing infrastructure can help actors save this cost.

Processing Profits: Millet Processing as a Profitable Enterprise in Karnataka

Interventions involving the addition of infrastructure and processing equipment like de-stoners, graders and dehullers enabled the quality of grains to improve significantly in a processing setup in the Haveri district of Karnataka. Percentage of unhusked grains reduced from 14-15% to 1% after the introduction of this infrastructure. Additionally, the processor fabricated the equipment at the least cost to derive maximum efficiency and profits (Sarojini et al. 2020).

2. Promoting/scaling post-harvest technologies and innovation

As mentioned above, although millets have nutritional benefits, the poor shelf life of processed produce leads to loss of taste and quality. There is thus also a need to invest in innovative technologies like additives (chemical substances added to improve or preserve foods) that can resolve these issues at the local level, without compromising the nutritional value of the product. Private players and startups that offer these solutions need to be promoted and incubated more aggressively, as farmers themselves do not have the capacity to work on these solutions. This can promote the development of resilient millet products that can compete with staple crops and their derivatives.

Igniting Innovation: Investing in Millet Processing Technologies by Agribusiness Incubators

Many millet-based startups have been promoted by incubators like Nutrihub – IIMR, University of Agricultural Sciences, Raichur, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and NIFTEM-T. While most startups focus on creation and branding of innovative millet based products, some startups have been also focusing on providing niche millet processing machinery innovation. Some examples are Perfura Technologies (India) Pvt Ltd, incubated by IIMR and ICRISAT which focuses on primary and secondary processing technologies; and Our Food Pvt Ltd, which focuses on post-harvest management, including storage and processing operations (Organics Millets International Trade Fair [ITF] 2023).

3. Capacity building and training of farm-level stakeholders

To enable value chain efficiency starting from the farm level, capacity building of stakeholders at this level, especially farmers and related community institutions like FPOs, cooperatives, and farmer groups should be undertaken. It is also important to note that FPOs dealing in millets are still few. There is a lack of knowledge about best cultivars

(plant varieties that have been produced in cultivation by selective breeding) and policies supporting millets in the farming community which needs to be developed. Several capacity-building efforts by state governments, NGOs, institutes are taking place with their limited expertise on products. However, a central framework is necessary for collating innovative technologies and providing training on them. Training operators working on machines can lead to efficient functioning and an increase in the quality of grains.

Making the Farmer Aware: Learnings from procurement through state-level interventions - Odisha's Millets Mission (OMM), Pradhan Mantri-Garib Kalyan Yojana (PM-GKY) and Karnataka's Anna Bhagya

The success of these government interventions demonstrates that resilient procurement channels can be created if farm mechanisation is incentivised, and farmers are made aware of technological know-how to ensure consistent quality and productivity of millets. This is also subject to the cultivation conditions and dietary preferences of the specific region. In Odisha, specifically, FPOs have been able to procure from farmers at collection centres and engage in value production and addition of millets. As a consequence, there has been a parallel and gradual rise in procurement of ragi grains from millet farmers by government agencies over the last few years.

This indicates an opportunity for private brands to also use similar established channels like FPOs to procure grains that have undergone a level of primary processing, by developing rapport and integration within the value chains, through focused awareness campaigns and community engagement programmes (Revitalising Rainfed Agriculture Network 2022).

Implementing action in these areas requires private brands to work closely with farmers and other local stakeholders in the millet value chain, whilst also boosting financial investments and innovation in infrastructure and technology, with help from R&D-focused organisations.

Bringing Key Actors Together to Collaborate

Private FMCG brands, farmers and FPOs, nonprofits operating at grassroots levels, angel investors and venture capitalists (VCs), and research institutes can collaborate effectively to establish a system that fosters robust millet value chains. Such value chains would be capable of operating at the desired scale and promoting millet consumption across the nation.

By leveraging their market reach, private FMCG brands can help promote millets as a healthy alternative to other grains. FPOs can partner with farmers to produce millets, while nonprofits can work towards facilitating creating awareness about the benefits of

Figure 6: Key actors that need to collaborate to scale up procurement of quality millets

Source: SKI Research

millet consumption. Consumers' growing preference for health and wellness-focused consumption is also an encouraging sign for private equity and venture capital funds to invest in millet-based businesses. Additionally, research institutes can provide scientific inputs to strengthen the production, processing, and marketing of millets.

