

**Goodness through *Jugaad* (Frugal Innovation)-
Disruptive Innovation in Agriculture Sector in India**

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After 67 years of Independence, India is standing at a cross road where on one end it faces dearth of natural resources and on the other end it still has not been able to strive for inclusive growth with an optimum utilization of the natural resources and the demographic advantage that the country has. India seems to be growing as an economy but Indians don't seem to be growing as a society. To meet this challenge, the basic approach needs to be revived as the ladder of true growth can only be risen from bottom to top. 'Business as usual' has served us good so far but it would not be able to drive any further growth. What we need is a more entrepreneurial approach, to think and act! But just any kind of entrepreneurship would not be able to solve the problem, as we also lack the basic resources, we need *entrepreneurship with innovation for sustainability. We need **Sustainopreneurship**-“business with a cause”* .

INDIA A LAND OF FRUGAL INNOVATION

India has been home to a series of disruptive and potentially game-changing innovations in recent years then be it GE's handheld electrocardiogram (ECG) Mac 400; the world's cheapest passenger car Tata Nano, Vortex's solar-powered Automatic Teller Machines (ATMs) or India's Mars Mission Mangalam. These innovations have been even more active at the grass root level by many individuals like Mitticool of Prajapati, Remya Jose's pedalled power washing machine, Husk Power system, Aakash tablet all created as an answer to the scarcity or non existence of a solution to the problem. The thing that is common in all these innovation at the companies level and at the grass root level is the element called '**jugaad**' or frugal innovation.



The concept of *jugaad* or frugal Innovation is based on the principle that 'use' is the key factor determining the worth of a technological creation, discovery or invention. Frugal innovation is the ability to generate considerably more value while significantly reducing the use of scarce resources. It is the Gutsy art of improvising an ingenious solution as said by Navi Radjou, author of *Jugaad Innovation*. It is not only meant for making things cheaper, but better with more appropriate means and applications.

India has provided the perfect ground for these frugal innovations to develop. And that is the reason why Mr. Lalu Prasad Yadav was invited to deliver a lecture on *Juggad* in Harvard University and Mr. David Camerron on his visit to India had a special session to understand the *Jugaad* model of India. Through these innovations, India can not only bring inclusive and

sustainable growth for the countrymen but can also provide robust and affordable solutions to other countries facing similar socio-economic and environmental challenges. A number of factors align to make India a “lead market”, a global leader in *jugaad* or frugal innovation :

1. A culture of ‘jugaad,’ or creative improvisation, as the unusual skillset and mindset required for frugal innovation are abundant.
2. A huge market with a growing, aspirational middle class creates the perfect conditions for frugal innovation.
3. Huge customer base thus high volume opportunities to compensate for low profit margins
4. Indian consumer base is extremely price-sensitive and willing to experiment, sustaining demand for frugal innovation.
5. Extreme conditions and major gaps in service provision stimulate demand for low-cost solutions in health, education and energy, Husk Power Systems is an example to this.
6. New sources of social finance are lowering the cost of investing in frugal innovations.
7. An increasingly ‘inclusive’ science and innovation policy is prioritising getting ‘more for less for more’ and attempting to develop the institutional conditions that could drive high impact frugal innovations.
8. Robustness to deal with infrastructure deficiencies such as voltage fluctuation, abrupt power-cuts , dust and extreme temperatures.

Despite these advantages we still have not been able to utilize this opportunity completely. Still there are many sectors in Indian economy which are working at a potential much below their capacity.

INDIAN AGRICULTURE



Agriculture sector which is the backbone of Indian economy accounts for 18 per cent of India's gross domestic product (GDP) and employs 58.2 per cent of the total workforce. India is ranked second in farm and agriculture outputs and in sugar production. Robust agricultural growth is expected to contain inflation, support industry and services, and increase employment opportunities in rural India. But India still not has been able to increase its productivity as per its potential. Reason behind these are many, one of which is lack of Information Most of the farmers are not aware of the latest technology, improved seeds and even about the technologies which are available for forecasting weather which can help them plan better. As mentioned by our PM in 86th annual ceremony of ICAR (Indian Council of Agriculture and Research) **Lab to Land** is our biggest challenge.

