

**Mini sanitary Napkin Making Machine (or) Technology for low  
cost Sanitary napkin making**

**(Designed by A. Muruganandam)**

**National Innovation Foundation, Ahmedabad**

## **Biography/Background**

The Innovator Mr. Muruganandam studied upto SSLC After that he dropped his schooling due to poor economic condition of his family. His father was a handloom weaver who passed away in the year 1981. His mother worked as a farm labor in a TNAU farm. He has two younger sisters and after the sudden dismissal of his father he took the entire responsibility of the family. He started his career as an apprentice in LMW Textile Machinery Company for a year. Later he joined as operator for a probationary period of three years in the same company.

Later he came out with his innovation and started his own business.

**Title:** Mini sanitary Napkin Making Machine/Technology for low cost Sanitary napkin making

**Summary:** The mini sanitary napkin making machine has three different units namely defibration, core forming and sealing unit for defibration of wood pulp, core forming and sealing with poly propylene respectively.

It is a technology to prepare the low cost sanitary napkin with the same materials as used in the by cutting down the cost in production. It requires 3 to 4 manpower to produce a pad in 2 min.

**Novelty:** Novelty lies in integration of well-known equipments like mixi (defibration), core forming press and manually operated electric sealing unit to cut down the cost of production. (A process to cut down the cost of the product).

### **Claims:**

- Low cost technology (50 % less) to produce the sanitary pads @ Rs.1/pad which is affordable for all kinds of people
- We can produces 4-10 pads/ min (depends on person's skills)
- Through this we can educate the rural people not to use the unhygienic cloths during menstruation period.
- Generates rural employment

## Innovation Description

**Mini sanitary napkin unit consists of three units;**

**De-fiberation machine:** Wood pulp which is commercially available in sheet form has to be defibred. The device for doing this is similar to the conventional mixi grinder. The machine has 4 blades at the bottom of the vessel and rotates at 10,000 rpm. In this machine the wood pulp is defibred to a filament length of 1-1.5mm. The capacity of the de-fiberation unit is about 150gms/min. it gives an output yield to a volume of 1 cubic feet of de-fibered soft pulp. The machine runs on 1hp single phase motor and the dimension is 36'' x 24''x 30'' .



**Core forming unit:** The purpose of the machine is to compress the de-fibered pulp to a required shape, which constitutes the soft core of the napkin. It is a foot pedal operated pressing machine (24'' x 24'' x 30''). The mould or core block is made of Aluminum sheet (food grade).



**Napkin finishing machine:** once the core is formed as a pad it has to be wrapped with non-woven fabrics (polypropylene), and sealed. The sensitive impulse sealing method machine with foot pedal powered pressing is employed to seal the pads on three sides. The power requirement for sealing is 40 volts. It seals about 4-10 napkins per minute. Nichrome alloy filament is used in the construction of the sealing pads. The machine dimension is 36'' x 30''x 30''.



## **Evaluation of Entry:**

### **Novelty of the innovation, feature or subsystem**

Novelty lies in employing the three different well-known common units to make low cost sanitary pads.

### **Comparison with currently available conventional alternatives –**

#### **a) In functioning,**

Napkins are manufactured with fully automatic machines at present by MNC's, whereas the proposed innovation is a manually operated one.

#### **b) In cost, and**

The cost of the currently available automatic machines is about 75 lakhs to 2.5 crores with the output of 140-220 pieces / min. The cost of the proposed machine is Rs. 50,000/- with the output of up to 10 pads/min.

#### **c) Elimination/ minimizing of drudgery**

Since the foot pedal is employed in core forming and sealing units, the drudgery involvement is very low.

### **Commercialization –**

#### **a) Status of Commercialization. (Manufactured/sold/ Used locally?)**

The innovator has sold about 14 units in the districts of Salem, Dindigal, Tanjavur, Tirupur, Chennai, Trichy, Cuddalore and Coimbatore in Tamilnadu, Mehboop Nagar in Andhra Pradesh, Allepey, Calicut, Cochin in Kerala and one in New Delhi also . The local entrepreneurs and the SHG's has launched the low cost sanitary pads in the local market with the Trade names of EASY FEEL, FREE STYLE, STYLE FREE, FEEL FREE and BE FREE. The products are available in the local market with the cost of Rs.13-15 (8-10 pads) per packet. Some of the products are given as below:

Some of the products made available in the market by SHG enterprises



#### **b) Potential for diffusion**

This machine has high potential to generate employment through SHG's and local NGO's. The napkins produced by these units are low in cost and thus affordable by rural, semi urban mass and even the urban poor.

