RESEARCH REVIEW JOURNALS
Volume-03
Issue-08
August-2018

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com [UGC Listed Journal]

Economics of Mat Sticks Cultivation and Mat Industry: A Study in Sabong Block of Paschim Medinipur District of West Bengal

*Samir Show

Research Scholar, Department of Economics with Rural Development, Vidyasagar University, Midnapore, W.B. (India)

ARTICLE DETAILS

Article History
Published Online: 07 August 2018

Keywords
Labour productivity, double mat production, per capital land, net profit, Gross profit

***Corresponding Author**

Email: *samirshow80[at]gmail.com*

ABSTRACT

Mat industry is one of the most prominent rural handicrafts surviving and even expanding in some parts of West Bengal including Paschim Medinipur district in the era of globalization. This phenomenon may be explained with reference to Sabong block of this industry by high profitability, labour intensity, wide variety of products produced and high participation of female workers in this industry. Per capita land, heredity, numbers of female workers per household and per capita income explain significantly the household participation in matstick cultivation and mat industry

1. Introduction

Mat industry plays a vital role in rural economy of Paschim Medinipur district of West Bengal in generation of employment and income. In Sabang block of this district where it is highly concentrated there are about 70 percent females who participate in mat weaving. They produce variety of mat products, namely ekh-rokha or single mat, do-rokha or double mat, and highly excellent masland. Do-rokha is thicker than the ekh-rokha and is more suitable and comfortable when compared to ekh-rokha. The masland mat is very fine textured and made of carefully selected reeds with beautiful geometric designs woven on it. These designs are self-coloured but sometimes they are painted in magenta shade.

Mat sticks (Madurkathi) are obtained by cultivation and these are eco-friendly in its nature. The artists cut Madurkathi into various shapes, both small and big for useful purposes. Madurkathi weaving is a traditional craft in different areas of rural Bengal like Bhagwanpur, Patashpur, Ramnagar and Sabang in the districts of Purba and Paschim Medinipur. [http://www.craftandartisans.com/mats-baskets-of-west-bengal.html]

Mat-sedge can thrive in a wide range of agro climatic conditions and occurs in marshy situations especially in eastern and southern parts of India (Sarkar and Samanta, 1987). The plant is capable of tolerating extremities such as prolonged submergence in water and extended drought conditions. Sometimes swampy and marshy lands are used to cultivate non-food crops like mat-sedges. Mat-sedge crop is grown in all three seasons, viz., *kharif* season (June to end of September) and subsequent winter season (October to end of January) as well as summer season (February to end of May) (Jana and Puste, 2012).

The mat weaving industry is highly labour-intensive and it forms a considerable part of the handicraft industry. It is an employment oriented agro-based cottage industry. The industry runs almost exclusively with the support from family labourers for whom no payment of wages is made. Family members, mainly women and child labourers do the same at their idle time and the opportunity cost of labourers, particularly, the women and children in the villages is zero. So by the use of their idle time they can maximize their total family earnings through this industry.

Globalization and high economic growth have opened up internal and overseas demand for rural handicrafts including mat. This demand side factor has led to the survival and even expansion of this type of handicraft which is environment-friendly and attractive to consumers.

There is, however, scanty literature on mat industry. Sau (2005) in his Rural Industrialisation Reflections on Development Trajectory in India dealt with some developmental issues concerning rural crafts including mat but the economics of this craft and household participation in it have not been analysed in depth and details. Maity (2005) also dealt with dynamics of some rural crafts including mat but no in-depth analysis has been carried out. Das (2017) estimated value of output, labour cost, other cost, labour days, profit before labour cost, profit after labour cost, and return per labour day at three stages, namely cultivation stage, harvesting stage and weaving stage of matstick and mat products but did not make detailed analysis of cost of production of both inputs and product. Besides, the issue of household participation in this industry as a whole has not been made by him.

The present note seeks to fill in some of the deficiencies in the recent literature on mat-stick cultivation and mat industry with reference to Sabong block of Paschim Medinipur district of West Bengal.

The specific objectives of the study are as follows.

i. To examine the economics of mat or madur kathi cultivation,
ii. To examine the economics mat industry,

iii. To present the Probit Estimates of household participation in madur kathi cultivation and in madur or mat industry.

The study is based on primary data. Primary data are collected from the households which are selected on the basis of random sampling. Sabang block in Paschim Medinipur district of West Bengal is purposely chosen for the present study for the field survey. Within a block all the villages are not equally important in respect of socio-economic characteristic. In view of this, six villages are selected from the village list of this block. 10 households were selected randomly from each village. From the above sample design 60 households are selected for detailed survey. Reference period for the study is the financial year 2016-17.

