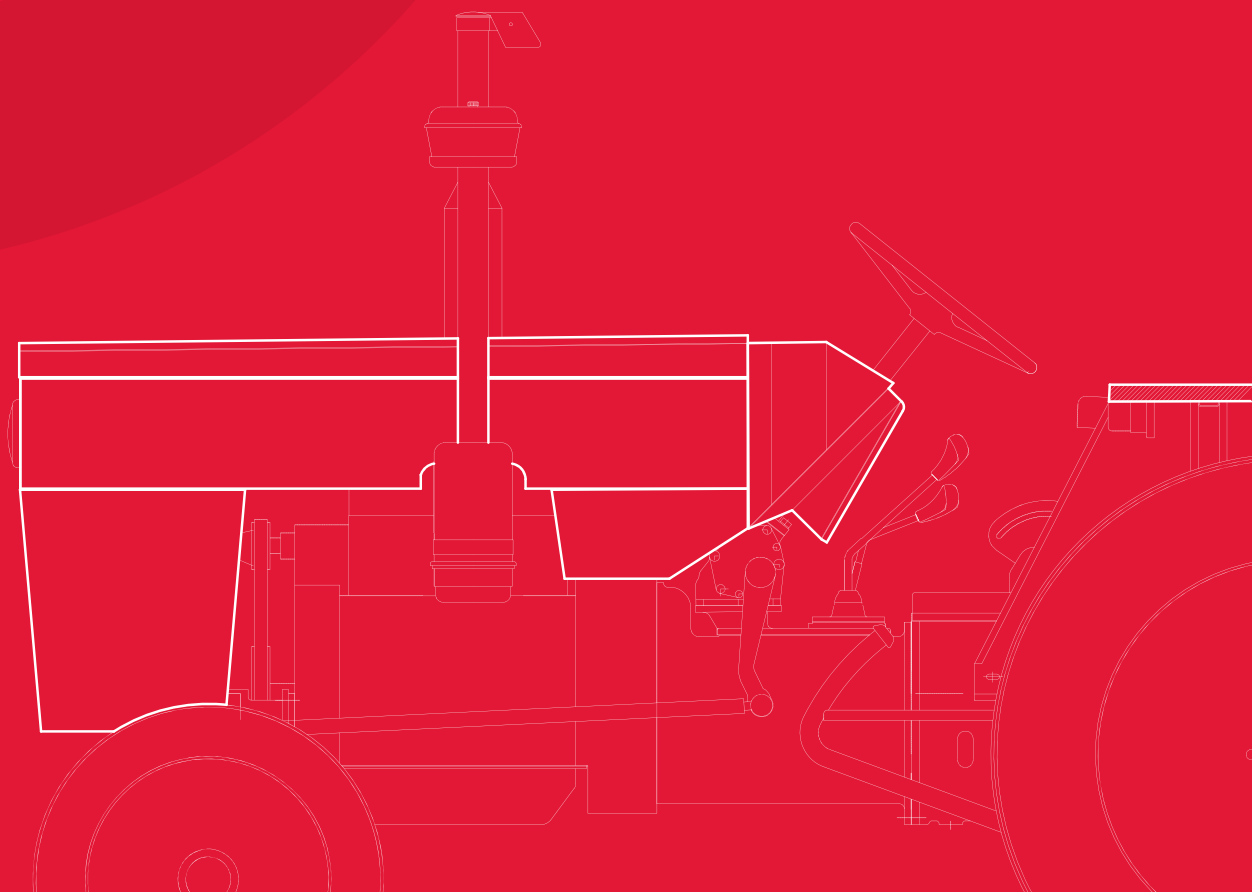
Mahindra
Rise.

FARM MECHANISATION

AUGMENTING AGRICULTURE PRODUCTIVITY, INCREASING RURAL INCOMES FOR AN ATMANIRBHAR BHARAT



FOREWORD

Agriculture sector continues to be the bedrock of the Indian economy. Almost 60 per cent of India's population depend upon agriculture and allied activities as their primary source of livelihood. Agriculture's contribution to the GDP has consistently been over 15 per cent in recent years.

As COVID-19 brought India's economic growth to a grinding halt, agriculture emerged as the only sector that bucked the trend and aggregated positive growth. In fact, share of agriculture in India's GDP increased to 19.9 per cent in year 2020-21 from 17.8 per cent in 2019-20. The Agriculture and Allied activities clocked a growth of 3.4 per cent at constant prices during 2020-21(first advance estimate) [1] .

According to the Agriculture Census 2015-16, small and marginal holdings (less than two hectares) constitute a whopping 86.21% of total land holdings in India. The average size of Indian land holdings is barely 1.08 hectares [2]. Our farmers need an array of mechanisation solutions to boost productivity of their small land holdings and strengthen the sector around which India's economy pivots.

The use of modern machinery is currently being promoted both by private and public sectors, with several initiatives being taken up by the government, such as the Sub-Mission on Agricultural Mechanisation (SMAM) under National Mission on Agricultural Extension and Technology, Rashtriya Krishi Vikas Yojana (RKVY)and Mission for Integrated Development of Horticulture (MIDH).

Unlike other agricultural sectors, farm mechanisation sector has a far more complex structural composition. It has been observed that the sector's performance depends on the interplay of factors that include, financial aspects, such as capital and rate of interest, lack of data, small and scattered landholdings etc. Despite all these, farm mechanisation is one of the essential components for growth of sustainable agricultural in India, especially in the context of diminishing agricultural labour.

Creating self-reliance in farm machinery manufacturing is a critical step towards mechanizing a range of farm products and implements. The Government can give a positive direction toIndia's farm mechanisation program by initiating a series of reforms, including but not limited to, promoting indigenous R&D and extend support for crop-based mechanisation efforts.

Hon'ble Prime Minister Shri Narendra Modi's mission of making India 'Atmanirbhar' is closely intertwined with creating an 'Atmanirbhar Krishi'. This includes empowering the farmers with efficient technology-driven systems to improve productivity and efficiency. At M&M, we have been at the forefront of efforts to achieve self-reliance in farm machinery. Starting from tractors, Mahindra has progressively built an entire ecosystem of farm machinery while launching strategic finance and rental initiatives to make it more accessible and affordable to farmers. The cutting-edge technologies developed by Mahindra in the farm machinery sector have enormous potential to realize Hon'ble Prime Minister Shri Narendra Modi Ji's vision of 'Atmanirbhar Bharat'.

