



Technology adoption for agriculture mechanization in India

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Paddy farming



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Source: <http://www.thehindu.com/todays-paper/tp-national/tp-otherstates/kharif-activity/article3756734.ece>



Source: <http://www.rkmp.co.in/content/how-to-transplant-rice-manually-0>



Source: Rice Knowledge Management Portal (Indian Council of Agricultural Research)



http://www.udupitoday.com/udtoday/news_The-Sugarcane-Farmer-Suicides-rock-Karnataka-%E2%80%93-Part2_6187.html



<http://bioenergycrops.com/blog/2014/01/15/biomass-india-sugar-cane-energy/>



http://www.quazoo.com/q/Sevanagala_Divisional_Secretariat



Source: <http://www.tribuneindia.com/2008/20081208/bathinda.htm>



Source: <http://www.dawn.com/news/1180341>



Why have the basic needs of the majority of people remained unmet??



Selected Indicators – Agriculture worldwide

Country	Agricultural land [1000 sq. km]	Agriculture, value added [% of GDP]	Agriculture value added per worker [US \$]	Employment in agriculture [% of total employment]	Tractors per 100 sq. km of arable land
Year	2011	2010	2010	2010	2000
Germany	167	0.9	32087	1.6	838
Italy	139	1.9	41267	3.8	1938
France	291	-	-	2.9	685
Finland	23	2.9	60842	4.4	781
USA	4113	1.2	57194	1.6	257
Japan	46	1.2	39284	3.7	4532
China	5191	10.1	681	36.7	82
India	1798	18.0	641	51.1	129
Morocco	301	15.4	3780	40.2	-
Cameroon	96	-	-	53.3	-
Botswana	259	-	-	-	77
South Africa	964	2.6	5510	4.9	49

Source: World Bank - World Development Indicators - Agriculture & Rural Development (2013)
<http://data.worldbank.org/topic/agriculture-and-rural-development>



A problem unsolved, but not any more....

Leadership is not having to live with
problems unsolved indefinitely



- When an individual, institution, network or a society learns to live with a problem unsolved indefinitely, it ceases to be a progressive and inclusive community.
- Indian society is going through a transformation.
- Traditional inertia is giving way and innovations are being recognized slowly and slowly as instruments of empowerment and change. But not enough.



National Innovation Foundation – India

Builds bridges between formal and informal science, technology and innovation: Incubates ideas, innovations and outstanding traditional knowledge practices for diffusion with or without value addition through commercial and non commercial channels as public goods

- Scouted and documented 211,000 innovations
- Filed over 745 patents
- Filed 31 applications under PPVFRA
- Supported over 1000 projects for value addition and product development
- Supported 193 project under MVIF
- Setup 37 community workshops
- Recognized 770 innovators, students and traditional knowledge holders in national award functions

Domain characteristics

Technological platforms

	Known	Unknown
Known	incremental innovations, adaptive trials, user-led modifications. , incubation	R & D with external experts, new actors and new arrangements
Unknown	Product Development, amplify the form, features and functions	Paradigmatic disruption, discontinuity and non-parameteric approaches , sanctuary model



Desired target group, awareness
building, affordability, functionality



Transformation is **possible** :

- a) From market led to market disruption: new forms of alliances:
Large companies and a small innovator
- a) Frugal, friendly, flexible and futuristic heuristics
- a) New models of learning from below: inverted model of innovation
- a) New models of financing and co-creation – techpedia.in,
empathetic innovations



- Less material
- Local material
- Repairable features
- Upgradable features
- Aspirational connect
- Sticking to essentials