1. Large- and small-scale FMCGs

Private food brands have a key role in scaling up consumption of millets across the

Figure 7: The collaboration in action

Source: SKI Research

country. They can play a significant role in **addressing the issue of the lack of well-defined grades and standards** for the procurement of millets. By creating and communicating clear standards and guidelines to suppliers, private brands can ensure that the millets procured meet certain quality and nutrition standards. This is especially important in the absence of established standards on aspects like physical composition, like grain size, the degree of polishing of the grain and so on, which can address issues related to inconsistent quality and nutrition of the grain, and unethical practices such as indiscriminate polishing.

Moreover, investments in processing technologies that can improve shelf life of millet based products is also required. This will primarily be true for small startups and brands that are willing to pursue new technologies and innovative practices more quickly. Nodal research institutes can come together with these startups to not only incubate them and accelerate progress, but also equip them with the R&D generated out of scientific and technical evidence. There is a need for multiple direct farm programmes which create a strong value chain model to facilitate connections between producers and market players.

Power of Agritech Investing: ITC's e-Choupal services to make supply chains more efficient

In 2000, ITC's Agribusiness Division introduced the e-Choupal, an internet-based intervention that covers more than 4 million farmers across 10 Indian states – Madhya Pradesh, Haryana, Uttarakhand, Uttar Pradesh, Rajasthan, Karnataka, Kerala, Maharashtra, Andhra Pradesh and Tamil Nadu. The e-Choupal addresses gaps resulting from the high fragmentation of Indian farms, and the numerous intermediaries involved, by aggregating information and knowledge derived from all value chain players at one stop, managed by farmers themselves, through internet kiosks setup at the village level. It aims at providing weather forecasts, market prices, and agricultural information in the local language for easy access by the agricultural community.

Similar initiatives can be undertaken by big brands along the millet value chains, to promote a farmer-inclusive approach while responding to the unique challenges of the Indian agricultural ecosystem.

Major brands can also directly connect with farmers and FPOs to set up direct procurement channels. However, this is still a solution that needs much more robust existing linkages within the market. The fact that most farmers are small and marginal makes it difficult to connect with them and establish robust linkages at scale.

2. Farmers and FPOs

Very few FPOs are focusing on millets. The few smallholder farmers that grow major millets in the top producing states also do not usually deal with brands directly. With further policy support and demand push from the consumer market, FPOs can help to ensure that farmers receive fair prices for their crops. **With increased scale, FPOs will play an important**

role in empowering farmers, and also support farmers to get access to high quality seeds, knowledge about important technologies, along with relevant capacity building and awareness to provide timely and quality supply to private procurers. Developing awareness among member farmers on Fair Average Quality (FAQs) and primary value addition are key intervention areas for FPOs.

Success of the Millet Sisters: Susag Millets Producer Company Limited (SMPCL), Andhra Pradesh

More than 900 farmers (mostly tribal) are a part of this farmer producer company working on enhancing the yields, procurement, processing and marketing of millets, along with other diverse range of crops. Moreover, the millets are cultivated through natural methods of farming. With collaborative support from National Bank for Agriculture and Rural Development (NABARD), financial players like Bank of Maharashtra, local processors and retail stores, capacity building and training organisations among others, this FPC was been able to reach a turnover of INR 43,12,903 during the year 2019-20.

3. Grassroot organisations and nonprofits

Grassroot organisations and nonprofits can help effectively utilise infrastructure, such as storage facilities and processing units, to help farmers store and process their millets. They can contribute to **building the capacity of farmers and FPOs on farm practices, post-harvest management practices and guiding them on business operations**. This will enable farmers to sell their millets at better prices and improve their income. These organisations can also provide the much-needed logistics support to connect the farms and the distribution point more effectively. Establishing a connection with farms is easier through organisations which understand the farmer profile, existing conditions and linkages within the value chains better.

4. Research organisations

Research organisations can conduct research on various aspects of millet farming, such as soil fertility, pest management, and seed quality, nutritional profiling to **identify best practices for enhancing the quality of millets**. This will include millet-based and participatory varietal trials to help identify and select the best performing varieties with desirable traits that can benefit farmers, consumers, and the environment. This will help in designing capacity building and awareness programmes more effectively. Their inputs are also to evaluate the geometry, shape and nutritional value of various millet cultivars and map them to their appropriate end-uses. This can help improve the quality of procurement and facilitate value addition by large-scale processors. For example, in the case of pearl millets, industries often have different priorities regarding price and quality. For instance, the cattle and poultry feed industry tends to prioritise lower unit prices over quality when selecting grain for their animal feed. Meanwhile, the breweries and starch industries typically prefer grain with high starch content and low protein (Reddy et al. 2018).