Hemant Sikka
President, Farm Equipment Sector,
Mahindra & Mahindra Ltd and
a member of Group Executive Board

*Source:
1) Economic Survey 2021-21
2) Agriculture Census 2015-16

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OVERVIEW

India is today among the world's largest foodgrain producers, consistently achieving surplus production. However, the agricultural sector faces many challenges, including stagnant productivity per hectare, ebbing farm incomes, and increasing agricultural labour shortage even as it is responsible for the onerous task of feeding a rising population.

As the area under cultivation declines, it is evident that India's agricultural sector needs to reinvent itself, augment farm mechanisation and increase productivity continually. Increasing farm mechanisation and productivity is crucial to realising Prime Minister Narendra Modi's target of doubling the farmers' income by 2022.

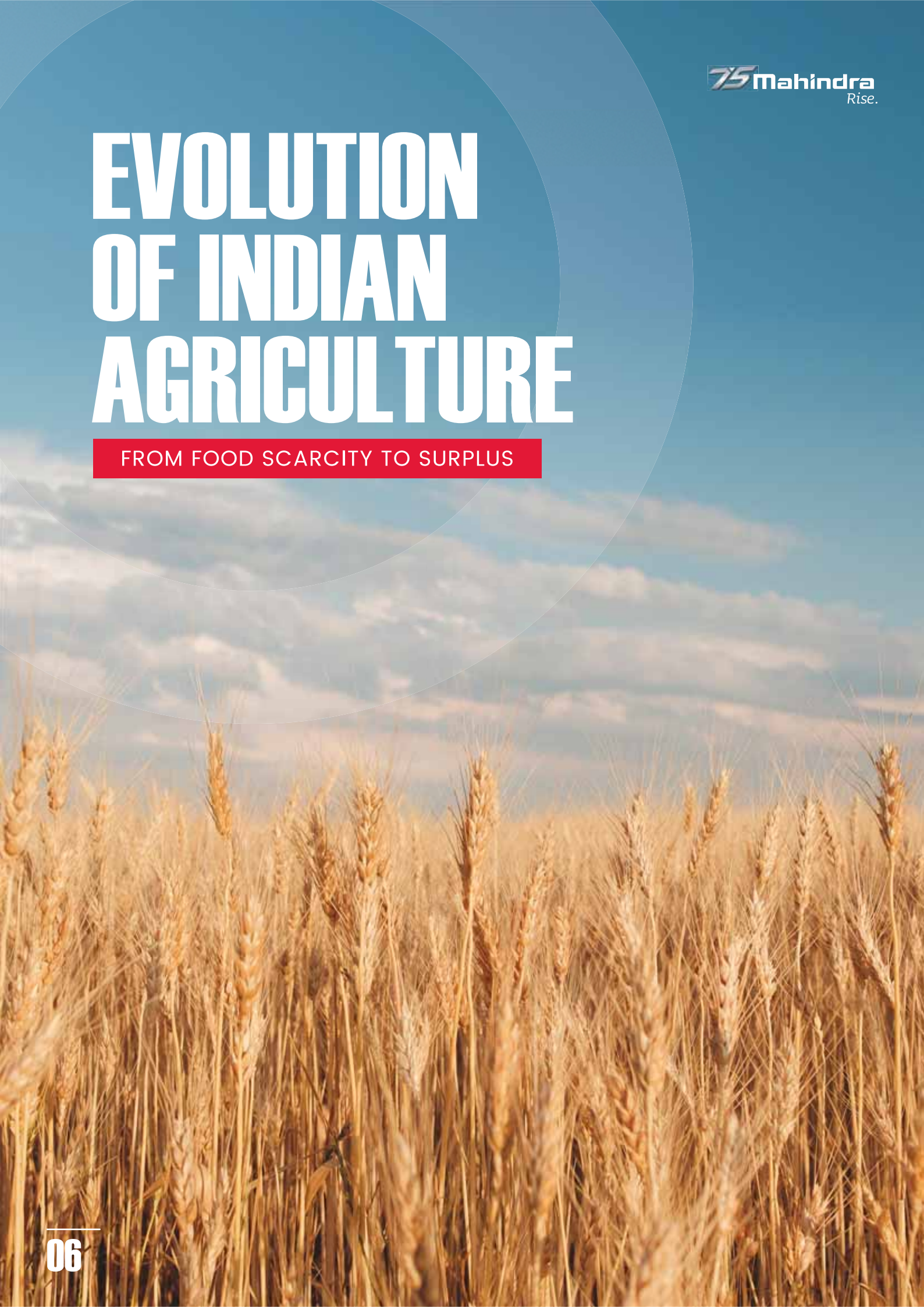
India currently operates at a significantly lower level of farm mechanisation as compared to developed countries. At the same time, power availability per hectare also varies greatly region to region and mechanisation is to a large extent limited to tractorisation. By increasing farm mechanisation across the country, addressing regional variations in farm power availability and making diverse farm machinery easily accessible to small farmers, India can significantly improve its food production.

The government must accord significant priority to this agricultural challenge and initiate measures to increase farm power availability to 4.0 kW per ha by 2030. Boosting indigenous manufacturing, making easy credit available to small farmers and encouraging energy and water conserving practices such as micro-irrigation and precision farming must be critical elements of India's agricultural policymaking going forward. Promoting indigenous research and development will also ensure that technology innovation takes care of the specific needs of the Indian farmers. Increasing farm productivity and indigenization of manufacturing of farm machinery will also lead us to the goal of creating an 'Atmanirbhar Bharat" through 'Atmanirbhar Krishi'.

This vision document intends to take stock of the challenges Indian agriculture faces and lays forward a series of suggestions on how the government can help the mechanisation process through favourable policies and programmes. The document also underlines the need for diversifying India's farm equipment sector, improving the livelihoods of farm workers by making ergonomical tools and equipment available to them and promoting adoption of mechanisation across the agri value chain.

EVOLUTION OF INDIAN AGRICULTURE

FROM FOOD SCARCITY TO SURPLUS



India has come a long way from a food scarce country heavily dependent on foodgrain imports to surplus production.

The Green Revolution brought about a tectonic shift in Indian agriculture by introducing high yielding varieties of seeds, modern fertilizers, insecticides, pesticides, and improved tubewell irrigation.