Extreme affordability

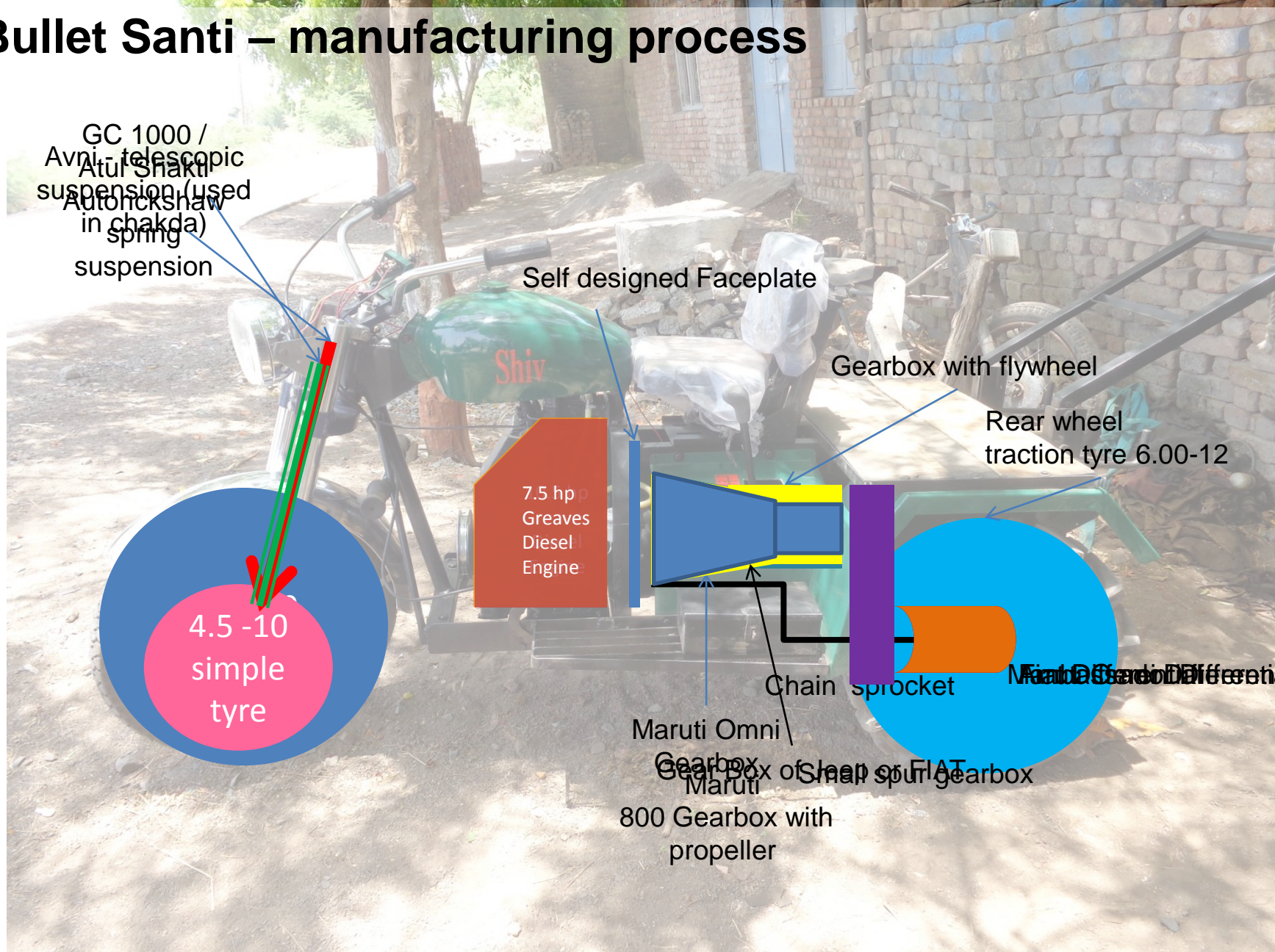
Bullet Santi – Local variants



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Bullet Santi – manufacturing process



GC 1000 /
Avni telescopic
Atul Shakti
Autochshaw
spring
suspension

Self designed Faceplate

Gearbox with flywheel

Rear wheel
traction tyre 6.00-12

7.5 hp
Greaves
Diesel
Engine

4.5 -10
simple
tyre

Chain sprocket

Maruti Gear Differential

Maruti Omni
Gear Box of Sharp or FIAT
Maruti
800 Gearbox with
propeller

BIS intervention for standardization





- in consumption
- in production
- in distribution
- in reuse, repurpose, recycling

Extreme frugality



Should accuracy be traded off with affordability?