Furthermore, technical assistance to private brands on millet processing and quality control, including recommendations on equipment, testing methods, and quality standards, focusing on moisture content, shape, size and variety can help brands develop comprehensive standards and specifications for procurement.

Embracing the Dual Role: Researchers and Trainers

A cooperative formed in 2015 in the Chamba block of the Tehri Garhwal district of Uttarakhand, Belmati Women Cooperative served as a model of inspiration for many other women-led FPOs, by gaining empowerment through the right kind of support in collaboration with scientists and researchers from the Krishi Vigyan Kendra (KVK), Tehri Garhwal.

The women farmers were empowered through training by KVK on grading, sorting, and packaging of their organically grown pulses and cereals. Additionally, KVK provided ongoing technical guidance on value addition, including the preparation of iron-rich laddoos and amaranthus laddoos. It also supported the setting up of minimal processing plants in their cooperative centres and facilitated marketing linkages to sell their products. KVK connected the cooperative to both government agencies and private players, creating opportunities for enhanced market access. This led to these farmers earning an income of approximately INR 10,000 per month, and achieving improved standards of living.

Similar models can be adopted by research and scientific organisations to equip farmers technologically, especially with respect to millet production and processing technologies (DoA&FW 2022).

5. Corporate philanthropists, angel investors and VCs

The millet sector requires increased investment from angel investors and VCs. To effectively scale and amplify the impact of innovative interventions in the millet's value chain, it is imperative to **harness diverse funding mechanisms, such as patient capital and blended finance**.

The gaps in technology and innovation across processing and quality production of major millet value chains can be covered by propelling startups to bring forth their solutions to address the above mentioned challenges. Investors and VCs can bring forth more investment to support startups in the industry. Additionally, sourcing corporate social responsibility (CSR) funds to support incubators for scaling up infrastructure would strengthen the ecosystem for millet startups. Moreover, impact investors can support FPOs to set up local processing units using cost-efficient machinery developed by leading technology institutions of India.

Effect of Impact Investing: Aavishkaar Capital's Early Investment on Future Crops - Millets
Aavishkaar Capital's investment in Kottaram in 2018 was driven by the vision to amplify the impact of millet cultivation by empowering entrepreneurs Prashant, Rasika, and Amith. The investment resulted in significant growth, robust financials, and positive impact metrics for the startup.

Today, Kottaram has transformed into the TATA-acquired Soulfull brand, which aims to deliver a range of healthy, tasty and easy-to-make packaged food products with millets as their key ingredient, through a robust retailing network in India. This startup's progress is a clear demonstration of the potential of impact investing to push forward initiatives with purpose-based visions, and the value of early investing in making challenging but nascent projects sustainable in the long run (Aavishkar Capital n.d.).

The Value that Collaborative Action can Unlock

Addressing millet supply chain issues can help stakeholders achieve three major positive outcomes.