The Green Revolution enabled record production of foodgrains, turning a new chapter in the history of the country. Between 1950-51 and 2015-16, gross foodgrain production increased from 50.8 Million tonnes to 252.22 Million tonnes while agricultural yield increased from 522 kg per ha to 2,056 kg/ha[3].

Today, India is the largest pulses producer and the second-largest producer of rice, wheat, sugarcane, cotton, groundnuts, fruits, and vegetables. With an estimated harvest of 295.67 million tonnes (mt), India is set to achieve record foodgrain production in 2019-20. Agriculture contributes about 18% to India's GDP, with 58% of the population dependent on agriculture and allied activities.

Intensive and modern agricultural methods, including increased mechanisation were critical elements of Green Revolution. M & M was among a handful of visionary private companies that laid the foundation of a strong local manufacturing capability. Starting from its first tractor in 1963, M&M has accomplished a highly diversified farm equipment portfolio covering the entire range of farm operations and has played a critical role in the success of Indian agriculture.

The use of mechanised power has increased tremendously over the past few decades. However, with a large part of the small and marginal farmers still bereft of mechanisation tools, there remains significant scope for expansion of farm mechanisation.

> **"Between 1950-51 to 2015-16, India's annual foodgrain production increased by over 200 million tonnes"**

*Source:
3) Agriculture Statistics At A Glance 2016 report

FARM MECHANISATION

INDIA'S POSITION ON THE GLOBAL STAGE

The Indian farm has been mechanised significantly over the past 50-60 years. In 1960-61, about 93% of farm power came from live sources – animals and human beings. This went down to about 10% by 2014-15. Still, India operates at a farm mechanisation level of just 40-45 percent, much lower than developed countries and BRICS nations[4]. The US boasts of 95 per cent farm mechanisation, while Brazil operates at 75% and China at 57%[5].

There are major regional variations within India itself. The mechanisation level in high yield regions of Punjab, Haryana, and Uttar Pradesh is higher than western, southern, and northeastern India. Mechanisation levels are also skewed overwhelmingly towards land preparation tasks[6].

As an essential element of farm mechanisation, tractors were crucial for India's agricultural sector, and tractor adoption has been encouraging on Indian farms. However, unlike the global farm market, tractors claim an inordinate market chunk in India. Indian farm machinery industry (other than tractors) is valued at Rs 7,000 crore, while the Indian tractor industry is valued at more than five times its value at Rs 39,000 crore. In contrast, the global agriculture equipment market is roughly about USD 160 billion, of which farm machinery makes up USD 100 billion and tractors USD 60 billion.

> **"India's farm machinery industry has largely been focused on low technology implements mainly manufactured by unorganised workshops in rural areas. Penetration of tractors and farm equipment remains the lowest among small and marginal farmerswho constitute 80% of farmers in India."**

*Source:
4) 'Transforming Agriculture Through Mechanisation', A Grant Thornton-FICCI report 2015
5) Indian Farm mechanization Market, ICFA
6) Farm Mehanisation document, ICFA 2017

The analysis tells us that Indian farmers have not yet adopted mechanisation at multiple levels of farm operations. The penetration of combine harvesters in India today was equal to the tractor penetration in 1971. For a specialised product like rice transplanters, today's penetration sat the same level as the tractor penetration in 1960. Therefore it can be said, that India is tractorised, not mechanised.

India's farm machinery industry has mostly been focused on low technology implements mainly manufactured by the unorganised workshops in rural areas. The industry needs to proliferate like the tractor industry, and farmers need to access the latest farm machinery. This will drive manufacturing, employment, technology development in India, farm incomes, and exports. The need is to increase farm power availability to 4.0 kW per ha by the end of 2030 to meet the increasing demand of food grains (the farm power availability was 2.02 kW per ha in 2016-17)[7].

M&M is aggressively working to create an entire ecosystem of farm machinery that can improve efficiency, address labour shortage issues in the farm sector, and aid the government's objective of doubling farm income. For the latter to happen, productivity per inch of farmland needs to be increased significantly through greater penetration of farm mechanisation and better agricultural practices.

> **Lack of diversity of farm machinery adoption implies that India is tractorised, not mechanised.**

*Source:
7) Sectoral Paper on Farm Mechanization, NABARD 2018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Tractors played a critical enabling role in ushering in the Green Revolution in India. This further pushed the use of tractors on Indian farms. From a little over 50,000 tractors in 1965 in India, the number increased to 146,000 in 1970 [8]. Initially, India imported most of its tractors from the erstwhile USSR, Germany, the UK, and Poland. However, the country gradually built its indigenous capacity to produce tractors and other advanced farm equipment. Today India is the largest tractor market in the world. Over a dozen brands of tractors have their manufacturing base here. In FY'19, a record number of 878,476 tractors were sold in India – the highest in a year.

Uttar Pradesh, Madhya Pradesh, Rajasthan, Maharashtra, Bihar, Jharkhand, and Telangana are the top five tractors markets in India. Farm mechanisation status is usually expressed in terms of power availability per unit area. The average farm power availability in India increased from about 0.30 kW/ha in 1960-61 to about 2.02 kW/ha in 2016-17 [9].

M&M has been a leading player in India's tractor market. Over the years, M&M focused its strategy on producing tractors and other farm equipment that was rugged, allowed for multi-functional use, and was best suited to the needs of the Indian farm.

M&M has invested relentlessly in research and innovation to usher in Farm Tech prosperity for the diverse Indian farmers with technologically superior affordable solutions. By 1983, M&M had emerged as the market leader in India. It has one of the most comprehensive tractor portfolios today and an entire range of products designed to serve a farmers' diverse needs – from tilling preparation to harvesting to post-harvesting functions.

> **"The average farm power availability in India increased from about 0.30 kW/ha in 1960-61 to about 2.02 kW/ha in 2013-14. In FY 2019, a record 878,476 units of tractors were sold in India."**

*Source:

8) G Singh, Agricultural Mechanisation Development in India, Indian Journal of Agricultural Economics 2015

9) Sectoral Paper on Farm Mechanization, NABARD 2018

MAHINDRA & MAHINDRA

DRIVING INDIA'S FARM MECHANISATION

A part of the USD 19.4 billion Mahindra Group, M&M is the world's largest farm tractor manufacturer by volume, with a presence in over 40 countries. M&M has been India's leading tractor manufacturer for over three decades and has played a pioneering role in shaping India's tractor industry. In FY 2019, M&M achieved the manufacturing milestone of over 3 million tractors.