The napkin when produced and sold by rural and semi urban women are the unit run by women entrepreneurs, irrespective of area has an added advantage. The manufacturers and marketers would be able to interact with local users/women and

can easily teach the napkin usages and advantages. This close interaction between manufacturers/marketers and users cannot be achieved by big corporations with their conventional form and channels of marketing.

**The potential advantages/impacts are:**

1. Rural women can develop economically by being provided direct and indirect employment.
2. For community of rural and poor urban females the hygiene levels can be improved.
3. The napkin does not pollute the environment. Disposal is easy as mostly wood pulp is being employed which has a distinctive property of being biodegradable.
4. Each unit produces 4000 packets of napkin (consists of 8 napkins each) for a single shift of eight hours everyday, which can create a direct employment for 6-10 women.
5. By selling this napkin through resident dealer mode 40-50 rural women would get economical benefit through indirect employment.
6. The cost of the Manufacturing unit along with initial raw material is Rs. 75000 only.
7. Being an FMCG product, this has the potential for having a long term stable and profitable business model, compared to other complicated and risky business initiatives by women self help groups and women entrepreneurs.
8. An example of this the first unit set up at Maduravayil, near Chennai run by a self help group gave direct employment to 10 women. The product manufactured and sold through women dealers led to indirect benefit to 50 women in the chain. The usage of the product was observed in 4000 women which led to improvement in the hygienic level. Average income of the women involved was Rs. 2000-3500/month

**Social /environmental impact**

1. The affordable cost of the sanitary pads replaces the use of unhygienic clothes during menstruation periods by the rural and urban economically poor women.
2. Economic development by providing direct and indirect employment to a lot of poor women.

**Significance to women, handicapped and other marginalized sections**

1. The napkins produced by these units are low cost and therefore affordable by rural, semi urban and even urban poor.
2. Easy switch over from unhygienic cotton-cloth method to hygienic sanitary napkin.

3. Generally in rural areas cloth is being used during the menstrual periods. Studies reveals that this practice is associated with very high risk of cervical cancer, There are chances that 98 out of 100 people will develop this type of cancer, and if uncontrolled, spread to other parts of the body. Lack of finance is the reason why the rural women opt for this mode of tackling those critical 4-5 days. Even adolescent girls get affected by this unhygienic practice. The reason is that even that they know about the sanitary napkin the cost of the napkins is not affordable.

### **FINANCIAL DETAILS:**

#### **Materials, labour cost and other expenses required for fabrication.**

#### **Cost of Raw Materials and Labour Charges per Unit (Working capital)**

#### **Required Fund per unit for supply of machine with raw materials for napkins**

<b>S.No</b>	<b>Item</b>	<b>Value</b>
1	Machine	50,000
2	Napkin material	21,400
	<b>Total</b>	<b>71,400</b>

**The Selling price per unit along with raw materials is Rs. 71400 /- (50000+21400)**

## **Annexure 1:**

### **List of past customers (SHG"s) and their contact details (address, ph .no)**

1.Janaki Rajaram  
Community center,  
Airport Authority  
INA Colony, Near INA Market  
New Delhi.  
Mobile: 09810398220

2.Dr.P.Lalitha  
Malabar hospitals & Urology centre  
Eranhiplam, Calicut 673 020  
Ph:04952375516

3.Mrs.Rame Suresbabu  
Anjali House,  
Santhose Nagar  
Alleppey  
Ph:04772266560

4.Mandal Mahila Samikiya  
Devar Kadra  
Dokur Po, Devar kadra mandal  
Mehabubnagar  
Andhra  
Mobile:09989040341