Should design overtake durability

Should desires be preferred over deserving

Trade-offs



The innovation exhibitions were organized in March 2010, 2011, 2012, 2013, 2014 and 2015 at the Mughal Garden where grassroots innovations were displayed for the public. The events were inaugurated by Hon'ble President and were visited by many dignitaries





Ease of operations After sale service



Manual Milking machine



Multipurpose food processing machine

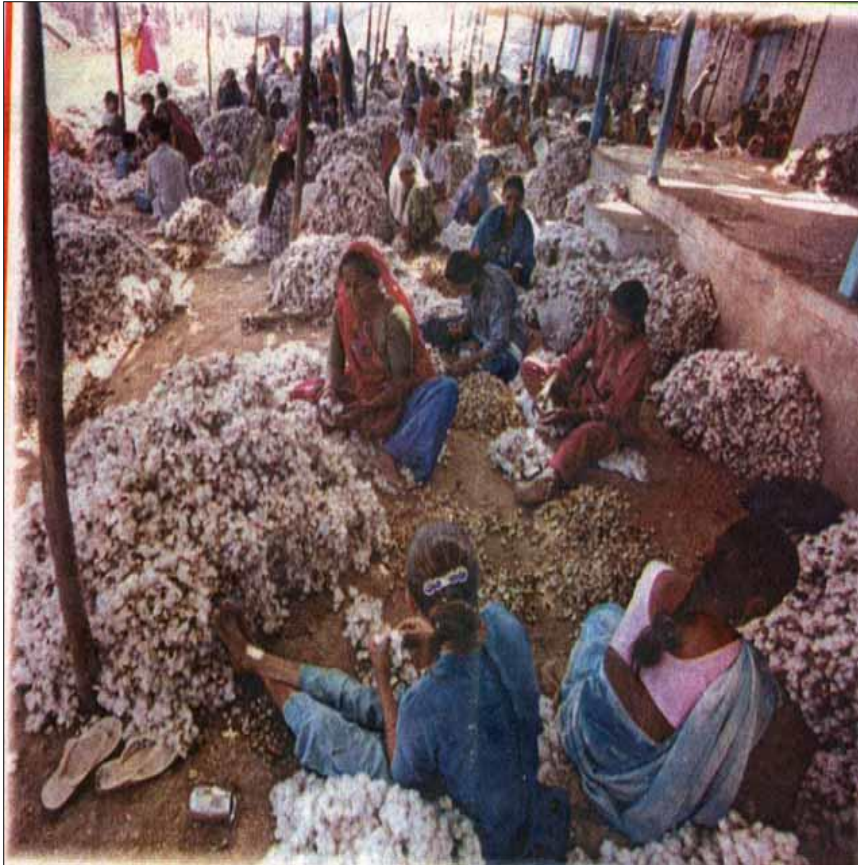


User driven design - robust

Cotton Stripper Machine



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In the dry cotton growing tracts of Gujarat and other parts of the country, there are some varieties of cotton (Kalyan – V 797, G-13 etc.) where the lint is tightly attached to the inner side of the shell. This lint has to be stripped from the shell before ginning. This is a laborious process, manually carried out usually by women and children labour.

Shri Mansukhbhai Patel, Studied up to 7th standard, An Electrician in Textile mill by profession & farmer from Gujarat solved the problem.



INNOVATION



As an answer to this problem, Mansukhbhai developed a machine which mechanically strip the cotton lint from the shell in a faster & efficient manner and leave it ready for ginning.

- It totally replaces the manual method of separating cotton from the harvested cotton shells.
- Social relevance - reduces drudgery of women and child labour
- Wider commercial application

The machine required just three workers and processed 100-160 Kg of cotton per hour. Innovator exhibited this model among the villagers. Mansukhbhai himself was not satisfied with this model, still the design was largely appreciated by those witnessing the exhibition.