M&M's journey in the farm equipment sector began in the 1960s when it entered into a joint venture with American manufacturer International Harvester to develop India's indigenous capacity in manufacturing tractors. Its first tractor M&M B 275, was based on International Harvester design and sold as many as 85,000 units. By 1983, M&M had emerged as the market leader in India. In 1994, M&M entered the US market as Mahindra USA.

Apart from building its R&D and manufacturing capability, M&M also expanded its market clout through a series of acquisitions, including Gujarat Tractors (1999) and Punjab Tractors Ltd (2007). Swaraj, initially a Punjab Tractors brand, is now the 2nd largest tractor brand in India and an illustrious part of the M&M family. In 2010, M&M became the world's top tractor player by volume.

Today M&M is the largest tractor company in the world, with sales across six continents and over 1000 dealers. It has manufacturing and CKD assembly in 8 countries – India (7 plants), USA, Brazil, Finland, Turkey, Algeria, Australia, and Japan. A series of acquisitions in recent years have further helped M&M expand its product portfolio to include new age farm technology, crop-specific machines, and precision planters and equipment. M&M aims to deliver Farm Tech prosperity through pioneering technologies for farmers across the world.

> **"From India's leading tractor manufacturer, M&M has evolved into a global farm equipment player. M&M today sells in 40 across six continents and has manufacturing and CKD assembly in 8 countries –India, USA, Brazil, Finland, Turkey, Algeria, Australia and Japan."**

EVOLUTION

1963
Started Manufacturing of Tractors

1977
International Tractor Company of India merged and commencement of Tractor Division

1994
Entered the American market as Mahindra USA

1999
Acquired 51% equity stake in Gujurat Tractor Corporation Ltd (GTCL)

2003
Deming Prize
We are the second company in India to win the Japan Quality Medal

2007
Acquired Punjab Tractor Limited (Swaraj)

2007

2010
Launched Mahindra-Farm Mechanisation Business

2010
Became World's no. 1 Tractor Manufacturer (by volume)

2016
Drawn up a Globalization Strategy Acquisition of MAM

2018
Acquisitions: Hisarlar, Sampa, Erkunt Traktor, Erkunt Foundry

2017
Launched third tractor brand through Gromax Agri Equipment Ltd-Trakstar

2019
1st Tractor Company in the World to win the "TPM Advanced Special Award"

Mahindra Way

M&M has a wide stable of tractor models and offers tractors under three different brands. While the M&M brand has 40 models suited for a wide variety of farms under its tractor range, the Swaraj brand that was acquired in 2007 offers over 20 models. Under a joint venture with the Gujarat Government named Gromax Agri Equipment (GAEL), M&M also launched Trakstar, a new tractor brand in 2017.

M&M's farm solutions also comprise a wide range of farm machinery including land preparation equipment, combine harvesters and a series of crop specific solutions.

BRANDS

Brands

FARM MACHINERY

HARVESTER

GYROVATOR

RICE-TRANSPLANTER

THRESHER

ROW CULTIVATOR

POWER TILLER

GYROVATOR

SPRAYER FLATTON

HARROW

MAHINDRA & MAHINDRA: GLOBAL REACH

M&M's Farm Equipment Sector has a broad global reach with sales spanning across six continents and 40 countries. The company has also established its product development and manufacturing facilities across multiple countries outside India.

While M&M has product/technology development centres in Japan, Turkey, USA, and Finland, it has manufacturing units in USA, Algeria, Mali, Benin, Chad, Egypt, Turkey, Finland, Australia, Brazil, and Japan.

Mahindra

Product/Technology Development

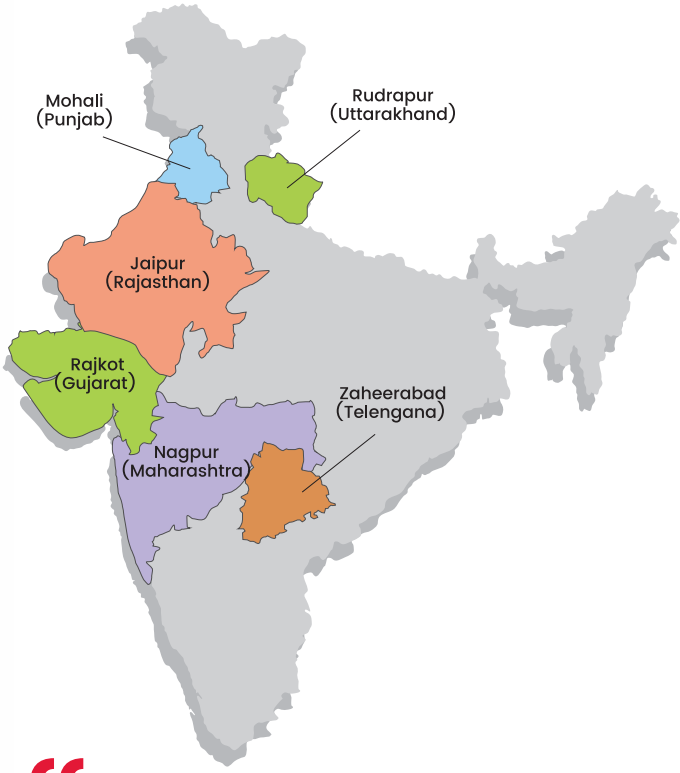
Manufacturing

ESTABLISHING LEADERSHIP THROUGH EXCELLENCE

Apart from establishing an undisputed leadership in India's tractor market, M&M has also sought to bring about a difference in the lives of farmers and rural populations through a series of other initiatives, particularly in the field of skill training.

In an attempt to bridge the skill gap among rural youth, M&M conducts regular skill training initiatives to train and equip people in using a wide array of farm machinery effectively. The M&M Centre of Excellence, Nagpur, offers comprehensive training programmes in solar panel installation and maintenance for the rural and urban youth. The programme bridges the gap between demand and supply of skilled workforce for Solar PV projects. The training enables and equips candidates to gain employment and earn regular, sustainable incomes. Such initiatives also help rural youth find additional sources of income in a primarily agricultural economy.