Second area of concern is proper warehousing facility. Small and medium sized farmers generally don't have any access to warehousing facilities and thus part of the produce goes waste due to poor storage. The Rural Credit Survey Report rightly remarked that the producers in general sell their produce at an unfavourable place and at an unfavourable time and usually they get unfavourable terms due to poor storage facilities. Parse Committee estimated the post-harvest losses at 9.3 per cent of which nearly 6.6 per cent occurred due to poor storage conditions alone. Poor variety of seed is another area of concern. Seed which is a critical and basic input for attaining higher crop yields and sustained growth in agricultural production. Distribution of assured quality seed is as critical as the production of such seeds.

Fourth area of concern is poor irrigational facilities. Although India is the second largest irrigated country of the world after China, only one-third of the cropped area is under irrigation. Irrigation is the most important agricultural input in a tropical monsoon country like India where rainfall is uncertain, unreliable and erratic India cannot achieve sustained

progress in agriculture unless and until more than half of the cropped area is brought under assured irrigation.

Also there is urgent need to mechanise the agricultural operations so that wastage of labour force is avoided and farming is made convenient and efficient. Agricultural implements and machinery are a crucial input for efficient and timely agricultural operations, facilitating multiple cropping and thereby increasing production.

Lot of innovation in the form of jugaad is happening in the agricultural sector but only at individual level. Jugaad when adopted at large scale would not only solve the problems but would increase the productivity many folds without increasing cost. Frugal Innovation has touched the small scale enterprises and many innovations are happening at the grass root level which are helping agriculture to grow. Some of the companies include:

Digital Green Trust

A NGO that focuses on training farmers to make and show short videos where they record their problems, share solutions and highlight success stories. A company founded in 2008 by few employees of Microsoft Research India with the main founder being Rinki Gandhi was the founder of the organization.

Digital Green trains local community members to storyboard, shoot, act in and screen videos. The villages where they work often lack reliable electricity, much less televisions or smart phones, so community members carry sandwich-sized battery-run projectors to show the videos at village meetings on any available wall. It works on the belief that frugality breeds resourcefulness, sustainability, and invention.

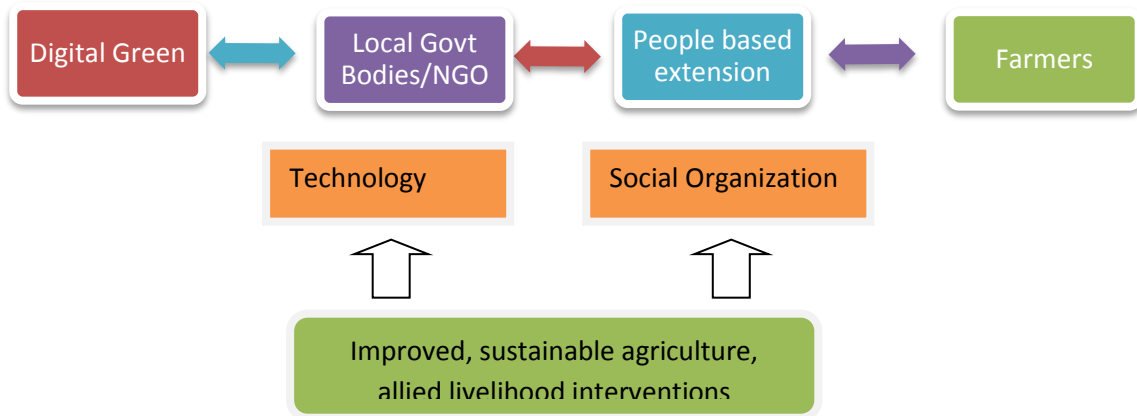




Digital Green aims to raise the livelihoods of smallholder farmers across the developing world through the targeted production and dissemination of agricultural information via participatory video and mediated instruction through grassroots-level partnerships through the use of Juggad. Rural farmers are more willing to take advice from people of the same sex, ethnic group and economic position. One of their main strategies is that the facilitator who would be showing the videos or answering questions would be from the same group of people. In this way the conversion rate of adoption went up.