Several inputs have been included in the calculation of a crop cost of production. Broadly these costs are classified into two categories such as:

Cost-A: (Variable cost/Operational cost): it includes the cost of human labour, Bullock labour, Machine labour cost of seeds/plants (included farm produced and purchased), insecticides and pesticides, manure (owned and purchased), fertilizers, Irrigation charges, (owned and purchased) Interest on working capital, and Miscellaneous cost— which have not come under main category

Cost-B: (Fixed cost): Rental value of owned land, Land revenue, Depreciation on implements and farm buildings, Interest on fixed capital

Cost-C: Total cost of Production (Cost A+ Cost B)

The profitability may be calculated by using various economic formulas:

Gross Profit per hectare = Value of yield - Cost C + Rental value of owned land + value of owned labour

Net Profit per hectare = Value of yield – Total cost of production

Output- Cost Ratio = Value of Yield/ Cost C

For specific purpose probit model is used to estimate the regression parameters. The steps involved in the estimation of the probit model are as follows:

a) From the grouped data, estimate the probability that an event will occur, i.e. Pi . This Pi is estimated by ni/Ni , where ni is observed frequency and Ni is total frequency.

b) Given estimated Pi, obtain normal equivalent deviate (n.e.d) (=Ii) from the standard normal cumulative distribution function (CDF).

That is, $Ii = F^{-1}(Pi) = \beta 1 + \beta 2Xi$

c) Use the estimated Ii obtained as the dependent variable in the regression, i.e.

$Ii = \beta 1 + \beta 2Xi + Ui$

d) R^2 as a measure of goodness of fit is not particularly well-suited for the dichotomous dependent variable models, one suggested alternative as the $\chi 2$ test. Apply the $\chi 2$ test to regression and comment on the resulting goodness of fit.

The rest of this work is conveniently divided into four sections. Section 2 discusses the economics of mat-stick cultivation and Section 3 that of mat industry. Section 4 analyses the factors that explain the household participation in mat-stick cultivation and mat industry.

2. Economics of *Cultivation in Mat-sticks*

The estimated production costs of mat or madur kathi cultivation are presented in Table 1. Total input cost has been calculated on the basis of local village market prices. It is observed that estimated per 20 decimal of land cultivation cost is Rs 13149/- . The labour cost of mat sticks cultivation is highest (Rs 7090/-) followed by root/plan cost (Rs. 2643/-), rental value of owned land (Rs. 1255/-), Fertilizer cost (Rs. 625/-), Irrigation cost (Rs. 364/-), Manure cost (Rs. 326/-) and machine labour cost is lowest. Mat cultivation and mat industry is totally labour intensive product. Percentage share of labour cost is 53.92, which is highest cost in mat cultivation. Root/Plant cost is 20.10%. On the other hand fertilizer cost is only 4.75% , irrigation cost is 2.77% and Pesticides cost is less than 1% (Table 1)

Table 1 Mat Sticks Production Cost per 20 Decimal of Land

Cost		Rs.	Percentage Share
Operation Cost	Family Labour	5440/-	41.37
	Hired Labour	1650/-	12.55
	Total Labour Cost	7090/-	53.92
	Hired Animal Labour	74	0.56
	Own Animal Labour	113	0.86
	Total Animal labour Cost	187	1.42
	Hired Machine Labour	00	0.00
	Own Machine Labour	00	0.00
	Root/Plant	2643	20.10
	Fertilizer	625	4.75

	Manure	326	2.48
	Pesticides	78	0.59
	Irrigation	364	2.77
	Interest on W. Capital	352	2.68
Fixed Costs	Rental Value of Owned Land	1255	9.54
	Interest on Fixed Capital	75	0.57
	Others	154	1.17
Total Cost		13149	100

Source: Field Level Survey (One mandays = 8 hours = Wage Rs 150/-)

Average output or average yield per 20 decimal in mat sticks cultivation is 30 bundle (dry mat sticks). The market price per bundle dry mat sticks is Rs. 1050/- and total value of yield per 20 decimal is Rs.31500/-. This market price of dry mat sticks is varies from block to block, in Sabang block there are market price of mat sticks is more or less same. The gross profit per 20 decimal is Rs. 26809/- and net profit is Rs. 18351/- . Farmer gets 203.88 percent gross profit from mat sticks cultivation and net profit earn 139.56 percent (Table 2).

Table 2 Yield,Value of output, Gross Profit and Net Profit per 20 Decimal of Land in Mat Sticks Cultivation

Yield/Output/Gross & Net Profit	Rs.
Yield	30 bundle per 20 decimal of land
Price per bundle (dry Mat sticks)	1050/-
Total value of output	31500/-
Total cost	13149/-
Gross Profit	26809/-
Net profit	18351/-
Gross profit rate (%)	203.88
Net profit rate (%)	139.56