5.T.Sigappy  
90,Shivajicolony  
Edyarpalayam  
Coimbatore-

6.R.Radha  
1,Andal Nagar  
M K Palayam  
Coimbatore-15

7.P.V.Vasundhra  
1,Balan Nagar  
Masakali playam  
Coimbatore-

8.R.Rama  
Annai Indira self help group  
64/1 Kalarampatti main road  
Karungalpatti  
Salem 6

9.V.Suganthi

27 Shivaraman nagar  
Kondur  
Kadalore

10.M.Saravanan  
24,25/2 south mathulamkombai street  
uraiyoor  
Trichy-3

11.V.sutha  
thiruvalluavr vasuki mahalir munnetra sangam  
Mettupatti,Dadanur Po  
Ayothiyapattinam  
Salem.

12.Jaya Ramakrishnan  
Govt.Palvadi  
Pillayar koil street  
Pasumpon nagar.Perumpakkam  
Chennai 601802  
Ph:04424662471

13.V.Jeeva  
19/31 SCM quarters,  
Chellammal Colony First street,  
Samunidipuram  
Tiruppur

14.Niraimathy  
Annapoorani mahajana mahalir self help group  
1/1A Pichai moideen street  
Didigul.

## **Annexure 4:**

### **A look into the sanitary napkin market**

#### **Menstrual Protection**

Menstrual period always brings some inevitable health concerns to the women. Apart from the major health concerns like unbalanced menstrual cycle, bleeding problems etc., many women face serious health problems with regard to the protective aids. Women use sanitary napkins, tampons or cups to prevent the blood stains during the menstrual period.

#### **Sanitary Napkins**

Sanitary napkins are the most popular item used by women during their menstrual period. Sanitary napkins can be harmful for women's health if, proper care is not taken. Women must be careful to change the napkins every 4-6 hours during the heavy flow. Otherwise, the poor hygiene lead to allergy on their private areas and subsequently to urinary infection.

#### **Tampons**

Tampons are cylindrical cotton plugsto absorb the flow of blood. It gives a neat feeling to women during their menstrual period. Tampons come in various materials and with aid of an applicator. **Toxic Shock Syndrome(TSS)** is one of the major health issue raised by tampons to the women. Even though it is a rare chance, it is a fatal disease caused by bacterial infection. Tampon raises a serious health concern with the use of rayon in some brands. The insertion of tampons also raises concerns regarding unmarried women.

#### **Cups**

A menstrual cup is worn to absorb the menstrual fluid. Unlike sanitary napkins and tampons, the menstrual cup neither absorbs the flow nor catches it outside the body. There are two types of menstrual cups available in the market as reusable ones and disposable ones.

Some women complain of allergy and pain while using menstrual cups. The failure to clean the cups and hands after insertion or removal causes serious health concerns to women.

### **Overall Indian scenario: Personal Care Products**

The annual value of personal products business in India, including oral care, hair cares and skin cares products, is currently estimated to be Rs 54.6 bn.

A few years ago, personal products were considered to be luxury items and attracted a high excise duty of 120% (except the oral care category). Gradual taxation reforms in India since 1991 have lowered the excise duty rates to a reasonable 30%, making these products more affordable. At the same time, rising income levels have led to rising aspirations on the part on Indian consumers. These factors have been the catalysts in the exponential growth rate in the personal product category over the past five years.

Personal care products are further divided into 6 categories:

- Oral care

- Hair care - oils
- Hair care - shampoos
- Skin care
- Cosmetics
- Feminine Hygiene

**Feminine Hygiene:** Most women use cloth during their menstruation days. This is because price is the biggest entry barrier. A pack of 10 sanitary napkins would cost Rs 30-40. Therefore, average spending during the menstruation days would be around Rs 48, which is expensive by Indian standards. Most Indian women fashion up pads out of cotton cloth as a home made and inexpensive solution to their hygiene and comfort needs during periods. These home made cloth pads are washed and reused. They lack the absorbing and liquid retention capacity of branded sanitary napkins and hence may lack in hygiene and comfort.

The feminine hygiene market is still a young market—only 20-25% women are estimated to use branded sanitary napkins in the urban sectors; the figure is much lower in rural India. While awareness in the urban areas would be reasonable given the substantial advertising, the penetration rate is abysmally low at 10%. The product is virtually absent in rural markets. As per estimates, only 20%-25% of urban women in India use sanitary napkins. The ratio is much lesser in other smaller towns and rural regions. Going forward, as living standards improve, the usage of the same is likely to increase.