How does it work??

It combines technology and social organization to maximize the potential of building the capacity of farmers on improved, sustainable agriculture and allied livelihood interventions. The videos that are produced by farmers, of farmers, and for farmers across our field locations are periodically synchronized with the global library of videos on the website. Data associated with the videos, including their reach, the feedback of viewers, and the ultimate take up of the featured practices or techniques, is also aggregated and analyzed in near real-time on our analytics dashboards. These analytics dashboards are built upon an data management framework, called COCO, which allows even remote areas with limited Internet and electrical connectivity to exchange data with the world.



Farms & Farmers (NGO)

Farms n Farmers (FnF) was started in 2010 by alumni of IIT Kharagpur and IIT Delhi having vast experience of Rural Development and Agriculture as well as Supply chain, Retail and FMCG. FnF targets to improve land profitability and hence increase revenue generation for land owners, farmers and farm laborers. Other focus areas include maintenance and augmentation of fertility, and improvement of farms' condition, so that long term profitability can be achieved in all aspects.





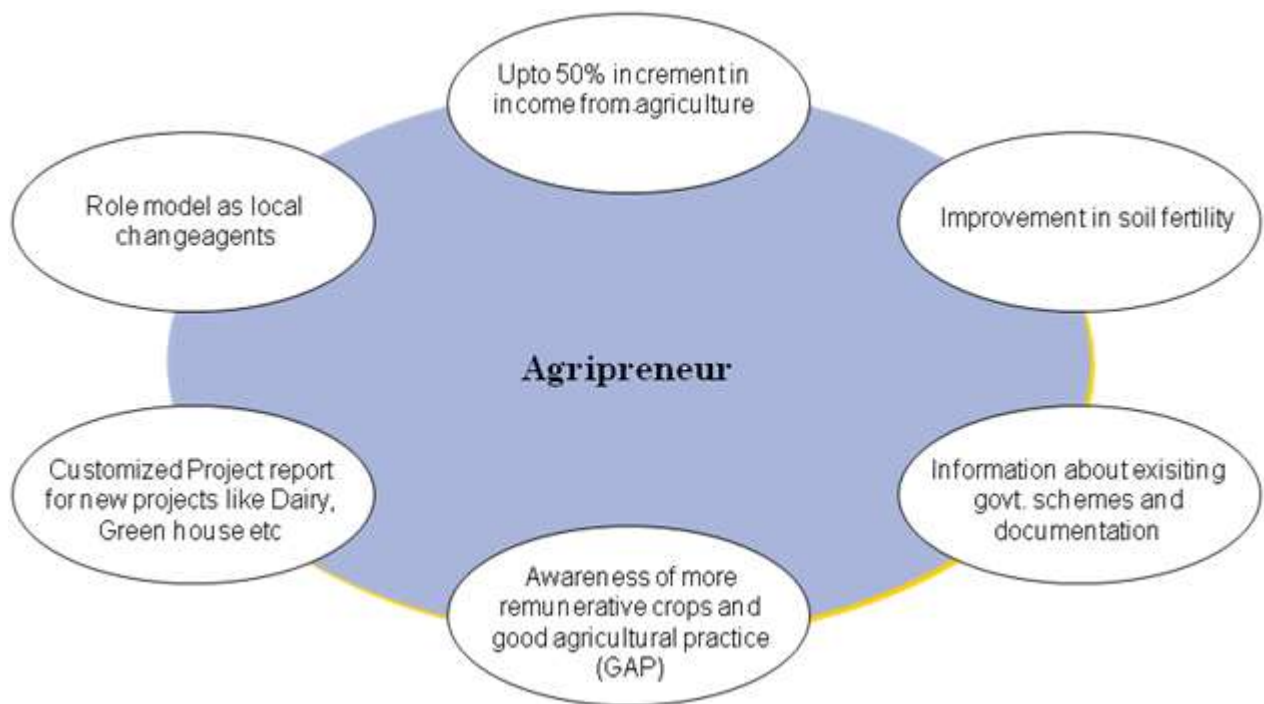
Farmer Service DEHAAT

FnF's local centers which are situated in villages, run by micro-entrepreneurs trained and guided by FnF. **DeHaat** which is the block based extension cum collection centre works on franchise model, the micro-entrepreneur running it is the owner of the particular DeHaat. For training the micro entrepreneurs 3 months long training & nurturing program has been designed.