Source: Field Level Survey

3. Economics of *Madur (mat) Production*

The working series activity begins with the preparation of basic raw material which is commonly termed as pre-loom weaving. The painstaking works start from the steps when the soft reeds and cotton (some cases jute thread) are arranged on a bamboo frame loom as weft and warp respectively. Single Madur(Mat) Production Cost by different Size in weaving stage has been presented in the Table 3. Dry mat sticks cost is highest (Rs. 105) in 54 inches wide mat weaving followed by 50 inches wide (Rs.90/-), 45 inches wide (Rs.52/-), 40 inches wide(Rs. 45/-) and 36 inches wide (Rs.33/-). The labour cost is highest (Rs. 150/-) in 54 and 50 inches wide mat weaving followed by 45 inches wide mat(Rs 125/-), 40 inches wide mat (Rs.100/-) and 36 inches wide mat (Rs. 75/-). Rope or threat cost per mat is highest (Rs. 16/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.15/-), 45 inches wide mat (Rs.12/-), 40 inches wide mat (Rs.10/-) and 36 inches wide mat (Rs.8/-). Jute cost per mat of all size is Rs 4/-. Total cost per single madur production is highest in 54 inches wide mat (Rs. 280/-) followed by 50 inches wide mat (Rs.264/-), 45 inches wide mat (Rs.197/-), 40 inches wide mat (Rs.163/-) and 36 inches wide mat (Rs. 124/-) (Table 3).

Market price per single mat is highest (Rs.460/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.425/-), 45 inches wide mat (Rs.285/-), 40 inches wide mat (Rs.210/-) and 36 inches wide mat (Rs.145/-). Gross profit per single mat is highest (Rs.330/-) in 54 inches wide mat followed by 50 inches wide mat (Rs 311/-), 45 inches wide mat (Rs 213/-), 40 inches wide mat (Rs 147/-), 36 inches wide mat (Rs 96/-). Similarly net profit per single mat is highest (Rs. 180/-) in 54 inches wide mat and lowest in 36 inches wide mat (Rs.21/-). Percentage of gross profit per single mat is highest (117.86) in 54 inches wide mat followed by 50 inches wide mat (117.80), 45 inches wide mat (108.12), 40 inches wide mat (90.18), 36 inches wide mat (77.42). Side by side Percentage of net profit per single mat is highest (64.29) in 54 inches wide mat followed by 50 inches wide mat (60.98), 45 inches wide mat (44.67), 40 inches wide mat (28.83), 36 inches wide mat (16.94) (Table 4). (Figure 1).

Table 3 Single Madur (Mat) Production Cost by different Size in weaving stage (per piece) (Rs)

Cost	54 inches wide	50 inches wide	45 inches wide	40 inches wide	36 inches wide
Dry Mat sticks	105	90	52	45	33
Labour	150	150	125	100	75
Rope/threat	16	15	12	10	8
Jute	4	4	4	4	4
Others	5	5	4	4	4
Total	280	264	197	163	124

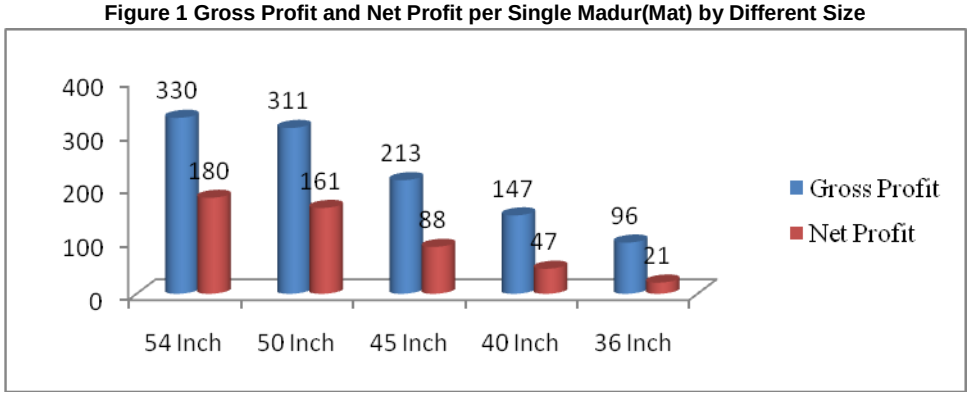
Source: Field Level Survey (Length of all mats are 72 inches)

Table 4 Value of Product, Gross Profit and Net Profit per Single Madur(Mat) by Size

Size of Mat/Madur	Market Price (Rs)	Gross Profit (Rs)	Net Profit (Rs)	Gross Profit Rate %	Net Profit Rate %
54 Inches wide	460	330	180	117.86	64.29
50 Inches wide	425	311	161	117.80	60.98
45 Inches wide	285	213	88	108.12	44.67
40 Inches wide	210	147	47	90.18	28.83
36 Inches wide	145	96	21	77.42	16.94

Source: Field Level Survey *(Length of all mats are 72 inches)*

Figure 1 Gross Profit and Net Profit per Single Madur(Mat) by Different Size



Double Madur (Mat) Production Cost by different Size in weaving stage has been presented in the Table 5. Dry mat sticks cost is highest (Rs. 155) in 54 inches wide mat weaving followed by 50 inches wide (Rs.145), 45 inches wide (Rs.95), 40 inches wide(Rs.84) and 36 inches wide (Rs.57/-). The labour cost is highest (Rs. 300/-) in 54 and 50 inches wide per mat weaving followed by 45 inches wide mat(Rs 225/-), 40 inches wide mat (Rs.200/-) and 36 inches wide mat (Rs. 150/-). Rope or threat cost per mat is highest (Rs. 24/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.23/-), 45 inches wide mat (Rs.20/-), 40 inches wide mat (Rs.18/-) and 36 inches wide mat (Rs.15/-). Jute cost per mat of all size is Rs 4/-. Total cost per double madur production is highest in 54 inches wide mat (Rs. 488/-) followed by 50 inches wide mat (Rs.477/-), 45 inches wide mat (Rs.348/-), 40 inches wide mat (Rs.310/-) and 36 inches wide mat (Rs. 230/-) (Table 5).