Given the low base and increasing awareness of hygienic products, the market is growing at a robust 20-25%. Entry of cheaper brands, at Rs 20 for a pack of 10, has spurred market growth. Currently, the market is mainly urban.

### **Advertising Trends in the Feminine Hygiene category**

Advertising in the category has traditionally been promoted based on the following factors:

- The absorption standard
- Moisture retention standard
- Brands have also directly confronted the use of home made cloth pads by promoting the benefits of sanitary brands over cloth.

The factors that go into buying a sanitary napkin on the basis of priority given by urban users are:

1. **Absorbency**
2. **Size and Shape**
3. **Thinness**
4. **With or Without Belt**
5. **Price**

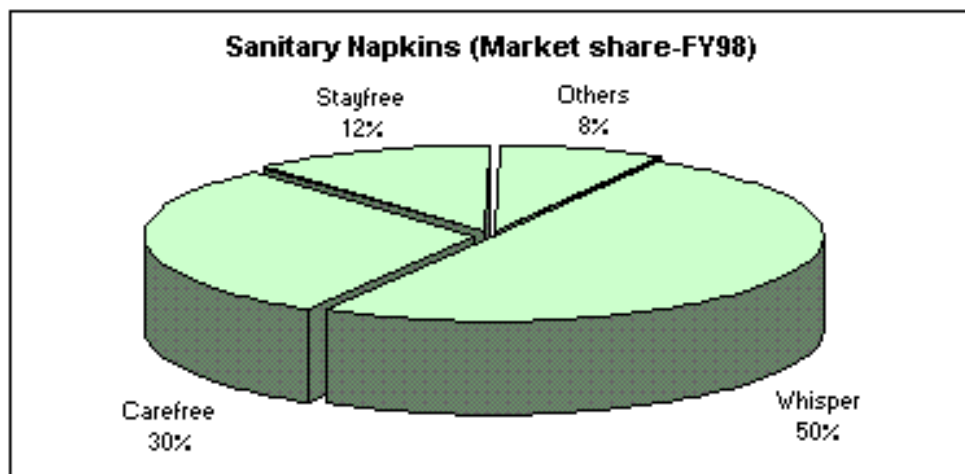
If the product meets all of the above criteria and in top terms, then the price in a higher range is acceptable for most. However, economy is the keyword for most women who buy sanitary pads.

So a product that adequately meets all of the above terms and offers an agreeable number of pads, under a decent price tag is the most opted menstruation solution.

### **Branded Products available in the Indian market**

The four brands that presently rule the sanitary napkin market in India are:

1. Whisper (Procter and Gamble): 50%
2. Carefree (Johnson and Johnson): 30%
3. StayFree (Johnson and Johnson): 12%
4. Shapers (Gufic Biosciences): 6%
5. Kotex -Kimberley Clarke: 2%



Whisper from Procter and Gamble and StayFree from Johnson & Johnson have six different products each on offer, whereas, Kotex and Shapers have two each.

Introduced in India in 1989, Whisper dominates the feminine hygiene products market in India with an estimated 50% market share. Competition comes in the name of Stayfree and Carefree from Johnson & Johnson and Kotex and Secure from KimberleyClark-HLL .

P&G has traditionally adopted the high quality, premium pricing policy for its products. The Indian market is extremely price sensitive and the company has been witnessing immense pressure from competitively priced products of other players in both its core businesses.

Through several line extensions—namely Whisper Maxi Regular, Whisper Maxi XL Wings, Whisper Ultra with Wings, Whisper Ultra XL Wings, and Whisper Choice, the brand provides feminine hygiene products for different comfort levels at different price points ranging from INR 29 to INR 65 for a pack of ten pads.



- P&G's Whisper dominates the Rs 1.8 bn sanitary napkins market with a 50% market share (in value terms). Whisper operates in the premium range, meaning high margins and low volumes.
- This segment is growing annually at 25-30%. The segment has low awareness and penetration levels (10-12% in urban areas). P&G competes with Johnson & Johnson (Stayfree, Carefree) and Kimberley Clarke-HLL (Kotex, Secure).