They have designed low cost services for farmers related to Crop selection, Soil test, Distribution of quality inputs (seeds, fertilizers), Crop monitoring, Mobile based crop reminders & Output marketing. ICT enabled one stop shop "DeHaat" centre is highly accessible for farmers. One DeHaat centre caters to 600-800 farmers in radius of 8 Km.

Farmer Producer Organization

They have created a large pool of scientists and advisors comprises of various agricultural universities and institutions. Under ABC, they suggest customized agri solutions to maximize profit per unit area of land. They have designed innovative farming models related to Integrated Farming System (IFS), Protective cultivation, Zero residual farming which can be successfully implemented at economy of scale.



M.I.T.R.A

(Machines Information Technology Resources Agriculture)



Mitra is engaged in making of best **quality** and **most effective technology** customized for Indian farmers at affordable prices. The Company was started in the month of April 2012 by Devneet Bajaj. Having made significant inroads into **spraying equipment** since inception, they aim to become **India's leading provider of farm machinery for Fruit and Vegetable cultivation**. **MITRA**, an Indian agtech startup that specializes in machinery for fruit cultivation, and develops automated solutions for spraying, pruning, weeding and harvesting.

Acute labour shortage and lack of mechanization is leading to rise in production costs and drop in quality of produce. They are involved in development machinery that is at the forefront of the farmer's needs.

Though at small scale level lot of innovation are happening but at the large scale level companies are not picking up the model that easily despite the visible results.

More than 60% of the population is dependent on agriculture as a source of their income. But figures says the in the coming years this percentage will decrease to 50% which will further reduce. This means that with less of farmers, India has to work on increasing its agricultural output as the population is increasing the demand for export also. Its quiet impossible to address this growth with day by day decreasing farmer, and hence the modernization of agricultural methods is required. Hence Manufacturing sector becomes crucial for the growth of agriculture in India.

WHY MODERNIZATION IN AGRICULTURE?

- Total proportion of workforce involved in agriculture is expected to decrease from 56% to 40% which creates an opportunity of mechanization of farming.
- Agriculture growth rates are expected to increase from the current average of 2.8% to ~4-5%.
- Agriculture-based energy policy to focus on production of fuel oil and biomass power; could generate lucrative alternative markets for farm production while reducing the country's dependence on imported fuels.
- Higher participation of commercial banks and NBFCs to offer finance to all customers with clear intention to pay. There needs to be a uniform loan policy and a standardized application format across all banks.
- Cost Analysis: Traditional Vs Modern Farming

Cost analysis

Total cost of a pair of bulls:

Basic cost:	- Rs75,000 - One-time payment
Average life	- 8 years
Per-year cost	- Rs 9,375
Maintenance cost	- Rs 4,000
Fodder cost	- Rs24,000
Cost per year	- Rs37,375

The Yuvraaj:

Basic cost	- Rs165,000 - One-time payment
Average life	-12 years
Per-year cost	- Rs13,750
Maintenance cost	- Rs 8,760
Diesel cost	- Rs15,000
Cost per year	- Rs37,510



INDIAN AGRICULTURE AND MECHANIZATION- LINK WITH MANUFACTURING INDUSTRY

The growth in agriculture is directly related to manufacturing industry. Now with this huge demand for mechanization in the agriculture, the Manufacturing Industry would play a major role in it by coming up with innovation and new products. With Government “Made in India” reforms launched, opportunities will be created in the country wherein MNC Company can come with the latest technology which will lead to mechanization of agriculture.