Market price per double mat is highest (Rs.720/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.685/-), 45 inches wide mat (Rs.525/-), 40 inches wide mat (Rs.460/-) and 36 inches wide mat (Rs.375/-). Gross profit per double mat is highest (Rs.532/-) in 54 inches wide mat followed by 50 inches wide mat (Rs 508/-), 45 inches wide mat (Rs 402/-), 40 inches wide mat (Rs 350/-), 36 inches wide mat (Rs 295/-). Similarly net profit per double mat is highest (Rs. 232/-) in 54 inches wide mat and lowest in 36 inches wide mat (Rs.145/-). Percentage of gross profit per double mat is highest (128.26) in 36 inches wide mat followed by 45 inches wide mat (115.52), 40 inches wide mat (112.90), 54 inches wide mat (108.61), 50 inches wide mat (106.50). Side by side Percentage of net profit per double mat is highest (63.04) in 36 inches wide mat followed by 45 inches wide mat (50.86), 40 inches wide mat (48.39), 54 inches wide mat (47.34), 50 inches wide mat (43.61) (Table 6).(Figure 2).

Table 5 Double Madur(Mat) Production Cost by Size at weaving stage (per pice) (Rs)

Cost	54 Inches wide	50 Inches wide	45 Inches wide	40 Inches wide	36 Inches wide
Mat sticks/Madur Kathi	155	145	95	84	57
Labour	300	300	225	200	150
Rope/threat	24	23	20	18	15
Jute	4	4	4	4	4
Others	5	5	4	4	4
Total	488	477	348	310	230

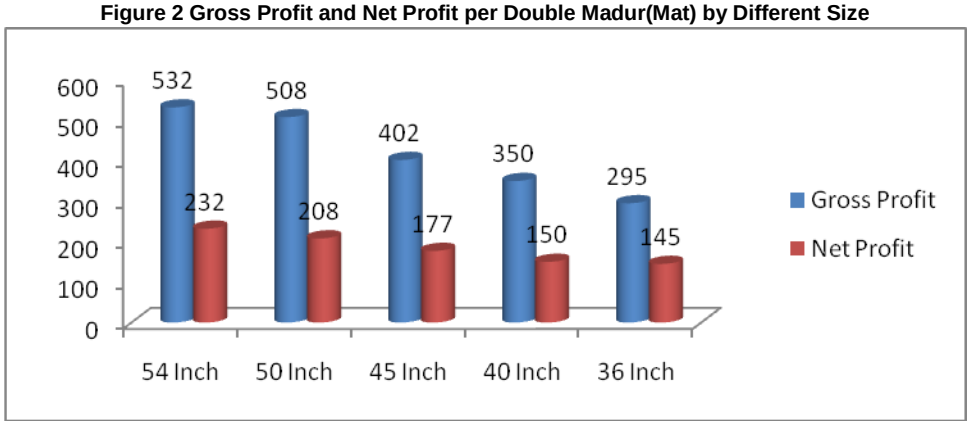
Source: Field Level Survey *(Length of all mats are 72 inches)*

Table 6 Value of Product, Gross Profit and Net Profit per Double Madur (Mat) by Size

Size of Mat/Madur	Market Price (Rs)	Gross Profit (Rs)	Net Profit (Rs)	Gross Profit Rate %	Net Profit Rate %
54 Inches wide	720	532	232	108.61	47.34
50 Inches wide	685	508	208	106.50	43.61
45 Inches wide	525	402	177	115.52	50.86
40 Inches wide	460	350	150	112.90	48.39
36 Inches wide	375	295	145	128.26	63.04

Source: Field Level Survey *(Length of all mats are 72 inches)*

Figure 2 Gross Profit and Net Profit per Double Madur(Mat) by Different Size



For weaving of masland mats at least two persons are required. One person places the reeds from left to right by placing one thread on top and another one down the other person does the same thing from right to left at meeting the finishing lines the threads are turned and the process is continued. The popular design on Masland mats are of flowers, honey comb (mouchak), Rhomboidal (barfi), Cascading (hama) etc. The process of weaving of the masland mats very much resemblance to the weaving of sari**.** Masland Madur(Mat) Production Cost by different Size in weaving stage has been presented in the Table 7. Dry mat sticks cost is highest (Rs. 122) in 54 inches wide mat weaving followed by 50 inches wide (Rs.112/-), 45 inches wide (Rs.92/-), 40 inches wide(Rs. 92/-) and 36 inches wide (Rs.64/-). The labour cost is highest (Rs. 620/-) in 54 and 50 inches wide per mat weaving followed by 45 inches wide mat(Rs 525/-), 40 inches wide mat (Rs.513/-) and 36 inches wide mat (Rs. 454/-). Rope or threat cost per mat is highest (Rs. 54/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.51/-), 45 inches wide mat (Rs.54/-), 40 inches wide mat (Rs.40/-) and 36 inches wide mat (Rs.38/-). Jute cost per mat of all size is Rs 4/-. Total cost per masland madur production is highest in 54 inches wide mat (Rs. 806/-) followed by 50 inches wide mat (Rs.792/-), 45 inches wide mat (Rs.670/-), 40 inches wide mat (Rs.653/-) and 36 inches wide mat (Rs. 564/-) (Table 7).