**Table: Comparison among the market leaders**

Brand	Whisper	Stayfree	Kotex	Shapers
Rank	2	1	4	3
Price *	Rs.30 - Rs.60	Rs.22 - Rs.50	Rs.20	Rs.20 - Rs.55
Varieties	6	6	2	2
Absorbency	Regular to extra heavy	Regular to heavy	Regular to heavy	Regular to heavy
Material	AGM (absorbent gel material)	AGM (absorbent gel material)	Funnel system	Liqui seal system
Hypoallergenic	Yes	Yes	No	No
Adhesive marks	No	No**	Yes	Yes
Odour control	No guarantee	Yes***	No guarantee	No guarantee
Score	80	88	40	43




\* for a pack of eight. Combo packs work out cheaper.  
 \*\* Silky Dry and Carefree, do leave adhesive marks.  
 \*\*\* Only two products available with odour control factor.



**Table: Johnson and Johnson Stayfree napkins**

	<p><b>StayFree® Secure</b></p> <ol style="list-style-type: none"> <li>1. Launched at the end of 1997</li> <li>2. Largest selling sanitary napkin in the Indian market</li> <li>3. A beltless napkin that provides protection that is superior to a home-made napkin, and at an affordable price!</li> <li>4. It is far more absorbent and is equipped with a plastic shield to prevent stains</li> <li>5. Rs. 23 for a pack of eight</li> </ol>
	<p><b>StayFree® Sure</b></p> <ol style="list-style-type: none"> <li>1. Sure with an Odour Control System.</li> <li>2. It contains Natural Plant Extract and absorbs period smell.</li> <li>3. Also every pad has 18 anti-leak channels which give you superior protection against leakage.</li> <li>4. Available at Rs 28 per pack.</li> </ol>
	<p><b>StayFree® Drymax UltraThins</b></p> <p>The key features of the napkin are:</p>

	<ol style="list-style-type: none"> <li>1. The New Drymax Cover- that works like a double layer absorbent system, giving it the superior dryness that makes it 3 times drier than the leading ultra napkin in the market.</li> <li>2. Odour Control System : Has natural plant extracts that helps absorb menstrual odor</li> <li>3. Gel Based Anti-Leak core that helps lock fluid in.</li> <li>4. Wide Wings , that helps protect against side leakage and holds the napkin firmly in place.</li> <li>5. Individually packed napkins - Making it easy to carry and dispose.</li> <li>6. Rs 49/- for a pack of 8 pads and Rs 90/- for a pack of 15 pads (which also has an additional offer of one napkin free).</li> </ol>
	<p><b>StayFree® Silky-Dry</b></p> <ol style="list-style-type: none"> <li>1. A beltless napkin with the unique Stain-Lock System</li> <li>2. It comprises of two covers and two plastic shields that make the napkin absorbent and more stable in use.</li> <li>3. The outer cover is designed to hold fluid inside and does not allow it to re-surface.</li> </ol>
	<p><b>Carefree®</b></p> <p>This highly absorbent napkin is specially designed to give extra protection to girls who have just begun menstruating. It comes with a special elastic belt that helps hold the napkin firmly in place.</p>

**Table: P & G whisper napkins**

	<p><b>Whisper Normal</b></p> <ol style="list-style-type: none"> <li>1. Superior and faster absorbency than ordinary sanitary napkins.</li> <li>2. Available in a convenient 'Fold n Wrap' wrapper, which helps you to carry and dispose the pad easily and with discretion.</li> <li>3. Recommended for regular flow.</li> </ol>
	<p><b>Whisper Maxi XL</b></p> <ol style="list-style-type: none"> <li>1. Wings is the only thick sanitary napkin available in the market with 'Wings' to offer both, superior and faster absorbency.</li> <li>2. Recommended for heavy and overnight use.</li> </ol>
	<p><b>Whisper Ultra</b></p> <ol style="list-style-type: none"> <li>1. The result of path-breaking research done by Procter &amp; Gamble worldwide.</li> <li>2. Whisper Ultra's special Lock-Away core is made of tiny AGM (Absorbent Gel Material) granules that have the capacity to absorb several times their own weight in liquid. Once absorbed the liquid turns into gel and hence</li> </ol>