FRUGAL INNOVATION IN MANUFACTURING INDUSTRY AT GLOBAL LEVEL- RENAULT NISSAN

Carlos Ghosn, Chairman and CEO of the Renault-Nissan Alliance, famously coined the term “frugal engineering” in 2006. He was impressed by Indian engineers’ ability to innovate cost-effectively and quickly under severe resource constraints. And under Ghosn’s leadership, Renault-Nissan has proactively embraced frugal engineering and become one of the world’s leading producers of both electric cars as well as low-cost vehicles — two of the fastest growing and most promising market segments in the global automotive sector.

In 2004 Renault launched “Logan”, a small no frills family car. The car is built with drastically simplified product architecture and minimal components. In 2011 Renault launched LCV truck – DOST in a joint venture with Ashok Leyland, India as a result of Frugal Innovation.

Best Practices Initiated by Carlos Ghosn: Frugal Innovation

- 1. Create “good enough” products that deliver high value for money:** Over-engineering products is no longer sustainable — both for economic and environmental reasons. In 2004, Renault launched Logan, a small, no-frills family car. At a starting price of \$10,000, the car is built with drastically simplified product architecture and minimal components. In addition to a stripped-down, modern design, Logan is reliable and energy efficient. As a result, it has become Renault’s best-selling car across recession-weary European markets as well as in many emerging markets.
- 2. Foster healthy rivalry among global R&D teams:** CEOs may find it difficult to persuade R&D teams in the US and Europe — used to abundant resources and pushing the technology frontier for its own sake — to embrace frugal innovation. In one instance, Ghosn requested three different R&D teams — one each from Japan, France, and India — to come up with an engineering solution for the same technical problem. The teams came up with solutions of equal quality — yet the Indian engineers’ solution cost only one-fifth of what the French and Japanese engineers’ solutions cost.
- 3. Tap partners in emerging markets who excel at innovating more with less.** Rather than relying exclusively on in-house R&D teams to develop frugal solutions, companies in developed economies need to connect with entrepreneurial organizations in emerging markets that have a knack for innovating on a shoestring. Recognizing that even its least-expensive pickup truck was five times costlier than the Indian market could afford, Nissan established an R&D and manufacturing joint venture with Ashok Leyland, an Indian commercial vehicle manufacturer. The result is DOST, an entry-level pick-up truck with a starting price of ₹ 3.7 lakhs (\$6,600). Since its launch in September 2011, DOST has garnered more than a third of India’s hypercompetitive light commercial vehicles market. The Ashok Leyland-Nissan joint venture now plans to introduce DOST in other emerging markets in Southeast Asia and the Middle East.



Fig: Ashok Leyland DOST

4. **Send your top executives to emerging markets to cultivate the jugaad mindset:** Ultimately frugal innovation is not just about doing more with less. It's about learning how to innovate under severe constraints and turn extreme adversity into an opportunity for growth. As Ghosn, explains: "We don't go to emerging markets to just bring back a product, but to learn something — like new processes or a whole new mindset."

"French knowledge and Japanese knowledge with Indian innovation: Frugal Innovation – Carlos Ghosn, CEO, Renault-Nissan Alliance"

Frugal Innovation is happening at grass root level by individuals in India and also at Global level but bigger companies in India still fail to understand the importance and effectiveness of this model. There are many reasons to this but primary reasons include:

1. Lack of "spec time" to develop new ideas and opportunities.
2. Systems like Six sigma or Lean management actually turn up as a hindrance in frugal innovation as they highly depend on standardization.
3. Innovation not articulated as a company-wide commitment
4. Management incentives are not structured to reward innovation
5. Belief that innovation is inherently risky also puts many companies away from it.
6. Focus on successes of the past rather than the challenges of the future
7. Rewarding crisis management rather than crisis prevention
8. Micromanagement, robs away the scope of development of new ideas especially the one which is completely out of the box.
9. Lack of skilful brainstorm facilitation.
10. Under-funding of new ideas in the name of sustaining current efforts.