Market price per masland mat is highest (Rs.1650/-) in 54 inches wide mat followed by 50 inches wide mat (Rs.1570/-), 45 inches wide mat (Rs.1265/-), 40 inches wide mat (Rs.1045/-) and 36 inches wide mat (Rs.950/-). Gross profit per masland mat is highest (Rs.1464/-) in 54 inches wide mat followed by 50 inches wide mat (Rs 1398/-), 45 inches wide mat (Rs 1120/-), 40 inches wide mat (Rs 905/-), 36 inches wide mat (Rs 840/-). Similarly net profit per masland mat is highest (Rs. 844/-) in 54 inches wide mat and lowest in 36 inches wide mat (Rs.386/-). Percentage of gross profit per masland mat is highest (181.63) in 54 inches wide mat followed by 50 inches wide mat (176.51), 45 inches wide mat (167.16), 36 inches wide mat (148.93) and 40 inches wide mat (138.59). Side by side Percentage of net profit per masland mat is highest (104.71) in 54 inches wide mat followed by 50 inches wide mat (98.23), 45 inches wide mat (88.81), 36 inches wide mat (68.43) and 40 inches wide mat (60.03) (Table 8). (Figure 3 and Figure 4).

Table 7 Masland mat Production Cost(Average) by Size at weaving stage (Rs)

Cost	54 Inch	50 Inch	45 Inch	40 Inch	36 Inch
Mat sticks/Madur Kathi	122	112	92	92	64
Labour	620	620	525	513	454
Rope/threat	54	51	45	40	38
Jute	5	4	4	4	4
Others	5	5	4	4	4
Total	806	792	670	653	564

Source: Field Level Survey *(Length of all mats are 72 inches)*

Table 8 Value of Product, Gross Profit and Net Profit per Masland Madur(Mat) by Different Size

Size of Mat/Madur	Market Price (Rs)	Gross Profit (Rs)	Net Profit (Rs)	Gross Profit Rate %	Net Profit Rate %
54 Inches wide	1650	1464	844	181.63	104.71
50 Inches wide	1570	1398	778	176.51	98.23
45 Inches wide	1265	1120	595	167.16	88.81
40 Inches wide	1045	905	392	138.59	60.03
36 Inches wide	950	840	386	148.93	68.43

Source: Field Level Survey *(Length of all mats are 72 inches)*

Figure 3 Gross Profit and Net Profit per Masland Madur(Mat) by Different Size

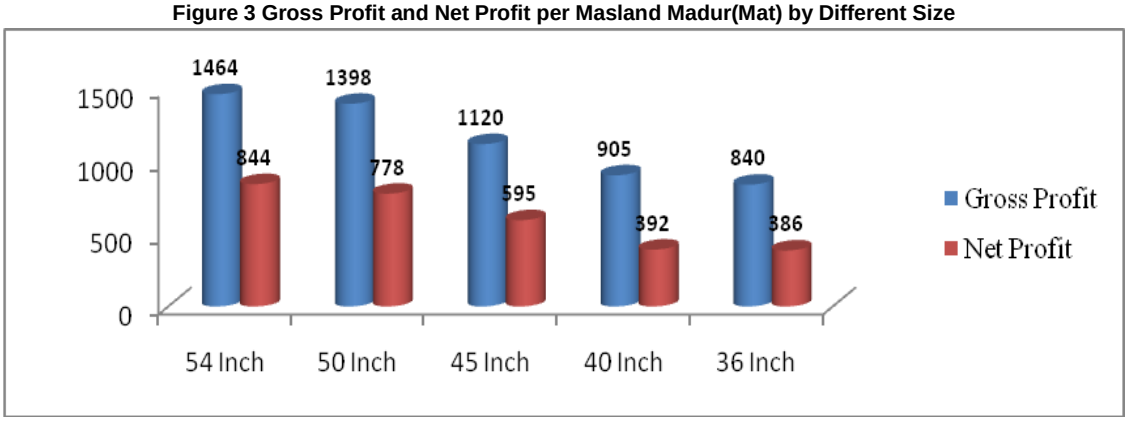


Figure 4 Net Profit in different types of Madur(Mat) Production (and Different Size)