	<p>these granules retain and lock wetness within and do not allow wetness to return back to the surface.</p> <p>3. Whisper Ultra is 5 times thinner than ordinary napkins, thus providing comfort, a sense of freedom and a feeling of not having their periods. Recommended for regular to heavy flow.</p>
	<p><b>Whisper Ultra XL Wings</b></p> <ol style="list-style-type: none"> <li>1. The longest sanitary napkin available in the Indian market.</li> <li>2. It's special Lock-Away Absorbency technology has the capacity to absorb several times their own weight</li> <li>3. Recommended for heavy to extra heavy flow.</li> </ol>
	<p><b>Whisper Choice</b></p> <ul style="list-style-type: none"> <li>• First, superior staining protection vs. other ordinary pads;</li> <li>• Second, ten times less wetness than non-woven pads with its unique dri-weave top sheet;</li> <li>• And third, its double adhesive coverage ensures that it stays in place better than ordinary pads.</li> <li>• Launched in May 2004, Whisper Choice is now being made accessible to all consumers via affordable pricing.</li> </ul>

### Local low cost emerging competitors

Apart from J&J highest selling branded product in the Indian market viz, StayFree Secure (available at Rs. 23 for a pack of 10 pads) and P&G Whisper Choice (available at Rs. 24 for a pack of 10 pads) respectively. the following are the emerging technologies that may compete with the innovation in the marginal urban market and rural market:

### SAKURA Magic

1. First in India, a 100% hand made sanitary napkin with Imported SAP Gel from GN Corporation Ltd., Japan and initiatives and assistance from M/S Nichi-In Bio Sciences (P) Ltd, Chennai India.
2. Technology taken over by M/S HOPE FOUNDATION, Chennai, India.
3. Awardee of World bank's best project
4. Sakura-Magic contains high quality surgical cotton.
5. The edges of Sakura-Magic are stitched together, instead of pasting them using synthetic-chemical glue in regular napkins. This gives freedom from chemical induced skin allergy to the user.
6. Sakura-Magic contains high quality surgical cotton and the SAP Gel (can absorb 200 times it's volume of fluid), makes the product leak proof and also makes it fit for longer duration of usage and keeps the surface DRY.
7. This project has been developed and worked out in such a way that with the very least investment, without big machineries and very little training, production could be started in a week or so.
8. Target the lower-middle and lower economic income group to make them practice this healthy way of maintaining personal hygiene.

9. An assurance is also taken that none of the beneficiaries of this technology will go for automation of the production, thus making it very friendly for the cottage industry
10. Information about the suppliers of all the material, their address and indicative price, are given to beneficiaries. The SAP Gel and the Polythene covers for packing the napkins, are supplied by the foundation

### **Low-cost napkin from cotton waste by Shriram Institute for Industrial Research in New Delhi**

1. A technology package to convert cotton or rayon waste into low-cost sanitary napkins in rural backyards.
2. The absorbency and design of the product are comparable to the sanitary napkins in the market
3. The production cost of each sanitary napkin is less than a rupee.
4. The retail price of comparable commercial products in the market ranges from Rs 2 to Rs 6 a piece.
5. An easy-to-handle machine has also been designed that would enable production of the napkins even in rural areas.
6. The institute has transferred the technology to a Hyderabad-based industry and is talking to some state governments to get rural women's self-help groups to adopt it.

### **Sanitary napkins by the Science and Technology Applied for Rural Transformation (START) project.**

1. Initiated by the United Nations Development Programme (UNDP), the project uses simple but appropriate technology for social development. through a network of technology development centres and resource centres.
2. Many START centres have started manufacturing sanitary napkins.
3. For rural and tribal women, the sterilized sanitary napkins are made available at Rs 3 per pack.

### **References:**

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<http://www.iwillgotoadcenter.com/whisper.html>  
<http://www.hopefoundation.in/sakuramagic/index.htm>  
<http://www.equitymaster.com/p-detail.asp?date=3/28/2005&story=3>  
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