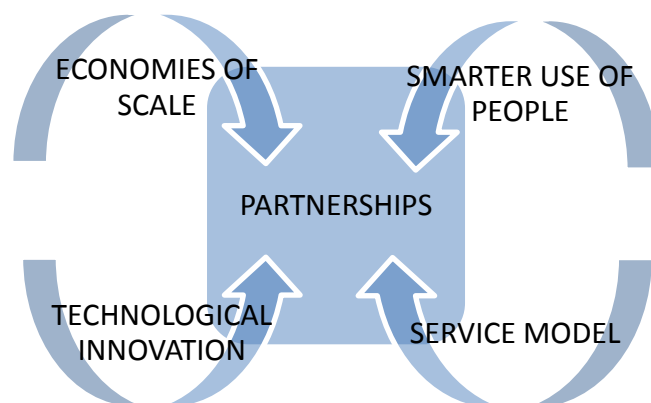
THE PROPOSAL

Dost which is a product of Frugal Innovation has changed the scenario of transportation of agricultural goods in India. Similarly for mechanization of agriculture tractor is very crucial but majority of the farmers are not even able to use it because of small size of the land holding or lack of money. The Indian Tractor Industry is the largest in the world, accounting for one third of the global production. But penetration of tractors is poor in India

About 75% of tractor sales in India come from seven to eight major states. The penetration of tractors is 10 tractors per 1000 hectares of cropped area, which is much below the world average of 19 tractors for the same. Thus there is scope for the demand to increase. Though it is said that the farm income has been increasing, but for small and medium farmer, capital and interest rate is still a big factor to consider before buying any product. If large scale companies manufacturing tractors with the help of Jugaad, work in partnership with farmers to build a holistic product and service model.

Currently, there are as many as 10 players (including MNCs) in tractor manufacturing, in India. About 90% of the market is shared by only the top five to six players.