1. Reducing Post-Harvest Losses: Value for Farmers and FPOs

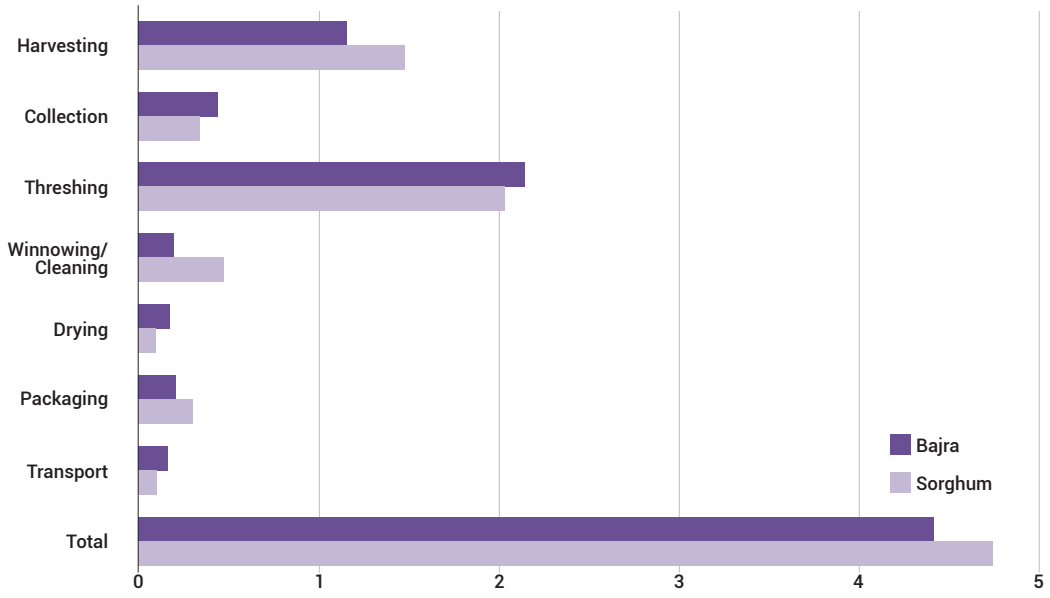
The prices realised out of public procurement for millets like jowar, ragi and bajra have witnessed an 8-12% increase in the last few decades. However, when we account for rising inflation, what farmers effectively earn is insufficient, when compared with major staple crops. The amount of procurement of coarse grains for the kharif marketing season as per latest estimates has also fallen short of the planned amount (Krishi Jagran 2023). Furthermore, experts suggest that it would not be able to reach even half of its target.

Private procurement can play a big role in making millet cultivation remunerative for farmers. It is to be noted that a significant portion of the price that can be realised is lost due to insufficient processing availability at the earlier stages, and not necessarily due to presence of intermediaries in the supply chain (IIMR). If quality issues are addressed at farm level, it can lead to **3-5% of millet processing related losses that can be recovered at farm level.** For instance, the use of thresher-cum-pearler at the farm level can reduce the mixing of impurities, minimising losses resulting from manual processing.

2. Importance of Primary Processing: Realising Incremental Value

A ragi value chain analysis revealed that **primary processing activities like cleaning, grading, better transportation and handling can lead to more than 20% value generation** through premiums for the stakeholders involved in processing (Palanimuthu 2017). Most farm-level stakeholders in the millet value chain are unorganised. Similar business cases like the inclusion of processing facilities in ragi value chain can be established for other millet varieties to develop a valuable case for processing and generate incremental value across the value chain.

Figure 8: Losses that can be addressed at farm level by making millet processing efficient (%)



Source: NABCONS 2022

3. Capturing High Growth Market: Value for Private Brands

With good quality of procured millets, **the catalytic role of private brands** can be leveraged to generate sufficient demand for a growing urban, health-conscious population that is willing to pay more premiums for health and wellness products. At a CAGR of 1.1%, estimates forecast that **by 2050, the global millets market will grow to $12 billion**. Major drivers for this growth would be the urban population, especially in countries with younger demographics and a growing population subject to risks of cardiovascular and related heart diseases. The widespread prevalence of health problems, ranging from diabetes and heart conditions to bone health issues and general health concerns, serves as a significant driver for millet consumption at a pan-India level.

There is also significant value in exploring export opportunities. While India is the largest producer of millets today, it is only exporting 1-2% of its produce to a growing global market, which has the potential to yield a CAGR of nearly 4-5% within the coming decade (Mordor Intelligence n.d.).

Limitations to Solving Procurement Issues

This perspective has limited its recommendations to supply side issues, focusing on optimising and strengthening the millet value chain to respond to the positive trends in consumer demand. However, while addressing the larger question of mainstreaming millets in the longer term, it is also necessary to account for consumer demand generation and sustainability as key elements.

"Millets are still a poor man's food and a rich man's luxury. The demand has to drive the entire thing, and is the core thing in any value chain. However, from a production perspective, millets provide a terrific opportunity in the dryland area."

— **Sanjiv Rangrass**, Former Group Head Sustainability & R&D, ITC Limited

Conclusion

The governmental impetus to millet cultivation and consumption in the country complements the growing interest in the private sector to tap into the future smart produce space, signalling a fertile environment for reintroducing millets to the mainstream in India. Collaborative ecosystem action with the private sector at its centre can strengthen millet supply chains, contributing to the practice of climate-smart agriculture, improvement of livelihoods for millet farmers, and the expansion of the choice basket for health-conscious consumers.

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