M&M has seven state-of-the-art tractor manufacturing plants at the following locations across India:



"The Mahindra Centre of Excellence, Nagpur trains rural and urban youth in solar panel installation and maintenance, creating for them new avenues for earning sustainable incomes"

DEMOCRATISING FARM TECHNOLOGY

It is estimated that the proportion of agricultural workers in the total workforce would drop to 25.7% by 2050. In the face of this challenge and that of increasingly smaller farm holdings and water scarcity, the need to increase farm mechanisation is pressing. Unfortunately, farm technology is yet to trickle down to the last farmer. The penetration of farm machinery is lowest among small and marginal farmers who have small incomes and lack institutional credit access.

India's farmers need a wide array of affordable farm mechanisation solutions. The use of various farm equipment such as customised crop planters, horticulture transplanters, sprayers, fertilizer applicators needs to be encouraged by ensuring better availability, easy credit, rental solutions, and skill training as awareness.

Elements of Indian farming such as seasonal and specialised product usage, cultural practices on small farms, risk-averse consumer behaviour, and the need for better after-sales services has not been a traditional focus area for large companies. M&M has sought to change this by building incredibly innovative products for small farmers such as IoT enabled rotary tiller, potato planters, horticulture transplanters, rice transplanters, silage baler, etc.

M&M has also launched a series of private initiatives to address several pivotal needs of farmers. The initiatives include M&M Finance, which provides credit solutions for a broad spectrum of farmers' needs; Krish-e, Mahindra's new 'Farming as a Service' (FaaS) business kicks off a digital era in Indian agriculture. Offers farmers a wide variety of technology-driven services customised to crops and stages in the crop cycle.

> **"M&M aims to democratise farm mechanisation technologies for small and medium landholding farmers to transform their lives and help them rise"**

RESEARCH & DEVELOPMENT: DRIVING ATMANIRBHARTA

In its quest to develop world-class manufacturing and production capacity of farm equipment in India, M&M has accorded high priority to Research & Development (R&D). The company accounted for one of the highest R&D spends among Indian companies in 2019-20. It spent Rs 2,974.98 crore on R&D in FY 20, which was about 6.3 per cent of its turnover. M&M's R&D ecosystem aimed at furthering innovation in the automobile and farm technology sectors is spread across the world with research facilities in India, the US, and Europe.

The Mahindra Research Valley in Chennai – the largest product development centre of the company- exemplifies its commitment to research and innovation. Spread across a sprawling 125 acres, the Mahindra Research Valley is a centre of world-class research in machine technology and design and employs some of the best engineering minds in the country. Established at an investment of USD 150 million, the Research Valley has over 1500 engineers working towards ushering in the best in class technology and innovation in automobile and farm equipment sectors.

Mahindra Research Valley houses engineering research and product development wings for both automobiles and tractors. It also has wholly equipped proto shops to support the development and research in new products and new technologies with test tracks to check vehicles and tractors' reliability. The smart hydraulics and hill farming technologies incorporated in M&M's latest tractor platforms Yuvo and Jivo have all been developed at the company in-house R&D centres.

> **"M&M spent about 6.3 per cent of its total turnover on R&D in FY 20, making it one of the highest R&D spends in India's corporate sector."**






MAHINDRA RESEARCH VALLEY

FOCUS ON RESEARCH & DEVELOPMENT

1500+ ENGINEERS

INVESTMENT OF USD 150MN.

SPREAD ACROSS 125 ACRES

FARM MECHANISATION: LEADING THROUGH CUTTING EDGE TECHNOLOGY

Farm mechanisation is no more just about tractors. With an increasing number of farm operations turning from manual to mechanised, several farm machinery segments such as threshers, tillers, and rotavators have emerged as essential components of a functional farm. As focus turns towards increasing farm productivity in the face of challenges such as labour shortage, rising population, and depleting groundwater resources, productivity per inch of farmland will increase significantly. Faster penetration of farm mechanisation at multiple levels of agricultural operations is crucial for achieving this goal.

Gauging the changing farm machinery market dynamics, M&M has launched an aggressive plan to overhaul the entire farm machinery ecosystem. The company aggressively builds technology skill sets beyond tractors to introduce a range of farm machinery. The idea is to rope in large landholding farms' technologies and make them affordable and accessible to small landholding farmers. The portfolio includes crop-specific machines such as potato farming equipment, rice transplanters, precision horticulture planters, harvesters, spraying machinery, and equipment to ensure the correct dosage of fertilizers and inputs.

> **"With an objective to take its technological skill set and product portfolio beyond tractors, M&M has scripted 8 global acquisitions over the last six years, and established 3 Centres of excellence in Japan, Turkey and Finland. Through these strategic moves, M&M is paving the way for incorporating the world's best agri technology into its domain"**

To further this goal, M&M has initiated a series of strategic alliances and acquisitions of Agri Tech companies and start-ups across the world. With eight global acquisitions over the last six years, M&M is paving the way for incorporating the world's best agricultural technology in its domain. The recent strategic acquisitions aimed at inheriting next-generation technologies include SAMPO in Finland, Mitsubishi Agri Machinery in Japan, Hisarlar, and Erkunt in Turkey.

M&M's latest acquisition - a stake in Swiss agriculture technology group Gamaya SA -- has been in the field of machine learning. Through this strategic acquisition, M&M seeks to build its expertise in data and imagery analytics and the use of artificial intelligence in agriculture.

Three Centres of Excellence (CoE's) established in different countries help the company adapt global technologies and make them relevant to the Indian market. While the Centre of Excellence in Japan is focused on innovation in light-weight tractors and rice machinery value chain, the Centre in Finlandis working to improve and adapt harvester technology. The Centre of Excellence in Turkey is focused on innovating farm implement technology.