First Demonstration in village



- Along with cotton, small pebbles were also infused in the system through hopper which caused system failure and shorten the life wire meshing

- Lifetime of the wire meshing (which was about 4000 kg) on the wheel was very less due to the scrubbing by the wooden scrubber. By the end of the exhibition, which lasted for 3 days the wire meshing was completely straightened out.

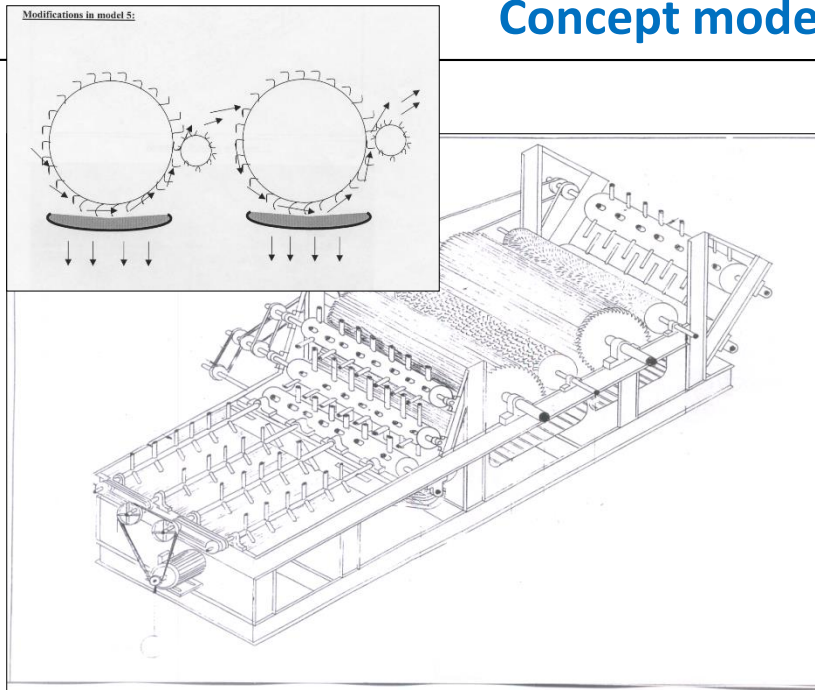
- Cotton dust reduced the life time of bearings used.

- Quality of cotton was not that good. As the balls was crushed it broke the seed in to fine particles which stuck with the cotton and was impossible to separate.

Shortcomings identified in 1st prototype:



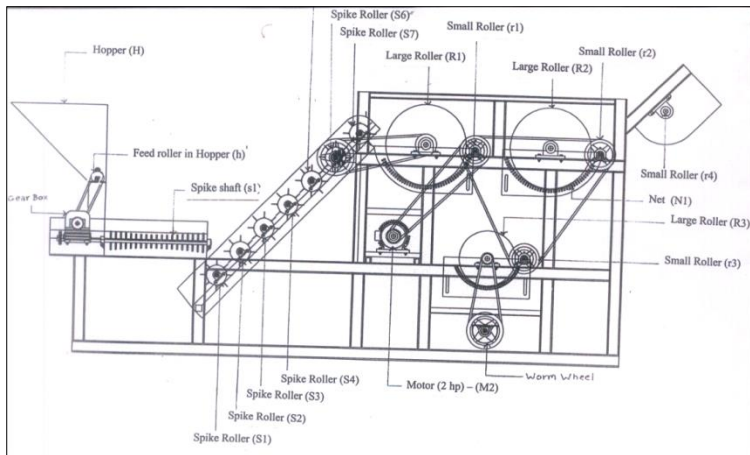
Concept model & Prototype



As shown fig, one more brushing wheel and one more small roller with fillet was used corresponding to the second large roller with wire meshing introduced in model 4.

Around 15 machines of this model were sold. The performance of these machines was much better than previous machines. Still there were some shortcomings in the model.