BUSINESS MODEL



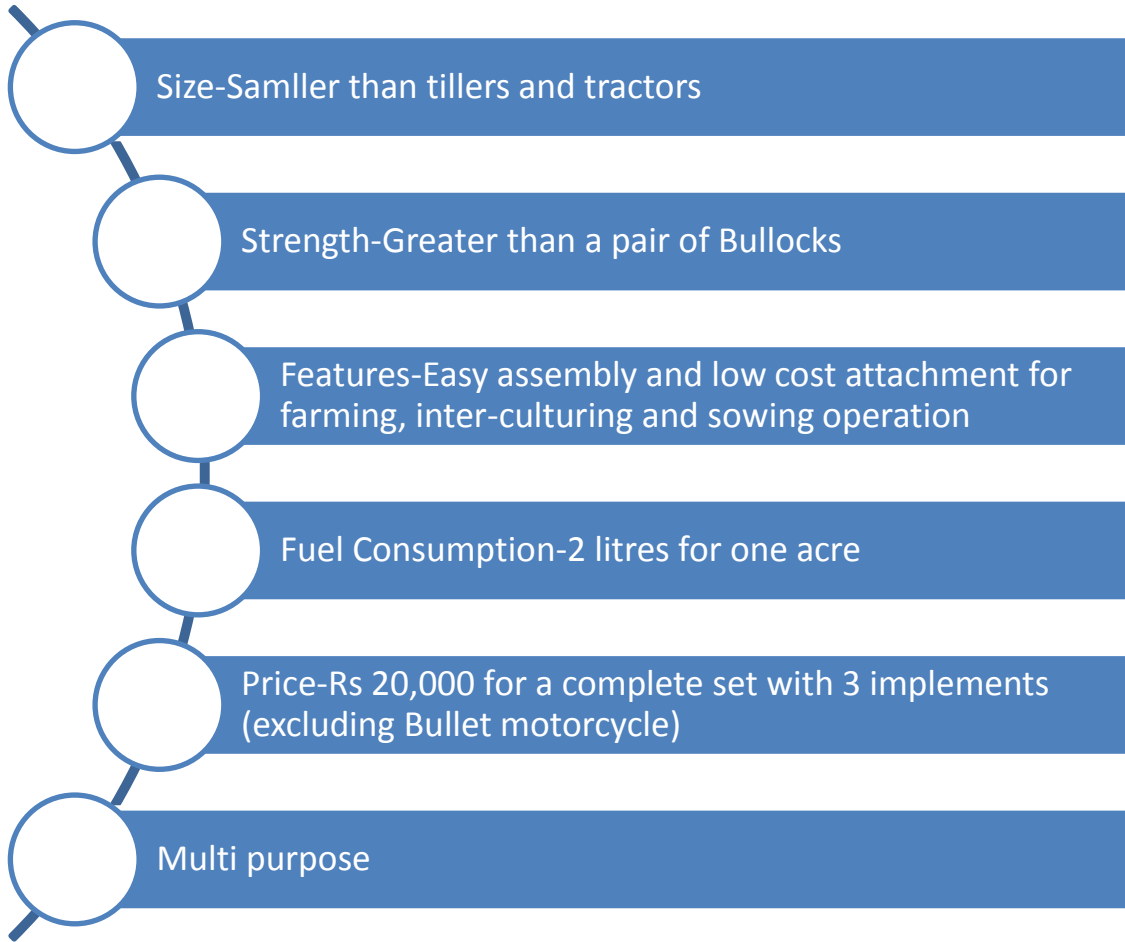


Business Model on Jugaad for the Manufacturing Sector is based on the foundation of Partnership. Through Jugaad innovation as the guiding principle and partnerships with stakeholders, company can actually tap the market which has huge potential but still is untapped.

Main players of Frugal innovation are at the grass root level. Partnering with them would provide the companies with actual wealth of knowledge. An example of this is PepsiCo India which partnered with local farmers to develop the technology of direct seeding for Rice and became the no water company in India.

Economies of Scale:

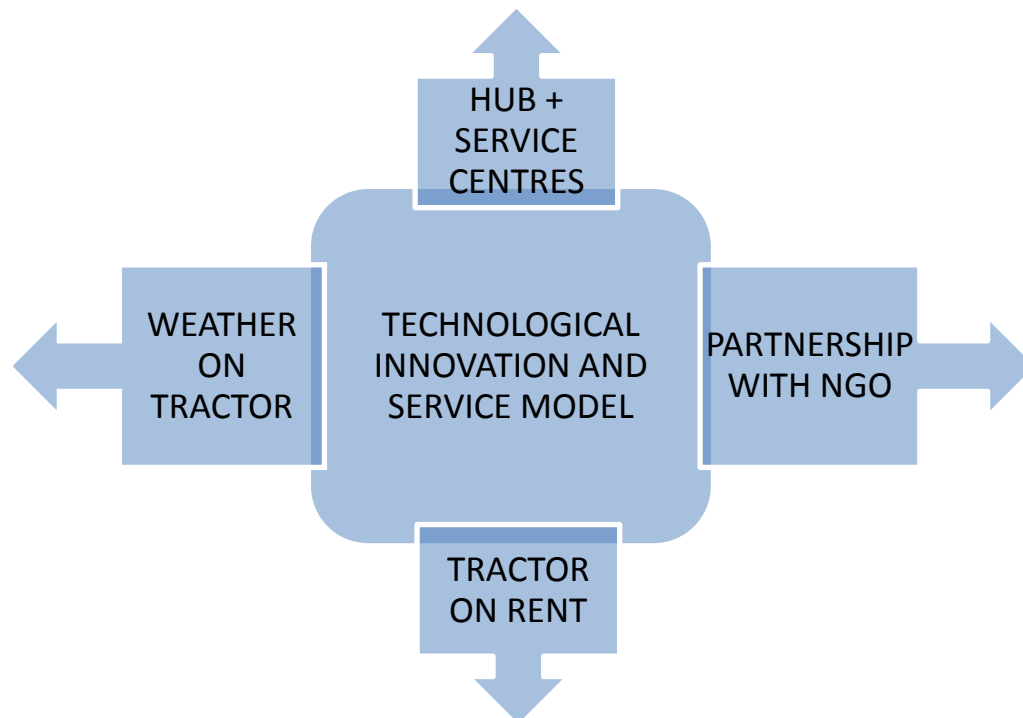
Manufacturing Company can achieve economies of scale through frugal innovation in Design. Through partnerships with farmers like Mansukhbhai Ambabhai Jagani, a farmer of village Mota Devaliya in Amreli district, Gujarat who has created Bullet Santi which is a tractor using Bullet.