Land Preparation	Seeding	Crop Care	Harvesting	Post Harvest	Commercial
 Cultivators	 Rice Transplanter	 Boom Sprayer	 Wheel Harvester	 Straw Reaper	 Trollev
 Rotavators	 Potato Planter	 Orchard Sprayer	 Tractor Mounted Harvester	 Round Baler	 Loader
 Disc Harrow	 Seed Drill		 Thresher	 Mulcher	 Dozer

M&M - PRESENCE IN THE AGRI VALUE CHAIN

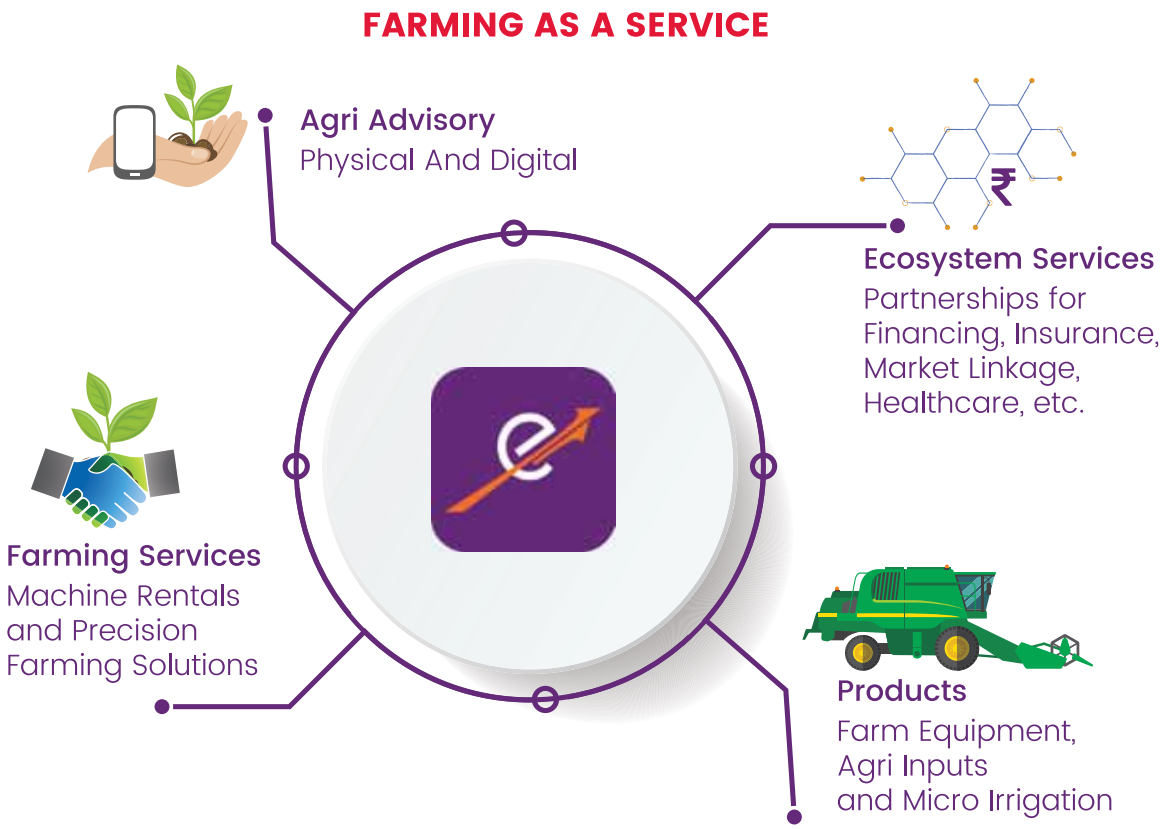
PRECISION FARMING SOLUTIONS

TECHNOLOGY ENABLED SUPPORT: KRISH-E

***EXPERT TAKNEEK.
NAYE UPAY.
PARINAAM DIKHAYE.***

Krish-e is a business vertical that provides technology driven services which are progressive, affordable and accessible to farmers. Krish-e aims to increase farmer income through digitally enabled services, across the complete crop cycle.

These include agronomy advisory, access to advanced farm equipment rentals and new-age precision farming solutions, all focused on bringing down overall farming costs and improving crop output and consequently the farmer's income.



(Our Initiative to Make A Difference in the Lives of Farmers)

Today, the Mahindra Group also celebrates its 75th anniversary, a journey that began in the state of Maharashtra. So, it is only befitting that Krish-e opens its first centres in Aurangabad and Baramati, and later at six other locations across Maharashtra in Jalna, Wardha, Nanded, Pune, Daund and Solapur.

Krish-e centres will soon roll-out across other states in a phased manner and have an Omni Channel approach where the farmer can avail of personalised services on their fields, at Krish-e centres, through the Krish-e suite of digital apps and through the call centre to reach out to our Krish-e Sahayaks.

EMPOWERING RURAL COMMUNITIES

As a leading player in India's agricultural sector, M&M believes in augmenting the capacity of farmers and rural communities towards the objective of improving livelihoods, promoting informed agricultural practices, boosting incomes, and reducing the drudgery of manual farm labour. Building knowledge and expertise and offering real-time information through digital technology can support farmers' critical support systems. Towards these goals, M&M has initiated a series of programmes and services for farmers and rural communities:

MAHINDRA SKILL DEVELOPMENT AND FARM TRAINING INITIATIVES FOR FARMERS

As part of its commitment to enrich and equip Indian agriculture with modern technology, Mahindra & Mahindra also conducts a series of skill development and farm training initiatives in collaboration with the state governments of Maharashtra, Madhya Pradesh and Jharkhand.

The skill development programmes train unemployed youth in effective usage of modern farm equipment as well as best farm practices. The training programmes equip the youth in practicing modern methods of farm mechanisation that ensure high productivity and efficiency. The training modules introduce the youth to tractor basics including Engine, Transmission, Hydraulic, Front Axle and Steering apart from driving and effectively using all implements of tractor. The training also equips the trainees in equipment repair and maintenance services to enable them take up roles of farm equipment maintenance providers. The participants are also provided customer relationship management training to them perform their repair and maintenance roles effectively.

The programmes are conducted in association with the Directorate of Agriculture Engineering, Govt. of Madhya Pradesh; Tribal Research & Training Institute, Govt. of Maharashtra; and Jharkhand Agricultural Machinery Testing & Training Institute.