Concept Model : 6

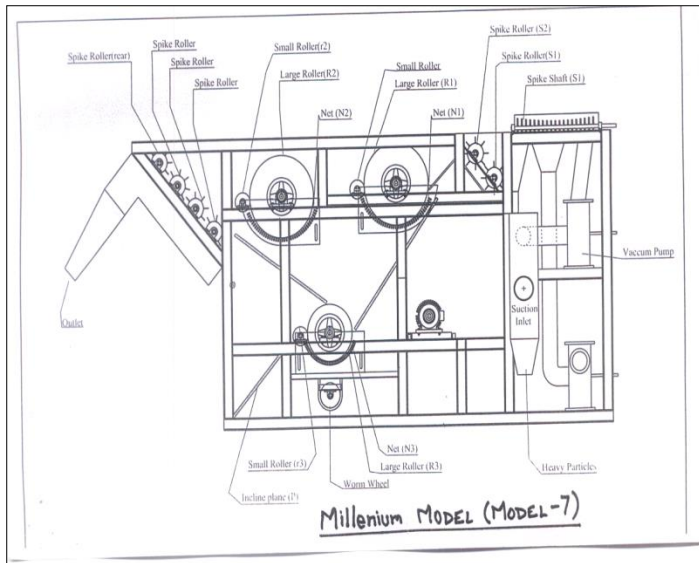


A very detailed and comprehensive market and feasibility study was carried out for the machine. The study also included development of Project Management plan for the innovator for his anticipated shift into commercial production.

Model 7 – Final Commercial Model named as Millennium Model



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The machine contains two 5HP motors one of which rotates the Blower and the spike shaft and other rotates three big rollers. There is also another 2HP motor, which is used to run smaller brush rollers. In this model , innovator has offered full guarantee for one season to the customers. This confidence has been gained over a decade of indigenous R&D on the prototype.

Stage wise development.....



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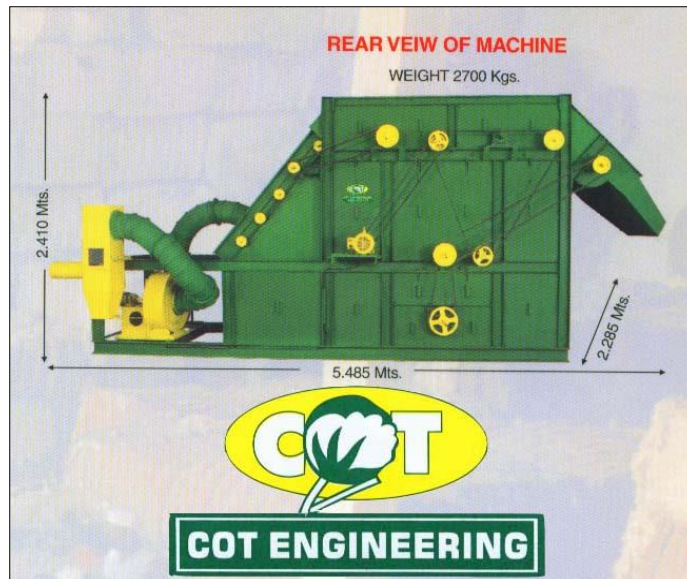




IPR Protection:

India patent awarded on Feb 6 , 2006 ,No: 198755

US patent Awarded on April 8, 2003. US 6, 543, 091B2



Eight people have copied this innovation & infringed the patent but none of them succeed in business. Innovator has continuously improved the technology and beat the market by winning confident of the customers.



Location specific



Walnut Cracker, Peeler & Washer





To improve the technology adoption in India, there is a need of discussion on :

- Increasing focus on **participatory research approach**
- Decentralized fabrication and services to reduce the cost
- More focus on **extension activities** including guidance to farmers about possible impacts of farm mechanization
- **Availability of mechanization solutions for entire value chain**
- focus research efforts towards design and development of farm machinery suitable for different types of soils, farm sizes and **diverse crops**
- Low cost tools for mass dissemination
- **More focus in the promotion of local artisan /small scale industries** for manufacturing and marketing the efficient implements
- Multiplicity of regional/ local languages



Thanks

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