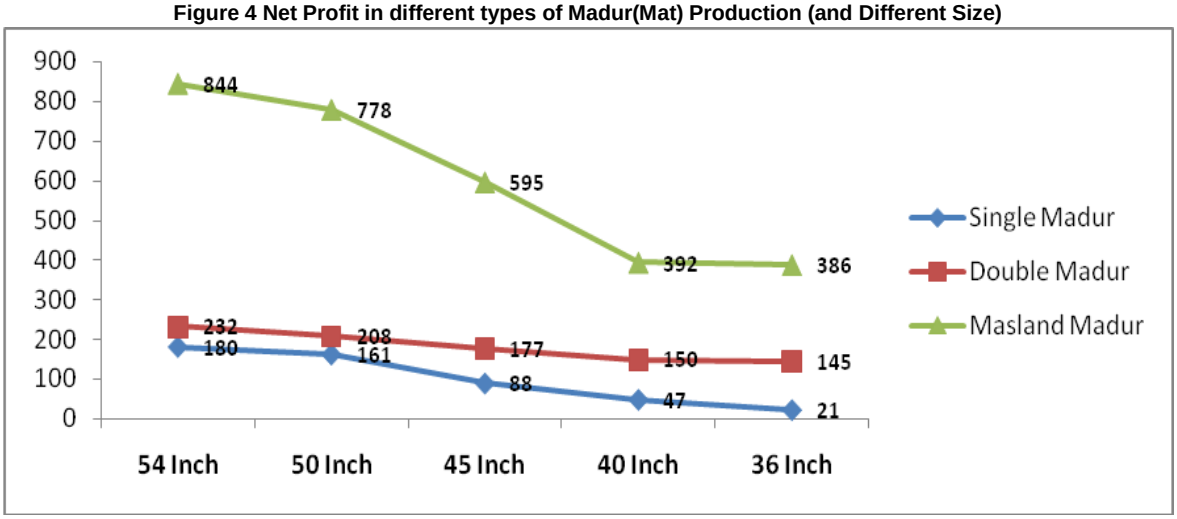
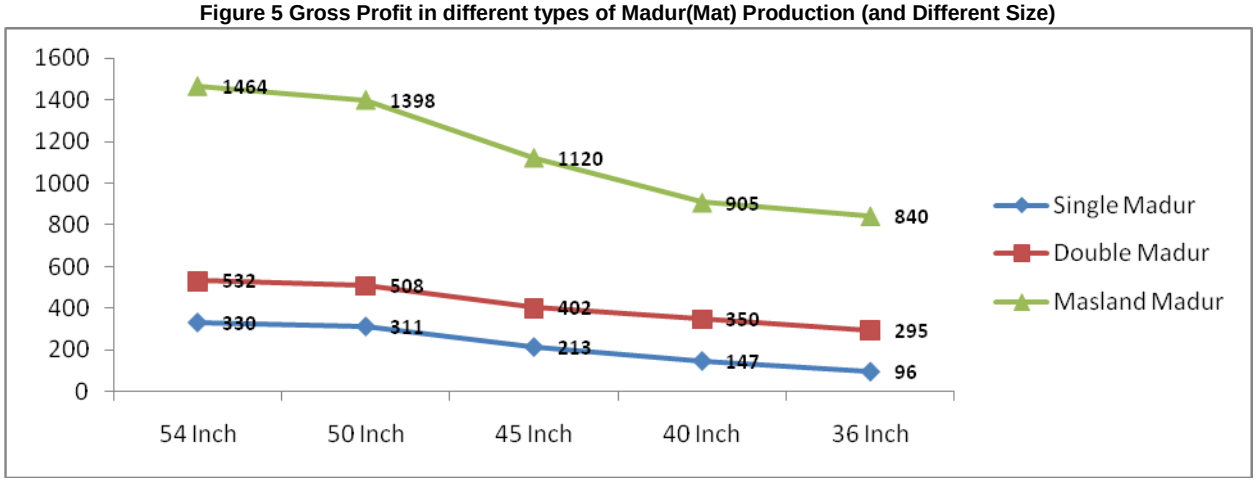


Figure 5 Gross Profit in different types of Madur(Mat) Production (and Different Size)



We have also estimated labour productivity in mat industry. It is concerned with the value of output that is obtained from each worker and is is directly linked to improved standards of living in the form of higher consumption. It is also an important measure of the cyclical changes in an economy. Labour productivity is highest in single madur production for 54 inches and 50 inches mat. Side by side labour productivity is highest in 45 inches masland madur production. Similarly labour productivity relatively high in 40 inches double madur production. Labour productivity is highest (Rs 396.72) in 54 inches madur production followed by 50 inches madur production (Rs 375.70), 45 inches madur production (Rs.355.71), 40 inches madur production (Rs.316.42) and 36 inches mat production (Rs.324.74) (Table 9).

Gross profit per unit of labour is highest in masland madur production followed by single and double madur production. Similarly net profit per unit of Labour is highest in masland madur production followed by single and double madur production (Table 10)

.