Smarter use of people:

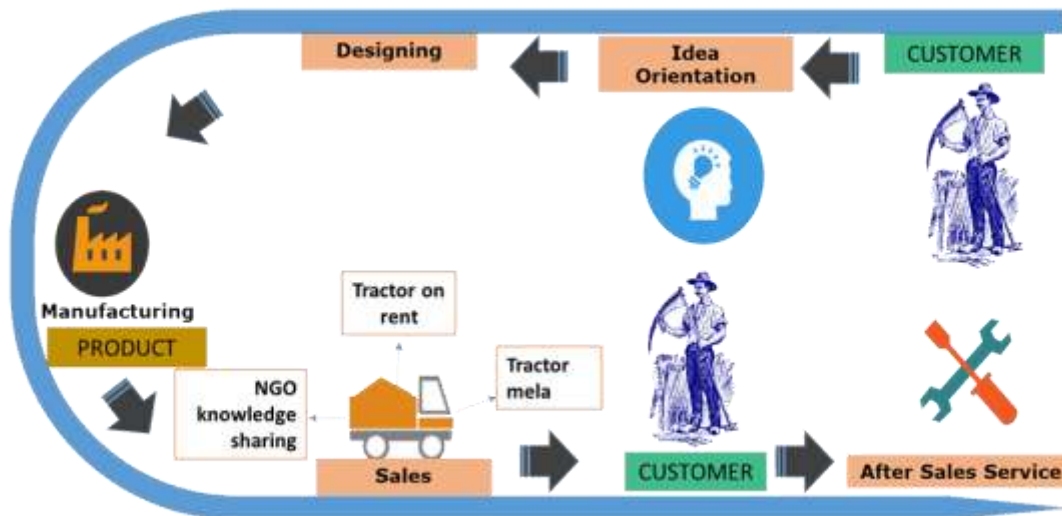
By recruiting and training farmers and their families, company would not only be able to tap local knowledge but also develop loyal partners who are also their customers.

Technological Innovation and service model:



- Tractor on Rent + Ownership for an interval- Farmers who can't afford to buy can also own it
- Service centres in villages- Owned by farmers
- Partnerships- NGOs like Digital Green can work in direct partnership with manufacturing company to build knowledge base of the farmers
- Weather on tractor- Like GPS system, weather forecasting equipment on the tractor itself to add to its usefulness

VALUE CHAIN



“Person who uses it knows it best” partnering with farmers right from the idea orientation stage would not only help develop more practical designs but would also help create customers as loyal stakeholders. After that expert R&D team can develop it further. During the Sales process also Tractor Melas can be held which not only act as selling ground but also knowledge sharing ground with the NGO partners and other farmers. Also a hub from where tractors can be bought on rent or can be given on ownership for a period. Finally like any other automobile tractors would also need after sales service. Manufacturing company can train farmers for after sales service and can help them establish company service centre. This would help complete the value chain with the customers (farmers) as the torch bearer at all the ends.

CONCLUSION:

There is a large and unsaturated young population in emerging economies, including and beyond India that is driven by aspirations. This creates a unique opportunity for Indian firms to offer new and affordable solutions, in collaboration with people who know the ground. While high volumes can compensate for thin margins, collaborative development can lower the associated development costs and risks. Collaborations can produce win-win results for all parties concerned. Jugaad is changing lives at grass root level. If adopted by bigger players in manufacturing sector it would not only make the dynamics of the company more profitable but would actually change how agricultural sector works which is the backbone of Indian economy.

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