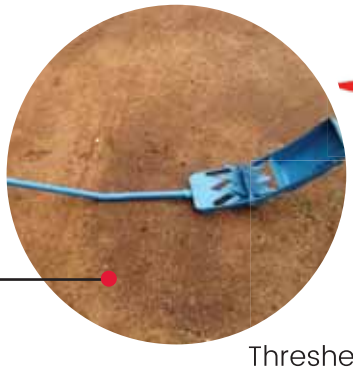
PRERNA

EMPOWERING WOMEN FARMERS

Over 70% of rural Indian women workers are engaged in agriculture, many of them working long hours, often with unsuitable, inefficient, and inconvenient tools. Making low-cost farm equipment available for multiple secondary operations such as weeding, winnowing, and threshing can significantly improve women's livelihoods and efficiency on the farm. To achieve this goal, M&M launched the 'Prerna' project in Odisha in collaboration with the Indian Council of Agricultural Research (ICAR) and the NGO Pradan. Under the project, low-cost equipment such as seed treatment tools, weeders, threshers, transplanters, and winnowers were offered to women across 40 villages resulting in significant improvement in their livelihoods and working conditions.

REDUCTION IN DURDGERY VIA MECHANISATION IN ODISHA

Seed Treatment



Weeder

Thresher

Winnower

Transplanter

IMPACT

- Gender Neutral low cost implements
- 40 villages
- 4-5 SHGs in each village
- Mayurbhanj & Koraput district of Orissa
- Total 150 SHGs
- 2000 women impacted

ACCELERATING THE MECHANISATION PROCESS

Farm mechanisation is critical to improve farm yields and farm incomes and provide different streams of rural employment. The government must initiate the following policy interventions to help hastening farm mechanisation:

PROMOTE 'ATMANIRBHAR INDIA' & 'MAKE IN INDIA'

India needs to boost manufacturing and design innovation through supportive subsidy programmes. India would do well to model its subsidy and preferential interest rate farmer finance programmes to combine harvesters, rice transplanters, and power tillers on Brazil's model. Brazil provides additional interest subsidy on products made there with at least 30- 50% by local content value. This has led to the emergence of a largely self-sufficient farm machinery industry in Brazil.

FINANCE PURCHASE OF FARM MACHINERY AND REFORM CREDIT POLICIES OF BANKS

Unfriendly credit policies discourage farmers from switching to machine aided farming. Therefore, we need to move away from collateral or income-based approaches to calculate creditworthiness and adopt a more rational approach to assess applicants' ability to repay loans. The government must also help Non-Banking Financial Companies (NBFCs) finance the purchase of farm machinery. NBFCs have profound access to rural geographies and have the means to lend to small farmers effectively. The Government of India must consider setting up a fund with an annual outlay of Rs 5000 crore to finance NBFCs to provide farmer finance for purchasing farm equipment at concessional rates.

KEEP TRACTORS AND RELATED FARM EQUIPMENT OUT OF EMISSION NORMS

As India shifts to BS-VI emission norms for vehicles that ply on roads, the government has also notified requirements for Agricultural Tractors and Combine Harvesters. However, farm equipment must be kept out of emission norms and not inordinately burden the farmer. Emission norms on equipment such as Combine Harvesters and Rice Trans planters need to be relaxed as they hardly ply on roads.

SKILL DEVELOPMENT INITIATIVES IN PPP MODE

The operation and maintenance of specialised farm machinery like harvesters, planters, sprayers, is a skilled profession, but there remains a paucity of skill training providers. To ensure a wider reach of skill development and training modules, the government must enter into public-private partnerships with equipment providers. Setting up farm machinery operation and maintenance skill development centres in every agricultural district is a requirement of our time. The government must provide incentives to farm machinery manufacturers best placed to set up and run these centres.

FOR CUTTING EDGE AND DIGITAL TECHNOLOGIES IN AGRI MACHINERY AREA

DEVISE EXPORT-FRIENDLY POLICIES

India is the 7th largest exporter of farm tractors with an export share of 4.9%[10], and the sector holds much potential to increase its export share further. Several countries worldwide provide their domestic companies incentives such as financial support for market research, product testing, consultancy, business development, advertising, and trade fairs to establish export markets. The Government of India must also support local manufacturers to help them better exploit the export market. Excise duties must be made more reasonable to support indigenous manufacturing. Issues pertaining to excise duties on intermediate parts such as higher-quality gear-boxes imported and used in assembling the final product must be addressed. The government must counter trade policy support with specific countries in Africa and South-East Asia.

PROMOTE PRECISION AGRICULTURE AND OTHER NEW TECHNOLOGIES

The precision agriculture approach uses Internet of Things (IoT) & Artificial Intelligence (AI) to ensure that the crops and soil receive exactly what they need for optimum health and productivity. The government must encourage farmers to adopt precision agriculture technology on a larger scale to counter low productivity, water scarcity, and excessive use of pesticides. Subsidies must be offered for new implements that use precision agriculture tools such as Automatic Section Control Technology, Crop Sensors, Yield Monitoring Technology, and Variable Rate Application Technology (VRA) to create heat maps of a field and spray on affected parts. Equipment using such technology must also be included in Custom Hiring Centres. The government must also immediately frame a drone spray policy and encourage cutting edge technology as part of the subsidy schemes.

*Source:
10) ITC Trade Map

PROMOTE MICRO IRRIGATION

Trickle irrigation techniques use lower water pressure and flow than a traditional sprinkler and save enormous amounts of water in irrigation. Promoting micro-irrigation will not only save water but also encourage farmers to use new-age equipment. Field crops like paddy use over 4,000 litres of water per Kg of produce, which is unsustainable in the long run. Micro Irrigation in field crops must be promoted, and private players are incentivised to develop solutions to this end. The government must also lower the subsidy amount/acre to cover more beneficiaries and include NBFCs in subsidy micro irrigation schemes.

DRIVING CUSTOM HIRING OF SPECIALISED FARM MACHINERY THROUGH SUBSIDIES

Existing government initiatives to promote custom hiring have been directed at subsidising the equipment. A more effective method would be implementing a Direct Benefits Transfer (DBT) type subsidy scheme for farmers to hire specialised equipment like harvesters, planters, sprayers, etc. Such machines on rent should be provided by government empanelled authorised customer hiring agencies who would roll out custom hiring services using a digital platform. The government subsidy funds meant for farmers using custom hiring can be targeted by the accounting of rental work done and subsidy availed through the digital platform. Authorised agencies can verify work done by using technology like GPS and maps. The authorised agencies will, in turn, set up rural entrepreneurs who will own and operate the equipment. Ten thousand local entrepreneur owned customer hiring centres can be set up with this public-private partnership. Government should provide these rural entrepreneurs with as even year interest-free term loan of Rs. 50 lakhs (USD 66,200) each to set up custom hiring centres.