Table 9 Labour Productivity by type and size of mat product (Rs)

Size of Mat/Madur	Labour Productivity			
	Single Madur	Double Madur	Masland Madur	All
54 Inches wide	460	360	399.19	396.72
50 Inches wide	425	342.5	379.84	375.70
45 Inches wide	342	350	361.43	355.71
40 Inches wide	315	345	305.56	316.42
36 Inches wide	290	375	313.88	324.74

Source: Field Level Survey

Table 10 Gross Profit and Net Profit per unit of Labour by type and size (Rs)

Size of Mat/Madur	Gross profit per unit of labour			Net profit per unit of labour		
	Single Madur	Double Madur	Masland Madur	Single Madur	Double Madur	Masland Madur
54 Inches wide	330.00	265.50	349.35	180.00	115.50	204.19
50 Inches wide	311.00	254.00	333.39	161.00	104.00	188.23
45 Inches wide	255.60	268.00	320.00	105.60	118.00	170.00
40 Inches wide	220.50	262.50	264.62	70.50	112.50	114.62
36 Inches wide	192.00	295.00	285.13	42.00	145.00	135.13

Source: Field Level Survey *(Length of all mats are 72 inches)*

While calculating the output-cost ratio in terms of total cost of production, it is found that the workers gained Rs 1.80 (if cost Rs.1) in 54 inches mat production followed by 50 inches mat (Rs. 1.75), 45 inches mat (Rs.1.71), 36 inches mat (Rs. 1.52) and 40 inches mat (Rs 1.52). Output-cost ratio is highest in masland madur followed by double madur and single madur for all size mats (Table 11).

Table 11 Output- Cost ratio by type and size of mat product

Size of Mat/Madur	Output-Cost Ratio			
	Single Madur	Double Madur	Masland Madur	All
54 Inches wide	1.64	1.47	2.05	1.80
50 Inches wide	1.61	1.44	1.98	1.75
45 Inches wide	1.45	1.51	1.89	1.71
40 Inches wide	1.29	1.48	1.60	1.52
36 Inches wide	1.17	1.63	1.76	1.64

Source: Field Level Survey

Employment opportunity is highest in mat cultivation and mat production. In mat weaving, however, many children and women labourers are used. Labour mandays use highest in masland madur production followed by double madur and single madur. In 54 inches mat weaving there labour mandays use highest in masland madur (4.13 mandays) followed by double madur (2 mandays) and single madur (one mandays). In 45 inches mat weaving there labour mandays use highest in masland madur (3.5 mandays) followed by double madur (1.5 mandays) and single madur (less than one mandays). Similarly in 40 inches mat weaving there labour mandays use highest in masland madur (3.42 mandays) followed by double madur (1.33 mandays) and single madur (less than one mandays) (Table 12)

Table 12 Mandays of employment by type and size of mat product

Size of Mat/Madur	Mandays		
	Single Madur	Double Madur	Masland Madur
54 Inch	1.00	2.00	4.13
50 Inch	1.00	2.00	4.13
45 Inch	0.83	1.50	3.50
40 Inch	0.67	1.33	3.42
36 Inch	0.50	1.00	3.03

Source: Field Level Survey *(One mandays = 8 hours = Wage Rs 150/-)*

4. Prbit Estimates of Household Participation

We first present theoretical framework of the estimate of household participation in this industry to be followed by the empirical results.

4.1 Theoretical framework:

The empirical analysis of household's participation in mat sticks cultivation (HPMC) and mat/madur weaving industry (HPMI) are made on the basis of the theoretical background. A probit model was developed to examine the relationship between socio-economic characteristics and the level of participation of household in mat sticks or madur kathi cultivation. The demographic variables included in the empirical model are given in Table 13&14. The dependent variable is whether or not the household participates in mat sticks or madur kathi cultivation (HPMC) in Sabang block.

Other dependent variable is whether or not the household participates in mat weaving industry (HPMI) in Sabang block.

The household demographic variables are Number of female workers per households (X_1),Per capita land (X_2), nearby open ground availability (X_3) and Per capita income(X_4).

i) $HPMC = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + U$

Nearby open ground availability may influence an individual's level of participation in mat sticks or madur kathi cultivation. Nearby open ground availability is a dummy variable. It takes on the value of 1 if household enjoy open ground facilities and 0 if not.

In household level we analyze the factors of household participation in mat sticks or madur kathi cultivation (HPMC) like Number of female workers per household (X_1),Per capita land (X_2), nearby open ground availability (X_3) and Per capita income(X_4).

The dependent variable is whether or not the household participates in mat weaving industry (HPMI) in Sabang block. The household demographic variables are Number of female workers per household (X_1), Per capita land (X_2), hereditarily (X_3) and Per capita income(X_4).

ii) $HPMI = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + U$

Hereditarily may influence an individual's level of participation in mat industry. Hereditarily is a dummy variable. It takes on the value of 1 if mat industry is hereditarily based and 0 if not.

In village level we analyze the factors of household participation in mat industry (HPMI) like Number of female workers per household (X_1),Per capita land (X_2), hereditarily (X_3) and Per capita income(X_4).