PROMOTE R&D AND INCENTIVISE INNOVATION

Countries like Turkey have built a self-reliant farm machinery industry by incentivising R&D by their local companies. Various incentives are given for private sector R&D expenditure on engineering, testing, and R&D infrastructure. The Government of India's should consider this model to allow the development of farm machinery customised to Indian farms' requirements and help lower costs.

PROMOTE SILAGE INDUSTRY

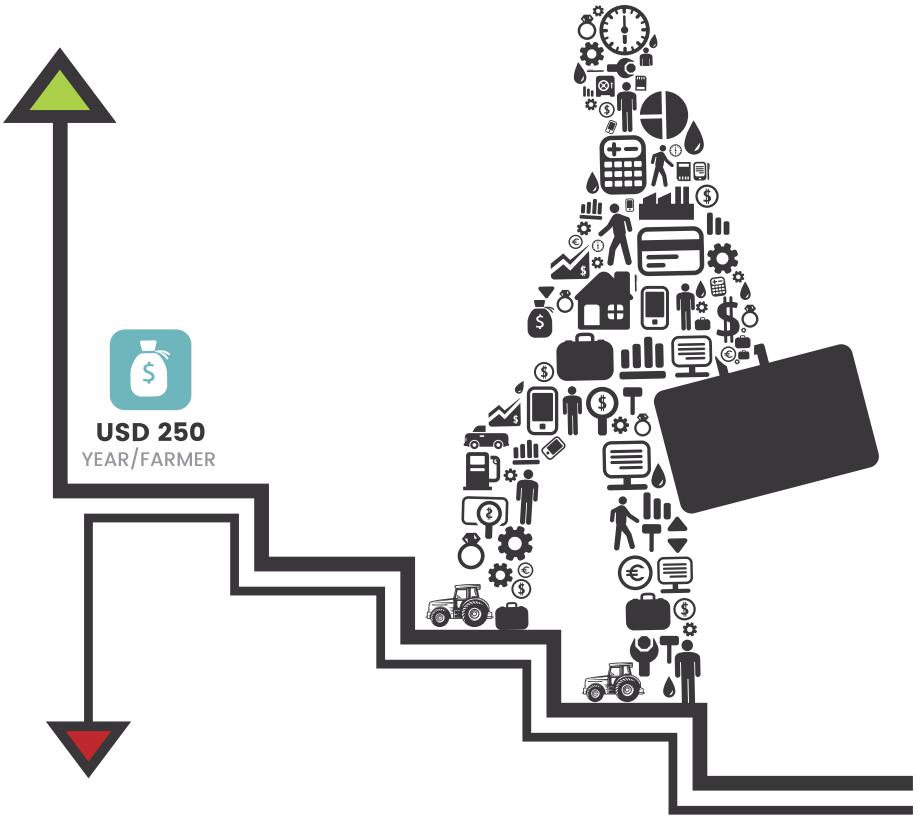
India is the world's largest milk producer. However, India's milk productivity stands at 1,600kg/animal and is among the lowest globally (the global average is 2,700kg/animal). A primary reason for this is the animal feed quality and shortage of up to 40% during dry months. The concept of silage as animal feed needs to be established to overcome this. Large silage balers of 500 kg and 1000 kg are needed to make silage and convert it to a form where it can be stored for many months. We need government sponsored training and communication on the use of silage by dairies and dairy farmers. The government must also incentivise entrepreneurs and dairies that set up silage manufacturing facilities using 500 kg and 1,000 kg silage balers. These balers being very expensive, capital subsidies and low interest finance can drive this sector's growth.

PROMOTE CROP-BASED ADOPTION OF MECHANISATION

Farm mechanisation and its needs vary widely from crop to crop as also from operation to operation. This is why the strategy to promote mechanisation must take into account differences in these counts. Rather than push for a one fits all approach, different promotion strategies must be devised for different crops. Promoting crop-based adoption of mechanisation will help bring about a broader and deeper mechanisation output. Promotion of bundled products such as trolleys and other haulage equipment being promoted as a combined solution for crop transport will also help the adoption of multiple types of equipment.

STREAMLINING OF THE SUBSIDY REGIME

India already provides a subsidy of about USD 250 (approx Rs 18,500) per annum per farmer through various schemes [11]. However, India's subsidy policies need to reach out to a more extensive section of farmers. The government must consider the reduction of tractor subsidy to Rs. 75,000 to cover more beneficiaries. To encourage farmers to buy different farm equipment subsidy on tractors should be considered only when two or more farm implements are bought together. To make institutional credit readily available to farmers, NBFCs must also be allowed to finance tractors in all states' subsidy space.



EXTENSION OF DIRECT BENEFITS TO FARMERS

Direct Benefits Transfer of subsidy needs to be extended to all states, and the subsidy amount should be given directly to farmers, not to OEMs so that the farmer can buy as per his choice at the actual price and receive the subsidy in his account. This will ensure a fair and transparent system. The government must also consider reforming its subsidy policy on Polyhouses used for climate-controlled vegetable cultivation and floriculture. The subsidy offered on polyhouses is currently based on the material's weight, rather it should be on the wind holding capacity.

*Source:
11) Commerce Secretary Anup Wadhawan quoted by PTI

RECOMMENDATIONS ON SUBSIDY SCHEMES

UNIFORMITY AND CONSISTENCY OF SCHEMES:

Subsidy schemes are currently marked by inconsistencies across states. Subsidies start and stop without notice, thus creating uncertainty for farmers, equipment dealers, and manufacturers. The reduction in subsidy disbursed in various states in the financial year 2019-20 has led to a large drop in farmers purchasing farm machinery. The government must announce subsidy schemes that remain consistent and uniform across states for at least three years.

ADEQUATE INFORMATION ON SUBSIDY SCHEMES:

Central Government should mandate and establish a single portal that provides up to date information on all central and state subsidy schemes with details required for qualification. The subsidy schemes should be communicated and finalised six months in advance. To cite an instance, a Square Baler Subsidy announcement in Gujarat gave manufacturers roughly two monthsto get ready 200 square balers, which is impractical.

DOCUMENTATION OF SUBSIDY SCHEMES SHOULD BE DONE CENTRALLY:

States manage most schemes released currently and each scheme has different or duplicate documentation requirements making the entire process time-consuming for the applicants. The documentation/empanelment should be done centrally.

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