4.2 The Empirical Results

The empirical results relating to the household participation in mat sticks or madur kathi cultivation (HPMC) (Dummy variable) are presented in Table 13. The Number of female workers per household (NFW) is positively and significantly associated in mat sticks cultivation. . It is significant (5 % level) for mat sticks cultivation. In Probit model there exists a negative relationship between per capita land (PCL) and household participation in mat sticks cultivation. This negative relationship is statistically significant at 1% level. Participation of the household in mat sticks cultivation is positively influenced by nearby open ground availability (OGA). Per capita income (PCI) also negatively and significantly influences household participation in mat sticks cultivation.

Table 13 Probit Estimates of Household Participation in Mat Sticks or Madur Kathi Cultivation (HPMC)

Variable	Coefficient	t-value/z-value	p>|z|	
Intercept	10.404	2.60**	0.009	Pearson Goodness of fit
NFW	2.235	1.98*	0.048	Chi-quare = 64.03
PCL	-0.199	-2.12*	0.034	No. of observation 60
PCI	- 0.001	-2.66**	0.008	P= 0.000
OGA	1.253	1.24	0.215	R^2 = 0.82

Notes: NFW = Number of female workers per household, PCL = Per capita land,
PCI = Per capita income, OGA = Nearby open ground availability (If Yes =1, No= 0)
*** and * Indicates coefficient significant at 1% and 5% level*

The empirical results relating to the household participation in mat or madur weaving industry (HPMI) (Dummy variable) are presented in Table 14. The Number of female workers per household (NFW) is positively and significantly associated in mat weaving industry. It is significant (5 % level) for mat industry. In Probit model there exists a negative relationship between per capita land (PCL) and household participation in mat or madur weaving industry. This negative relationship is statistically significant at 5% level. Participation of the household in mat or madur weaving industry is positively influenced by heredity (HR). Per capita income (PCI) also negatively and significantly influences household participation in mat or madur weaving industry.

Table 14 Probit Estimates of Household Participation in Mat or Madur weaving Industry (HPMI)

Variable	Coefficient	t-value/z-value	p>|z|	
Intercept	5.42	1.77	0.077	Pearson Goodness of fit
NFW	1.602	1.95*	0.050	Chi-quare = 56.66
PCL	-0.153	-2.02*	0.043	No. of observation= 59
PCI	- 0.001	-2.05*	0.040	P= 0.000
HR	1.84	1.52	0.128	R^2 = 0.75

Notes: NFW = Number of female workers per households, PCL = Per capita land,
PCI = Per capita income, HR = hereditarily (If Yes =1,No = 0)
*** and * Indicates coefficient significant at 1% and 5% level*

5. Conclusion

The mat industry plays a vital role in rural economy of Paschim Medinipur district in generation of employment and income. In Sabang block of this district there are 70 percent females who participate in mat industry**.** Cultivation of mat sticks and its valuable products provide gainful employment opportunity to the poor farming community for their secure livelihoods, the industry being highly labour intensive. Labour productivity varies widely across types and sizes of mat products. Gross profit per unit of labour is highest in masland madur production followed by single and double madur production while net profit per unit of labour is highest in

masland madur production followed by single and double madur production. Output-cost ratio is highest in masland madur followed by double madur and single madur for all size mats. The factors influencing household participation in mat sticks or madur kathi cultivation are number of female workers per household, per capita land, nearby open ground availability and per capita income while The factors affecting household participation in mat industry are number of female workers per household, per capita land, hereditarily and per capita income. The number of female workers per household is positively and significantly associated with household participation in mat weaving industry. Participation of the household in mat or madur weaving industry is positively influenced by heredity. Per capita income also negatively and significantly influences household participation in mat weaving industry.

References

1. Amalraj VA. (1985), '*Korai*' – A profi table crop for marshy lands. Indian Farming 35(8):35–56.
2. CSIR. (1988), ,. Vol. IIC. Council of Scientifi c and Industrial Research, New Delhi,India.
3. Das, C. (2017), Earnings from Mat Industry: A Study in Sabang Block of Paschim Medinipur District', World Wide Journal of Multi-disciplinary Research and Development, 3(10).
4. Jana K and Puste AM. (2012), Effect of water management practices on dry mat-stick yield of mat-sedges (*Cyperus tegetum* R.) for sustainability of resource poor farming community. Green Farming 3(3):277–281.
5. Puste AM. 2004. Aquatic non-food commercial crops. In: Agronomic Management of Wetland Crops. Kalyani Publishers, India. pp. 198–206.
6. Sarkar R and Samanta N. 1987. Cultivation of the matreed in West Bengal. Indian Farming 30 (11):16–17.
7. Watt G. 1889. A Dictionary of the Economic Products of India. Volume 2. Cosmo Publications, New Delhi, India. 688 pp.
8. Jana, K., & Puste, A. M. (2014)' Madur Kathi-An Important Economic Non-food Crop of West Bengal. Asian Agi-History, 145-l5l
9. Maity, D.S. (2005), *Dynamics of Production Organisation and Industrial Development in West Bengal*, Ph.D. Thesis submitted to Vidyasagar University.
10. Sau, S. (2005), *Rural Industrialisation Reflections on Development Trajectory in India*, Firma KLM Private Limited, Kolkata.

